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PREFACE

The Unani drugs are symbol of life as they are drown from natural resources, mostly plants and are generally free from adverse side effects. Drugs those are toxic in crude form are processed and detoxified in many ways before use. So it is considered free from side effects. Unani system of Medical Science prefers treatment through single drugs and their combination in raw form, rather than compound formulations. In the system, there is great emphasis on proper identifications of single drugs. Dioscorides (40-90 A.D.) is known in the field of ElmulAdvia (Pharmacology) as its founder. He described about five hundred single drugs, later on, Galen, Abu Hanifa, IbnSina etc. contributed a lot to this field. IbnBaitar (1176-1248 A.D.), the great scientist of Unani Medicine, compiled a book on pharmacology after extensive field survey and research described 1500 single drugs used in Unani medicine.

Now a days, the increasing popularity and acceptance of herbal drugs around the world is a major demand of a standard book. So, to ensure the quality and standard of herbs practicing in Unani system of medicine, the Government of Bangladesh has taken initiatives to establish a book 'The Unani Pharmacopeia of Bangladesh' to maintain the purity, quality and safety through scientific and standard quality controlparameters.

In this context the Govt. of Bangladesh has already published the first volume of 'The Unani pharmacopeia of Bangladesh' consisting of fifty monograph of single drugs. This present volume-II is a continuation of such efforts. It also comprises fifty monographs of medicinal plants.

The speciallity of volume-II is that, the monograph of single drugs selected here are basically indigenous, easily available, cost-effective, acquainted to the country people. These drugs are also has its own reference to the Unani text and other books of herbal drugs published in the country. Among them only the scientifically evaluated and research based drugs are broughtin to account.

The pictures, included with every monograph are contains high resolution/pixel so that, it can be viewed clearly. The Unani name of drugs is used as title name. Some of drugs which are essential in medical service, but imported in our country are also included in the volume due to its necessity.

As the book is belongs to Unani system of medicinetherefore, Unani terminology get emphasized,but modern terms are also included. Research based efficacy of drugs are also described under the heading of Af'aal-e-Adviya (Pharmacological Activities) taking from different journals.

Each monographs deals with necessary botanical descriptions which helps to identify it physically. Other than Unani name the botanical, English and Bengali name also mentioned here. To evaluate on scientific manner microscopic and macroscopic description also comprised here.The drug's parts of use also maintain with title name but under the heading 'Parts Used', all parts of drugs which are using in the medical practice have been mentioned in the monographs.

Every monograph has information about phytoconstituents; research based pharmacological activities, temperament and required correctives, availabale proximal substitutes, side or adverse effects or precautions (if any), TLC behavior etc.

In the efforts to compile pharmacopoeialmonographs of Unani drugs the classical attributes of the drugs, according to Unani medical science like Mijzaj (Temperament), Aa'maal-e-Adviya (Pharmacological action), Mahall-e-Istemalat(therapeutic use) and Meqdar-e-Khorak(dose) have been mentioned.

The Pharmacopoeial Team expect that with the publication of the Unani Pharmacopeia of Bangladesh, volume-II, the format and procedure have been laid down and there should not be any difficulty for the researchers and pharmaceutical organisations to plan and expedite their research work.

Being limitation of facilities, opportunities and time frame, the Pharmacopoeia Team were unable to maintain the procedure require to prepare a pharmacopeia, thus the Team followed the Unani pharmacopeia of India as main standard book. The Team also followed other Unani, herbal books and different research papers/ journals/articles etc.

The pharmacopeia Team put their enthusiastic efforts to complete it with the limitation of facilities to make it appropriate for the users.

As the first efforts of its kind in the field of Unani System of Medical Science, there is always scope for further improvement and we would like greatly welcome suggestion and advice from the experts in the field.

At last, I thank all those who have directly or indirectly contributed in the preparation and planning of volume-II specially Line Director (AMC) and his team and also Personnels of Life Centre for their continuous support.

Professor Dr. Md. Ruhul Furkan Siddique
Team leader, Pharmacopoeia preparatory committee
And Professor, Department of Public Health and Informatics,
Jahangirnagar University.

Abbreviations and Acronyms

AMC	: Alternative Medical Care
cm.	: Centimeter
DGHS	: Directorate General of Health Services
ECNEC	: Executive Committee of the National Economic Council
gm.	: Gram
HNPSP	: Health, Nutrition and Population Sector Program
HNPSDP	: Health, Nutrition and Population Sector Development Program
kg.	: Kilogram
1	: Liter
m	: Meter
mm.	: Millimeter
mg.	: Milligram
ml.	: Milliliter
OP	: Operation Plan
PIP	: Programme Implementation Plan.
PM	: Program Manager
TLC	: Thin Layer Chromatography
v/v	: volume by volume
v/w	: volume by weight
w/w	: weight by weight
w/v	: weight by volume
u	: Weight by Volume
U	: Micron (0.001)
%	: Percentage

Index

AAM

(Stem Bark)

The mango is an important fruit for human nutrition in several parts of the world. It is a tropical fruit widely accepted by consumers throughout the world for its succulence, sweet taste and exotic flavor, being called the 'king of fruits'. Ethno botanical studies indicated that the plant is widely used to treat diseases. It has active substances in its composition with high therapeutic potential.

Other Names:

- Botanical : *Mangifera indica* Linn
- Family : Anacardiaceae
- Bengali : Ama, Am
- English : Mango

Description:

General : The drug Aam consists ofstem bark of *Mangifera indica* Linn. (Fam. Anacardiceae), a tree found wild or cultivate throughout the country.

Macroscopic: Drug occurs in pieces of variable size and thickness, surface rough due to longitudinal cracks, fissures and scattered, raised lenticels, grayish to dark brown externally and yellowish-white to reddish internally; odour; pleasantand taste; astringent.

Microscopic: Mature bark, shows a wide crock consisting of tangentially elongated cells, a few outer layers brown and inner lighter in colour, at a few places lenticels appear. Secondary cortex almost absent. Secondary phloem wide, consisting of sieve elements, parenchyma and phloem fibres, traversed by medullary rays, acrid juice canals and yellow coloured elongated tannin sacs abundantly scattered throughout phloem region. Stone cells thick walled, rectangular with wide lumen also present in single or in groups. Starch grains and prismatic

crystals of calcium oxalate present in number of phloem cells; phloem fibers in groups composed of 2-15 or more cells, long and thick walled. Phloem rays 1-3 seriate, 3 seriate rays more common, somewhat wavy, thin walled, radially elongated and filled with crystal of calcium oxalate and simple, round starch grains, measuring 12-16 μ in diameter.

Parts used: Ripe mango, seed, leaves, bark

Habitat: Today, mangos are grown throughout the tropical regions of the world such as the Caribbean, Southern Asia, and Africa.The mango tree grows best in dry, sandy soil with a pH of 5.5-7.5. Direct sun is preferred for tree growth and fruit production.

Phytoconstituents: Tannins – protocatechuic acid , catechin, mangiferin, alanine, glycine, α-aminobutyric acid, kinic and shikimic acids.

Af'aal-e-Advia (Pharmacological activities): According toInternational Journal of Biomedical and Pharmaceutical Sciences ©2007 Global Science Books Ethnopharmacology of Mangifera indica L. Bark andPharmacological Studies of its Main C-Glucosylxanthone, Mangiferin, the pharmacological activities of *Mangifera indica* are;

Antioxidant activity: Reactive oxygen species (ROS) possess a strong oxidizing effect and induce damage to biological molecules, including proteins, lipids and DNA, with concomitant changes in their structure and function (Seifried *et al*. 2007). In aseries of pathological conditions, an extensive generation of ROS appears to overwhelm natural defense mechanisms,dramatically reducing the levels of endogenous antioxidants, a condition named "oxidative stress" (McCord2000); as epidemiological studies indicate that the major nutritional antioxidants, vitamin E, vitamin C and β-carotene,may be beneficial to prevent several chronic disorders (Diplock *et al*. 1998), considerable interest has arisen in the possible reinforcement of antioxidant defenses, both for chemoprevention and treatment purposes (Maxwell 1997).

Radioprotective effect: A protection of mangiferin against radiation-induced micronuclei formation in cultured human peripheral bloodlymphocytes and in DBAxC57BL mice was shown by Jagetia and Venkatesha (2005) and by Jagetia and Baliga(2005).

Immunomodulatory effect: Most of the genes overexpressed in inflammation, such as those encoding proinflammatory cytokines, chemokines,adhesion molecules and inflammatory enzymes, contain κB sites within their promoter suggesting that these genes arecontrolled predominantly by the nuclear factor kappa B (NF-κB) (Christman *et al*. 2000; Aggarwal *et al*. 2006).The activation of NF-κB and its associated kinases as IκBα kinase (IKK) depends in most cases on the production ofROS (Manna *et al*. 1998; Kumar and Aggarwal 1999). Mangiferin mediates the down-regulation of NF-κB,suppresses NF-κB activation induced by inflammatory agents, including tumor nuclear factor (TNF), increases theintracellular glutathione (GSH) levels and potentiates chemotherapeutic agent-mediated cell death; this suggests apossible role in combination therapy for cancer (Sarkar *et al*. 2004). It is likely that these effects are mediated throughmangiferin ROS quenching and GSH rising; increased intracellular (GSH) levels are indeed known to inhibit theTNF-induced activation of NF-κB (Manna *et al*. 1999). Leiro *et al*. (2004a) characterized *in vivo* the immunomodulatoryactivity of mangiferin on thioglycollate-elicited mouse macrophages which were stimulated with lipopolysaccharide(LPS) and gamma interferon (IFN-γ). The expression of cytokines synthesis and of 96 genes involved inthe NF-κB signal transduction pathway was investigated by microarray. Mangiferin at 10μM significantly (i) hinders NF-κB activation by LPS, TNF, and interleukin 1 (IL-1) at the level of TNF receptor-associated factor 6; (ii) inhibits NF-Kbmediated signal transduction (inhibition of two genes of the Rel/ NF-κB/ IκB family, RelA and RelB); (iii) inhibits tolllike receptor proteins, including Jun N-terminal Kinase 1 and 2 (JNK1 and JNK2); (iv) inhibits proteins involved inresponse to TNF and in apoptotic pathways triggered by DNA damage; (v) inhibits a series of pro-inflammatory cytokines (IL-1α, IL-1, IL-6, IL-12, TNF-α, granulocyte and macrophage colony-stimulating factors, A2) and variousintracellular and vascular adhesion molecules (VCAM- 1) (Leiro *et al*. 2004a). These results indicate that, in addition to ROS-scavenging properties, mangiferin modulates the expression of alarge number of genes critical for the regulation of apoptosis, viral replication, tumorogenesis, inflammation and various autoimmune diseases. They suggest that mangiferin, protecting cells against oxidative damage and mutagenesis, may be of value in the treatment and prevention of inflammatory diseases and/or cancer.

Anti-allergic activity: Type I allergic response is mainly mediated by mast cells activated through the interaction of their surface receptors(FcεRI) with specific molecules such as an IgE-bound antigen.These interactions initiate a series of biochemicalevents resulting in the release of biologically active mediators that cause allergic reaction (Chang and Shiung 2006);

other cells, notably basophils, eosinophils, B and Th2 lymphocytes and neutrophils, are also involved in the allergic response.

Antitumor activity: Minor dietary constituents, apparently important to prevent carcinogenesis or revert tumor promotion, are known aschemopreventive agents, a very promising approach to cancer control (Chen and Kong 2005). Yoshimi *et al*. (2001) examined in rats the chemopreventive effects of mangiferin for both the initiation and post-initiation phases of azoxymethane (AOM; alkylant, 15 mg/kg body weight, s.c., once a week for 3 weeks) - induced colon carcinogenesis.

Anti-diabetic activity: Diabetes mellitus represents a series of metabolic conditions associated with hyperglycaemia and caused by defectsin insulin secretion and/or insulin action. In type 1 diabetes, pancreatic β-cells are destroyed, usually by autoimmune inflammatory mechanisms; type 2 diabetes is a complex metabolic disorder associated with β-cells dysfunctionand with varying degrees of insulin resistance (Dinneen 2006). Recently, it has been reported that longstanding hyperglycaemia with diabetes mellitus leads to the formation of advanced glycosylated end-products whichare involved in the generation of ROS, leading to oxidative damage, particularly to heart and kidney (Rolo and Palmeira 2006).

Different studies show that mangiferin (10 and 20 mg/kg, i.p.) exhibits potent antidiabetic, antihyperlipidemic,antiatherogenic and antioxidant properties without causinghypoglycaemia; mangiferin would then offer a greater therapeutic benefit for the management of diabetes mellitus and diabetic complications associated with abnormalities in lipid profiles.

Mizaj (Temperament): Cold and dry

Musleh (Correction): Unknown

Badal(Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 9 per cent, Appendix 2.2.3

Acid-insoluble ash	: Not more than 2 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 20 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 14 per cent, Appendix 2.2.7

TLC behavior of chloroform exreact:

TLC. of the alcoholic extract on silica gel 'G' plate using n-Butanol: Acetic acid : Water (4 : 1: 5) shows under U.V. light (366 nm) three violet spots at Rf. 0.12, 0.73 and 0.87. On exposure to Iodine Vapour four yellow colour spots appear at Rf. 0.33, 0.51, 0.74 and 0.88. On spraying with 5% ethanolic Sulphuric acid reagent and after the plate for about ten minutes at 105^0 C, three gray spots appear at Rf. 0.49, 0.69 and 0.88. Appendix 2.2.10.

Aa'mal-e-Advia (Pharmacological action) : Naf-e-Sozak, Qabiz, Habis, Mudammil-e-Qurooh

Mahall-e-Istemalat(Therapeutic uses) : Sozak, Ishal, Bawasir Damvi, Qurooh

Meqdar-e-khorak (Dose): 5-10 gm

Side-effects: No significant side-effect have been observed.

Important formulations: Morabba-e-Amba

AAMLA

(Fruits)

Drug Aamla consists of pericap of dried mature fruits of *Emblica officinalis* GaertnSyn.*Phyllanthus emblica*Linn. It is mostly collected in winter season after ripening the fruits. It has huge amount of medicinal values.

Other names :

Botanical name : *Emblica officinalis* Gaertn.

Family : Euphorbiaceae

Bengali name : Amla, Dhatri, Amlaki, Amlati

English name : Emblic Myrobelan, Indian Goosebery

Description:

General: The tree is small to medium in size, reaching 1–8 m (3 ft 3 in–26 ft 3 in) in height. The branchlets are not glabrous or finely pubescent, 10–20 cm (3.9–7.9 in) long, usually deciduous; the leaves are simple, subsessile and closely set along branchlets, light green, resembling pinnate leaves. The flowers are greenish-yellow. The fruit is nearly spherical, light greenish-yellow, quite smooth and hard on appearance, with six vertical stripes or furrows.

Ripening in autumn, the berries are harvested by hand after climbing to upper branches bearing the fruits. The taste of Indian emblic is sour, bitter and astringent, and it is quite fibrous. In India, it is common to eat emblic steeped in salt water and red chilli powder to make the sour fruits palatable.

Macroscopic: Drug consists of curled pieces of pericarp of dried fruit occurring either as saperated single segment; 1-2 cm long or united as 3 or 4 segments; bulk colour grey to black, pieces showing a broad, higly shriveled and wrinkled external convex surface to somewhat concave, transversely wrinkled lateral surface, external surface shows a few whitish specks, occasionally some pieces show a portion of stony testa (which should be removed before processing); texture rough cartilaginous, tough; taste, sour and astringent.

Microscopic: Transverse section of fruit epicarp consisting of a single layered epidermis cell appearing tabular and polygonal in surface view; cuticle present mesocarp cells tangentially

elongated parenchymatous and crushed, differentiated roughly into a peripheral 8 or 9 layers of tangentially elongated smaller cells, rest consisting of mostly isodiametric large cells with walls showing irregular thickenings, ramified vascular elements occasionally present; stone cells present either isolated or in small groups towarda towards endocarp; pitted vascular fobers, walls appearing serrated due to the pit canals leading into lumen.

Powder: Fine powder shows epidermis with uniformly thickened straight walled, isodiametric parenchyma cells with irregular thickened walls, occasionally short fibers and tracheids.

Parts Used: Dried mature fruit

Habitat: Aamla plant is a small or medium sized tree, found both in natural state in mixed deciduous forests of Indo-Pak subcontinent ascending to 1300 meter on hills, cultivated in garden, homeyards of grown as a road side tree.

Phyto constituents: Ascorbic acid and gallo tannins

Af'aal-e-Advia (Pharmacological activities):

Antifungal activity: Antifungal property of E. officinalis was reported against Aspergillus (Satish et al., 2007). Fruit ethanol and acetone extracts showed moderate activity against Fusarium equisetiand Candida albicans where Grisofulvin was used as standard antibiotic (Hossain et al., 2012).

Antioxidant and free radical scavenging activity: Galic acid equivalent as total phenolic content from fruit and seed of E. officinalis has excellent antioxidant proper-ties and play an important role as free radical scavengers required in the maintenance of,redox homeostasis' responsible for diverse degenerative diseases (Prakash et al., 2012). The methanolic seed extract of Emblica officinalis has promising free radical scavenging activity of 1,1, Diphenyl-2-picryl-hydrazil (DPPH) in a concentration dependant manner (Priya et al., 2012). Methanolic extract of fruit pulp also have antioxidant and free radical scavenging activity (Mehrotra et al., 2011; Liu et al., 2008a; Liu et al., 2008b, Hazraet al., 2010, Majumdar et al., 2010). Methanolic extracts of dried leaves of Phyllanthus emblicawas used for the comparative study of antibacterial and antioxidant activity and the research work was ended positively showing the extract has both these activities (Shivaji et al., 2010). In a separate research work, it is seen that the water extract of E. officinalis fruit prepared according to Thai

Herbal Pharmacopoeia has a strong potential for free radical scavenging, ferric reducing as well as inhibiting ROS (reactive oxygen species) produc-tion (Charoenteeraboonet al., 2010).

Insecticidal activity: Saponins which are important constituents of E. officinalis have insecticidal or cytotoxic properties to certain insects (Chaieb, 2010). Although saponins which had shown insecticidal activity was collected from natural sources other than E. officinalis. But as saponins are bioactive compounds found in E. officinalis too, it is obvious that E. officinalis might have insecticidal activity and further evaluation can be conducted to get more precise evaluation.

Larvicidal and mosquitocidal activity: In a mosquitocidal property evaluation test Muruganet al. (2012) observed larvicidal and pupicidal activities of methanol extract of E. officinalis against the malarial vector, Anopheles stephensishowing 98% mortality rate at 100 ppm. The ethanol and methanol extracts of E. officinalis also exerted 100% mortality (no hatchability) at 400 ppm and above (Muruganet al., 2012). Jeyasankaret al. (2012)reported that the larvicidal activity of Phyllanthus emblicaethyl acetate leaf extracts. The study concluded that the ethyl acetate extract of P. emblicaexhibited the maximum larvicidal activity (99.6%) with LC50 (lethal Concentration brings out 50% mortality) value of 78.89 ppm against the larvae of Aedes aegypti (Jeyasankaret al., 2012).

Antidepressant activity: Pemminatiet al. (2010) has checked the antidepressant activity of aqueous extract of fruits of E. officinalis in inbred adult male Swiss Albino mice weighing 25-30g. The test was carried out by forced swim test (FST) and tail suspension test (TST). The result of this test showed the antidepressant activity of E. officinalis as comparable to the of standard antidepressant drug imipramine.

Immunomodulatory activity: Reports suggest that triphala can stimulate the neutrophil functions in the immunized albino rats (Srikumaret al., 2005). There was considerable dose dependent raise in haemagglutination antibody titre, macrophage migration index, hypersensitivity reaction, respiratory burst activity of the peritoneal macrophages, total leukocyte count, percentage lymphocyte distribution, serum globulin and relative lymphoid organ weight in Emblicatreated albino mice indicating its ability to stimulate humoral and cell mediated immunity along with macrophage phagocyte (Sujaet al., 2009).

Anti-inflammatory activity:E. officinalis showed anti-inflammatory activities in carrageenan induced acute and cotton pellet induced chronic inflammation in Sprague-Dawley rats by

reducing paw volume in acute inflammation and by decreasing cotton pellet induced granulomas tissue lipid peroxida-tion, the granulomatous tissue mass, myeloperoxidase activity and plasma extravasation in chronic inflammato-ry condition (Muthuramanet al., 2011). E. officinalis water extract has reported to have inhibitory effect on the synthesis and release of inflammatory mediators in rats (Jaijoyet al., 2010).

Radioprotective activity: It has been reported that mice treated with Emblica officinalis extract before exposure to different doses of gamma radiation can reduce the severity of symptoms of radiation sickness and mortality (Singh et al., 2006). Similar delayed onset of mortality and reduction in the symptoms of radiation sickness in mice were seen in consecutively triphala treated mice before irradiation when compared with the non-drug treated irradiated controls (Jagetiaet al., 2002).

Hypolipidemic activity: Amla fruit have been reported to have significant anti-hyperlipidemic, hypolipidemic, and anti-atherogenic effect (Santoshkumaret al., 2013). Treatment with Emblica officinalis caused significant reduction of Total Cholesterol (TC), Low Density Lipoprotein (LDL), triglyceride (TG) and Very Low Density Lipoprotein (VLDL), and a significant increase in High Density Lipoprotein (HDL) levels in patients with type II hyperlipidemia. Both treatments from E. officinalis and simvastatin produced significant reduction in blood pressure; however, this beneficial effect was more marked in patients receiving E. officinalis (Gopaet al., 2012). Histopathological study of thoracic aorta of Emblica officinalis treated group has shown decrease in atherogenicity compared to untreated high cholesterol diet fed rats. The data demonstrated that Emblica officinalis formulation was associated with hypolipidemic effects on the experimentally induced hypercholesteremic rats (Kumar and Kalaivani, 2011). It is also seen that E. officinalis treated rat showed more hypogly-cemic and hypolipidemic activity than Phyllanthus acidustreated diabetic rats (Modilal and Pitchai, 2011).

Cytotoxic effects: To evaluate the immunostimulatory and side effects of Triphala in a clinical phase I, all the volunteers took Triphala for two weeks (3 capsules per day). As complete physical examinations, routine laboratory analysis and immunological studies were performed before ingestion and after initial meeting for 4 consecutive weeks. The result revealed significant immunostimulatory effects on cytotoxic T cells (CD3−CD8+) and natural killer cells (CD16+CD56+). Both of them increased significantly when compared with those of the control samples. However, no significant change in cytokine secretion was detected. All

volunteers were healthy and showed no adverse effects throughout the duration of the study (Phetkateet al., 2012). Flavonoids, a group of essential bioactive secondary metabolites of Emblica officinalis, were evaluated for antioxidant potential, cytotoxicity and intestinal absorp-tion. The research concluded that flavonoids from E. officinalis and some other medicinal plants hold a good prospective as nutraceutical & chemotherapeutics agents because of their antioxidant potential, no cytotoxicity and good intestinal absorptive property (Sharma et al., 2010). But it is confirmed that the chloroform soluble fraction of the ripe fruits of Amlaki containing alkaloids have both antimicrobial and cytotoxic activity (Rahman et al., 2009).

Anti-diabetic and hypoglycemic activity: Herbal formulations prepared by extracts of Tinosporacordifolia, Trigonellafoenumand Emblica officinalis wereevaluated for hypoglycemic effects and Oral Glucose Tolerance Test (OGTT) in normal and Alloxan induced diabetic rats and significant, marginal and very less decrease in blood glucose level was observed when different herbal combinations were used (Deep et al., 2011).

The polyherbal combination of extracts E. officinalis (fruit), Momordica charantia(fruit) and Trigonellafoenum-graecum (leaves and seeds) had shown synergistic activity, as the glucose levels were decreased more significantly by the combination of extracts compared to the individual extract when used separately in streptozotocin induced diabetic rats (Satyanarayana et al., 2010). The aqueous fruit extract of Phyllanthus emblicawas evaluated on type-II diabetes, triglycerides (TG) and liver-specific enzyme, alanine transaminase (ALT). This study showed that in a dose of 200mg/kg body weight the aqueous fruit extract can significantly reduce the blood glucose level in alloxan-induced diabetic rats (Qureshi et al., 2009). Another study reports that Phyllanthus emblicatreated rat showed more hypoglycemic and hypo lipidemic activity than Phyl-lanthusacidustreated diabetic rats when the effect of orally administered aqueous extracts (350 mg/kg body weight) of fruits of Phyllanthus emblicaand Phyllanthus aciduson serum glucose, glycosylated hemoglobin, insulin, cholesterol, triglycerides, HDL-cholesterol, protein, urea and creatinine were examined in control and extract-treated diabetic rats (Modilal and Pitchai, 2011).

Hepato-protective activity: The histopathological study of liver cells of rats was examined by administering E. officinalis as a preventative agent to reduce paracetamol induced hepatotoxicity and it has been observed that fruit extract has the ability to rectify toxicity or hepatic damage (Malar and Bai, 2009). Another histological study was undertaken to demon-

strate the protective effect of 50% hydroalcoholic extract of the fresh fruit of E. officinalis against chronic toxicity induced by carbon tetrachloride and thioacetamide in rats. From the liver sections of the tested rats, it was observed that E. officinalis reversed the abnormal histopathology by accelerating the regenerative activity and in a few cases, the hepatocytic injury was found negligible in E. officinalis treated group of rats (Mir et al., 2007).

Anti-cancer and anti-proliferative activity:E. officinalis exhibits its anticancer activities through inhibition of activator protein-1 and targets transcription of viral oncogenes responsible for development of cervicalcancer thus demonstrating its potential efficacy for treatment of human papillomavirus-induced cervical cancers (Mahataet al., 2013).

HIV-reverse transcriptase inhibitory activity: Inhibition of HIV-Reverse Transcriptase (HIV-RT) by P. emblicaplant extract fractions was tested on Peripheral Blood Mononuclear Cells. From this test it was observedthat aqueous fraction and n-hexane fraction have highest inhibition of recombinant HIV-RT (91% and 89%, respectively) at 1 mg/ml concentration. Chloroform fraction showed highest inhibition of HIV-RT at 0.5 mg/ml and carbon tetrachloride fraction at 0.12 mg/ml concentra-tion. At 0.12 mg/ml and 0.5 concentrations 50% of the HIV-RT activity is inhibited in n-hexane fraction and carbon tetrachloride fraction respectively (Estariet al., 2012).

Anti-ulcerogenic activity: The ethanolic extract of E. officinalis has found highly effective in controlling growth of H. pylori in-vitro with minimum inhibitory control ranging from 0.91 to 1.87 µg/ µl. The result concluded that the plant ethanolic extract is well retained with total phenolics, reducing power, flavanoids and the antioxidant properties which make amla a proper remedial use against H. pylori infection and gastric ulcer (Mehrotra et al., 2011).

Antimutagenic and wound healing activity: An investigation on Swiss albino mice showed that 50% methanolic extract of Emblica fruit can protect mice against the chromosome damaging effects of the well-known mutagen cyclophosphamide (Agrawal et al., 2012). Ascorbic acid and tannins of E. officinalis, namely emblicanin A and emblicanin B have strong antioxidant action and it is proposed that the addition of these antioxidants support the repair process of cells. Emblicaincreases cellular proliferation at the wound site, as supported by a raise in the action of extracellular signal-regulated kinase 1/2, along with an increase in DNA, type III collagen, acid-soluble collagen, aldehyde content, shrinkage temperature and tensile strength (Sumitra et al., 2009).

Mizaj (Temperament) : Cold 1^0 and Dry 2^0

Musleh (Correction) : Honey, Milk, Oil of KagojiBadam.

Badal (Proximal substitute): Halela.

Identity, purity & strength:

Foreign matter(Including seed and seed coat) : Not more than 2 per cent, Appendix 2.2.2

Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 2 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 40 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 50 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Muraqqiq-e-Qalb, Qabiz, Musakkin, Muqawwi-e-dimagh.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Dimagh, Nisyan, Suda, Qarha-e-Meda, Humuzat-e-Made, Ishal.

Meqdar-e-khorak (Dose): 3-5 gm

Side-effects : Aamla(Indian gooseberry) seems likely safe for most people when consumed in amounts found in foods. Ayurvedic formulations containing Indian gooseberry have been linked to liver damage. But, it's not clear if taking Indian gooseberry alone might have these effects.

Important formulations: Anoshdaru, Murabba-e-Amla, Majoon-e-Maqawwi-e-Rahem, Majoon-e-Mundi, Majoon-e-Lana, Majoon-e-Kundur, Qurs-e-Mulaiyin, Jawarish-e-Aamla Sada, Sufoof- e-Hazim Kalan, Dawa-ul-Misk Motadil Sada, Itrifal, Zamani, Itrifal-e-Sagheer, Itrifal-e-Ustu-Khuddus, Sufoof- e-Aamla.

ANISOON

(Fruit)

Anise or aniseed (*Pimpinellaanisum*) is a famous sweet spice similar to fennel. It is also used to flavour dishes, drinks, and candies. It is now grown all over world for its seeds. Anise is also cultivated in Bangladesh India too.

Other names:

a) Botanical Name: *Pempinella anisum* Linn (Apiaceae)

b) Family:Apiaceae, Umbelliferae

c) Bengali Name: Muhuri, Mitha Jira,

d) English name: Anise, Sweet fennel, Aniseed

Description:

a) **General**: The drug Anisoon consists of dried fruits of *Pempinella anisum* Linn (Apiaceae), It is widely cultivated in Southern and Central Europe and Bangladesh, India to a small extent. The plant occurs during September to March, flowering and fruiting takes place during January to March. Its an annual plant growing upto 0.3 to 0.6 m.

Stem: Erect, branched, solid, round, jointed, striated, slightly rough or downy, and rises about a foot in height.

Leaf: Feather shaped; lower leaves roundish, indistinctly 3-5 lobed, unequally toothed, and stand upon scored sheath-like footstalks; upper leaves divided into narrow, pinnated acute segments.

Root: Tapering and woody.

Flowers: Small yellow-white, compound umbels; Calyx none. Petals inversely heart-shaped, nearly equal, inflected, white, about 15 mm long, and have a ciliate margin. They have small bristles on the outside and a long indented tip. Stigma subglobose.

Fruit: Ovate, separable into two parts, and crowned with the long, capillary, permanent styles., and there are numerous flavonoids present, including quercetin, apigenin and luteolin.

Seeds: Greenish-brown, ovate-oblong, striated; externally convex, each with five rather prominent ribs, the interstices rugose; flat on the inner surface with a longitudinal rib in the middle. It is native to Egypt.

b)Macroscopic: The fruits are dried pear-shaped, yellowish-green, somewhat compressed, cremocarps usually with the pedicels attached and 3-4 mm long and 1.5-3 mm broad. They are rough to touch due to the presence of numerous, short, conical epidermal trichomes and

crowned by a short, bifurcate styloped. Each mericarp has five somewhat wavy ridges and is slightly pubescent on the dorsal surface. They possess a sweet aromatic taste and give, an aromatic odour when crushed.

c)Microscopic: The epicarp is consisted of a single layer of cells which are rectangular to Polygonal in shape and coated with thick cuticle on the outer side. Trichomes are conical slightly curved and usually unicellular and the walls are thickened and distinctly warted. Each mericarp has 2-3 or 4 large vittae on commissural surface and 15-30 small vttae on the dorsal surface. These vittae are composed of thin walled brown cells. In the mesocarpic region sclereids are usually found in groups in single layer which are often associated with thinner walled unlignified parenchyma. The sclereids are squred to rectangular in outline with a large lumen and uniformly thickened wall traversed by numerous pits. The endocarp is made of a single layer of very thin walled cells and is usually found attached to fragment of vitae. The cells of endosperm possess protein and fixed oil. A small amount of vascular tissue reticulated parenchyma is present. The elements are small and are usually found in groups, the vessels show spiral or recticulatethickening.

Powder: Powder analysis of the crude drug revealed the presence of fragmants of epicarp, mesocarp, vittae, endosperm, trichomes, vessels and sclereids.

Parts used: Seeds, essential oil from the dried fruit

Habitat: Light, fertile, well-drained soil

Phytoconstituents:

Glycosides, Phenolic Compounds Tannins Saponins, Resins, Carbohydrates, Flavonoids, Steroids, Iron, Sodium, Magnesium, Potassium and Calcium.

The constituent of anise depends on various factors but average composition is given below:

Volatile oil (2 to 6%): Chief constituent trans-anethole (94%), including as well chavicol methyl ether (estragole, 2%), anis aldehyde (1.4%) Caffeic acid derivatives: including chlorogenic acid (0.1%), other caffeoylquinic acids.

Flavonoids: Flavonol (quercetin) and flavone (apigenin, luteolin) glycosides, e.g. quercetin-3-glucuronide, rutin, luteolin-7-glucoside, apigenin-7-glucoside; isoorientin and isovitexin (C-glucosides), luteolin-7-O-glucoside.

Fatty oil (30%), Protein substances (20%)

Other constituents:Carbohydrate (50%), lipids 16% (saturated and unsaturated), b-amyrin (triterpene), stigmasterol (phytosterol) and its palmitate and stearate salts.

Af'aal-e-Adviya (Pharmacological activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Muscle Relaxant Effect:The relaxant effect of Pimpinellaanisum on isolated guinea pig tracheal chains and its possiblemechanism was studied by Boskabady and Ramazani-Assari.In this research, the bronchodilatory effects of aqueous and ethanol extracts and essential oil of anise were examined onprecontracted isolated tracheal chains of the guinea pig by10 mM methacholine in two different conditions includingnonincubated tissues (group 1) and incubated tissues with 1 mM propranolol and 1 mM chlorpheniramine (group 2).The results showed that aqueous and ethanol extracts,essential oil, and theophylline (1 mM) showed significantrelaxant effects compared to those of controls. The relaxant effects of aqueous and ethanol extracts were not significantlydifferent from that of theophylline, but the effect of essentialoil was significantly lower than theophylline. There wasalso no significant difference between the relaxant effectsobtained in group 1 and 2 experiments. The results alsoshowed that the relaxant effect of this plant is due toinhibitory effects on muscarinic receptors.

In another study, antispasmodic and relaxant effects ofthree hydroalcoholic extracts of the aerial parts of Pimpinellaanisum (ethanol: water; 40: 60, 60: 40, and 80: 20) wereinvestigated on rat anococcygeus smooth muscle. Theentire three hydroalcoholic extracts attenuated acetylcholine-induced contraction. The finding of this study described thatonly the extract contains 60% ethanol (HA60) showed concentration dependently relaxed acetylcholine-precontractedtissues, but two other hydro alcoholic extracts cannot pro-duce relaxation. Studying the possible mechanisms under-lying the relaxant effect showed that this effect is mainly dependent on the activation of the NO-cGMP pathway.

Effect on Gatric Ulcer: For studying the effect ofaqueous suspension of anise against gastric ulcers in rat, acute gastric ulceration was produced by various noxiouschemicals and indomethacin. The results showed that anisesignificantly inhibited gastric mucosal damage induced bynecrotizing agents and indomethacin. The antiulcer effectwas further confirmed histologically.

Effect on Morphine Dependence:The effects of essentialoil of Pimpinella anisum on the expression and acquisition ofconditioned place preference (CPP) induced by morphine inmice were studied. The findings showed that subcutaneousinjections of morphine (2–5 mg/kg)

produced place preference in a dose-dependent manner and injection of essentialoil of P. anisum may induce conditioned place aversion inmice, that is, the essential oil has some aversive effects asinvestigated by place conditioning paradigm. In addition, this oil has also a GABA ergic effect.

Effect on Menopausal Hot Flashes: In a double blindclinical trial, the effect of anise extract on menopausal hotflashes in 72 postmenopausal women was examined. In thisstudy, consumption of 3 capsules of anise extract (eachcapsule contains 100 mg of extract) for 4 weeks leads tosignificant reduction in hot flash frequency and intensity andin postmenopausal women.

Mizaj (Temperament): Hot 3^o Dry 3^o

Musleeh (Corrective): Sekanjabeen

Badal (Proximal substitute): No prpximal substitute is identified.

Identity, purity and strength:

Foreign Matter	-	Not more than 2% ,	Appendix 2.2.2.
Total Ash	-	Not more than 17% ,	Appendix 2.2.3.
Acid insoluble ash	-	Not more than 7% ,	Appendix 2.2.4.
Alcohol-soluble extractives	-	Not less than 1.5% ,	Appendix 2.2.6.
Water-soluble extractives	-	Not less than 16% ,	Appendix 2.2.7.

TLC behaviour of petroleum ether ($60\text{-}80^0$) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Benzene: Ethyl. Acetate (4:1)	1_2 vapours	2	0.11, 0.87

Aa'maal-e-Adviya (Pharmacological Action):

Kasir-e-Riyah, Musakkin-e-Auja, Munafiis-e-Balgham, Mudirr-e-Baul, Mudirr-e-Haiz, Mufatteh, Jali, Musakkin, Muqawwi-e-Kulya, Muqawwi-e-Bah.

Mahall-e-Istemalat (Therapeutic use):

Zeeq-un-Nafas, Nafakh-e-Shikam, Waj-ul-Meda, Waj-ul-Uzan

Meqdar-e-Khorak (Dose): 2 - 5g

Side-effects / Adverse-effects: No significant side effects have been observed.

Important formulations:

Habb-e-Iyarij, Itrifal Ghudadi, Jawarish-e-Narmushk, Jawarish-e-Shahreyaran, Majoon-e-Antaki, Majoon-e-Hajr-ul-yahood, Majoon-e-Jalali, Majoon-e-Jalinoos Lului. Sufoof-e-Moya.

ANJEER / TEEN

(Fruit)

This is a fruit of a beautiful small tree *Ficus carica*Linn. (Moraceae) with an interesting spreading habit. The tree is a native of Asia Minor and cultivated in many parts of India and Bangladesh. Receptacles occur during January to April and ripe fruits (figs) from June to October.

Other names:

a) Botanical name: *Ficus carica* Linn.

b) FAMILY: Moraceae

c) Bengali name: Anjir,Phalgu, Manjul, Raajdumbara, Bhadrodumbara

d) English name: Fig

Description :

a) General: Anjeer is a beautiful small tree with an interesting spreading habit. The breadth is often wider than the height of 15 to 30 ft. The bark is a smooth, silvery gray. The leaves of the tree are the identifying feature. They are about 4 inches long and have 3 or 5 lobes. The species name carica means having papaya-like leaves. The fruit, which is called Anjeer, may be oval ovoid, top-shaped, or pear-shaped, 1 to 4 in long, and varies in color from yellowish-green to coppery, bronze, or dark-purple. Flower colours: Yellowish-green to coppery. Bloom time: Seasonal bloomer. Height: 15 to 30 feet.

c) Macroscopic: Dried fruits of Anjeer / Teen (*Ficus carica* Linn.). Are compressed to a circular shape with a central hole, 4-6 cm in diameter, 1 cm thick. Surface of the fruit is wrinkled and light yellow to brown in colour. The fruit contains many small seeds in pulpy mesocarp.

d)Microscopic: In transverse section epidermis of the epicarp consists of single layer of oval or barrel shaped cells coated with thick cuticle. Hypodermal region consists of thick walled collenchymatous cells which are almost hexagonal to polygonal and 3-5 cells in thickness. These cells contain yellowish brown contents. Few cells contain rosette crystals of calcium oxalate, brownish black in colour. The mesocarpic region consists of large, thin walled, ovate to polygonal or squarish paranchymatous cells without intercellular spaces. The laticifers appearing in this region are elongated tubular and few are branched laticifers give positive test of tanin . Vascular traces are observed in this region. In surface view, the epicarp shows thick walled parenchymatous cells which are oval to Polygonal. The anomocytic type of stomta are observed which are abundant. The numerous guard cells are oval to round containing starch grains.

Powder: The powdered drug is brown in colour. Under the microscope it shows the presence of cells of epidermis, hypodermis and thick walled parenchymatous cells of testa. Vessels with spiral thickenings are also found along with the cells endosperm.

Parts used: fruits

Habitat:

Fig is native to Mediterranean region. It is cultivated in many parts of world with dry summers and mild winters. In India, it is cultivated in Uttar Pradesh, Rajasthan, Punjab, Andhra Pradesh and Maharashtra and some of the warm places of our country in very small scale.

Phytoconstituents:

F. carica have numerous bioactive compounds such as Mucilages, Glycosides, proteins/amino acids, resins, reducing sugar, steroids/ triterpenes, tannins, fixed oils, potassium, calcium, magnesium, iron, copper, phosphorus in Phosphate and chlorine in chloride. Proteose, amino acid, tyrosin, cravin lipase, Protease, carotin, flavinoids, vitamins, enzymes, nicotinic acid.

Ficusin, bergaptene, stigmasterol, psoralen, taraxasterol, beta-sitosterol, rutin, sapogenin, Calotropenyl acetate, lepeolacetate and oleanolic acid sistosterol are present in the leaf. The plant also contains arabinose, β-amyrins, β- carotines, glycosides, β-setosterols and xanthotoxol16-18. Umbelliferone19,20 , campesterol, , fucosterol, fatty acids21, 6-(2-methoxyZ-vinyl)-7-methyl-pyranocoumarin and 9,19- cycloarlane triterpenoid as an anticancer22 and 6-Oacyl-β-Dglucosyl -β-sitosterol 23, calotropenyl acetate, and lupeol acetate 24as an antiproliferative agent

Stem: campesterol, hentriacontanol, , stigmasterol, euphorbol and its hexacosanate, ingenol and taraxerone.

Leaves: moisture, 67.6%; protein, 4.3%; fat, 1.7%; crude fiber, 4.7%; ash, 5.3%; N-free extract, 16.4%; pentosans, 3.6%; carotene , bergaptene, stigmasterol, sitosterol, and tyrosine. Ficusin, taraxasterol, betasitosterol, rutin ,sapogenin, Calotropenyl acetate, lepeolacetate and oleanolic Latex: caoutchouc (2.4%), resin, albumin, cerin, sugar and malic acid, rennin, proteolytic enzymes, diastase, esterase, lipase, catalase, and peroxidase.

Seed: Dried seeds contain 30% of a fixed oil containing the fatty acids: oleic, 18.99%; linoleic, 33.72%; linolenic, 32.95%; palmitic, 5.23%; stearic, 2.1 8%; arachidic, 1.05%. It is an edible oil and can be used as a lubricant.

Af'aal-e-Adviya (Pharmacological activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Hepatoprotective activity: Significant reversal of biochemical, histological and functional changes where induced by petroleum ether extract treatment in rifampicin treated rats, indicating promising hepatoprotective activity.

Antioxidant activity: The potential health-promoting constituents of fig fruits were studied with six commercial fig varieties differing in color (black, red, yellow, and green) were analyzed for total polyphenols, total flavonoids, antioxidant capacity, and profile of anthocyanins. In the dark-colored mission and the red Brown-Turkey varieties, the anthocyanin fraction contributed 36 and 28% of the total antioxidant capacity, C3R (cyanidin3-O-rutinoside) contributed 92% of the total antioxidant capacity of the anthocyanin fraction. Fruits of the mission variety contained the highest levels of polyphenols, flavonoids, and anthocyanins and exhibited the highest antioxidant capacity.

Scavenging activity and immune response: The water extract (WE) and crude hot-water soluble polysaccharide (PS) from Ficus carica L. fruit were investigated for scavenging abilities on DPPH, superoxide and hydroxyl radicals and reducing power. The immune activities of PS were evaluated using the carbon clearance test and serum hemolysin analysis in mice. Both WE and PS have scavenging activities on DPPH with the EC50 (0.72, 0.61) mg/ml, respectively. The PS showed higher scavenging activity than WE on superoxide radical (EC50, 0.95 mg/ml) and hydroxyl anion radical (scavenging rate 43.4% at 4 mg/ml). The PS (500 mg/kg) also has a significant increase in the clearance rate of carbon particles and serum hemolysin level of normal mice. This indicates the scavenging activity and immune responses of the extract.

Anti-pyretic activity: The ethanol extract of Ficus carica, at doses of 100, 200 and 300 mg/kg showed significant dose-dependent reduction in normal body temperature and yeastprovoked elevated temperature. The effect extended up to five hours after drug administration when compared to that of Paracetamol (150 mg/kg.), a standard antipyretic agent. This shows the anti pyretic effect of ethanol extract.

Antibacterial activity: The methanol extract of (MICs, 0.156 to 5 mg/ml; MBCs, 0.313 to 5 mg/ml) showed a strong antibacterial activity against oral bacteria. The combination effects of methanol extract with ampicillin or gentamicin were synergistic against oral bacteria. It is proved that figs could act as a natural antibacterial agent.

Mizaj (Temperament): Hot 1^{O} Moist 2^{O}

Musleeh (Corrective): Sekanjabeen

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	-	Not more than 2%, Appendix 2.2.2.
Total Ash	-	Not more than 4%, Appendix 2.2.3.
Acid insoluble ash	-	Not more than 1%, Appendix 2.2.4.
Alcohol-soluble extractives	-	Not less than 20%, Appendix 2.2.6.
Water-soluble extractives	-	Not less than 52%, Appendix 2.2.7.

TLC behavior of petroleum ether (60-80^{o}) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Pet. Ether: Ethyl acetate (24:1)	2% Ethanolic H_2SO_4	2	0.76, 0.88

Aa'maal-e-Adviya (Pharmacological Action):

Mulattif, Mohallil-e-Waram, Muder-e- boul, Munaffis-e-Balgam, Munzij, Mulaiyin.

Mahall-e-Istemalat (Therapeutic use):

Qabz, Waram-e-Tehal, Warm-e-Kabed, Sara, Zeeq-un-Nafas

Meqdar-e-Khorak (Dose): Anjeer (Dry) 10 — 12 number

Side-effects / Adverse-effects: No significant side effects have been observed.

Important formulations: Zimad-e-Kibreet, Sufoof-e-Bars.

ARJUN
(Stem bark)

Arjun is a potential cardioprotective agent belonging to the Combretaceae family. It is a traditional remedy that has been mentioned since ancient period.

Other names:

- Botanical : *Terminalia arjuna*
- Family : Combretaceae
- Bengali : Arjun
- English : Arjun Tree

Description :

General: The drug Arjun consists of the stem bark of *Terminalia arjuna* a large deciduous tree, commonly found throughout the greater parts of the country.

Macroscopic : Bark available in pieces, flat, curved, recurved, channeled to half quilled, 0.2-1.5 cm thick, market samples upto 10 cm in length and upto 7 cm in widddth, outer surface somewhat smooth and grey, inner surface somewhat fibrous and pinkish, transversely cut smoothed bark shows pinkish surface, fracture, short in inner and laminated in outer part; taste, bitter and astringent.

Microscopic : Mature stem bark shows cork consisting of 9-10 layers of tangentially elongated cells, a few outer layers filled with brown colouring matter; cork cambium and secondary cortex not distinct and medullary rays observed traversing almost upto outer bark. Secondary phloem occupies a wide zone, consisting of sieve tubes, companion cells, phloem fibers, traversed by phloem rays, usually uniseriate but biseriate rays also occasionally seen in the middle and outer phloem region, sieve tubes get collapsed. Phloem fibers distributed in rows and present in groups of 2-10. Rosette crystals of calcium oxalate measuring 80-180 µ in diameter present in most of the phloem parenchyma, alternating with fibers. Idioblasts consisting of large cells having aggregates of prismatic and rhomboidal crystals calcium oxalate in row throughout the zone measuring 260-600 µ in diameter. Starch grains, mostly simple, compound of 2-3 components, sometimes upto 5 components, round to oval, elliptical, measuring 5-13 µ in diameter. Distributed throughout the tissue in a tangential section the uniseriate phloem rays 2-1 cells high and biseriate, 4-12 cells high; in longitudinal section rosette crystals of calcium oxalate found in the form of strands in phloem parenchyma.

Powder: Reddish-brown; shows fragments of cork cells, uniseriate phloem rays, fibres, a number of rosette crystal of calcium oxalate, a few rhomboidal crystal. Starch grains simple and compound, round to oval, elliptic, having 2-3 component with concentric striations and small narrow hilum, measuring 5-13 μ in diameter.

Parts Used: Stem bark

Habitat: Arjuntree is about 60-80 ft in height, and is seen along rivers, streams, and dry water bodies throughout the sub-continent.

Phyto Constituents: Tannins

Af'aal-e-Advia (Pharmacological activities): The popularity of the plant was highly enhanced by the ideological belief in the herb as a cure for multiple diseases. The detailed pharmacological activities of *Terminalia arjuna* are given below:

Cardiovascular activity: Different study was carried out to examine the mechanism of the cardiovascular effects of aqueous solution of *T. arjuna*extract. Intravenous administration of the extract was found to induce dose dependent decrease in blood pressure and heart rate**.** These extracts also inhibited carotid occlusion response, without affecting the pressor responses, induced by intravenous injection of nor epinephrine and by electrical stimulation of preganglionic fibres of the abdominal splanchnic nerve. Hypotension and bradycardia were also observed following the injection of the extract into the lateral cerebral ventricle and vertebral artery which suggest that the hypotensive and bradycardiac effects of *T. arjuna* are mainly of central origin (Singh *et al*., 1982).

Antiinflammatory activity: *T. arjuna* bark powder (400 mg kg^{-1}, p.o.) significantly reduced formalin-indued paw edema at 24 h but not carrageenan-induced paw edema suggesting its role in prevention of inflammation (Halder *et al*., 2009).Arjunaphthanoloside isolated from the stem bark of *T. arjuna* showed potent antioxidant activity and inhibited Nitric Oxide (NO) production in lipopolysaccharide (LPS)-stimulated rat peritoneal macrophages (Ali *et al*., 2003a).

Terminoside A isolated from the acetone fraction of the ethanolic extract of stem bark of *T. arjuna* potently inhibited Nitric Oxide (NO) production and decreased Inducible Nitric Oxide Synthase (iNOS) levels in lipopolysaccharide-stimulated macrophages (Ali *et al*., 2003b).

Antitumor activity: The effect of a bark extract of *T. arjuna* (TAE) was studied on the alteration of adriamycin (ADR)-induced micronuclei formation in cultured human peripheral

blood lymphocytes. Pretreatment of lymphocytes with TAE before ADR treatment resulted in a significant decline in micronuclei formation. Prior exposure of lymphocytes to 15 μg mL^{-1} of TAE significantly reduced the frequency of lymphocytes bearing one, two and multiple micronuclei when compared with ADR-treated control. TAE-inhibited the induction of (*) OH (hydroxyl), O_2 (*-) (superoxide), DPPH (1, 1-diphenyl-2-picrylhydrazyl), ABTS (*+) (2, 2-azino-bis-3-ethyl benzothiazoline-6-sulphonic acid) radicals in a dose-dependent manner. These results demonstrate that TAE protects DNA against ADR-induced damage (Reddy *et al*., 2008).

Gastric activity: The anti-ulcer effect of methanol extract of *T.arjuna* (TA) against *Helicobacter pylori* lipopolysaccharide (HP-LPS; 50 μg $animal^{-1}$) induced gastric damage in rats was evaluated. The efficacy of TA on gastric secretory parameters such as volume of gastric juice, pH, free and total acidity, pepsin concentration and the cytoprotective parameters such as protein-bound carbohydrate complexes in gastric juice and gastric mucosa were assessed. The protective effect of TA was also confirmed by histopathological examination of gastric mucosa. HP-LPS-induced alterations in gastric secretory parameters and gastric defense factors were altered favorably in rats treated with TA, suggesting that TA has an anti-secretory role. These results suggest that the severe cellular damage and pathological changes caused by HP-LPS are mitigated by TA. The anti-ulcer effect of TA may reflect its ability to combat factors that damage the gastric mucosa and to protect the mucosal defensive factors (Devi *et al*., 2008).

Hepatoprotective activity: The effects of *T. arjuna* extract on human hepatoma cell line (HepG2) and its possible role in induction of apoptosis was evaluated. *T. arjuna*inhibited the proliferation of HepG2 cells in a concentration-dependent manner. Apoptotic morphology was observed in HepG2 cells treated with *T. arjuna* at the concentrations of 60 and 100 mg L^{-1}. DNA fragmentation, accumulation of p53 and cleavage of procaspase-3 protein were observed in HepG2 cells after the treatment with *T. arjuna*. The depletion of GSH was observed in HepG2 cells treated with *T. arjuna*. Apoptosis of HepG2 cells may be due to the DNA damage and expression of apoptotic proteins. Depletion of GSH may be involved in the induction of apoptosis of HepG2 cells suggesting it induces cytotoxicity in HepG2 cells (Sivalokanathan *et al*., 2006a).

Wound healing activity: The effect of topical application of phytoconstituents (fraction I, II and III) fractionated from a hydroalcohol extract of the bark of *T. arjuna*, was assessed on the

healing of rat dermal wounds using *in vivo* models. The results indicated a statistically significant increase in the tensile strength of the incision wounds and the percent epithelialization of excision wounds compared with control. However, topical treatment with fraction I, consisting mainly of tannins, was found to demonstrate a maximum increase in the tensile strength of incision wounds. Even with respect to excision wounds, the fastest rate of epithelialization was seen with fraction I. Fraction I from the hydroalcohol extract of Arjuna bark possessed antimicrobial activity against tested microorganisms such as *Pseudomonas aeruginosa***,** *Escherichia coli*, *Staphylococcus aureus***,** *Streptococcus pyogenes* but not *Candida albicans*. These results strongly document the beneficial effects of fraction I, consisting mainly of tannins, of *T. arjuna* in the acceleration of the healing process well as corroborating the astringent effect of tannins by drawing the tissues closer together (Chaudhari and Mengi, 2006).

Antibacterial activity: The **antibacterial activity** of acetone, hexane, dichloromethane leaf extract of five *Terminalia* species (*Terminalia alata* Heyne ex Roth., *Terminalia arjuna* (Roxb.) Wt. and Am., *Terminalia bellerica* (Gaertn.) Roxb., *Terminalia catappa* L. and *Terminalia chebula* Retz.) were tested by Agar-well-diffusion method against human pathogens *E. coli*, *Pseudomonas aeruginosa***,** *Bacillus subtilis***,***Staphylococcus aureus* and *Staphylococcus epidermidis*. Hexane and dichloromethane extracts have shown more antibacterial components than the acetone extract suggesting the antibacterial activity in *T.arjuna* extracts (Shinde *et al*., 2009).

Strong antibacterial activity was shown by the methanol extracts of T.arjuna against multi-drug resistant *Salmonella typhi* (Rani and Khullar, 2004).

Antioxidant activity: The antioxidant and free radical scavenging capacities of arjunic acid, an aglycone obtained from the fruit of *Terminalia* was evaluated. Results showed that arjunic acid was a strong antioxidant and a free radical scavenger, more potent than ascorbic acid**,** in microsomes lipid peroxidation**,** DPPH, hydrogen peroxide induced RBCs hemolysis and 2', 7'-dichlorodihydrofluorcin diacetate (DCFH(2)-DA) assay. However, no significant difference was observed in the RBCs autoxidative hemolysis assay (Sun *et al*., 2008).

Antidiabetic activity: The effect of ethanol extract (250 and 500 mg kg^{-1} b.wt.) of *T. arjuna* stem bark in alloxan induced diabetic rats and its lipid peroxidation**,** enzymatic and nonenzymatic activity was investigated in the liver and kidney tissues. The extract at a dose of

500 mg kg^{-1} produced significant reduction in lipid peroxidation (LPO). The extract also causes a significant increase in superoxide dismutase**,** catalase, glutathione peroxidase, glutathione-s-transferase glutathione reductase and glucose-6-phosphate dehydrogenase, reduced glutathione, vitamin A**,** vitamin C, vitamin E, total sulfhydryl groups (TSH) and non protein sulfhydryl groups (NPSH) in liver and kidney of alloxan induced diabetic rats, which clearly shows, the antioxidant property of *T. arjuna* bark. The result indicates that the extract exhibit the antioxidant activity through correction of oxidative stress and validates the traditional use of this plant in diabetic animals (Raghavan and Kumari, 2006).

Antiviral activity: Casuarinin isolated from the bark of *T. arjuna* was investigated for its antiviral activity on *Herpes simplex* type 2 (HSV-2) *in vitro***.** Results showed that the IC_{50} of casuarinin in XTT and plaque reduction assays were 3.6±0.9 and 1.5±0.2 μM, respectively. The 50% cytotoxic concentration for cell growth (CC_{50}) was 89±1 μM. Thus, the Selectivity Index (SI) (ratio of CC_{50} to IC_{50}) of casuarinin was 25 and 59 for XTT and plaque reduction assays, respectively. Casuarinin continued to exhibit antiviral activity even added 12 h after infection. During the attachment assay, casuarinin was shown to prevent the attachment of HSV-2 to cells. Furthermore, casuarinin also exhibited an activity in inhibiting the viral penetration. Interestingly, casuarinin was virucidal at a concentration of 25 μM, reducing viral titers up to 100, 000-fold which suggest that casuarinin possesses anti-herpesvirus activity in inhibiting viral attachment and penetration and also disturbing the late event(s) of infection (Cheng *et al*., 2002).

Reproductive activity: The preventive role of arjunolic acid, a triterpenoid saponin isolated from the bark of *T. arjuna*, against arsenic (sodium arsenite, 10 mg kg^{-1} b.wt. for 2 days) - induced testicular damage in mice was evaluated. Pretreatment with arjunolic acid at a dose of 20 mg kg^{-1} b.wt. for 4 days could prevent the arsenic-induced testicular oxidative stress and injury to the histological structures of the testes. Arjunolic acid had free radical scavenging activity in a cell-free system and antioxidant power *in vivo*. The results suggest that the chemopreventive role of arjunolic acid against arsenic-induced testicular toxicity may be due to its intrinsic antioxidant property (Manna *et al*., 2008).

Mizaj(Temperament) : Hot & dry

Musleh (Correction) : Unknown

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 25 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 20 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 20 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action): Qabiz, Muraqqiq-e-Dam, Daf-e-Humma

Mahall-e-Istemalat (Therapeutic uses) : Zof-e-Qalb, Khafqan, Warm-e-Qalb, Fasad-e-Dam, Ishal, Sangrahni, Hummiyat-e-Muzmina.

Meqdar-e-khorak (Dose): 3-5gms

Side-effects: Mild side effects like nausea, gastritis, headache, bodyache, constipation, and insomnia have been reported. No hematological, renal, or metabolic toxicity has been reported even after more than 24 months of its administration.

Important formulations: Not available.

ASGAND

(Roots)

Drug Asgand consists of dried mature roots of *Withania somnifera* of Solanaceae family. Drug yielding plant is a tall perennial shrub, found in waste land, cultivated in fields and open grounds throughout the country. It is widely cultivated in certain areas of Bangladesh and India. Its root is basically collected in winter, then washed and cut into short pieces for medicinal purpose.

Other names :

Botanical :*Withania somnifera*

Family : Solanaceae

Bengali : Ashavagandha, Asvagandha

English name : Winter cherry

Description:

General: This species is a short, tender perennial shrub growing 35–75 cm (14–30 in) tall. Tomentose branches extend radially from a central stem. Leaves are dull green, elliptic, usually up to 10–12 cm (4 to 5 in) long. The flowers are small, green and bell-shaped. The ripe fruit is orange-red.

Macroscopic: Roots straight, unbranched,thicknees varying with age roots bear fiber like secondary roots, outer surface buff to grey-yellow with longitudinal wrinkles; crown consists of 2-6 remains of stem base; stem bases variously thicked; nodes prominent only on the side from where petiole arises, cylindrical, green with longitudinal wrinkles fracture, short and uneven; odour characteristic; taste bitter and acrid.

Microscopic: Transverse section of root shows cork exfoliated or crushed; when present isodiamatric and non-ligified; cork cambium of 2-4 diffused rows of cells; secondary cortex about twenty layers of compact parenchymatous cells; phloem consists of sieve tubes companion cells, phloem parenchyma; cambium 4-5 rows of tangentially elongated cells; secondary xylem hard forming a closed vascular ring separated by multiseriate medullary rays; a few xylem parenchyma.

Parts Used: Dried mature roots and berry

Habitat: Withania somnifera is cultivated in many of the drier regions of Bangladesh and India. It is also found in Nepal, China and Yemen. It prefers dry stony soil with sun to partial shade. To propagate it can be grown from seed in the early spring, or from greenwood cuttings in the later spring.[

Phyto constituents: Alkaloids and Winthanolides

Af'aal-e-Advia (Pharmacological activities):

Anticancer activity: Numerous studies published over the last two decades indicate that *W. somnifera*has unique characteristics to suppress various types of cancer and it has been used as Traditional remedy for the treatment of various types of cancer over two thousand years. Ashwagandha possesses anticancer properties against prostate, colon, lung, breast, leukemia, pancreatic, renal, head and neck cancer cells of humans (Nema et al., 2013; Patel et al., 2013; Singh et al., 2011; Yadav et al., 2010), forestomach and skin cancer cells in mice (Padmavathi et al., 2005). Recently the anticancerous potential of *W. somnifera*and itsbioactivewithanolides has been extensively studied by several research groups all around the world, which have discovered diverse mechanisms such as cytotoxicity, cell differentiation induction, cancer chemoprevention, cyclooxygenase-2 (COX-2)inhibition and a potential to inhibit the enzyme quinine reductase. These withanolides are highly oxygenated natural bioactive constituents which are responsiblefor ashwagandha's biological properties including antitumor activity (Mulabagalet al., 2009; Patel et al., 2013).

Neuroprotective activity: Preclinical research and clinical trials support the use of *W. somnifera*for the treatment of neurological conditions such as anxiety, depression, cognitive disorders, senile dementia and neurodegenerative disorders (Alzheimer's and Parkinson'sdiseases). Earlier, it was reported that the neuroprotective activity of

*W.somnifera*root extract could be because of presence of glycowithanolides and their ability to inhibit lipid peroxidation because of their antioxidant actions. In addition, withanolides and sitoindosides (VII–X) also augment catalase and glutathione peroxidase activitiesin rat frontal cortex and striatum. *W. somnifera*was also found to improve the cognitive capabilities of the brain by increasing the cortical muscarinic acetylcholine capacity in lateral septum and frontal cortex, which suggest their capacity to affect events in the cortical cholinergic-signal transduction cascade (Schliebs et al., 1997). The pharmacological studies suggested that *W. somnifera*improves the athletic performance via increasing the hemoglobin count and red blood cellcount, which leads to an increase in the capacity of blood to transport oxygen at a greater capacity to the peripheral system (Shenoy et al., 2012). It has been shown that *W. somnifera*improves endurance performance in healthy individuals at a moderate intensity of 65% VO2 max (Sandhu, 2010). *W. somnifera*which is rich in proteins, amino acids (glycine, alanine, tyrosine, aspartic acid, tryptophan, glutamic acid, cysteine, etc.), starch, reducing sugars, alkaloids, steroidal lactones possess an amazing nutritional value and acts as a tonic, stimulant and energy rejuvenator. Studies also revealed that, phenolic compounds present in the root of *W. somnifera*play an important role on overall antioxidant activities of the plant (Bhatnagar et al., 2009).

Antiepileptic activity:*W. somnifera*is traditionally used for the treatment of epilepsy and seizures. Various *in vitro*and*in vivo*preclinical studies have provided enough evidence for the use of *W. somnifera*against various types of epilepsy. In general, studies with rodent models show that *W. somnifera*and its bioactive withanolides are effective in reducing seizures through various mechanisms. One such mechanism involved the Gama amino butyric acid (GABA)Areceptormodulation in brain, where sub-effective dose of *W. somnifera*(50mg/kg), with a sub-protective dose of either GABA (25mg/kg) or Diazepm (0.5mg/kg) increases the seizure threshold in brain (Kulkarni et al., 2008). In another study,it was demonstrated that *W. somnifera*root extract and withanolide-A were capable of restoring spatial memory deficit by inhibiting oxidative stress induced alteration in glutamergic neurotransmission, where *W. somnifera*reduces the expression of N-metyl-D-aspartate (NMDA)receptor, which is responsible for spatial memory loss in epileptic rats (Soman et al., 2012). Leaf extracts of *W. somnifera*were also showing its protective action against glutamate induced toxicity in human neuroblastoma (IMR-32) cells, by inhibiting over expression of stress protein 70 kilodalton heat shock proteins(Kataria et al., 2012). In another study it was found that *W. somnifera*root

extract and withanolide-A regulate the expression and function of α-Amino-3-hydroxy-5-methyl-4-isoxazolepropionic acidreceptor and glutamate levels in brain dopaminergic nervous system and results are attributed to improvement in motor learningin pilocarpine-induced temporal lobe epilepsy model (Soman et al., 2013). These findings reveal that *W. somnifera*and its bioactive withanolides have anti convulsant potential and are useful in treating various types of epilepsy.

Antidepression and antianxiety activity: The roots of *W. somnifera*are used extensively in Ayurveda for the treatment of anxiety and depression. Earlier it was reported that, anxiolytic-antidepressant potential of *W. somnifera*and its glycowithanolides (Bhattacharya et al., 2000). Recent study reports also support the use of *W. somnifera*for depression andanxiety disorders. In a very recent study, it is found that *W. somnifera*at 40 mg/kg significantly reduces the depression in various experimental models (Jayanthi et al., 2012). Clinical trials with healthy volunteers also revealed that aqueous extracts of *W. somnifera*improve the psychomotor performances in anxiety and depression (Pingali et al., 2014). It was assumed that *W. somnifera*reduces the production of nitric oxide in the brain tissues, resulting in its anxiolytic activity (Khan and Ghosh, 2011; Maity et al., 2011). Study findingsexplained that *W. somnifera*and its bioactive withanolides possesses antidepression and antianxiety potential and are useful in treating various types of mental disorders.

Antiinflammatory and antiarthritic activity:*W. somnifera*exhibits potent antiarthritic and antiinflammatory activities. Antiinflammatory activity has been characteristic to biologically active steroids, of which withaferin-A is a major component. Recent studies revealed that *W. somnifera*at dose levels600 & 800mg/kgsignificantly decreased the severity of arthritis by effectively suppressing the inflammatory mediators and improving the functional recovery of motor activity in experimental animals (Gupta and Singh, 2014). Roots of *W. somnifera*and withanolides are also effective in treating arthritic inflammation, inflammation in cystic fibrosis and irritable bowel syndrome, through various mechanisms such as inhibiting NF-κB activation, inhibition of COX-2 generation, inhibition of endothelial cell protein C receptor through antioxidant effect and cytokines release, thus in turn causes depletion of inflammatory mediators (Ku et al., 2014; Mulabagalet al., 2009; Oh and Kwon, 2009).*W. somnifera*and its bioactive withaferin-A down regulate the production of inflammatory mediators like prostaglandins, histamine, interleukins and cytokines (Gupta and Singh, 2014; Paval et al., 2009).Withaferin-A has been shown to stimulate differentiation and growth of osteoblasts in menopausal osteoporosis and by bone injury, via increased expression of osteoblast-specific

transcription factor and mineralizing genes (Khedgikar et al., 2013). Through all these mechanisms *W. somnifera*shows its antiinflammatory and antiarthritic activity, which makes it useful for the treatment of various inflammatory disorders. *W. somnifera*is also shown to possess analgesic activity in several rodent models andthus preferred for various pain management therapies (Sabina et al., 2009; Shahriar et al., 2014).

Spermatogenic activity: Several investigators reports have suggested that *W. somnifera*is beneficial in the treatment of male infertility. Experimental evidences have shown that treatment with *W. somnifera*induced testicular development and spermatogenesis in immature Wistar rats by directly affecting the seminiferous tubules, improved pro-sexual behavior of sexually sluggish mice, and increased testicular daily sperm production and serum testosterone level. *W. somnifera,* also counteract the oxidative damage to the sperm and reactive oxygen species associated with abnormal sperm parameters leading to infertility (Ambiye et al., 2013). In recent years, it has been well documented that *W. somnifera*improves semen quality by effectively reducing oxidative stress and improving reproductive hormone levels in infertile male patients (Ahmad et al., 2010; Shukla et al., 2011). In clinical trials with infertile male patients, *W. somnifera*repairs the altered concentrations of lactate, alanine, citrate, glycerylphosphorylcholine, histidine, and phenylalanine in seminal plasma, and it recovers the quality of semen of post-treated compared to pre-treated men, in addition toinducing spermatogenesis in infertile male patients (Ambiye et al., 2013; Gupta et al., 2013). *W.somnifera*boosts enzymatic activity of metabolic pathways and energy metabolism. These evidences support the use of *W. somnifera*for the treatment of male infertility.

Hepatoprotective activity: Various studies were performed to evaluate the hepatoprotective potential of *W. somnifera*. As it isused for various ailments, the hepatoprotective activity was also considered for its effective use. Investigations have given numerous evidences, where *W. somnifera*at a dose 500 mg/kg significantly reduces the elevated biomarkers (aspartate aminotransferase, alanine transaminase, alkaline phosphatase,and Bilirubin) in experimental animals when exposed to hepatotoxic dose of paracetamol. It significantly reduces the lipid peroxidation, enhances glutathione content, catalase, glutathione reductase and glutathione peroxidase activity in liver (Malik et al., 2013; Sabina et al., 2013).In another study, *W. somnifera*has shown its hepatoprotective activity againstgamma radiation induced toxicity in rodents, where 100 mg/kgdose of *W. somnifera*significantly decreases hepatic serum enzymes, levels of malondialdehyde, total nitrate/nitrite NO(x) and also heme oxygenase activityin

liver. Serumantioxidant enzymes, includingSODand glutathione peroxidasein hepatic tissues were elevated (Hosny and Farouk, 2012). These study findings support the use of *W. somnifera*for various hepatic disorders.

Antimicrobial activity: The leavesand roots of *W. somnifera*have been shown to exhibit antimicrobial activity in recent studies. Leaf extracts at concentrations 6.25 mg/mland 12.5 mg/mlinhibitedthe growth of five Gram-negative pathogenic bacteria (*Escherichia coli, Salmonella typhi, Citrobacter freundii, Pseudomonas aeruginosa* and *Klebsiella pneumonia*) (Alam et al., 2012). Isolated flavonoids and alkaloids from *W. somnifera*show growth inhibitory activity against *Enterobacter aerogens, Proteus mirabilis, Pseudomonas aeruginosa, Staphylococcus aureus, Bacillus subtilis, Klebsiella pneumoniae, Raoultellaplanticola*and*Agrobacterium tumefaciens*at concentration 0.039 mg/ml(Singh and Kumar, 2011; Singh and Kumar, 2012).In a separate study, crude extract of leaves of *W. somnifera*was tested against clinical pathogens *Staphylococcus aureus, roteusmirabilisStreptococcusmutans, Streptococcus sobrinus*and*Salmonella paratyphi*B, where it was found that 100 µl of extracts (100 mg/ml) was able to inhibit the growth of all the pathogenic bacteria (Al-Ani et al., 2013; Pandit et al., 2013). The antimicrobial potency of *W. somnifera*was thought to be due to its antioxidantproperties (Alam et al., 2012). The ascorbic acid, anthocyanin and polyphenols found in *W. somnifera*leaves could inhibit microorganisms via iron deprivation or hydrogen bonding with vital proteins such as microbial enzymes (Scalbert, 1991). *W. somnifera*reported to exhibit antibacterial activities and it shows its activity against both Gram-positive and Gram-negative pathogenic bacteria (Singariya et al., 2012). In another study, it was argued that *W. somnifera*shows its bactericidal and fungicidal activity through mechanisms attributed to cytotoxicity, gene silencing and immune potentiation, where aerial extract at concentration 1.56 mg/ml shows good antimicrobial potency (Mwitari et al., 2013). It is also shown to be a moderate to active against *Microsporumgypseum, Candida albicans*and*Cryptococcus neoformans* (Mwitari et al., 2013). Withanolide D, E and F showed potent activity against PknG target in *Mycobacterium tuberculosis*(Santhi and Aishwarya, 2011). It has also been shown in different studies that *W. somnifera*have the best antimicrobial (1.5625 mg/ml), immunopotentiation (2 times IL-7 mRNA expression) and safety level (IC50 200 mg/ml). Results of these findings reveal that extracts of *W. somnifera*and its bioactive constituents possess great antimicrobial potentialagainstvarioustest pathogenic microorganisms that can be exploited for future

antimicrobial drugs for treating infectious diseases and could be an alternative for chemotherapy.

Hypoglycaemic and hypolipidemic activity: *W. somnifera*has long been used in traditional and Unani medicine to cure diabetes and obesity. Recent studies and observations have revealed that, flavonoids found in the roots of *W. somnifera*were able to reduce the high blood glucose level in experimental animals. It was also shown that *W. somnifera*at dose 100 mg/kg significantly reduces the blood glucose and lipid levels (Rajangam, et al., 2009). In another study, powder of *W. somnifera*at dose 200 mg/kg significantly reduces the blood glucose level. The blood glucose lowering activity of *W. somnifera*is thought to be its action on pancreatic β-cells to stimulate the release of insulin. It was also found that *W. somnifera*and its glycowithanolides induce the transport of glucose into the cells, stimulate the release of insulin and increase the activity of GLUT transporters activity (Anwer et al., 2008; Khalili, 2009; Sarangi et al., 2013; Visavadiya and Narasimhacharya, 2007). In another study it was observed that, *W. somnifera*diet significantly increases plasma HDL-cholesterol levels, increases HMG-CoA reductase activityand bile acid content of liver in experimental animals (Visavadiya and Narasimhacharya, 2007).These observations support the traditional claims for the use of *W. somnifera*against diabetes and obesity.

Miscellaneous pharmacological activities: In recent years, numerous pharmacological studies were also carried out to explore other beneficial effects of *W. somnifera*. Further research with withaferin-A shows that having antiplatelet, anticoagulant, and profibrinolytic properties (Ku and Bae, 2014), cardioprotective activity, nephroprotective activity, immunomodulatory activity and antileishmanial activities.

Mizaj (Temperament) : Hot 2^0 and dry 2^0

Musleh (Correction) : Katira gum

Badal (Proximal substitute) : Bahmansafed, Suranjan

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 15 per cent, Appendix 2.2.6

Assay: Asgand consists of not less than 0.2 percent bof total alkaloids, when assayed 0as follows:-

Take about 30gm accurately weighed of powdered drug, cover with Alcohol (90 percent) and allow to stand overnight. Extract for 6 hours in wet apparatus and concentrate to syrup residue. Treat with 25, 20 and 10 ml. portions of 5 percent Sulphuric Acid until complete extraction of alkaloids is affected.

To the combined acid extracts add an excess of Dragandorf's reagent. Filter under suction and dissolve the residue in Acetone. Shake the Acetone solution with freshly prepared suspension of 2gm Silver Carbonate in 10 ml of water. Filter the solution and wash the precipitate with Acetone, Alcohol and water in that order. Pass sufficient Hydrogen Sulphide through filtrate. Boil the Solution for 10 minutes, filter and evaporate under vacuum in tared flask. Add to the residue 5ml. of Ethyl Alcohol evaporate to dryness, the process once again and weight the residue to constant weight in a vacuum dessicator.

Aa'mal-e-Advia (Pharmacological action) : Mohallil-e-Warm, Muqawwi-e-Aam, Muqawwi-e-Meda, Muwallid-e-Mani, Musammin-e-Badan, Musakkin-e-Asab, Munawwim.

Mahall-e-Istemalat (Therapeutic uses): Sailan-ur-Rahem, Jiryan, Riqqat-e-Mani, Waj-ul-Qutn, Waj-ul-Mafasil, Zof-e-Bah.

Meqdar-e-khorak (Dose):5 to 10 gm

Side-effects: Ashwagandha is possibly safewhen taken by mouth short-term. The long-term safety of ashwagandha is not known. Large doses of ashwagandha might cause stomach upset, diarrhea, and vomiting.

It's not known whether it's safe to apply ashwagandha directly to the skin.

Important formulations : Majoon-e-Sohag Sonth, Majoon-e-Salab, Zimad-e-Mohallil, Kushta-e-Gaodanti.

ASL-US-SOOS

(Stolon and root)

Drug Asl-us-sus consists of dried, unpeeled, stolon and root of *Gycyrrhiza glabra* Linn of Leguminaceae family. Drug yielding plant is a tall perennial herb, up to two meter high found cultivated in Europe, Persia, Afghanistan and to little extent in some parts of India.

Other names :

Botanical :*Gycyrrhiza glabra* Linn

Family : Leguminaceae

Bengali :Jeshthimadhu, Jaishbomadhu

English name : Liquorice root, Sweetwood

Description:

General: *Glycyrrhiza glabra*, commonly known as licorice, is an herbaceous perennial and has been used as a flavoring agent in foods and medicinal remedies for thousands of years. Licorice root has been widely used around the world to treat cough since ancient times.

Macroscopic: Stolon consists of yellowish brown or dark or brown outer layers, externally longitudinally wrinkled, with occasional small buds and encircling scale leaves, smoothed transversely cut surface shows a cambium ring about one-third of radius from outer surface and a small central pith; root similar without a path; fracture coarsely fibrous in bark splintery in wood; odour, faint and characteristic; taste sweetish.

Microscopic:

Stolon: Transverse section of stolon shows cork of 10-20 or more layers of tabular cells, outer layers with reddish-brown amorphous contents, inner 3 or 4 rows having thicker, colourless walls; secondary cortex usually of 1-3 layers of radially arranged parenchymatous cells containing isolated prisms of caicium oxalate; secondary phloem a broad band, cells of innerpart cellulosic and outer lignified, radially arranged groups of about 10-50 fibers surrounded by a sheath of parenchyma cells, each usually containing a prism of calcium oxalate about 10-35m long; cambium from tissue of 3 or more layers of cells; secondary xylem distinctly radiate with medullary rays, 3-5 cells wide, vessels about 80-200meter in diameter with thick, yellow, pitted recticulately thickened walls; groups of lignified fibers with crystal sheaths similar to those of phloem; xylem parenchyma of two kinds those between the vessels having thick pitted walls without intercellular spaces, the remaining with thin walls; pith of parenchymatous cells in longitudinal rows, with inter-cellular spaces.

Root: Transverse section of root shows structure closely resembling that of stolon except that no medulla is present; xylem tetrarch; usually our principal medullary rays at right angles to each other; in peeled drug cork shows phelloderm and sometimes without secondary phloem; all parenchymatous tissues conaining abundant simple, oval or rounded starch grains 2-20 meter in length.

Parts Used: Dried, unpeeled, stolon and root

Habitat: Licorice is an herb that is native to the Mediterranean, southern and central Russia, and Asia Minor to Iran. Many species are now grown throughout Europe, Asia, and the Middle East.

Phyto constituents: Glycyrrhizin, Glycyrrhizic acid, glycyrrhetinic acid, asparagines, sugar, resin and starch.

Af'aal-e-Advia (Pharmacological activities):

Effect on memory and learning: The effect of *Glycyrrhiza glabra* root extract (75, 150 and 300 mg/kg for 2 weeks) was evaluated on learning and memory in three months old male rats. Elevated plus-maze and Morris water maze tests were conducted to evaluate the learning and memory parameters as exteroceptive behavioral model and Diazepam induced amnesia as interoceptive behavioral model. The aqueous extract of root of *Glycyrrhiza glabra* showed improvement in learning and memory in a dose dependent manner. However, 150 mg/kg dose significantly ($P<0.01$) enhanced learning and memory(52-53). The beneficial effects of aqueous extract of *Glycyrrhiza glabra* root extract (75, 150, 225, and 300 mg/kg, for six successive weeks) on learning and memory were studied in 1-month-old male Wistar albino rats using the elevated plus maze, Hebb-William maze, and Morris water maze tests as exteroceptive behavioral model and Diazepam-induced amnesia as interoceptive behavioral model. Results revealed that all the doses of aqueous root extract of *Glycyrrhiza glabra* significantly enhanced the memory, the doses 150 and 225 mg/kg, possessed significant ($P < 0.01$) enhancement in learning and memory. Furthermore, diazepam-induced amnesia was reversed by the aqueous root extract of *Glycyrrhiza glabra* (150 and 225 mg/kg, po)(54). The effects of aqueous extract of *Glycyrrhiza glabra* (75, 150 and 300 mg/kg po for 7 successive days) on learning and memory was also evaluated in mice. Elevated plus-maze and passive avoidance paradigm were employed to test learning and memory. The dose of 150 mg/kg of the aqueous extract of liquorice significantly improved learning and memory of mice. This dose also significantly reversed the amnesia induced by diazepam (1 mg/kg ip) and scopolamine (0.4 mg/kg ip)(55). The dose of 150 mg/kg of the aqueous extract of *Glycyrrhiza glabra* for 7 successive days, significantly improved learning and memory of mice and reversed the amnesia induced by diazepam (1 mg/kg p), scopolamine (0.4 mg/kg ip), and ethanol (1 g/kg ip)(56). The effects of *Glycyrrhiza glabra* on learning and memory were evaluated using object recognition task (ORT) and elevated plus maze (EPM) models in mice. One dose level of aqueous liquorice extract 400mg/kg po, and two doses levels of glabridin rich extract 5mg/kg and 10mg/kg were administered orally in separate groups of animals. Aqueous liquorice extract and glabridin 10mg/kg treatment significantly improved learning and memory of mice by reversing the amnesia induced by scopolamine hydrobromide (2mg/kg, ip) and diazepam (1mg/kg, ip)(57).

Antidepressant effect: The effects of aqueous extract of *Glycyrrhiza glabra* on depression was investigated in mice using forced swim test (FST) and tail suspension test (TST). The extract of *Glycyrrhiza glabra* (75, 150, and 300 mg/kg) was administered orally for 7 successive days in separate groups of male mice. The dose of 150 mg/kg of the extract significantly reduced the immobility times of mice in both FST and TST, without any significant effect on locomotor activity of mice. The efficacy of extract was found to be comparable to that of imipramine (15 mg/kg ip) and fluoxetine (20 mg/kg ip). Liquorice extract reversed reserpine-induced extension of immobility period of mice in FST and TST. Sulpiride (50 mg/kg ip, a selective D2 receptor antagonist) and prazosin (62.5 μg/kg ip, an α1-adrenoceptor antagonist) significantly attenuated the extract-induced antidepressant-like effect in TST. On the other hand, *p*-chlorophenylalanine (100 mg/kg ip, an inhibitor of serotonin synthesis) did not reverse antidepressant-like effect of liquorice extract. It seemed that the antidepressant-like effect of liquorice extract mediated by increase of brain norepinephrine and dopamine, but not by increase of serotonin(61).

Antimicrobial effects: The antibacterial effect of alcoholic extract obtained by percolation from roots of *Glycyrrhiza glabra* was tested against *Escherichia coli, Pseudomonas fluorescens, Enterococcus faecalis, Bacillus cereus,* and *Staphylococcus aureus,* the extract showed the strong antibacterial activity against all bacterial strains tested. The maximum inhibition diameter was 15 mm against *E. coli, E. faecalis, B.cereus,* whereas *P. fluorescens* showed the lowest sensitivity, with an inhibition zone of 9 mm. The antimicrobial effect of the methanolic extract of *Glycyrrhiza glabra* was investigated against *B. megaterium, B. subtilis, Staphylococcus aureus, Sarcina lutea, Escherichia coli, Pseudomonas aeruginosa, Salmonella paratyphi, S. typhi, Shigella boydii, S. dysenteriae, Vibrio mimicus*and *V. parahemolyticus*. *Glycyrrhiza glabra* methanolic extract showed potent antimicrobial activity against almost all the tested organisms except *Pseudomonas aeruginosa.* It exhibited highest activity against *Staphylococcus aureus* with a zone of inhibition of 22 mm.

Anticancer effect: The cytotoxic activity of the methanolic extract of *Glycyrrhiza* was tested using brine shrimp lethality bioassay methods. The extract possessed potent cytotoxic activity with LC 50 value of 0.771μg/ml(63). The antitumor activity of licorice methanolic extract (0, 12.5, 25, 50 and 100 μg/ml) was evaluated against intestinal carcinoma cell line (Caco-2) and prostate carcinoma cell line (PC-3). Licorice methanolic extract had a growth inhibitory action against Caco-2 and PC-3 with IC50 values of 40 and 40.6 μg/ml, respectively(51).

Isoliquiritigenin isolated from the root of *Glycyrrhiza glabra* prevented the incidence of 1,2-dimethylhydrazine-induced colon and lung tumors in mice when administered at a dose of 300 mg/kg. The cytotoxic activity of different extracts of *Glycyrrhiza glabra* was tested on mice transformed cell line. The results showed that hot alcoholic extract possessed the greatest cytotoxic effect on the cancer cells ($P < 0.05$) after 72 hourseexposure.

Antioxidant effect: Chalcone derivative, a novel group of neolignan lipid esters, and seven known phenolic compounds (formononetin, glabridin, hemileiocarpin, hispaglabridin B, isoliquiritigenin, 4‘-O-methylglabridin, and paratocarpin B) isolated from the roots and stolons of *Glycyrrhiza glabra* were tested in an authentic peroxynitrite anti-oxidant assay. Of these compounds, hispaglabridin B, isoliquiritigenin, and paratocarpin B were found to be the most potent anti-oxidant agents. The antioxidant effect of root methanolic extracts of *Glycyrrhiza glabra* var. glandulifera was investigated using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method. The extracts showed good antioxidant activity, with a median inhibitory concentration (IC50) of 588 ± 0.86 to 2190 ± 1.73 mg/ml. The free radical scavenging of the methanolic extract of *Glycyrrhiza glabra* was investigated using DPPH. The extract showed moderate free radical scavenging activity with IC 50 value of 87.152 µg/ml(63). The antioxidant activity of roots extracts of *Glycyrrhiza glabra* was investigated with DPPH scavenging assay. The results revealed that methanolic extract of *Glycyrrhiza glabra* was potent antioxidant with maximum scavenging effect of 67.22% at a concentration of 500µg/ml. The calculated IC50 for the methanol extract of *Glycyrrhiza glabra* was 359.45µg/ml.

Effect on respiratory system: The bronchorelaxant effect of *Glycyrrhiza glabra* was studied in a clinical trial (54 patients) in comparison with *Boswellia carterii*(Olibanum) and prednisolone (18 patients each group) for 21 days. Pulmonary function tests and serum electrolytes: calcium, magnesium, potassium and selenium were done before and after the study. The results showed that the tested plants had significant elevation in the values of forced expiratory volume in first second (FEV1%) as (72.45±5.83 vs 61.33±6.04 and 81.10±11.07 vs 62.30±7.22) for olibanum and licorice respectively. Also, elevation in the values of forced volume capacity (FVC) with marked reduction in asthmatic attacks as (2.63±0.82 vs 0.72±0.16, 3.60±0.02 vs 1.08±0.08, and 2.25±0.16 vs 1.05± 0.15) for olibanum, licorice and prednisolone respectively, with better symptomatic improvement in licorice group as compared to olibanum. *Glycyrrhiza glabra* was significantly elevated Mg: from 0.66±0.17

to 1.02±0.10 , Se: from 28.19±3.72 to 51.70±8.63, Ca: from 1.90±0.06 2 to .30±0.08 and K: from 3.60±0.03 to 4.10±0.12. *Glycyrrhiza* decreased irritations in the throat and produced expectorant effects. It was assumed that *Glycyrrhiza* was able to stimulate tracheal mucus secretions and produce demulcent and expectorant effects. Its powder and extract was useful for the treatment of sore throat, cough and bronchial catarrh. It also possessed antitussive and expectorant.

Protective effects: The hepatoprotective potential of aqueous (QGG) and ethanol extract of *Glycyrrhiza glabra* (EGG) and their possible mechanism were studied in rats hepatotoxicity.For acute hepatopathy, rats were intraperitoneally injected with CCl4 at a dose of 1.0 ml/kg as a 50% olive oil solution. The rats were orally given the aqueous and ethanol extract of *Glycyrrhiza glabra* at doses of 250, 500 mg/kg after 6 h of CCl4 treatment. At 24 h after CCl4 injection, samples of blood and liver were collected and then biochemical parameters and histological studies were carried out. The results revealed that both extracts inhibited significantly the activities of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) which elevated by CCl4 and increased the activity of superoxide dismutase which decreased by CCl4(101). The hepatoprotective effect of aqueous extract (2gm/kg/day orally for 7 days) of *Glycyrrhiza glabra* roots was investigated in rabbit models with acute liver injury induced by carbon tetrachloride at a dose of 1.25 ml/kg. Aqueous extract of *Glycyrrhiza glabra* had a significant effect in amiolerating liver functions as well as restoring hepatic tissue in acute liver diseases.

Anti-inflammatory effect: The anti-inflammatory activity of hydro alcoholic extract of *Glycyrrhiza glabra* (HAEGG) root was evaluated against carrageenan induced rat paw oedema at dose levels of 100, 200, and 300 mg/kg orally. The hydro alcoholic extract of *Glycyrrhiza glabra* showed a maximum (46.86%) inhibitory action on carrageenan induced paw oedema at the dose of 200 mg/kg and inhibited the leukocyte migration in a dose dependent manner. The anti-inflammatory activity was comparable to indomethacin (10mg/kg)(66). Several secondary metabolites isolated from rhizomes of *Glycyrrhiza glabra* were investigated for the COX-2 inhibitory activity using Cayman COX (ovine) inhibitory screening assay. A few molecules showed potent COX-2 inhibitory activity which may beneficial as anti-inflammatory agents(107) Glycyrrhizin exhibited steroid-like anti-inflammatory activity, similar to hydrocortisone due to inhibition of phospholipase A2

activity, glycyrrhizic acid inhibited cyclooxygenase activity and prostaglandin formation (specifically prostaglandin E2), as well as indirectly inhibiting platelet aggregation(108-109).

Effect in gastric duodenal ulcers: Carbenoxolone a glycyrrhizate analog was effective in clinical trials in the treatment of gastric and duodenal ulcer at the medium dose of 100 mg three times a day. Liquorice can raise the concentration of prostaglandins in the digestive system that promote mucus secretion from the stomach, it was also prolonged the life span of surface cells in the stomach and has an anti-pepsin effects.

The anti- *Helicobacter pylori* activity of glycyrrhizic acid, glycyrrhetinic acid and a novel lipophilic derivative of glycyrrhetinic acid monoglucuronide acetylated GAMG was tested against 29 *Helicobacter pylori* strains. Glycyrrhetinic acid was the most potent compound (MIC 50 /90, 50/100 mg/l), inhibiting 79.3% of the strains at MIC <50 mg/l(75). Forty patients receiving either 3.0 or 4.5 g deglycyrrhizinated licorice (DGL) daily for eight weeks, were assessed for relief from epigastric pain, nausea, vomiting, x-ray of ulcer craters to determine changes in size of ulcer, and frequency of relapse. All patients showed significant improvement after 5-7 days. In more larger trial carried out on 874 patients with chronic duodenal ulcers. Patients were received DGL, cimetidine, or antacids. No differences were recorded among groups in the rate of ulcer healing, but patients in the DGL group showed less occurance of relapses.

Effect on smooth muscles: The effect of the hydro-alcoholic extract of licorice rhizome on mechanical activity of isolated colon, was studied in male rats. The mechanical activity of tissue in presence of extract and epinephrine was significantly decreased ($p \leq 0.05$) compared to the control group. While the mechanical activity in the presence of extract and propranolol was significantly increased ($p \leq 0.05$) compared to the control group. However, no significant modification was observed in the mechanical activity of the tissue in the presence of phenylephrine and extract compared to the control group. According to the result, it appeared that hydro-alcoholic extract of licorice had modifying effect on colon motility via synergist effect with beta adrenergic receptors and independent of the alpha adrenergic receptors. Isoliquiritigenin isolated from an aqueous extract of licorice was a potent relaxant, it inhibited the contraction induced by various types of stimulants, such as CCh, KCl, and BaCl2 with IC50 values of 4.96±1.97 microM, 4.03±1.34 microM and 3.70±0.58 microM(119-120). The mechanisms of action of licorice rhizome extract on duodenal motility *in vitro* were investigated in rats. Mechanical activity in response to extract 43µg/ml (most effective

concentration based on concentration/response experiments) in the presence of acetylcholine (10-5 M) as the muscarinic receptor agonist, atropine (10-4 M) as the muscarinic receptor antagonist, epinephrine (10-6 M) as the β-adrenoceptor agonist, propranolol as β receptor antagonist, or N-w- nitro- L arginine methyl ester (L-NAME) (10-4 M) as the inhibitor of the NO synthase enzyme was measured. The results showed that the contraction force exerted on the isolated duodenum pieces by acetylcholine was remarkably reduced in the presence of licorice rhizome extract compared to that of the control group ($P<0.05$). However, this response in the presence of atropine, propranolol and (L-NAME) was not changed significantly. According to the results of the study, alcoholic extract of licorice rhizome decreases bowel motility. This inhibitory effect was independent of cholinergic, β- adrenergic and nitrergic pathways.

Effect on diabetes: The effects of long-term glycyrrhizin treatment (2.7, 4.1 g/kg diet) on diabetic symptoms were studied using genetically non-insulin dependent diabetic model mice (KK-Ay). The elevation of blood glucose concentration was almost entirely suppressed in mice fed the 0.41% glycyrrhizin diet 7 weeks after the beginning of test feeding, although it was not suppressed in mice fed the control diet or the 0.27% glycyrrhizin diet. Water intake in the control and 0.27% glycyrrhizin diet groups increased gradually, whereas, this was not true in the 0.41% glycyrrhizin diet group. Glycyrrhizin treatment significantly lowered blood insulin level. It did not affect the food intake or body weight. 0.41% glycyrrhizin diet in mice also improved their tolerance to oral glucose loading 9 weeks after the beginning of test feeding. The effect of glycyrrhizin was studied on streptozotocin (STZ)-induced diabetic changes and associated oxidative stress, including haemoglobin-induced free iron-mediated oxidative reactions. Glycyrrhizin treatment improved significantly the diabetogenic effects of STZ, it modulated blood glucose level, glucose intolerant behaviour, decreased serum insulin level including pancreatic islet cell numbers, increased glycohaemoglobin level and enhanced levels of cholesterol and triglyceride. The treatment significantly reduced diabetes-induced abnormalities of pancreas and kidney tissues. Oxidative stress parameters, serum superoxide dismutase, catalase, malondialdehyde and fructosamine in diabetic rats were reverted to respective normal values after glycyrrhizin administration. Free iron in haemoglobin, iron-mediated free radical reactions and carbonyl formation in haemoglobin were pronounced in diabetes, and were counteracted by glycyrrhizin. Effects of glycyrrhizin and glibenclamide treatments appeared comparable.

Hypolipidemic effect: Ethanolic extract and its ethyl acetate soluble, water soluble and hexane soluble fractions decreased serum level of total cholesterol by 25.9, 38.0, 39.0 and 26.3%, respectively in high fructose diet induced dsyslipidaemic in Syrian golden hamsters. Furthermore, they also increased the serum HDL-cholesterol level by 14.8, 34.3, 27.3 and 17.2%, and decreased triglyceride level by 31.3, 37.2, 41.2 and 28.9%, respectively. The reduction in LDL-cholesterol level by ethanolic extract, ethyl acetate soluble fraction and water soluble fraction were 43.9, 31.0, 33.4 and 24.6%, respectively.

Effect on body weight: In studying of body weight changes of rats pre-treated with licorice in infusion and tea forms, the results showed that after 4-weeks, the mean values of body weight gains for control and pre-treated rats group with licorice infusion and tea were 118.5, 132.6 and 121.7 gm ($p < 0.01$) respectively. After 8-weeks, the group of male rats drank licorice infusion were increased in weight than that of the control.

Effect on metabolic syndrome: Therapeutic potential of *Glycyrrhiza glabra* root extract incorporated diet at 300 mg/kg/day was evaluated in a rat model with high-fat diet-induced signs of metabolic syndrome. *Glycyrrhiza glabra* root extract significantly reduced the weight of epididymal tissue (19.0%, $p < 0.01$) and basal serum glucose level (19.4%, $p < 0.05$), decreased systolic blood pressure by 12.0% ($p < 0.05$), reduced serum IL6 and corticosterone levels induced by HFD and reduced triacylglycerol accumulation in the liver(125).

Reproductive and hormonal effects: The aphrodisiac activity of aqueous extract of *Glycyrrhiza glabra* roots and rhizomes was investigated in rats. 150 mg/kg & 300 mg/kg/day were administered orally by gavage for 28 days. Mount latency, intromission latency, mounting frequency, intromission frequency observed before and during the study at day 0, 7, 10, 14, 21, and 28. The extract reduced significantly mount latency and intromission latency. The extract also increased significantly mounting frequency and intromission frequency(126). Licorise showed mineralocorticoid properties due to the presence of glycyrrhizin and its metabolite 18β-glycyrrhetinic acid, which was an inhibitor of cortisol metabolism. It was suggest the mineralocorticoid properties of liquorice, agonist of mineralocorticoid receptors and mild inhibitor of androgen synthesis, can reduce the prevalence of side effects related to the diuretic activity of spironolactone in patients with PCOS (Polycystic Ovarian Syndrome). 18β-glycyrrhetinic acid, was a potent competitive inhibitor of 11β-HSD (11β-hydroxysteroid dehydrogenase). Lowered 11β-HSD activity resulted in higher peripheral and intrarenal

concentrations of corticosterone in experimental animals and cortisol in humans, which interacted with mineralocorticoid receptors and promote Na+ re-absorption. Acute pretreatment of adrenalectomized male rats with the the water-soluble succinate derivative of 18β-glycyrrhetinic acid (carbenoxolone sodium) caused both cortisol and corticosterone to display significant mineralocorticoid-like activity, particularly Na+ retention(129-130). *Glycyrrhiza glabra* (25 mg alcoholic extract) showed high estrogenic activity reflected by uterine response and vaginal opening. Based upon the mouse uterine weight method, three doses of 25 mg of the alcoholic extract showed an estrogenic activity 1:4716980 of estradiol monobenzoate. Six *Glycyrrhiza* phenols showed binding affinities for the bovine uterine estrogen receptor. The affinity of a dihydrostilbene with two 3-methyl-2-butenyl (prenyl) groups, gancaonin R, was higher than those of isoflavone phytoestrogens (genistein and daidzein) in dietary foods. The affinities of the other five phenols, a flavanone (liquiritigenin), two prenylflavanones (isobavachin and sigmoidin B), a prenylated coumestan (glycyrol), and a pyranoisoflav-3-ene (glabrene), were similar to that of the dietary isoflavone, genistein or daidzein.

Effect on oral health, aphthous ulcer and lichen planus: In a double-blind, placebo-controlled trial, 24 patients with recurrent aphthous ulcers were randomly allocated to consume 2 g glycyrrhizin (carbenoxolone sodium) in 30 ml of warm water three times daily following meals for four weeks. Oral licorice mouthwash significantly reduced the average number of ulcers per day, pain scores, and the development of new ulcers compared with placebo. In another trial, 20 patients used DGL mouthwash four times daily. 50-75 percent clinical improvement was recorded in 15 patients after only one day, with complete healing of canker sores after three days(133-134). In an open clinical trial, 17 hepatitis C positive patients with oral lichen planus (an inflammatory disease characterized by lymphocytic hyperkeratosis of the oral mucosa) were given either routine dental care or 40 ml iv glycyrrhizin daily for one month. 66.7% of patients showed general clinical improvement, decreased redness, fewer white papules, and less erosion of the mucosa(135).

Effect on the skin: The extract of liquorice was reported to be an effective pigment lightening agent. Glabridin, in the hydrophobic fraction of liquorice extract inhibited tyrosinase activity in cultured B16 murine melanoma cells. Glabridin, licochalcone A and isoliquiritin were inhibited tyrosinase activity. *In vitro* tyrosinase enzyme inhibition studies has showed that 21.2 µg/ml of methanolic extract of liquorice caused 50% tyrosinase enzyme inhibition. Due

to good tyrosinase inhibition activity, liquorice extract can be used to formulate cosmetic formulations with depigmenting activity. Ethanolic extract of *Glycyrrhiza glabra* was reported to show improvement in the viscoelastic and hydration properties of the skin(136-138). A double blind placebo controlled study was carried out on one hundred female volunteers suffering from melasma (93 completed the study). Half of the females were used 2.5% of *Glycyrrhiza glabra* extract cream and the other half were used placebo for 28 days. Comparison between the active treated cream and placebo on week intervals, indicated a non significant improvement for the first week of the treatment course (P=0.18). However, there was a significant difference in the improvement rate between the two treatment groups for week 2 (P=0.009), week 3 (P=0.005) and week 4 (P=0.001)(139). Liquorice showed hair growth stimulatory activity. Comparison between liquorice extract and Minoxidil 2%, showed that, 2% concentration of liquorice hydro-alcoholic extract possessed better hair growth stimulatory activity than 2% Minoxidil(140).

Immunological effect: Neutrophils treated with alcoholic extract of *Glycyrrhiza glabra* showed increase in phagocytic activity. The effect of *Glycyrrhiza glabra* root extract (0.1, 0.2 and 0.3 mg/l drinking water) was investigated on the performance and some immunological parameters of broiler chickens. *Glycyrrhiza glabra* root extract had no significant ($P > .05$) effect on immunological parameters including antibody titers against Newcastle disease and Influenza viruses, heterophil and lymphocyte percentages and heterophil to lymphocyte (H/L) ratio as well as liver and lymphoid organ (bursa of Fabricius, thymus and spleen) weights.

Mizaj (Temperament) : Hot 2^0 and dry 2^0

Musleh (Correction) : Katira gum, Gul-e-Surkh

Badal (Proximal substitute) : Khulanjan.

Identity, purity & strength:

Total ash	: Not more than 10 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 2.5 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 10 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 20 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Munziz, Muqawwi-e-Asab, Mohallil-e-Waram, Munaffis-e-Balgham, Kasir-e-Riyah, Mudirr-e-Baul, Mudirr-e-Haiz.

Mahall-e-Istemalat (Therapeutic uses): Sual, Khushunat-e-Halaq, Bohat-us-Saut Haad, Zeequn Nafas, Hirqat-ul-Baul.

Meqdar-e-khorak (Dose): 3 to 7 gm

Side-effects: Licorice is likely safe for most people when taken by mouth in amounts found in foods. Licorice is possibly safewhen taken by mouth in larger amounts for medicinal purposes and when applied to the skin for a short amount of time. However, it is possibly unsafe when taken by mouth in large amounts for more than 4 weeks or in smaller amounts long-term. Consuming licorice daily for several weeks or longer can cause severe side effects including high blood pressure, low potassium levels, weakness, paralysis, and occasionally brain damage in otherwise healthy people. In people who eat a lot of salt or have heart disease, kidney disease, or high blood pressure, as little as 5 grams per day can cause these problems.

Other side effects of licorice use include tiredness, absence of a menstrual period in women, headache, water and sodium retention, and decreased sexual interest and function in men.

Important formulations: Habb-e-Ghariqoon, Habb-e-Surfa, Habb-e-Surfa Qawi, Qurs-e-Zarishk, Dayaqooza, Lauq-e-Hulba, Lauq-e-Khiyar Shmabar, Lauq-e-Nazli, Lauq-e-Sapistan, Lauq-e-Shamoon, Lauq-e-Zeequn Nafas, Majoon-e-Mundi, Qairooti-e-Aarad-e-Karsana, Raughan-e-Sanan, Sharbat-e-Sadar.

ASPAGHOL

(Seed)

The drug Aspaghol consists of mature dried seeds of *Plantago Ovata* Forsk. Syn, *Plantago ispaghula*Roxb. (Plantaginaceae).Aspaghol (Psyllium) are the seeds of one species of the herb plantain.

Othernames:

a) Botanical name: *Plantago ovata* Forsk. Syn, *Plantago ispaghula* Roxb.

b) Family: *Plantaginaceae*

c) Bengali name: Eshopgol

d) English name: Spogel seeds

Description:

a) General:This is a seed of Plantago ovata (psyllium or dessert Indian wheat), which is a small annual herb. It is cultivated worldwide due to its medicinal importance. It grows very low to the ground on roadsides on sandy soil and prefers dry weather. The plant is small bushy herb and produces small white flowers. The seeds are smooth, dull ovals with a pinkish-white or dark brown coloring, and the leaves are opposite, lance-shaped, hairy and 4-10 inches long. The leaves bear three veins. It is commonly considered a weed. If seed pods are not harvested before they break open, the 15,000 seeds that the plant can grow may be scattered about by the wind. The species of plantain known as psyllium (*Plantago ovata*) is an annual herb. It is also grows in our country too.

The height of Aspagholplant is about 12-18 inches.Roots are short, well-developed tap roots with fibrous secondary roots. The stem is erect but soft. It is non-woody. Flowers are hermaphrodite and pollinated by wind. It is white in color and in form of the inflorescence. The fruits are 7-8 mm long and oval. The seeds are pink or brown in color. They are an ovular boat or ear-shaped and 2mm long. Seeds are present inside capsules. The plant spreads on the ground. Flowering occurs after 60 days of the plantation. The plant prefers full sunlight or partial sunlight. It requires moderate water for growth. It is easy to maintain the plant. The plant should be protected from pests and microorganisms. Leaves and seeds have medicinal properties. The leaves are used as medicine and added in food items. The flower attracts the insects and bees for pollination. The Growing Season is spring. It is a short-lived plant and stays alive for 130 days. The seed and husk of the plant are edible. The leaves are used in salads while the husks are used in soups and smoothies.




b)Macroscopic:Seeds boat-shaped, somewhat acute at one end, from two to three millimetres long and from one to one and a half millimetres wide; pale greyish-brown, with a darker elongated spot on the convex side; on the concave side the hilum covered with the remains of a thin white membrane. In water the seed swells and produce a viscous mucilage.

c) Microscopic:Transverse section of seed is oval in outline while the longitudinal section is oblong, elliptical. The transverse section cut through one end of the seed shows a central core of radical surrounded by endosperm while the other end shows two fleshy cotyledons. The structure of seed coat is simple. The epidermis of the testa is composed of polyhedral cells, the walls of which are thickened by a secondary deposit, the source of mucilage. A thin brownish layer is found in between the epidermis and the albumin. The albumin is formed of

thick walled cells which are rich in matter like the fixed oil and proteins. The cells of embryo are parenchymatous and packed with aleurone grains.

Powder: As the seeds are very slippery, fine powder could not be obtained. However, a coarse. Creamy brownish powder with somewhat sweet & mucilaginous taste but without any characteristic odour was observed.

Parts used: Seeds**,** Husk**,**

Habitat: The drug Aspaghol consists of mature dried seeds of Plantago Ovata Forsk. The herb is found in West Bengal as well as in our country also. The plant occurs during winter season. Flowering takes place during November to January while fruiting occurs during March - April.

Phytoconstituents: Protein, Tannin, Glycosides, Fixed oils, Carbohydrates, Iron, Zinc, Potassium and Sodium.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Allergic reaction effects: IgE-mediated allergic mechanism is probably responsible for the allergic symptoms in many individuals with repeated psyllium exposures.

Anti-inflammatory effects: Five phenylethyanoids were isolated from Plantago lanceolata herbage and tested in mice with arachidonic acid-induced mouse ear edema. Acetoside and plantamajoside were found to have an anti-edema effect.

Chemoprotective effects: Psyllium alone does not affect the absorption of carcinogens in the gastrointestinal tract, and the soluble fiber formed by psyllium does not bind to carcinogens. Some evidence suggests that psyllium might improve the chemoprotective effect of wheat bran.22 Psyllium might help maintain normal cell proliferation in the colon. Psyllium fiber is converted to butyrate, which appears to be important in protecting against colon cancer.

Cholesterol-lowering effects: Studies on the effects of psyllium on cholesterol absorption have been conflicting. One proposed hypocholesterolemic effect of psyllium is "displacement" of dietary fat by soluble fiber. Psyllium in the diet may simply displace fats and cholesterol in the diet, reducing the amount available for absorption, but not directly affecting cholesterol. Psyllium has been shown to increase fecal excretion of bile acids and cholesterol, bind bile acids and cholesterol in the intestines, allow less circulation for reabsorption, and cause the

liver to use more cholesterol to make bile acids. Fatty acids, propionate and acetate, had an indirect inhibitory effect on cholesterol in the liver. These fatty acids are produced from soluble fiber by bacteria in the colon. In a human study, psyllium lowered LDL, decreased cholesterol absorption, and increased the fractional turnover of both chenodeoxycholic and cholic acids. The authors' conclusion was that psyllium lowered LDL primarily via the stimulation of bile acid synthesis. Other researchers have also come to similar conclusions. Hypocholesterolemic effects of psyllium are possibly imparted through increased fecal bile acid elimination, with a compensatory increase in bile acid synthesis. A single animal study found that psyllium, when added to pre-existing cholestyramine therapy, reduced hepatic cholesterol content and reversed the LDL receptor suppression induced by single-agent resin therapy. The hypocholesterolemic action of psyllium and plant sterols can be explained in part by modifications in the intravascular processing of lipoproteins and by increases in LDL receptor-mediated uptake. Psyllium exhibited viscous characteristics throughout small intestinal simulation, indicating potential for these fibers to elicit blood glucose and lipid attenuation.

Gastrointestinal effects: The laxative properties of psyllium are due to the swelling of the husk when it comes in contact with water. The polysaccharides in psyllium that form into a gel in the intestine also lubricate stool contents and provide greater ease during defecation. The resulting bulk stimulates a reflex contraction of the walls of the bowel, followed by emptying. Studies exploring the mechanism of the laxative effects of psyllium have been somewhat conflicting, but have generally revealed an increase in bowel movements daily, an increase in wet and dry stool weight, and a decrease in total gut transit time with psyllium administration. In persons with diarrhea, the mucilage may increase the water-holding capacity and viscosity of stools, which delays gastric emptying and improves stool consistency. Psyllium maintains remission in ulcerative colitis since fermentation of blond psyllium in the colon yields butyrate, a short-chain fatty acid known to inhibit cytokine production and have an anti-inflammatory effect. With irritable bowel syndrome, blond psyllium may normalize bowel function and relieve symptom severity by reducing rectosigmoidal pressure.

Glucose-lowering effects: The glucose-lowering effects of psyllium may be mediated by its slowing the access of glucose to the small intestine, delaying gastric emptying, or through carbohydrate digestion and absorption. Psyllium appears to decrease hyperglycemia in response to dextrose intake, when it is given simultaneously with dextrose, possibly by interfering with glucose intestinal absorption.38 Psyllium exhibited viscous characteristics

throughout small intestinal simulation, indicating the potential for these fibers to elicit blood glucose and lipid attenuation.

Mizaj (Temperament): Cold 3° Moist 2°

Musleeh (Corrective): Sekanjabeen-e-aslee, Shahad

Badal (Proximal substitute): Habbus safarjal

Identity, purity and strength:

Foreign Matter	-	Not more than 2%,	Appendix 2.2.2
Total Ash	-	Not more than 4%,	Appendix 2.2.3
Acid insoluble ash	-	Not more than 15%,	Appendix 2.2.4
Alcohol-soluble extractives	-	Not less than 0.4%,	Appendix 2.2.6

TLC behavior of petroleum ether (60-80^{o}) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Benzene: Chloroform (1:4)	I_2 vapours	3	0.14, 0.26, 0.96

Aa'maal-e-Adviya (Pharmacological Action): Musakkin, Mohallil, Mulaiyin

Mahall-e-Istemalat (Therapeutic use): Zaheer, Qabz, Sual-e-Yabis, Zat-ul-Janb, Qulanj, Waram-e-Luhut, Waj-ul-Mafasil

Meqdar-e-Khorak (Dose): 4.5 - 7 g

Side-effects / Adverse-effects: No significant side effects have been observed.

Important formulations:

Habb-e-Sil, Qurs-e-Kafoor, Qurs-e-Munawwim Barid, Qurs-e-Sartan, Qurs-e-Shadnaj, Qurs-e-Tabasheer Mulaiyin, Qurs-e-Ziabetus-Khaas, Shiyaf-e-Abyaz, Laooq-e-Behidana, Marharn-e-Dakhilyun, Sufoof-e-Moya, Sufool-e-Teen.

AZARAQI

(Seed)

Azaraki (Nux vomica) is a deciduous tree native to Indian subcontinent and to Southeast Asia. Mainly the seed is used to make medicine after detoxification. It is a major source of the highly poisonous, intensely bitter alkaloids strychnine and brucine derived from the seeds inside the tree's round, green to orange fruit. The seeds contain approximately 1.5% strychnine, and the dried blossoms contain 1.0%. However, the tree's bark also contains brucine and other poisonous compounds.Seeds of Azaraqi should he used after proper detoxtication (Modabbar)

Other names:

a) Botanical name: *Strychnos nuxvomica* Linn

b) Family: Loganiaceae

c) Bengali name: Kuchila

d) English name: *Nux-vomica*

Description:

a) General: It is a medium-sized tree with a short, thick trunk that grows in open habitats. The wood is dense, hard white, and close-grained. The branches are irregular and are covered with a smooth ashen bark. The young shoots are a deep green colour with a shiny coat. They have an opposite decussate arrangement (each opposing pair of leaves at right angles to the next pair along the stem), are short stalked and oval shaped, have a shiny coat, and are smooth on both sides. The leaves are about 4 inches (10 cm) long and 3 inches (7.6 cm) wide. The flowers are small with a pale green colour and a funnel shape. They bloom in the cold season and have a foul smell. The fruit are about the size of a large apple with a smooth and hard shell that when ripened is a mild shade of orange in colour. The flesh of the fruit is soft and white with a jelly-like pulp containing five seeds covered with a soft, woolly substance. Mainly the seed is used to make medicine.

b) Macroscopic: The ashy grey or greenish grey seeds have the shape of a flattened disc completely covered with hairs radiating from the center of the sides. This gives the seeds a very characteristic sheen. The seeds are very hard, with a dark gray horny endosperm where the small embryo is housed that gives off no odor but possesses a very bitter taste. The disc shaped seeds are about 17-29 mm across and 2.5-7 mm thick. They are usually uneven inside, a little depressed on one side and arched on the other.

c) Microscopic: The testa is about 0.1 nun thick and is divided into an outer trichomatous epidermis and on inner layer of ground tissue, each epidermal cell is extended to form an appressed trichome. The walls of these cells are highly thickened and lignified. The ground tissue of the testa functions as a nutrient layer and is represented by abrkmn bend of flattened parenchyma. In transverse section these cells appear as ill defined polygonal cells. Theendosperm is composed of thick walled cellulosic parenchyma, the cells of which are isodiametric, are largertowards inside. The epidermis of the endosperm and the one or two outer layers are formed ofrather smaller cells. The walls of which swell to a less extent in Water- Soluble extractive(s). Fixed oil and aleuronegrains of irregular and various shapes are present in the protoplasm.The aleurone grains do not contain crystalloids but severalglobules are usually present in each grain.

Powder: The powder is yellowish to brownwish grey with a slightly fatty and radical odur and an intensely persistent bitter taste. The powder analysis of the crude drug shows the

sclerenchyrnatous epidermis of the testa, very abundant fragments of the lignified rods of the trichomes and abundant fragments of endosperm and large number of aleurone grains.

Parts used: Seed, Bark, Leave

Habitat: It is a medium-sized tree with a short, thick trunk that grows in open habitats of the country too. Though it is native to Indian subcontinent and to Southeast Asia.

Phytoconstituents:

Alkaloids, glycosides, carbohydrates, proteins/amino acids, steroids, resin, triterpenes, tannins. Glucoside-loganin from fruit brucine, strychnine, vormicine, metnoxyrthychinna and C-mavcusine from leaves and roots pseduobrucine, a and b colubrinesn novacine, strychnine methosulphateisostrychnine, Nmethyl-sec:-pseudo-B-colubrine, 4-hydroxystrychine, P-hydroxybenzoic, vanillic, 2-hydroxy-4-methoxybenzoic, sinapic and syringic acids, kaemferol, quercertin and 3-0 methylquereetin, a new alkaloid- protostrychnine, normacusine B and 4-hydroxy-3-methoxystrochine.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Hepatoprotective: Nux vomica is listed as a toxic drug; however its processed extract still used in various herbal formulations for the treatment of various ailments including liver diseases and jaundice. Recent, In vivo study demonstrated the hepatoprotective potential of processed seed extract in assays involving CCl4-induced liver injury in rats. Oral administration of varying doses of processed seed extract for 5 days resulted in the reduction of serum levels of glutamate pyruvate transaminase (GPT), glutamate oxaloacetate transaminase (GOT), alkaline phosphatase (ALP), bilirubin, cholesterol in addition with the restoration of glutathione (GSH) and reduced lipid peroxidation in liver tissue. In a study performed by Visen et al. loganin was isolated from the fruit of nux vomica and was showed excellent hepatoprotective potential in ex vivo and In vivo models of liver injury induced by galactosamine. This hepatoprotective potential of loganin was confirmed by ameliorating the galactosamine-mediated reduction of hepatocytes viability as well as bile volume and bile contents.

Antioxidant: Antioxidant property of nux vomica seeds was first reported by Tripathi and Chaurasia. The ethanol extract of nux vomica dose dependently inhibited the FeSO4-induced

lipid peroxidation through the chelation of Fe++/Fe+++ ions not by tapping the hydroxyl radicals.[32] In further studies, Chitra et al. established that the methanol extract of seeds showed significant antioxidant activity by reducing lipid peroxidation and increasing the levels of antioxidant enzymes like super oxide dismutase (SOD) and catalase in the liver of alloxan-induced diabetic rats. Antioxidant potential of nux vomica seed extract may be attributed to the presence of antioxidant compounds such as loganin, uvaol, secoxyloganin, maltol, lupeol, hydroxybenzoic acid and caffeic acid.Besides, chloroform, ethyl acetate and methanol extracts (100 μg/ml) of nux vomica leaves showed significant in vitro antioxidant capacity in terms of scavenging 2,2-diphenyl-1-picrylhydrazyl (DPPH) radicals; however the methanol extract had higher scavenging activity (IC50 73.41 μg/ml) than ethyl acetate and chloroform extracts. Another studies established that the nux vomica leaves contain high levels of non-enzymatic (superoxide dismutase, ascorbate peroxidase, catalase, peroxidase and polyphenol oxidase) and enzymatic (ascorbic acid, α-tocopherol and reduced glutathione) antioxidants. Hence, it was postulated that the antioxidant effect of nux vomica leaves might be predominantly due to the abundance of non-enzymatic and enzymatic antioxidant contents. However, further studies are warranted to evaluate the antioxidant potential of these individual anti-oxidant components. In order to investigate the antioxidant potential, the methanolic flower extract of nux vomica also showed significant DPPH free radicals scavenging activity.

Antinociceptive: Nux vomica seeds extract has been used in various analgesic preparations of traditional medicine. Using tail-pressure, hotplate and acetic acid-induced writhing tests models, the intraperitoneal administration of crude alkaloid fractions (CAF) and processed alkaloidal fractions (PAF) of nux vomica seeds extract exhibited antinociception potential in mice; however PAF showed stronger antinociception than CAF. Using the same models, the transdermal administration of modified total alkaloid fractions (MTAF) containing low strychnine and high brucine was significantly improved the analgesic activity in compared to the total alkaloidal fractions (TAF). Strychnine possessed little antinociceptive property; however brucine and brucine N-oxide showed strong antinociceptive potential. It has been also demonstrated that the transdermal absorption of brucine of MTAF was significantly higher than brucine alone, which might account somewhat for the higher antinociceptive potential of MTAF. Therefore, it has been postulated that antinociceptive potential of nux vomica seed extract might be due to a synergistic effect of low level strychnine with brucine and brucine N-oxide which might attributed by the inhibition of cyclooxygenase (COX) and monoamine oxidase activities.

In a recent studies, oral administration hydro-methanolic leaves extract of nux vomica also showed promising dose dependent (100, 200 and 400 mg/kg) analgesic activity in various animal models and the extract dose of 400 mg/kg showed highest analgesic potential which was comparable to that of the standard analgesic drug, diclofenac (100 mg/kg). This pharmacological activity of the leaves extract was due to the presence of strychnine, brucine, and brucine N-oxide in association with analgesic flavonoid compounds. The postulated mechanisms of this activity might involve peripheral analgesic (inhibition of COX and/or lipoxygenases) and central analgesic (inhibition of central pain receptors) effects of these compounds.

Anti-allergic: Nnux vomica has been used for alleviating inflammation, arthritis, joint pain and allergic symptoms. In vivo study demonstrated that the intraperitoneal administration of aqueous stem extract of nux vomica significantly suppressed the induction of ovalbumin (OVA)- specific IgE antibody response in different haplotypes of mice viz. BALB/C, C57BL/6 and SWR/J without any significant change in the total IgG antibody response against OVA.

Anti-inflammatory: The seeds of nux vomica are used in various for the treatment of pain, inflammation and rheumatism. A number of different solvent extracts from different parts of S. nux vomica have shown anti-inflammatory activity in different test models. Mitra et al. reported the significant anti-inflammatory activity of raw and purified seed extract of this plant against formaldehyde induced hind paw edema in rats. In a more recent study, the MTAF of nux vomica seeds extract with a low strychnine content showed 1.8 times higher anti-inflammatory potential than that of total alkaloid fraction (TAF) at the dosage of 1 mg/kg body weight against xylene-induced ear edema in rats. Alkaloids of nux vomica seeds such strychnine, brucine and brucine N-oxide were reported as primary active compounds exhibited significant anti-inflammatory activity. Brucine and brucine N-oxide showed higher anti-inflammatory potential than that of strychnine; since brucine N-oxide was found to more active than that of brucine. Both, brucine and brucine N-oxide were found to inhibit the release of prostaglandin E2 in inflammatory tissue, reduced acetic acid-induced vascular permeability and the content of 6-keto- PGF1a in blood plasma of Freund's complete adjuvant (FCA) induced arthritis rats. In addition, both compounds were also shown to reduce 5-hydroxytryptamine (5-HT), while increased 5-hydroxytryindole- 3-acetic acid (5-HIAA) contents in blood plasma. On the other hand, orally administered hydro-methanolic leaves extract (100, 200 and 400 mg/kg) was also showed dose dependent anti-inflammatory potential against carrageenan-induced paw edema in rats. In this acute inflammation model,

the extract dose of 400 mg/kg showed maximal inhibitory effect against carrageenan-induced paw edema and the result was comparable to that of the reference drug, diclofenac (100 mg/kg). In order to understand the mechanism of anti-inflammatory potential leaves extract, paw tissue exudates and plasma were analyzed and found that the leaves extract significantly lowered the high levels of prostaglandin E2 (PGE2), TNF-α, malonaldhyde (MDA) with higher superoxide dismutase (SOD) content in paw tissue exudates with the reduction of elevated levels of PGE2, TNF-α, IL-1β, and IL-6 in serum. It was suggested that these effects of leaves extract could be mediated through the inhibition of COX and subsequent inhibition of PGE2 synthesis.

Antipyretic: Antipyretic activity of nux vomica leaves extract against yeast induced pyrexia in rats was studied by Eldahshan and Abdel-Daim. The methanolic leaves extract showed dose dependent antipyretic activity; however higher dose of extract (400 mg/kg) showed comparable efficacy as compare to the standard drug, paracetamol (150 mg/kg).

Gastroprotective: Nux vomica seeds extract are often clinically used as important remedy for gastritis, gastric ulcers, atony and relaxation of the stomach and bowels. Recent investigation with highly diluted form of nux vomica seeds extract (10c) prepared in ethanol was found to reduce Helicobacter pylori induced up-regulation of HB-EGF gene expression in KATO-III cells even in dilutions beyond Avogadro's number.

Antidiabetic: It has been found that the oral administration of ethanolic (50%) and aqueous extracts (3.6 mg/kg) of nux vomica seeds showed significant hypoglycemic potential in alloxaninduced diabetic rats. Effective and significant results for both extracts were observed in reducing the blood glucose level and the results were comparable with that of standard (gliclazide, 10 mg/kg). In a similar study, the methanolic seed extract of nux vomica also reduced the blood glucose level in addition with the reduction of serum levels of total protein, cholesterol, creatinine and blood urea nitrogen (BUN) in alloxan induced diabetic rats. Besides, the methanol extract of nux vomica leaves also exhibited dose dependent antidiabetic potential via inhibition α-amylase activity and non-enzymatic glycosylation of haemoglobin.

Neuropharmacological:Studies showed that the sub-convulsive dose of processed seed extract (125 mg/kg) significantly inhibited the pentylenetetrazole-induced convulsions and potentiated barbiturate induced hypnosis in animals and the facts are indicative of CNS depressant action of processed seed extract of nux vomica. It was also seen that processed seed extract antagonized the morphineinduced catalepsy in rats which may justify the clinical use of nux vomica in muscular rigidity.[60] Further, the brucine was found to allosteric enhancers of acetylcholine binding to the muscarinic 1 receptor by 2-fold. Therefore, it was

postulated that nux vomica seeds extract might useful in the development of drugs for the treatment of various neurological disorders such as Parkinson's and Alzheimer's diseases.
Anti-snake Venom: Anti-snake venom potential of nux vomica seeds extract was evaluated by Chatterjee et al. In low doses, nux vomica seeds extract was found to effectively neutralized Daboia russelii venom induced lethal, haemorrhage, defibrinogenation, phospholipase A2 (PLA2) enzyme activity and Naja kaouthia venom induced lethal, cardiotoxicity, neurotoxicity, PLA2 enzyme activity.

Temperament: Hot 3^0 Dry 3^0

Purification / rectification: The specific process of Modabbir (detoxifying) must be follow before
use. See appendices.

Musleeh (corrective): Qand-e-Sufaid, Lowa'baat and Adban

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	:	Not more than 2%, Appendix2.2.2
Total Ash	:	Not more than 3%, Appendix2.2.3
Acid insoluble ash	:	Not more than 15%, Appendix 2.2.4
Alcohol-soluble extractives	:	Not less than 2%, Appendix2.2.6
Water-soluble extractives	:	Not less than 7%, Appendix 2.2.7

TLC behaviour of petroleum ether (60-80^0) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Pet. Ether: Ethyl acetate (24:1)	5% Ethanolic H_2SO_4	1	0.76

Aa'maal-e-Adviya (Pharmacological Action):

Mohallil, Musaffi-e-Dam, Muqavvi-e-Aasab, Musakkin -e- Aasab, Muqavvi-e-Bah, Moharrik-e-Nukha, Muqavvi-e-Masana

Mahall-e-Istemalat (Therapeutic use):

Laqwa, Waj-ul-Mafasil, Waj-ul-Qutn, Zeeq-un-Nafas, Sil, Suzak, Falij, Nuqrus, Erqun Nisa, Zof-e-Meda, Salasul Boul, Na'mardi

Meqdar-e-Khorak (Dose): 60 - 250 mg

Side-effects / Adverse-effects: No significant side effects have been observedif Azaraqi seeds are used after proper detoxification and proper dose.

Important formulations: Habb-e-Azaraqi, Habb-e- Maewareed, Majun-e-Azaraki, Majun-e-Lana, Raughan-e-Azaraki, Tila-e- Mubahhi, Tila-e- Mumsik, Sanoon-e-Mustahakam-e-Dandan.

Note: Seeds of Azaraqi should he used after proper detoxtication (Modabbar)

BABCHI
(Fruits)

Drug Babchi consists of dry ripe fruits of *Psoralea corylifolia* Linn of Leguminaceae family. Drug yielding plant is an erect, 0.3 to 1.8 meter high annual herb, distributed throughout Indo-Pak subcontinent, found commonly in some parts of Bangladesh and India.

Other names :

Botanical :*Psoralea corylifolia* Linn.

Family : Leguminaceae

Bengali : Hakuchi, Bavachi, Late Kasturi

English name : Babachi, Babchi Seeds

Description :

General: Babchi is a commercial Hindi name for Psoralea corylifolia and the Sanskrit name is Bakuchi. It is a part of the Fabaceae plant family. The essential oil of Babchi is extracted from its seeds by steam distillation method. It is used as a cardiac tonic, pigmentor and vasodilator in Ayurveda for more than 4,000 years

Macroscopic: Fruits, dark chocolate to almost black with pericarp adhering to the seed-coat,3- 4.5mm long, 2-3mm broad, ovoid-oblong or bean shaped, somewhat compressed, glabrous rounded or mucronate, closely pitted; seeds compylotrpous, non-endospermous, oily and free from starch; odourless, but when chewed smell of pungent essential oil felt; taste bitter unpleasant and acrid.

Microscopic: Transverse section of fruit shows pericarp with prominent ridges and depressions, consisting of collapased parenchyma and large secretory glands containing oleo-resinous matter; testa, an outer layer of palisade epidermis, layer of bearer cells which are much thickened in the inner tangential and basal radial walls and 2-3 layers of parenchyma; cotyledons of polyhedral parenchyma and three layers of palisade cells on the adaxial side.

Parts Used: Dry ripe fruits

Phyto Constituents: Essential oil, fixed oil, psoralen, psoralidin, isopsoralen and bakuchiol.

Af'aal-e-Advia (Pharmacological activities):

Antibacterial activity: *P. corylifolia* has been tested for antibacterial activity. Wang et al.(2013) reported that twoisolated compounds, Corylifolinin andneobavaisoflavone, possessed significant antibacterialactivity againstStaphylococcus aureus (SA),

Methicillin-resistant Staphylococcus aureus(MRSA),and β-lactamase positive Staphylococcus aureus (ESBLs-SA).The minimum inhibitoryconcentration (MIC) for Corylifolinin andneobavaisoflavone against SA, MRSA, and ESBLs-SA were (MIC 0.781, 3, 1.562, 5, 0.781 25 micro g x disc (−1) and 6.25, 6.25, 6.25 microg x disc (−1),respectively. In another study, psoralidin and bakuchicincompounds were extracted from *P.corylifolia* (seeds) showed significantinhibition of Gram-negative bacteria, including Shigella sonneiand Shigella flexneri, whereas psoralen and angelicin compoundsshowed promising activities against Gram-positive bacteria, SA. Theconcentrations of various compounds used were in range of 200–400 μg/disc and the results were compared with the standard antibioticKanamycin at 30 μg/disc (Khatune, Islam, Haque, Khondkar, &Rahman, 2004). Yin and colleagues isolated 16 new compounds from*P. corylifolia* seeds including three new prenylflavonoids (corylifols).Nine compounds exhibited significant antibacterial activity against SAand S.epidermidis (Yin et al., 2004). In one experiment, bioassay guidedisolation lead to the purification of antibacterial compound bakuchiolfrom crude methanol extracts of seeds of *P. corylifolia*. The compoundfound to be effective against Mycobacterium, M. aurum andM. smegmatis. But P. corylifolia extract was found to have significantantibacterial activity against M. aurum only (MIC = 62.5 μg/ml; Newton,Lau, Gurcha, Besra, & Wright, 2002).

Antiviral activity: The crude ethanol extract of the seeds of *P. corylifolia* was revealed tohave high activity againstthe severe acute respiratory syndromecorona virus (SARS-CoV) papain-like protease (PLpro) with an IC50 ofvalue of 15 μg/ml. SARS-CoV-PLpro is a main enzyme that have a vitalrole in SARS virus replication (Kim et al., 2014).

Antifungal: A phenolic compound bakuchiol extracted from *P. corylifolia* (seeds)exhibited antifungal activity against many strains of pathogenic fungi,including Microsporumgypseum, Epidermophyton floccosum,Trichophyton rubrum, and Trichophyton mentagrophytes in a dose rangeof about 250 μg/ml (Hosamani, Lakshman, &Sandeepkumar, 2012;Lau et al., 2010; Lau et al., 2014; Newton et al., 2002; Prasad, Anandi,Balasubramanian, &Pugalendi, 2004; Savoia, 2012; Srinivasan &Sarada, 2012; Yang et al., 2006). In another study, activity was foundagainst other fungi such as Alternaribrassicae, Aspergillus niger, Fusariumoxysporum, and Rhizoctonia cerealis, in which mycelial growth wasinhibited (Satish, Raghavendra, &Raveesha, 2009; Vonshak et al.,2003; Yang et al., 2006).In one study, *P. corylifolia* significantly reduced the incidents ofseed-borne fungi, for example, Fusarium verticillioides and Aspergillusflavus, which have theability to cause many diseases in maize crop(Zeamays

L.) and latterly released mycotoxins. These mycotoxins havevery bad effect on human and animal health (Aiyaz, Divakara,Chandranayaka, & Niranjana, 2015).

Anthelmintic activity: The anti-worm property of the seeds of *P. corylifolia* is clinically provenon roundworms and flatworms (Gidwani et al., 2010). The seeds andthe leaves of *P. corylifolia* was extracted with water and alcohol, andwere tested on the spontaneous movements of Setariacervi wholeworm and again on the isolated nerve muscle preparations. The survivalof the microfilariae was tested in vitro. The dose required toinhibit the movements of whole worm and nerve musclepreparationsfor alcohol extracts of leaves were 160, 30, and for seeds were 50,20 μg/ml (Maurya, Singh, & Seth, 2014; Mendam, Kavitha, & Naik,2015; Qamaruddin, Parveen, Khan, & Singhal,2002).

Anti-Alzheimer's: Two compounds isolated from commonly used in clinical practices ofTraditional Chinese Medicine *P. corylifolia* named as IBC and BCN modulateamyloid β (Aβ) peptides, especially the peptides with 40 (Aβ40) or42 (Aβ42) residues, which are believed to be responsible for the developmentof amyloid plaques in Alzheimer's disease. The peptides wereprepared in the lab in dried form in DMSO; Aβ42 5 mg/ml was used
and was diluted in PBS to 50 μM. Both the compounds acted in a differentway. IBC significantly inhibits both oligomerization andfibrillarization of Aβ42, whereas BCN converts Aβ42 into largeunstructured aggregates in neuroblastoma cells. Both compounds
were quite effective in Alzheimer's (Chen et al., 2013).Psoralen isolated from *P. corylifolia* fruits were investigated as aninhibitor of AChE enzyme in an attempt to explore its potential forthe management of Alzheimer's disease. The concentration of psoralenused was 25–400 μg/ml. It inhibited the AchE in a dose-dependentway in animal models. Adult male Wistar rats, weighing 180–250 g,were used in the study. While a molecular docking study was also carriedout, which showed that psoralen binds well within the binding siteof the enzyme showing interactions such as π-π stacking and hydrogenbonding (Somani et al., 2015). Although the activity measured in thisstudy was moderate when compared with the standard compoundused, despite that, the compound could serve as lead for synthetic analogpreparation to improve the inhibitory activity.

Antidepressant activity: *P. corylifoia* also found to possess antidepressant activity. Marzieh Sarbandi Farahani and colleague mentioned the mechanism of action of the plants with antidepressant action and the chemical componentsisolated from them. They mentioned that

psoralidin isolated fromseeds of P. corylifolia modify the hypothalamic–pituitary–adrenal axis(Farahani, Bahramsoltani, Farzaei, Abdollahi, & Rahimi, 2015). A similar study was conducted on psoralidin by Yi and colleague onthe ICR strain of male mice. The dose was administered orally inforced swimming test and they observed the increased levels of 5-hydroxytryptamine and 5-hydroxyindoleacetic acid in the brain andan altered dopamine level. The mechanism for antidepressant activitywas proposed to be through involvement of monoamineneurotransmitter and the hypothalamic pituitary adrenal axis systems(Yi et al., 2008).Some previous studies are also available, for example, one studywas conducted on mice models and it was concluded that furocoumarins were actually responsible for antidepressant activity.In this study, the well-established antidepressants were used as standardsfor comparison with the seed extract of P. corylifolia. The doserange used was 7.5 to 100 mg/kg in comparison with amitriptyline(10 and 20 mg/kg) and fluoxetine (13 mg/kg). This study was welldesigned and results indicate the potential of the seed extract as competitiveantidepressant when compared to the conventional therapeuticagents (Chopra et al., 2013).

Antioxidant*:* *P. corylifolia* also has a wide range of antioxidant activity. Differentcompounds isolated from P. corylifolia were tested for their antioxidantpotential. A compound Psoralidin proved to be a better scavengerof DPPH free radical with IC50 values of 43.85 mg/L. Tested for ABTSfree radical scavenging activity, the compounds showed differentantioxidant activities, for example, psoralidin (IC50 1.32 mg/L),coryfolin (IC50 4.97 mg/L), daidzin (IC50 10.47 mg/L), daidzein (IC5034.22 mg/L), and astragalin (IC50 31.27 mg/L; Wang, Yin, Zhang, Peng,& Kang, 2013a).In the understanding of the reputation of this plant species inmedicines now, attention has been given to produce callus culture. Inone study, relationship between isoflavone and antioxidant activityof P. corylifolia cultures were experimented, and it was found thatroot-derived callus cultures produced more daidzein, whereas leafderviedcallus produced more genistein, and this enhanced productionwas related to enhanced antioxidant activities (Shinde, Malpathak, &Fulzele, 2010).One of the isolated compound, psoralen showed the promisingantioxidant activity (IC50 value = 1.10 ± 0.60 μg/ml) against the superoxideanion production by human neutrophils in response to formyl-Lmethionyl-L-leucyl-L-phenylalanine/cytochalasin B (fMLP/CB; Chenet al., 2011).

Anti-diabetic activity: Various components from *P. corylifolia* exhibited a variety of activitiesagainst the enzymes involved in different forms of diabetes. One ofsuch enzyme is Protein tyrosine phosphate 1B (PTP-1B), which causeda negative regulation of insulin

signaling. Two compounds, psoralidinand bakuchiol, were isolated from Ethyl-acetate fraction P. corylifoliaseeds showed protein tyrosine phosphatase 1B inhibitory activity.One compound, corylin, was found inactive. The first two compoundsrepressed PTP-1B activity in a concentration-dependent method, withIC50 values of 9.4 and 20.8 μM, respectively. Similarly, the compoundsisolated from P. corylifolia were tested in vitro for alpha-glucosidaseinhibitory activity, among the compounds, psoralidin showed morepotency with IC50 values of 40.74 mg/L, coryfolin inhibited the enzymewith IC50 values of 45.73 mg/L, and daidzein showed IC50 values of49.44 mg/L. It was concluded that these compounds have the potentialto be used against type 2 diabetes (Wang et al., 2013a). Genistein, fromP. corylifolia extract possesses anti-diabetic activity by its action as theprotective effects on pancreatic β cells (Behloul& Wu, 2013).A more detailed biochemical study was conducted on the aqueousextract of seed of P. corylifolia that caused a significant recoveryn the activities of hexokinase, glucose-6-phosphatase, and glucose-6-phosphate dehydrogenase and antioxidant enzymes such asperoxidase, catalase, and superoxide dismutase, along with the lipidperoxidation level in liver tissue and serum transaminase, andcorrected the fasting blood glucose level in streptozotocin-induceddiabetic rats at a dose of 20 mg/0.5 ml water/100gm body weight(Ghosh, Bera, Chatterjee, Ali, &Debasis, 2009).

Neuroprotective: *P. corylifolia* has been the part of many Ayurvedic formulation that areused for the treatment of various central nervous system conditionssuch as for neurotropic activity and as central nervous system protectiveagent (Goel & Ojha, 2015). Based on such report, a study was conductedon the extract P. corylifolia L. seeds. The results displayed asignificant protective effect against 3-nitropropionic acid (3-NP)induced cytotoxicity. The seed extract of P. corylifolia L. stimulatedmitochondrial respiration with uncoupling and induced an increasedbioenergetic reserve capacity. Moreover, cultured rat pheochromocytoma(PC12) cells pretreated with the extract of P. corylifolia L. seed significantlyattenuated 3-NP induced cell death, reduced ATP levels, and lowered the mitochondrial membrane potential. This study was conductedusing MTS assay on PC12 cells with a dose range of 10 μM to1 mM. A cell viability of 54.1% was observed with a dose of 25 μM 3-NP for 3-hr exposure, while the control showed 100% viability withthe same dose. This study showed that P. corylifolia seed extracts mayhave potential usefulness as therapeutic agents against neurodegenerativediseases (Im, Chae, &jun Zhang, G, Lee, M-Y., 2014).In another study, it was revealed that IBC, a flavonoid fromP. corylifolia, has the ability to ameliorate the neuronal injury in braindiseases related to inflammation, and this was accomplished throughinhibition of lipopolysaccharide

induced intercellular adhesion molecule-1 expression and leukocyte adhesion to brain endothelial cell byblocking toll-like receptor 4 signaling (Lee et al., 2015).

Anti-obesity: Various studies on animals showed that genistein has the ability todecrease body weight by decreasing food intake. It also reduced thefat pad weight and enhanced the apoptosis of adipose tissues. Forexample, one such study was conducted on ovariectomised mice. Thiswell-known trihydroxyflavone, Genistein, has also been isolated fromP. corylifolia, exhibited a potential anti-obesity and obesity related lowgrade inflammation activities through multiple mechanisms and cell signalingpathways. P. corylifolia extract possesses anti-obesity and antdiabeticactivity by its action on adipocyte life cycle, obesity-relatedlow-grade inflammation, and oxidative stress (Behloul& Wu, 2013).

Anti-coagulant effect against snake venom: The plant *P. corylifolia* extract neutralized the coagulation of caused byNajanajakarachiensis snakebite when compared with the antidoteused as a standard. The snake venom was experimented on humanplasma (citrated) to evaluate its effect on activated partial thromboplastintime (aPTT), prothrombin time (PT), and thrombin time (TT).Snake venom (200 µg/ml) was found to delay PT (13 ± 0.57 to23 ± 0.57 sec), aPTT (35 ± 1.52 to 48 ± 2.0 sec), and TT (13 ± 0.57 to 33 ± 0.57 sec). PT and TT were prolonged, and it suggested theoccurrence of thrombin-like or plasminogen activating enzymes (Asadet al., 2013; Asad et al., 2014). A further in depth study of this activityis still underway in the author's laboratory.

Immunomodulatory activity: The extract of seeds of *P. corylifolia* has been reported to have stimulantactivity against natural killer cells when tested in mice. This studyreport thatthe extract also modulates the antibody dependent cellulartoxicity. During tumor development, the seed extract also inhibited theantibody complement mediated cytotoxicity. The study was conductedon Balb/c male mice. The dose of 100 mg/kg was administered intraperitoneally.Blood collected from punctured heart and serum wasseparated to study the antibody complement-mediated cytotoxicity.The natural killer cells were removed from spleen, and antibodydependentcellular cytotoxicity was assessed (Latha, Evans, Panikkar,&Jayavardhanan, 2000).

Anticancer activity: The isolated compounds from *P. corylifolia* including arylcoumarin and

psoracoumestan showed strong anticancer potential by stronglyinhibiting enzyme system of MAPK/ERK kinase phosphorylation. Themechanism underlying was apoptosis. Other compounds, includingcorylifol C and xanthoangelol, has been proved to be a strong inhibitor of protein kinase (inhibitory concentration 50% values for epidermalgrowth factor receptor: 1.1 and 4.4 × 10−6 μg/ml, respectively; Limperet al., 2013). This was a very important study from a pharmacologicalpoint of view. Psoralidin is an ER agonist also have revealed its activityin MCF-7 cancer cells (isolated from human breast) by induction ofgene pS2 activity. EC50 values of ERE-reporter gene transcriptionactivities by psoralidin in cell lines MCF-7 was 1.85 μM (Liu et al.,2014). Psoralen also showed to invade the breast cancer cells MDAMB-231BO in another in vitro study. It also stimulates osteoblast differentiationin an in vivo study. Psolaren when tested in HumanHepatocarcinoma cells, it showed its inhibitory activity by inducingthe mechanism of Apoptosis (Guo, Liu, Ye, & Han, 2011; Jiang &Xiong,2014; Khan, Iqbal, Ahmed, & Jamil, 2015; Mohammadparast, Rustaiee,Rasouli, Zardari, & Agrawal, 2014; Nehybova, Smarda, & Benes, 2014;Rajan, Tripathi, Variyar, & Pandey, 2014; Tang et al., 2011; Wong &Rabie, 2011; Yang et al., 2012). Similarly, two more compounds fromthe same specie identified as IBC and BCN attenuate Aβ42-inducedcell toxicity. The investigation was carried out on yeast two-hybrid system(Chen et al., 2013).

Mizaj (Temperment)): Hot 2^0 and dry 2^0

Musleh (Correction): Curd, Oily product

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 8 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 2 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 13 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 11 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Musaffi-e-Dam, Mohammir-e-Jild, Muqawwi-e-Meda, Qatil-e-Deedan-e-Ama, Mulaiyin.

Mahall-e-Istemalat (Therapeutic uses): Fasad-ul-Dam, Juzam, Bars, Bahaq, Abyza.

Meqdar-e-khorak (Dose):3 to 5 gm

Side-effects: Biliousness, Edema of the legs, Acute dermatitis, Nausea, Vomiting, Insomnia, Malaise, Loose motions, Headache, Mental depression etc. may occur if use long time and abundantly.

Important formulations: Suffof-e-Bars

BADIYAN

(Fruits)

Drug Badiyan consists of dried ripe fruits of *Foeniculum vulgare* Mill. of Umbelliferae family. Drug yielding plant is an erect glabrous aromatic herb, 1-2 meter high, cultivated extensively throughout Bangladesh and upto 1830 meter and also sometimes found wild, fruits ripen in September, stems cut with sickles and put up in loose sheaves to dry the sun. Then dried fruits are beaten out in a cloth in sun, cleaned by winnowing and collected.

Other names :

Botanical :*Foeniculum vulgare* Mill.

Family : Umbelliferae

Bengali : Mauri, Panmauri

English name : Fennel

Description:

General: Fennel is a perennial, pleasant-smelling herb with yellow flowers. It is native to the Mediterranean, but is now found throughout the world. Dried fennel seeds are often used in cooking as an anise-flavored spice. But don't confuse fennel with anise; though they look and taste similar, they are not the same. Fennel's dried ripe seeds and oil are used to make medicine.

Macroscopic: Fruits, usually entire with pedicel attached; mericarps, upto about 100mm long and 4mm broad, five sided with a wider commissural surface, tapering slightly towards base and apex, crowned with a conical stylopod, glabrous, greenish or yellowish-brown with five paler prominent primary ridges; endosperm; othospermous.

Microscopic: Transverse section of fruit shows pericarp with outer epidermis of quadrangular to polygonal cells with smooth cuticle and a few stomata; trichomes, absent; vitttae, 4 dorsal and 2 commissural extending with length of each mericarp, intercostals, with an epithelium of brown cells and volatile oil in cavity; mesocarp, with much reticulate lignified parenchyma; costae, 5 in each mericarp, each with 1 vascular strand having 1 inner xylem strand and 2 lateral phloem strands separated by a bundle of fibers; inner epidermis of very narrow, thin-walled cells arranged parallel to one another in groups of 5-7 many of these groups with longer axis of their cells at an angle with those of adjacent groups(parquetry arrangement); endosperm consists of thick-walled,cellulosic parenchyma containing much fixed oil, microrosette srystals of calcium oxalate, and numberous aleurone grains upto 5meter in diameter; carpophores with very thick walled sclerenchyma in two strands, often unsplit with two strands very closed toeach other.

Parts Used: Dried ripe fruits

Habitat: The *Foeniculum vulgare*, wild fennel, also called fennel, is a perennial herbaceous plant belonging to the Umbrella family. Wild fennel is a typical Mediterranean plant. It is

most commonly found in denser populations in southern regions and islands, from baseline up to approx. 1000 meter of altitude.

Phyto Constituents: Essential oil and fixed oil.

Af'aal-e-Advia (Pharmacological activities):

Anti-viral Activity: Some study reported the antiviral activity of the essential oil of fruit sample of *Foeniculum vulgare* against the DNA virus Herpes simplex type-1. Most of the oils and compounds displayed strong antiviral effects against Herpes Simplex Virus-1 (HSV-1), ranging between 0.8 and 0.025µg/ml.

Anti-Fungal Activity: Naim et al.showed in an in vitro study, fungal and aflatoxin contamination in stored tobacco leaves and the potential of *Foeniculum vulgare* (fennel) seed essential oil as a plant-based preservative in protection tobacco during storage was examined and it showed that the fennel essential oil can thus be formulated as plant-based preservatives for food items.

Singh et al., (2010), reported that the fennel has exhibit antifungal effect. Fennel essential oils and its seed extracts have been reported to show antimicrobial and anticandidal activity. Various bark extracts from F. vulgare have also been reported to have antifungal activity against *Candida albicans*. The essential oil of F. vulgare has also been reported to reduce the mycelia growth and germination of Sclerotiniasclerotiorum and as such could be used as bio fungicide alternative to synthetic fungicides against phytopathogenic fungi. The essential oil of F. vulgare has been reported to show complete zone of inhibition against Aspergillum Niger, Aspergillumflavus, Fusarium graminearum and Fusarium moniliforme at 6 µl doses.

Anthelmintic Activity: KianiSadegh, et al. investigated that the essential oil of *Foeniculum vulgare* has antischistosomal activity and cytotoxic effects against V79 cell. The plant of displayed moderate in vitro schistosomicidal activity against adult *S. mansoni*worms, exerted remarkable inhibitory effects on the egg development, and was of low toxicity.

Antioxidant activity: KianiSadegh, et al. evaluated that the effect of fennel and sage extracts and the influence of the egg yolk source (fresh or pasteurized) on the success of freezing boar epididymal spermatozoa. The results show that the interaction between fennel and sage antioxidants with fresh egg yolk has improved the quality of the protected plg epididymal spermatozoa due to the loss of post operation damage result of oxidative stress. Marino et al.

investigated that the antioxidant activity of wild, edible and medicinal fennels from different Mediterranean countries has been determined. Wild fennel has been found to display a radical scavenging activity compared to both a medicinal and edible fennel. The methanolic extract of F. vulgare fruit has also been reported to exhibit antioxidant activity by decreasing the malondialdehyde level in F. vulgare fruit methanol extract group compared to the control group. The essential oil and acetone extracts of F. vulgare have been reported to exhibit strong antioxidant activity in comparison with Butylated hydroxyanisole (BHA) and Butylated hydroxytoluene (BHT).

Anti-Anxiety Activity: Kumar et al reported the Anxiolytic activity of the crude extract of fennel. Fennel due to phytoestrogens extensively has therapeutic use in the treatment of estrogens deficiency abnormalities. There are estrogens hormones which are involved in the phenomenon of anxiety that started functioning through GABA-A receptors. The results of a study show that with the increase in the time spent in open hands, the plant has established important acollatic effects. Picrotoxin (GABA receptor antagonist) and Tamoxifen prevented Anxiolytic effect. Therefore, fennel probably is an herbal remedy that has Anxiolytic effects mediated by GABA-nergic system and estrogens receptors. Mesfin et al, Anxiolytic activity of fennel confirmed on adult mice. This plant can have a promising effect in the treatment of anxiety and stress.

Anti-Inflammatory Activity: Mahmoud et al. reported the pharmacological effects of fennel plant, anti-inflammatory activity can be noted. It also significantly increased plasma levels of High-Density Lipoprotein (HDL) cholesterol. In contrast, it significantly reduced the level of malondialdehyde (MDA) as a measure of lipid per oxidation. These results indicate that removing methanol of fennel fruit is effective in reducing inflammation. Choi and Hwang et al, (2004) investigated that oral administration of methanolic extract of F. vulgare fruit shows the inhibitory effects against acute and sub-acute inflammatory diseases and type IV allergic reactions. Research has shown that the methanol extract of fennel has anti- inflammatory effects of fennel. The results show that by removing the methanol of the fennel seeds, it is swollen through cyclooxygenase and lipoxygenase routes.

Antibacterial Activity: Sofi et al. reported that the aqueous and organic extract of *F. Vulgare* shows the antibacterial activity against some bacterial strains. The essential oil of *Foeniculum vulgare* has also been reported to possess antibacterial activity against some human pathogenic bacteria. Ethanol and water extracts of *Foeniculum Vulgare* have shown Antibacterial activity. Mahady et al. (2005), reported the chemical constituents from

Foeniculum vulgare have been identified as active antimicrobial principles such as a phenyl propanoid derivative – Dillapional was found to be the active antimicrobial principle of the *Foeniculum vulgare* stem. Another molecule - scoplatin which is a quaterrain derivative, has been separated from vulgare and has been reported to have slight antimicrobial effects.

Antithrombotic Activity: Sofi et al. found that the essential oil of F. vulgare and its main component, anethole has been shown to have a safe antithrombotic activity that originates due to their broad-spectrum anti-platelet activity, clot destabilizing effect and vasorelaxant action. The main component of fennel oil tested in Anithol, Guinea Pig Plasma was powerful as fennel oil in preventing aggregation of arachidonic acid, collagen-ADP and U46619. Anethole also prevent thrombin-driven clutter reaction at concentrations like phenyl oil. The fennel oil and anethole were tested in rat aorta with or without endothelium and displayed comparable NO-independent vasorelaxant activity at antiplatelet concentrations which have been proved to be free from cytotoxic effects in vitro. Furthermore, both F. vulgare essential oil and anethole (100 mg/kg oral administration) provided significant protection towards ethanol induced gastric lesions in rats.

Hepatoprotective Activity: Ozbek et al. showed that the essential oil of fennel possesses hepatoprotective activity. In a study, the hepatotoxicity produced by acute CCl4 administration was found to be inhibited by fennel essential oil with evidence of decreased levels of serum aspirate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatise (ALP) and bilirubin.

Anti-diabetic activity: Soud et al. investigated that the essential oil of *Foeniculum vulgare* show hypoglycaemic activity in Streptozotocin induced diabetic rats. *Foeniculum vulgar* essential oils for diabetic mice from hyperglycemias (162.5 + 3.1 9 mg / dl) (81.97 + 1.97 mg / dl) (Activity of serum glutathione peroxide (59.72 + 2.78 U / g HB) (99.60 + 6.38) U / G HB). This makes the possibility of its inclusion in ant diabetic drug industry.

Anti-hirustism activity: Manzoor A, Riather et al. [1], reported the effect of ethanolic extract of F. vulgare has anti-hirustism activity. In a double-blind study patient were treated with creams containing 1%, 2% of fennel extract and placebo. 2% fennel creams are better than 1% fennel cream.

Oestrogenic Activity: Arya et al, (2005), studied that the anethole present in fennel has efficient effect in increase milk secretion, promote menstruation, facilitate birth, alleviate the symptoms of the male climacteric and increase libido. Fennel essential oil, the main constituent of Athol is considered active oestrogenic agent. Some other studies have suggested that the actual pharmacological active.

Acaricidal activity: Abbas, et al, (2009), reported that the fennel possess Acaricidal activity against D. farina and D. pteronyssinus using direct contact application and compared with that of the commercial repellent benzyl benzoate. The biologically active constituents of the *Foeniculum vulgare* fruit oil have been identified as P-anisaldehyde, (+)-fen chone, (−) -fen hone, thymol and estragol. The methanol extract of F. vulgare fruit has been reported to exhibit mosquito repellent activity against Aides aegypti females using skin and patch tests. The biologically active constituents of the *Foeniculum vulgare* fruits were characterised as (+)-fen hone and (z)-9-octadecanoic acid.

Gastro-Protective activity: Delaram M et al. investigated that fennel plant has significant protective effect on gastrointestinal disorders. It was shown that the use of fennel oil emulsion removed the collic in 65% of infants who were much better than the control group. The effect of fennel plant on gastric ulcer. The findings showed that the plant had a protective effect on gastric ulcer. In addition, the herb reduced the muscular lining of the stomach. These functions were attributed to its antioxidant capacity.

Anti-Cancer activity: Kooti W et al. found that anethole in fennel seed has inhibitory effect on activating TNF-α by transcription factor NF-KB. The results show that Athol stopped cellular responses inspired by these cytokines that could explain its role in suppressing cancer. It has also been specified that fennel prostate tumour with its antangongi mechanism stops xenograft. Boguga-Coca et al, evaluated apoptotic activity of fennel's ethanol findings against leukaemia. The findings have shown that the removal of cancer cells had significant apoptotic effect. In other study, methanolic extract of fennel has effects on antitumor and cytotoxic activities in mice with cancer.

Memory-Protective Activity: Abe R, et al. investigated that some plants including fennel herbs are used to enhance memory and intelligence. Therefore, the effect of removing fennel on memory in amnesiac mice was examined. The results showed that there was a memory increase property in removing this. The effect of removing fennel in the form of a neurotropic factor in mice and anti-acetlocholinastase was investigated. The findings of this study have

shown that acetylchlorastasus has been severely stopped in fennel extract. According to this study it can be deduced that fennel might be used min treatment of cognitive disorders such as dementia and Alzheimer.

Mizaj (Temperment): Hot 2^0 and dry 2^0

Musleh (Correction): Chandalsafed, Kishneez

Badal (Proximal substitute): Anisun,Seed of corpus

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 12 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 15 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 4 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 1 per cent, Appendix 2.2.7
Volatile oil	: Not less 1.4 per cent v/w

Aa'mal-e-Advia (Pharmacological action) : Mufatteh Sudad, Kasir-e-Riyah, Muqawwie-e-Meda, Muddir-e-Baul, Muddir-e-Haiz, Muqawwie-e-Basar

Mahall-e-Istemalat (Therapeutic uses): Waj-ul-meda, Nafakh-e-Shikam, Zof-e-Meda, Ehtebas-e-Baul, Ehtebas-e-Tims,Zof-e-Basarat.

Meqdar-e-khorak (Dose): 5 to 7 gm

Side-effects: Fennel is likely safe when taken by mouth in the amounts commonly found in food. It is possibly safe when used as at appropriate doses for a short period of time. Fennel creams are also possibly safe when applied to the skin. There is not enough evidence to know whether fennel is safe when used as medicine for longer periods of time. Although rare, other side effects might include stomach and intestinal upset. Seizures related to taking fennel essential oil by mouth have also been reported.

Important formulations: Habb-e-Ghariqoon, Qurs-e-Mulaiyin, Jawarish-e-Narmusk, Jawarish Zarooni Sada, Majoon-e-Muqil, Majoon-e-Musaffi-e-Khoon, Majoon-e-Nankhah, Raughan-e-Baladur, Arq-e-Badiyan, Arq-e-Juzam, Sikanjaben Buzoori Motadil, Sharbat-e-Sadar, Sufoof-e-Hazim Kalan, Sufoof-e-Tabkheer.

BALELA

(Fruits)

Drug Balela consists of pericarp of dried ripe fruits of *Terminalia bellerica* Roxb.of Combretaceae family. Drug yielding plant is a large deciduous tree, 10-12 meter or more high, commonly found in plain and forests upto 900 meter elevation, fruits ripen towards November.

Other names :

Botanical **:***Terminalia bellerica* Roxb.

Family **:** Combretaceae

Bengali **:** Bohera

English name : Belleric Myrobalan

Description:

General: Terminalia is a tree. Three species of terminalia are used for medicine. These species are Terminalia arjuna, Terminalia bellerica, and Terminalia chebula.

Macroscopic: Fruit nearly spherical to ovoid, 2.5-4.0 cm. in diameter; fresh ripe fruits slightly silvery or whitish shiny pubescent surface; mature fruits grey or grayish-brown with slightly wrinkled appearance; rind of fruit shows variation in thickness from 3-5 mm; taste, astringent.

Microscopic: Transverse section of fruit shows an outer epicarp consisting of a layer of epidermis, most of epidermal cells elongate to form hair like protuberance with swollen base; composed of a zone of parenchymatous cells; slightly tangentially elongated and irregularly arranged, intermingled with stone cells of varying shape and size, elongated stone cells found towards periphery and spherical in the inner zone of mesocarp in groups of 3-10; mesocarp traversed in various directions by numerous vascular strands; bundles collateral, endarch; simple starch grains and some stone cells found in most of mesocarp cells, few peripheral layers devoid of starch grains; rosettes of calcium oxalate and stone cells present in parenchymatous cells endosperm composed of stone cells running longitudinally as well as transversely.

Parts Used **:** Dried ripe fruits

Habitat:*T. Bellerica*, a large tree, grows up to 20-25 meters high, rust-coloured pubescence on young branchlets. Leaves: simple, alternate, long petioled and clustered at the ends of the branchlets, elliptic, entire and acute, 8-20 cm long.

Phyto Constituents: Gallic acid, tannic, acid and glycosides

Af'aal-e-Advia (Pharmacological activities):

Anti-Diabetic Effects: The various studies have been attempted to explore the antidiabetic effect of fruit extract. Sabu and kuttan (2009) have reported administration of 75% methanolic extract of fruits of Terminalia bellericaRoxb. suspended in water was studied in alloxan induced hyperglycemia and antioxidant defense mechanism in rats. The study results suggested that Terminalia bellerica fruit extract possessed anti-diabetic and antioxidant activity and these activities may be interrelated. Kasabri et al (2010) have reported the efficacy and mode of action of Terminalia bellerica used traditionally for the treatment of diabetes in India. Terminalia bellerica aqueous extract stimulated basal insulin output and potentiated glucose-stimulated insulin secretion concentration-dependently in the clonal pancreatic b-cell line, BRIN-BD11 ($P<0{\cdot}001$). Furthermore, the extract did not increase insulin secretion in depolarised cells and did not further augment insulin secretion triggered by tolbutamide or glibenclamide. Terminalia bellerica extract also displayed insulin-mimetic activity and enhanced insulin-stimulated glucose uptake in 3T3-L1 adipocytes by 300%.

Antioxidant Activity: Fruit of this plant rich source of gallic acid and other polyphenols, so they have possessed good antioxidant activities. Several studies were confirming antioxidant effects of plant. Guleria et al (2010) have reported *Terminalia bellerica*Roxb. have antioxidant properties. The study reported to the free radical scavenging activity and antioxidant potential of acetone extract of fruit was investigated using in vitro assays, including scavenging ability against DPPH, β-carotene bleaching inhibition, reducing power and chelating ability on Fe2+ ions. Fraction rich in polyphenolic content were more effective than the crude extract. Pfundstein et al (2010) have reported methanol extracts of the fruits of *Terminalia bellerica* antioxidant capacities and the major isolated substances were determined using the 1, 1-diphenyl-2-picrylhydrazyl radical (DPPH), oxygen radical absorbance capacity (ORAC) and ferric reducing ability of plasma (FRAP) in vitro assays and indicated that chebulic ellagitannins have high activity which may correlate with high potential as cancer chemo preventive agents.

Antimicrobial Effects: Elizabeth (2005) has reported the antimicrobial activity of crude and methanol extract of *Terminalia bellerica* fruits was tested by disc diffusion method, against 9 human microbial pathogens. Crude aqueous extract of dry fruit at 4 mg concentration showed zone of inhibition ranging from 15.5-28.0 mm. S. aureus was found to be highly susceptible forming highest zone of inhibition, suggesting that Terminalia bellerica was strongly

inhibitory towards this organism. Investigator reported the MIC of crude and methanol extracts determined by both dilution technique which ranged from 300 to >2400 µg/ml and 250 to >2000 µg/ml respectively, indicating that *Terminalia bellerica* was highly effective against S. aureus with lower MIC values.

Wound Healing Activity: Choudhary (2008) has reported the wound healing activity of ethanol extract of *Terminalia bellerica*Roxb. fruit was evaluated on excision and incision wound model, in albino rats, in the form of an ointment with 2 and 4% two concentrations of fruit extract in simple ointment base. Both concentrations of the ethanol extract showed significant response in both the wound types tested when compared with the control group [31]. Gupta et al (2011) have reported the herbal drug combination one of which Terminalia bellerica, effective for wound healing activity, on excision wound of albino rats. Wound healing activity of the herbal combination was evaluated by formulating the drug in ointment dosage form and then compared with a marketed formulation (Soframycin cream) as reference drug. The herbal drug combination has been observed to promote healing of wounds in animals [32]. Another ethnopharmacological effects have been shown Terminalia belliricia extracts have proper efficacy on wound healing. Herbal paste preparation showed significant ($P<0.05$) improvement on maturation, wound contraction and epithelialization.

Hepatoprotective Activity: Jadon et al (2007) have reported the protective effect of Terminalia bellerica fruit and its active principle, gallic acid at different doses against carbon tetrachloride intoxication. Treatments with *Terminalia bellerica* extract (200,400 and 800 mg/kg, p.o.) and gallic acid (50, 100 and 200 mg.kg, p.o.) showed dose-dependent recovery in all these biochemical parameters but the effect was more pronounced with gallic acid.

Antiulcer and Antidiarrhoeal Activity: Pandey et al (2017) have reported comparing the antidiarrhoeal effect of grilled fruits (GF) with dried fruits (DF). The 50% ethanolic extracts of GF and DF were successively fractionated the antioxidant and bacterial inhibition activity were studied using DPPH free radical scavenging, anti-lipid peroxidation and broth dilution method respectively. In this study plant extract protective in castor oil induced diarrhoea. In vivo antidiarrhoeal activity DF and GF (100 mg/kg oral) inhibited diarrhoea by 41.87% and 71.72% respectively. Grilling significantly altered the levels of metabolites in T. bellerica fruits which could be responsible for its increased therapeutic potential. The mature, dried fruit of Bibhitaka is effective in the treatment of dysentery and intestinal parasites but should

be taken along with purgatives such as Markandika to counteract its constipating effects the sun-dried unripe fruit, however, is gently aperient and can be used on its own.

Antiplatelet and Antithrombotic Activity: Ansari et al (2016) have reported the ethanolic extract of fruit and its isolated compound (Tb-01) were intended to estimate antiplatelet and anti-oxidant activities. The ethanolic extract was submitted to Si-gel CC and compound was isolated. Present study revealed that antiplatelet activity was carried out by using platelet rich plasma (PRP) prepared by centrifugation of rabbit whole blood (containing 0.9% sodium citrate as anticoagulant) and antioxidant activity using 1, 1-diphenyl-2-picrylhydrazyl (DPPH), reducing power and nitric oxide anion scavenging activity models. Further investigators have been reported Tb-01 was found as amorphous brownish powder; yield 0.64% (w/w); mp 105-110 °C, Rf value at 0.42 in methanol : chloroform (20:80) solvent system, UV absorption maxima at 243 nm and molecular peak [M + H]+ at 394.15 m/z. They were observed that ethanolic extract and Tb-01 at different concentrations showed significant antiplatelet and anti-oxidant activity. The fruit extract of *Terminalia belliricia* have showing antithrombotic activity. An In vitro model was used to check the clot lysis and antithrombotic effect of fruits along with Streptokinase as a positive control. For thrombolytic activity, at concentration 1.00 mg/dl the clot dissolution time is minimum i.e. 58 and 66 min for aqueous and alcoholic extracts respectively.

Anticancer Activity: The Ayurvedic medicine Triphala in which *Terminalia belliricia* is the main constituents, has cytotoxic effects against various cancer cell lines, thymic lymphoma cells, human breast cancer cell lines, human prostate cancer cell lines and human pancreatic cancer cell lines. Acetone extract of Terminalia belliricia have exhibited antimutagenic potency using Salmonella/microsome assay. Extract having variable inhibitory activity of 65.6% and 69.7% with 4-O-nitrophenylenediamine (NPD) and sodium azide respectively (as direct –acting mutagens).

Cardioprotective and Antihyperlipidemic Activity: Shaila et al (1995) have reported hypercholesterolemia and atherosclerosis were induced experimentally in rabbits by cholesterol feeding. The effect of an indigenous drug, *Terminalia belliricia*, was evaluated in these hypercholesterolemia rabbits. *Terminalia belliricia* reduced the levels of lipids in hypercholesterolemia animals. There was also a significant decrease in liver lipids and heart lipids ($P < 0.05$) in the drug-treated animals [45]. Kannan et al (2012) have reported the effect of Terminalia bellerica fruit extracts on diabetic related atheroclerosis. Investigators have used

different extracts such as Hexane (HETB), Chloroform (CETB), Ethanol (EETB), Aqueous (AETB) at the dose of 200mg/kg were administered to high fat diet associated with alloxan induced diabetic hyperlipidemic rats. Aqueous extract of Terminalia bellerica fruit extracts, have more significant activity on reducing the Total cholestrol, LDL, VLDL levels and significantly increase in HDL Levels. Terminalia belliricia extracts have posse's antihypertensive activity. This is carried out using an isolated guinea-pig atria, inhibition of force and rate of atrial contraction noted. Also they have relaxed rabbit thoracic aorta after the induction of contraction which was induced by phenylephrine.

Other Ethnopharmacological Activity: The *Terminalia belliricia* extract affected T cell proliferation mainly through the same mechanism as PHA. The extract affected cellular mediated immunity (CMI) rather than humoral mediated immunity (HMI). The Cakradatta states that the fruit pulp mixed with gharta is covered with cow dung and heated in a fire, and held in the mouth to control coughing. For severe cough and asthma the curna of the dried fruit may be taken with honey. Mixed with saindhava, Pippali and buttermilk, Bibhitaka is taken in hoarseness. Gilani et al (2008) have reported the medicinal use of *Terminalia bellerica* in hyperactive gastrointestinal and respiratory disorders. Crude extract of *Terminalia bellerica* fruit (Tb.Cr) was studied in in vitro and in vivo. Tb.Cr caused relaxation ofspontaneous contractions in isolated rabbit jejunum at 0.1–3.0 mg/mL. These study results indicate that *Terminalia bellerica* fruit possess a combination of anticholinergic and Ca2+ antagonist effects, which explain its folkloric use in the colic, diarrhea and asthma.

Mizaj (Temperment): Cold 1^0 and Dry 2^0

Musleh (Correction): Honey, Sweet, Badiyan, Sirka.

Badal (Proximal substitute): Halela.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 8 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 35 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Muqawwie-e-Meda, Qabiz, Munaffis-e-Balgham, Muqawwie-e-Dimgah, Muqawwi-e-Basar.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Meda, Zof-e-Ama, Ishal, Zof-e-Barasat, Zof-e-Dimgah, Sual

Meqdar-e-khorak (Dose): 5 to 7 gm

Side-effects: Terminalia belerica is possibly safe when taken by mouth for 3 months or less. But don't use it without medical supervision. It might affect heart. Not enough is known about the safety of Terminalia belerica. It's best to avoid use until more is known.

Important formulations : Majoon-e-Jograj Gugal, Itrifal-e-Mukil, Itrifal-e-Saghir, Itrifal-e-Ustukhudus, Majoon-e-Fanjnos.

BED ANJEER

(Seeds)

The drug Bed Anjeer consists of mature and dried seeds of *Ricinus communis* Linn of Euphorbiaceae family, a tall glabrous shrub or almost small tree, 2-4 meter high, found throughout the country, mostly growing wild on waste land and also cultivated for its oil seeds.

Other names:

1. Botanical : *Ricinus communis* Linn
2. Family : Euphorbiaceae
3. Bengali : Bherenda
4. English : Castor Oil Plant

Description:

General: Bed Anjeer is an Asian species of flowering plant in the Euphorbiaceae family. It is the source of oil also called the fig and as such is an important crop in those areas where it is grown commercially and as well as it has the medicinal properties for different diseases.

Macroscopic: Seeds oblong, one face convex and the other slightly flattened, 1-1.5 cm long, 0.6-0.9 cm wide, 0.4-0.8 cm thick, testa hard, glossy, smooth, grey or brown to red-dish-brown or black and may be variously marbled or striped, raphe extends from the caruncle to chalaza. Outdoor not distinct; taste weakly acrid.

Microscopic: Seed shows a hard testa, membraneous tegmen , a fleshy endosperm, and thin embryo with flat, board leafy cotylendos; testa consist of hard, single layered epidermis, radially elongated, compactly arranged; slightly curved tabular cells, having reddish –brown contents followed by 8-10 layered, tangentially elongated parenchymatous cells, most of them containing oil globules Fibrovascular bundles found scattered in this zone; endosperm consisting of oval, irregular cells filled with oil globules, abun-dant aleurone grains, measuring 8.2-13.75 µ in diameter; cotyledons thin, flat and leafy.

Powder: Dark brown, oily; shows fragments of numerous elongated thick walled, polygonal cells of testa, reddish-brown tabular cells, thin-walled oval to round parenchymatous cells endosperm. Oil globules numerous aleurone grains measuring upto 13.75 µ in diameter and including crystalloids and globoids within.

Parts used: Roots, leaves, fruits, seeds

Habitat: This plant is originally native to the Middle East and northeastern Africa. Later it becomes distributed as a weed everywhere in tropical and sub-tropical regions of the world. Mainly it grows in waste farms, rocky hillsides and on the edges of cultivated lands.

Phyto constituents: The plant contains alkaloids, ricinoleic acid, stearic, linoleic, palmitic acid, sitosterol, squalene tocopherols and stearic acid. Plants also have toxic constituents like ricinine and ricin. The root of Ricinus is sweet in taste and used as medicine.

Af'aal-e-Advia (Pharmacological activities) :

Antioxidant activity: Antioxidants are compounds that prevent or delay the oxidation of oxidizable materials by scavenging free radicals. Free radicals are responsible for oxidative stress which promotes the development of chronic degenerative diseases including coronary heart disease, cancer and aging. The plant R. communis has significant radicals scavenging abilities on dipehyl-1-picrylhydrazyl (DPPH), nitric oxide (NO), and superoxide radicals. The CH_3OH:H_2Oextract of leaves showed strong DPPH radical-scavenging activity. The stem and leave extracts also produce antioxidant activity due to the presence of flavonoids in their extracts. III.2.2 Antidiabetic activity: Diabetes or diabetes mellitus is a group of metabolic diseases in which a person has high blood glucose (blood sugar). This may be due to inadequate insulin production, or because the body's cells do not respond properly to insulin, or both. An antidiabetic agent controls diabetes.

Antimicrobial activity: An antimicrobial is an agent that kills microorganisms or inhibits their growth. Antimicrobial substances are grouped according to the microorganisms against which they act. The antimicrobial activity of the oil isolated from leaves was investigated in order to evaluate its efficacy against twelve bacteria and four fungi species, using disc diffusion and minimum inhibitory concentration methods. The results are comparable to the antibiotic ampicillin, used as a positive control. The isolated leaf oil showed strong antimicrobial activity against all microorganisms tested with higher sensitivity for Bacillus subtilis, Staphylococcus aureus and Enterobacter cloacae.

Anti-inflammatory activity: Roots and seeds of *R. Comunis* have been used for the treatment of inflammation. Methanolic extract of the root was studied for anti-inflammatory activity in

carrageenan induced hind paw edema model in Wistar albino rats. Ricinine (27), Quercetin (22) and n-butanol soluble fraction of methanol extract gave promising result for anti-inflammatory activity. Root crude methanolic, enriched n-hexane fraction
isolates at doses 100 mg/kg p.o. exhibited significant ($P < 0.001$) anti-inflammatory activity in carrageenan-induced hind paw oedema model. The compound ricinoleic acid (38), the main component of castor oil also showed remarkable analgesic and anti-inflammatory effects.The results showed that 38 may be seen as a new capsaicin-like, non-pungent anti-inflammatory agent suitable for peripheral application.

Anti-fertility activity: The seed extract have been found to possess anti-fertility activity. The ether soluble portion of the methanol extract of seeds when administered subcutaneously to adult female rats and rabbits showed anti-implantation and anti-conceptive activity. The extract protected the animals from getting pregnant for over three gestation periods. Further, the extract did not show any long term effect on the pups that were born after the extract effect.The seed extract was found to possess anti-implantation and abortificient effects. It was also observed that the seed extract prolonged the oestrus cycle of guinea pigs. The dioestrus phase was significantly prolonged as well. After stopping the administration of the extract, the normal dioestrus phase and oestrus cycle started to resume. The seed extract also reduced the weight of the uterus without affecting that of the ovaries significantly. The anti-fertility effect of R. communis in female guinea pigs might be extrapolated to human beings.The 50% alcohol extract of the roots possess significant reversible anti-fertilityeffectThere was a drastic reduction in the epididymal sperm counts in male rats.

Mizaj (Temperament) : Hot & dry

Musleh (Correction) : Seeds of Ricinus are highly toxic and for the purification, seeds are fomented in coconut water for three hours. Then these seeds are washed and dried for the preparation of medicines.

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 4 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not less than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 36 per cent, Appendix 2.2.6

Water- soluble extractive : Not less than 6 per cent, Appendix 2.2.7

Fixed Oil : Not less than 37 per cent, Appendix 2.2.8

TLC behavior:

TLC of the alcoholic extract on silica gel 'G' plate using Chloroform : Ethy-lacetate (95:5) shows under U.V.(366 nm) a fluorescent spots at Rf. 0.95 (sky blue). On exposure to Iodine Vapour seven spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all yellowish brown). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate for about ten minutes at 105^0 C, seven spots appear at three gray spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95. Appendix 2.2.10.

Aa'mal-e-Advia (Pharmacological action) : Mohallil, Musakkin, Jali, Mudirr-e-Haiz, Qatil-e-Karim-e-Shikam.

Mahall-e-Istemalat (Therapeutic uses) : Waja-ul-Mafasil, Falij, Laqwa, Deedan-e-Ama, Ehtebas-e-Haiz, Sual.

Meqdar-e-khorak (Dose): 7-10 gms

Side-effects: Castor oil is likely safe for most people when taken by mouth as a single dose. In some people, castor oil can cause stomach discomfort, cramping, nausea, and faintness.

Castor oil seeds that have had the outer coat removed (hulled) are possibly safewhen taken by mouth as a single dose. Also, castor oil eye drops are possibly safewhen applied to the eye for up to 30 days.

Castor oil is possibly unsafe when taken by mouth long-term or in large doses. It might cause fluid and potassium loss from the body when used for more than a week or in doses of more than 15-60 ml per day.

The whole seed is unsafe to take by mouth. The outer coating (hull) of the castor seed contains a deadly poison. This outer coating can cause nausea; vomiting; diarrhea; abdominal pain; dehydration; shock; blood cell destruction; severe fluid and chemical disturbances; liver, kidney, and pancreas damage; and death. Chewing as few as 1-6 whole seeds can kill an adult. If the seed is swallowed whole, poisoning is less likely; however, prompt medical attention is still an absolute necessity.

Important formulations : Raughan-e-Bedanjeer

BELGIRI

(Fruits)

Drug Belgiri consists of pulp of entire, unripe or half ripe fruits of *Aegle marmelos* Corr. of Rutaceae family. Drug yielding plant is a tree, attaining a heigjt of 12 meter growing wild and also cultivated throughout the country; rind of frouit is removed and pulp is bruised and dried.

Other names :

Botanical :*Aegle marmelos* Corr.

Family : Rutaceae

Bengali : Bela, Vilva, Bel

English name : Bengal Quince, Bael Fruit, Golden Apple, Holy fruit, Stone Apple

Description:

General: Bael is the only member of the monotypic genus Aegle. It is a mid-sized, slender, aromatic, armed, gum-bearing tree growing up to 18 meters tall. It has a leaf with three leaflets.

Macroscopic:Fruit, sub-globose, 5-10 cm. in diameter, externally greenish when young, yellowish-brown when ripe, rind about 1.5-3 mm. thick, hard and woody, surface smooth or slightly granular bearing a circular scar at the point of attachment with peduncle; carpels, 10-15, central, each containing several hairy seeds embedded in yellowish-brown, extremely stickly mucilage; seeds oblong, flat, woody and having white hair; fresh pulp of ripe fruit, brown, of sticky shreads; dried pulp hard and pale to dar red in colour, frequently breaks away from the rind duning drying, leaving a thin layer attached to it; odour, faintly aromatic, taste, mucilaginous and slightly astringent.

Parts Used **:** Ripe fruits

Habitat:*Aegle marmelos* is native across the Indian subcontinent and Southeast Asia, and is cultivated throughout Sri Lanka, Thailand and Malesia. It occurs in dry, open forests on hills

and plains at altitudes from sea level to around 1200m with mean annual rainfall of 570-2,000 mm.

Phyto Constituents: Marmalosin, tannins, mucilage, fatty oil and sugar

Af'aal-e-Advia (Pharmacological activities):

Antioxidant Activity: Antioxidants are the compounds with free radicals scavenging activity and capable of protectingthe cells from free radical mediate oxidative stress. The antioxidant compounds can be derivedfrom natural sources such as plants. Antioxidant activity of these plants is due to the presence offlavones, isoflavones, flavonoids, anthocyanin, coumarin lignans, catechins and isocatechins. *A.marmelos* is extensively reported to possess antioxidant activity against a variety of free radicals.Antioxidant activity of the fruit of *A. marmelos* was reported. Antioxidant activity and freeradical scavenging activity of the ripe and unripe fruit of *Aegle marmelos* was compared. Resultsindicate that the enzymatic antioxidants increased in ripe fruit when compared to unripe fruitextract (except glutathione peroxidase). The percentage of free radical inhibition was also high inunripe fruit than that of the ripe fruit.
Methanol and aqueous extract of *A. marmelos* fruit pulp was screened for antioxidant activity byDPPH radical scavenging method, reducing power assay, nitric oxide scavenging assay,superoxide radical scavenging assay, ABTS radical scavenging assay and H2O2 radicalscavenging assay. Both aqueous and alcoholic extract exhibited good antioxidant activity.The antioxidant activity of the fruit of *A. marmelos* was reported. The aqueous extract of *A.marmelos* fruit was screened for antioxidant activity by the DPPH radical scavenging. Theextract showed efficient antioxidant activity.

Antimicrobial Activity: *A. marmelos* has been traditionally used for the treatment of various infectious diseases and beenextensible reported to inhibit the broad range of pathogenic microorganisms. Many *in vitro*studies proved the antimicrobial potential of *A. marmelos* extracts towards the pathogenicmicroorganisms including bacteria and fungi.The antimicrobial activity of the leaves of *A. marmelos* was performed by agar well diffusionmethod. The aqueous, petroleum ether and ethanol extract of the leaves of *Aegle marmelos*exhibited efficient antimicrobial activity against *Escherichia coli, Streptococcus pneumoniae,Salmonella typhi, Klebsiella pneumoniae* and *Proteus vulgaris.* The ethanolic extract showsactivity against *Penicillium chrysogenum* and the petroleum ether and aqueous extract showsactivity against *Fusarium oxysporum*.

The antimicrobial activity of the leaves of *Aegle marmelos* was reported. The antimicrobialactivity was checked by disc diffusion method. The petroleum ether extract of leaves waschecked against multi resistant strains of *Staphylococcus aureus, Bacillus subtilis, Escherichiacoli, Salmonella typhi, Proteus vulgaris, Pseudomonas aeruginosa* and *Klebsiella pneumoniae.*The antimicrobial activity against gram-negative strains was higher than that of gram positivestrains.

The antifungal activity of the leaves of *Aegle marmelos* was reported against clinical isolates ofdermatophytes. *A. marmelos* leaf extracts and fractions were found to have fungicidal activityagainst *Trichophyton mentagrophytes, T. rubrum, Microsporum canis, M. gypseum,Epidermophyton floccosum*.

The antibacterial activity of the leaves, fruits and barks of *Aegle marmelos* was reported. Theantimicrobial activity of chloroform, methanol and water was performed by disc diffusionmethod. The antimicrobial activity was checked against *Bacillus subtilis*, *Staphylococcus aureus,Klebsiella pneumoniae, Proteus mirabilis, Escherichia coli*, *Salmonella paratyphi* A and*Salmonella paratyphi* B. The methanol extract showed significantly high activity against abovementioned bacteria than that of the other extracts.

Antidiarrheal Activity: Antidiarrheal activity is one of the major medicinal properties of *A. marmelos* and traditionally itis extensively used to control chronic diarrhea and dysentery. Recently, several *in vitro* and *invivo* studies have been conducted to confirm the antidiarrheal property of *A. marmelos*.The *in vitro* antidiarrheal activity of dried fruit pulps of *A. marmelos* was reported. Antidiarrhealactivity was performed by MIC method against the causative organisms of diarrhea. Theethanolic extract showed good activity against *Shigella boydii, S. sonnei* and *S. flexneri,*moderate against *S. dysenteriae.*

Antidiabetic Activity: *A. marmelos* has been used to control diabetes in traditional medicinal system. Many *in vivo*scientific studies have been conducted in animal models to evaluate the ant-diabetic activity ofdifferent organic extracts and fresh juice of *A. marmelos*.Antidiabetic potential of the leaves and callus of *A. marmelos* was reported in streptozotocininduced diabetic rabbits. All the extracts reduced the blood sugar level in streptozotozin diabeticrabbits, however, among the various extracts, the methanol extracts of the leaf and callus broughtabout the maximum anti-diabetic effect.

Antiproliferative activity: The different solvent fractions of ethanolic extract of the stem barks of *A. marmelos* werereported to possess antiproliferative effects against human tumor cell lines. The results showedthe inhibition of *in vitro* proliferation of human tumor cell lines, including the leukemic K562, T lymphoid Jurkat, Blymphoid Raji, erythroleukemic HEL, melanoma Colo38, and breast cancer MCF7 and MDAMB-231 cell lines.

Cytoprotective Effect: The cytoprotective effect of the leaves of *Aegle marmelos* was reported in *Cyprinus carpio*(freshwater fish) exposed to heavy metals. *C. carpio* was exposed to heavy metals followed bythe treatment with the dried powder of *Aegle marmelos* leaves. Treatment resulted in
cytoprotective effect by stabilization of plasma membrane and modulation of antioxidant enzyme
system.

Hepatoprotective Effect: The hepatoprotective effect of the leaves of *A. marmelos* and were reported in alcohol inducedliver injury in Albino rats. Rats were administered with 30% ethyl alcohol for a period of 40 days.The induced rats were fed with leaves of *A. marmelos* for 21 days. The TBARS values of healthy,alcohol intoxicated and herbal drug treated animals were 123.35, 235.68 and 141.85 µg/g tissuerespectively. This indicates the excellent hepatoprotective effect of the leaves of *A. marmelos*.

Mizaj (Temperment): Cold 2^0 and Dry 2^0(Unripe) Hot 1^0 and Dry 2^0 (Ripe)

Musleh (Correction): Honey, Same amount of sugar.

Badal (Proximal substitute): Koyet bael

Identity, purity & strength:

Total ash	: Not more than 4 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 6 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 50 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Qabiz, Haabis-ud-dam, Muqawwi-e-Meda, Daf-e-Human, Musakkin-e-Alam, Mufarreh.

Mahall-e-Istemalat (Therapeutic uses): Zaheer-e-Damvi, Ishal

Meqdar-e-khorak (Dose): 2 to 3 gm

Side-effects: There's some concern that bael fruit may trigger side effects, such as low blood sugar and stomach upset. Bael leaf contains aegeline, a substance that has been associated with severe liver injury, liver faillure, and death

Special Precautions to be taken in diabetes, pregnancy and breast feeding.

Important formulations: Murabba-e-Belgiri, Jawarish-e-Zanzabieel.

BHANGRA

(Whole Plant)

The drug Bhangra consists of whole plant of *Eclipta alba* Hassk of Asteraceae family,a herbaceous annual, 30-50 cm high, erect or prostrate, much branched,strigosely hirsute, often rooting at nodes, a common weed of moist places found in some parts of the country ascending up to 1700 meter.

Other names **:**

Botanical name **:***Eclipta alba* Hassk

Family **:** Asteraceae

Bengali **:** Garujalu, Garugada Soppu, Keshavardhana, Kodigaraju.

English name **:**False Daisy

Description:

General: Perennial herb, erect or prostrate, grows upto 30-40 cm in height. Stems: green or purple, bristly, thickened at the nodes. Leaves: opposite, subsessile, lanceolate-oblong, denticulate, hirsute on both sides.

Macroscopic:

Root: Root well developed, a number of secondary branches arise from main root, upto about 7 mm in diameter, cylindrical, grayish.

Stem: Stem herbaceous, branched, occasionally rooting at nodes, cylindrical or flat, rough due to appressed white hairs, node distinct, greenish, and occasionally brownish.

Leaf: Leaf opposite, sessile to sub sessile, 2.2-8.5 cm long, 1.2-2.3 cm wide, usually oblong lanceolate, sub-entire, sub-acute or acute, strigose with appressed hairs on both surfaces.

Flower: Flowers in capitulum or head, solitary or in pair together on unequal axillary peduncles; involucral bracts about 8, ovate, obtuse or acute, herbaceous, strigose with appressed hairs; ray floret ligulate, ligule small, spreading, scarcely as long as bracts, not tootherd, white; disc floret tubular, corolla often 4 toothed; pappus absent, expect occasionally very minute teeth on the top of cypsela; stamen 5, filaments epipetalous, anthers united into a tube, filaments free with obtuse base bicarpellary syncarpos, ovary inferior, unilocular with one basal ovule.

Fruit: fruit Cypsella, one seeded, cuneate, with a narrow wing, covered with warty excrescences, brown.

Seed: Seed 0.2-0.25 cm long, 0.1 cm wide, dark brown, hairy and non endospermic.

Microscopic:

Root: Mature root shows poorly developed cork, consisting of 3-5 rows of thin-walled, tangential' elongated cells; secondary cortex consists of outer one or two rows of tangentially elongated or rounded cells with air cavities. Inner secondary cortex of tangentially elongated to irregular shapetz parenchymatous cells with conspicuous air cavities; stone cells found scattered in seconday cortex and cork, in singles or in groups of various shape and size. Pericyclic fibres in tangentially arranged bands of many cells or in singles; secondary phloem consists of sieve elements including phloem fibres,, traversed by multiseriate phloem rays; phloem rays broader towards periphery, consisting of rounde& cells; xylem composed of vessels, fibre tracheids, fibres and xylem parenchyma, traversed by xylem; rays. Vessels numerous, found scattered throughout wood. In macerated preparation vessels small,' drum-shaped, cylindrical elongated with pitted walls and perforations simple, rarely slightly oblique; fibre tracheids, pitted, with very pointed tips, xylem fibres long with pointed tapering ends and short lumen, a few fibres show peg-like outgrowths towards the tapering ends.

Xylem parenchyma sparse usually squarish to rectangular having simple pits on their walls, xylem ray distinct, run straight in:, tangential section, generally 5-32 cells in height and 3-5 cells in width although very rarely uniseriate and biseriate rays also found, ray cells pitted.

Petiole: Shows single layered upper and lower epidermis consisting of tubular cells, covered with striated cuticle. Trichomes of two types, non-glandular, uniseriate, 1-5 celled, warty, and with pointed apical cell; epidermis followed by wide cortex, consisting of 2-5 layered collenchyma on both, upper and lower side with distinct angular thickening; parenchyma 4-6 layered on upper side and 5-8 layered on lower side consisting of isodiametric, thin-walled cells with intercellular spaces; five vascular bundles, central one largest while four others small flanking to either side of central bundle, consists of xylem on dorsal side and phloem on ventral side; xylem vessels arranged in radial rows traversed y xylem rays.

Midrib: Section cut at basal region shows both upper and lower single layered epidermis, externally covered with cuticle, a few epidermal. cells elongate outwards to form uniseriate hairs; epidermis followed by cortex, consisting of 3-5 layered collenchymatous cells on both sides; section cut at middle region shows 3-4 layered collenchymatous cells on dorsal and 1-3 layered on ventral side, while the section cut at apical region, shows 2 layered collenchymatous cells on both sides. Similarly cells transverse section cut at a basal, middle and apical regions shows 4-6 layered parenchymatous lls on dorsal side' and 6-9 layered parenchyma on ventral side. In section cut at basal region 4-6 layered parenchyma on both the sides in the middle region with thin-walled cells and intercellular spaces, 2-3 layera parenchymatous cells on both side in the apical region; in the basal region section shows vasculat bundle similar to that of petiole while in the section cut at middle and apical region section shows 4 smaller bundles shifting towards lamina.

Lamina:shows a dorsiventral structure, epiderniis single layered, externally covered with cuticle, followed by single layered palisade parenchyma containing chlorophyll contents. Spongy parenchyrna irregularly arranged with distict intercellular spaces and filled with chlorophyll contents. Mesophyll traversed by number of veins; anisocytic and anomocytic stomata present on both surface more abundant on lower surfaces. Stomatal index 20.0-22.5 on upper and 23.5 -26.0 on lower surface; palisade ratio 3.8-4.5; hairs stiff, pointed, wide at the base, about 3 celled, unisreiate, middle cells longest, uppermost generally not exceeding the basal cell in length, septa thick-walled.

Stem - mature stem shows single layered epidermis, externally covered with cuticle, a few epidermal cells elongate to form characteristic non-glandular trichomes, the cork where formed, poorly developed consisting of rectangular cells. Secondary cortex composed of

large, rounded or irregular shaped parenchymatous cells having wide air spaces; endodermis single layered consists of tangentially elongated cells; pericyclic fibers distinct, arranged in tangential strands. Vascular bundles in a ring. collateral. endarch. of varying sizes traversed by medullary rays; phloem a narrow strip composed of sieve elements and phloem parenchyma; xylem consists of large number of vessels, xylem fibres and xylem parenchyma; xylem vessels appear evenly distributed throughout the xylem. In macerated preparation vessels barrel-shaped , some elongated with simple perforations, pitted with spiral thickening.; xylem fibres with wide lumen, pointed tips and pitted walls, a few often bifurcate and a few large, peg-like outgrowth; xylem rays triseriate to pentaseriate, normally biseriate and uniseriate. 8-15 cells in height and 3-5 cells in width; centre occupied by a wide pith consisting of isodiametric cells of parenchyma.

Powder: Dark green; shows vessels in large groups or single broken pieces with pitted walls, numerous fibres entire or in pieces, trichomes entire or in pieces, warty, a few attached with epidermal and subsidiary cells, anomocytic and anisocytic stomata.

Parts used: Whole plant

Habitat: Eclipta prostrata commonly known as false daisy, is a species of plant in the sunflower family. It is widespread across much of the world. This plant has cylindrical, grayish roots. The solitary flower heads are 6–8 mm (0.24–0.31 in) in diameter, with white florets. The achenes are compressed and narrowly winged.This species grows commonly in moist places in warm temperate to tropical areas worldwide. It is widely distributed throughout India, Nepal, China, Thailand, and Brazil.

Phytoconstituents: Alkaloids, Ecliptine and Nicotine.

Af'aal-e-Advia (Pharmacological activities):From different studies;

Antimicrobial activity: The extract of *Eclipta alba*is active against A. flavus and F. solani and A. niger and inactive against A. fumigates [29]. The micro dilution technique as described by the National Committee for Clinical Laboratories standards (2000) by which MIC of wedelolactone was determined. The bacteria inoculums were prepared in 5ml nutrient broth and incubation was done on 37 °C. Approximately 5x106CFU/ml were final inoculums. The Controls is having with 0.5ml of culture medium without the samples while other were using in the tests without microorganisms. The incubation of tubes was done at 37 °C for 24h. And

the activity of extract was measured as a function of turbidity at 660nm. Lack of turbidity was further confirmed by pouring suspension aliquot of 0.1ml into pre-sterilized Petri dishes with nutrient agar medium. The tests were performed in triplicate. In DMSO, wedelolactone dissolved at a concentration of 3.5mg/well and 10mg/ml respectively and agar well diffusion method was carried out by favoring perforation of extract. Before inoculating the microorganism, petriplate containing 30ml nutrient agar medium were kept for the solidification. After solidification, the desired numbers of holes of uniform diameter of 8mm were made, using sterile aluminum borer. 0.2ml of compound, positive (Gentamycin) and negative (solvent blank) controls were poured into wells. After incubation for 24h at 37 °C the plates were observed and by measuring zone of inhibition (diameter mm) the compound activity was evaluated. The tests were conducted in triplicate. Gentamycin (10.0µg/ml) was used as positive control. DMSO (10%) was the negative control.

Anti-bacterial activity: The antimicrobial activity was studied by using the extracts obtained from the aerial parts. A loopful of gram negative and gram positive bacterial strains such as S pyogenes, S aureus, E coli, B cereus, KPneumoniae, S typhi, P aeruginosa and P mirabilis were inoculated to activate the strain in 30ml of nutrient broth in a conical flask and incubated for 24hrs. The media and the test bacterial cultures were inoculated into petri-dishes, in agar well diffusion method. The test strain 0.25ml was inoculated into the media. Adequate care was taken to ensure proper homogenization. Under strict aseptic conditions the experiment was performed. The first medium is solidified, and after that a well was made in the plates with the help of sterile borer (5mm). The extract compound (50µl) was introduced into the well and the plates were incubated at 37 °C for 24hrs. All samples were tested in triplicates. The microbial growth was determined by measuring the diameter of the zone of inhibition. Ciprofloxacin (25µg) (Himedia, Mumbai, India) was the reference drug used as a control for test organisms.

Anti-inflammatory and analgesic activity: To investigate anti-inflammatory activity, the *Eclipta alba*extract was given orally. Carragenan induced paw oedema model is used to estimate the anti-inflammatory activity. The release of pro-inflammatory mediators such as prostaglandins (PGs), kinins, tumor necrosis factors (TNF) and nitric acid and activation of platelet activation factors are responsible for inflammation. The *Eclipta alba*extract is having the action as the potent inhibitor of the pro-inflammatory transcription factors because of this action, it is beneficial for the treatment of the inflammatory cascade of cardiovascular diseases.

Anti-hyperglycemic activity: The people with diabetes mellitus have more than doubled globally, and which results, most important public health challenges to all nations. And it is the most common disease which is associated with carbohydrate metabolism, affecting about 200 million people worldwide. The suspension of leaf was given by oral intragastric tube. After 60 days of treatment, the rats were fasted overnight and sacrificed by cervical decapitation. The blood glycosylated hemoglobin and glucose were estimated. The rat liver was dissected out and immediately washed thoroughly with ice-cold saline. Potter-Elvejham homogenizer was used to homogenize the portion of tissue, and the extract was used for the estimations of glucose 6-phosphatase, protein, fructose 1,6-bis-phosphatase,hemoglobin, hexokinase, inorganic phosphorus, and blood urea using a semi-autoanalyzer. The values decreased very much in E Alba administered animals showing the influence of the leaf suspension on sugar reduction. In conclusion, we have demonstrated that the folk medicinal plant E.Alba possesses a hypoglycemic effect. It is a potent antihyperglycemic agent.

Anti-anaphylactic activity: By using different animal models, the antianaphylactic activity of alcoholic extract of *Eclipta alba*was studied. Each petri dishes were incubated for 10min at 37 °C and then to each petri dish 0.1ml of compound 48/80, a mast cell degranulator used to induce mast cell degranulation, having concentration of 10µg/ml was added and again incubated for 10min at 37 °C. After that, all the pieces were transferred to 4% HCHO solution which containing 0.1% toluidine blue and kept a side for 20 to 25 minutes. After fixation and staining, mesentery pieces were transferred through acetone and xylene two times and mounted on slides. All the pieces were kept under light microscope with 450x magnification and examined. Disrupted mast cells were determined and minimum of 100 cells were counted and percentage of intact. Disrupted mast cells were stained with toluidine blue and undisrupted mast cells remain as such almost round shaped. Percentage protection from degranulation of mast cells by the drug was determined. Hair growth & Alopecia- In hair oil preparations, the extract of *Eclipta alba*is used since it enriches hair growth and maintains hair black. *Eclipta alba*(10%w/v) was an important ingredient in the preparation of herbal formulation for hair growth. Alopecia is a dermal disorder with psychosocial implications on patients with hair loss. It is a well-known Ayurvedic herb for hair growth. A reported work was done in which an ethanolic extracts & petroleum etherwere drown into oleaginous cream and applied on shaved denuded skin of albino rats. To know the effect of eclipta alba, it is necessary to record the both time (in days), hair growth initiation as well as completion of hair growth. The 2% solution of Minoxidil was applied on skin and served as positive control for

comparison. The treatment with 2 and 5% petroleum ether extracts result were better than the positive control that was minoxidil treatment.

Anthelmintic activity: The anthelmintic activity was performed according to the method of Ghosh. on adult Indian earthworm Pheritimaposthuma as it has anatomical and physiological resemblance with the intestinal roundworm parasites of human beings. Pheritimaposthuma worms are easily available and used as suitable model for screening anthelmintic drugs. In the 50ml of formulations containing four different concentrations of methanol extract (25, 50, 75 and 100mg/ml in normal saline) and standard (20mg/ml) were prepared and approximately equal sized six earthworms were released in each group. Observations were made for the time taken to paralyse or death of individual worms. Paralysis was said to occur when the worms do not revive even in normal saline. Death was concluded when the worms lose their motility followed with fading away of their body color. Albendazole (20mg/ml) was used as standard while normal saline as control.

Anti-viral activity: The in vitromethod for the extract of *Eclipta alba*showing strongly inhibited RNA dependent RNA polymerase (RdRp) activity of HCV replicase. It did effectively inhibit the replication of HCV which was responsible in reduced HCV RNA titer and viral proteins translation level in cell culture system. The extracts which are based on bioassay (response checked in living tissue) and the purification of their phytochemicals have identified three potent chemical compounds, apigenin, wedelolactone, and luteolin. The inhibition of HCV replicase *in vitro* and anti- HCV replication activity in the cell culture system is exhibited by those phytochemically derived compound. The standardized extract of *Eclipta alba*or its constituent can be generally used as an effective treatment against HCV replicase.

Ovicidal activity: The eggs of Ae. Aegypti were gathered from that laboratory which is vector controlled. To achieve various concentrations ranging from 100 to 350ppm, the extract of leaf diluted in the suitable solvent. Eggs of Ae. Aegypti (100 nos.) were disclosed to each concentrations of extract until they devised or died. The eggs from each concentration were individually lifted to distilled water cups after treatment for hatching evaluated after counting the eggs under microscope. Each trial was recreated six times. The rates of hatching were measured 48h post treatment by following formula.

% of egg mortality = Number of hatched larvae/ Total no of eggs×100.

Anti-hypertensive activity: The active constituent and the ethanolic extract of *E prostrata*showed remarkable hypertensive activity on rats. The thiophene acetylenes, active constituent, culumbin are enriched in roots and which exhibited noticeable antihypertensive activity [5]. Therefore, *Eclipta alba*is a cheap herbal therapy, offer safe & effective measure to produce a potent action on an biggest people's health problem of high blood pressure.

Hepato-protective activity: Generally, the herb is used as a deobstruent (removes obstructions in the body via opening the duct) and cholagogue (promotes the discharge of bile) in hepatomegaly, for jaundice (yellowish and greenish pigmentation), and other ailments of the liver and gall bladder. And the chemical constituents derived from *Eclipta alba*also showed a consequential effect on formation of new liver cell. There was a survey done on total twenty two formulations, among which *Eclipta alba*(bhringraj) was adjacent in 16 hepatoprotective herbal formulations. Among these Formulation, the formulation H contains 750mg of bhringraj and 600mg of kasani per 10ml of dose which was the highest amongst all other formulations. The hepatoprotective effect of Enicostemmalittorale Blume and *Eclipta alba*was performed by Baranisrinivasan et al. during the oxidative stress induced by ethanol in albino rats [42]. Six albino rats of either sex were taken weighing between 180 and 220gm. The oral administration of 25% carbon tetrachloride in liquid paraffin at a dose of 1.25ml/kg daily was induced for five days. The loss of alkaline phosphatase and hepatic lysomal acid phosphatase by (CCl4) was significantly rehabilitated by *Eclipta alba*. *Eclipta alba*is responsible for hepatoprotective activity because the levels of hepatic microsomal drug metabolizing enzymes is regulated by *Eclipta alba*. The loss of hepatic lysomal acid phosphatase and alkaline phosphatase by (CCl4) was significantly restored by Eclipta alba. Hepatoprotective activity of *Eclipta alba*is by regulating the levels of hepatic microsomal drug metabolizing enzymes.

Anti-cancer activity: The crude methanolic extract of *Eclipta alba*has been tested for its *in vitro* inhibitory effect against normal intestinal cells and a panel of colon cancer using MTT cytotox assays. The extract of this plant interfere with the multiplication of colon cancer cells, depend upon the concentration and more cytotoxic to cancer cells than to normal cells.The cancer cell lines for further test and assay methods were sent to cancer cell lines, New Delhi to obtain the results.

Antioxidant activity: Antioxidants play an important role in barricade and scavenging free radicals, and providing the defence mechanism to humans against degenerative and infection. There are various method through which the antioxidant activity is measured like:- radical

scavenging activity, FRAP, reducing activity, and DPPH assay. The antioxidant capacity was concentration dependent and showed varying effect as increasing the dose from 25 to 100mg/ml [37]. The antioxidant activity of E alba extract was assessed in comparison ascorbic acid which is standard antioxidant (Sigma, Germany) on the basis of scavenging effect of the stable 2,2- diphenyl-1-picrylhydrazyl (DPPH) free radical procedure. Lower absorbance of the reaction mixture indicated higher free radical- scavenging activity [46]. The phenols contain hydroxyls that are responsible for the radical scavenging effect mainly due to redox properties. The high quantity of ascorbic acid and phenolic content in E alba can explain its stronger free radical scavenging activity.

Antidiabetic activity: The choloroform extract of eclipta alba exhibitedsignificant antidiabetic activities in alloxan induced diabetic rats. Thisextract has showed improvement in parameters like body weight and lipid profile by enhancing effect on cellularantioxidant defenses to protect against oxidative damage. Present efforts are directed to isolate the active constituentsfrom this fraction and confirmation of mechanism of action.

Hair growth & Alopecia: Eclipta Alba is used in hair oil preparations since it promotes hair growth and maintains hair black. 10%w/v of Ecliptaalba was an main ingredient in the preparation of herbal formulation for hair growth. Alopecia is a dermatologicaldisorder with psychosocial implications on patients with hair loss. Eclipta Alba is a well-known Ayurvedic herb for hairgrowth. In the reported work Petroleum ether & ethanolic extracts were incorporated into oleaginous cream (water inoil cream base) and applied topically on shaved denuded skin of albino rats. The time (in days) required for hairgrowth initiation as well as completion of hair growth cycle was recorded. Minoxidil 2% solution was applied topically and served as positive control for comparison. The result of treatment with 2 and 5% petroleum ether extracts werebetter than the positive control minoxidi21

Anticancer activity: The inhibitory effect of the crude methanolic extract of Eclipta alba has been tested in vitro against a panel of coloncancer and normal intestinal cells using MTT cytotox assays. Plant extracts inhibited the proliferation of colon cancer cellsin a concentration-dependent manner and more cytotoxic to cancer cells than to normal cells. The cancer cell lines forfurther test and assay methods were sent to cancer cell lines, New Delhi to obtain the results.

Mizaj (Temperament) : Hot 2^0 and dry 2^0

Musleh (Correction) : Filfil Siyah, Aada, Honey

Badal (Proximal substitute) : Corpus seed.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 11 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 5 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 15 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action): Musaffi-e-Khoon, Muqawwi-e-Bah, Muqawwi-e-Basr, Kasir-e-Riyah, Mohallil, Musaffi-e-Shar

Mahall-e-Istemalat (Therapeutic uses) : Zof-e-Bah, Ezam-e-Kabid, Ezam-e-Tehal

Meqdar-e-khorak (Dose): 5-7 gm

Side-effects : Bhangra has no such side effects. Its extract is cool, this one may catch a cold. Higher dose may cause a slight burning sensation.

Important formulations : Majoon-e -Bhangra

CHIRAITA

(Whole plant)

Drug Chiraita consists of whole plants of *Swertia chirata* Buch. ofGentianaceae family. Drug yielding plant is a small, erect, annual herb, 0.6-1.25 meter high, found in temperate Himalayas at an altitude between 1200-1300 meter from Kashmir to Bhutan and Khasia Hills in Meghalayas. Flowers are collected as drug in July-October and then dried.

Other names :

Botanical **:***Swertia chirata* Buch.

Family **:** Gentianaceae

Bengali **:** Chirata, Mahatita

English name : Chiretta.

Description:

General: Chirata is a herb. People use the whole plants to make medicine that grow above the ground

Macroscopic: Drug consists of whole plant, a peculiar shining yellowish tinge all over the herb in fresh sample; stem upto 1 meter long and 6mm in diameter, glabrous, yellowish-

brown to purplish, slightly guadrangular above and cylindrical below; large, continuous, easily separable yellow pith, leaf, opposite, cauline, broad at bose, ovate or lanceolate, entire, acuminate, glabrous, usually with 5-7 prominent lateral veins; branching from the axils of the leaves which ramify further into paniculate inflorescence; flower, tetramerous, 2-3 mm wide, ovoid, with two glandular depressions near the base of each of corolla lobes; ovary, superior, bicarpellary, unilocular,ovoid and pointed; fruit a capsule with numerous, minute reticulated seed, 0.25 mm long 0.16-0.45mm broad irregularly ovoid.

Microscopic:

Root : Transverse section of root shows, 2-4 layers of cork; secondary cortex represented by 4-12 layers of thick-walled, parenchymataous cells, some showing radial wall formation, tangentially elongated with sinuous walls; secondary phloem composed of thin-walled srrands of sieve tubes, companion cells and phloem parenchyma; secondary xylem composed of vessels, tracheids parenchyma and xylem fibers, all elements lignified and thick-walled; in older roots, centre of wood more or less spongy and hollow in most cases; outer woody ring remaining strongly lignified; vessels show scalariform thickening and also simple and bordered pits, tracheids similar in thickening as the vessels; fibers have simple pits; mucilage present in secondary cortical cells; minute aciculax crystals present in abundance in secondary cortex and phloem region; resin also present as dark brown mass in secondary cortex cells.

Stem : Transverse Section of stem shows single layered epidermis, externally covered with a thick striated cuticle present in young stem, in older epidermis remains intact but cells flattened and tangentially elongated, four ribs also consists of an epidermis and parenchymatous cortical cells; endodermis distinct, showing anticlinal or periclinal walls, followed by single layered pericycle consisting of thin walled cells; stem possesses an amphiphloic siphonostele; external phloem represented by usual elements, cambium between external phloem and xylem composed of a thin strip of tangentially elongated cells, internal phloem similar in structure as that of external phloem excepting that sieve tube strand is more videly separated; xylem continuous and composed mostly of tracheids, a few xylem vessels present single or rarely in groups of two, while tracheids and fibers present in abundance; vessels and fiber tracheids have mostly simple and bordered pits and fibers with simple pits on the walls; medullary rays absent; central part of the stem occupied by a pith consisting of rounded and isodiametric cells with prominent interecellular spaces mucilage present in

cortical cells; minute acicular crystals also present in abundance, cortical cells, in resin present as dark brown mass in some cortical cells along with oil droplets.

Leaf: Transverse section of leaf shows very little differentiation of mesophyll tissues; epidermis single layered covered with a thick, strated cuticle, more strongly developed on the upper surface than the lower; stomata of anisocytic type; palisade tissue single layered cells at places become wider and less elongated particularly in bigger veins; spongy messophyll represented by 4-7 layers of somewhat loosely arranged, tangentially elongated cells, some epidermal cells prominently arched outside at the margin; mucilage present in epidermal and mesophyll cell while minute acicular also present in abundance in mesophyll cells; in leaf parenchymas oil droplets also present.

Parts Used: Whole plant

Habitat:*Swertia chirata*found found in pastures and slopes in the Himalayas to 3,000 metres.

Phyto Constituents: Xanthnes, Xanthone glycoside and mangiferine (Flavonoid)

Af'aal-e-Advia (Pharmacological activities):Antipyretic activity: *S. chirayita* is mentioned to treat jwar by various ayurvedictexts.. It is used traditionally to treat fever.47The aqueousextract of *Swertiachirata*Buch Ham. Root (ASC) (Family:Gentianaceae) was evaluated for its antipyretic potential onBrewer's yeast induced pyrexia in albino rats and Typhoid-Paratyphoid A, B vaccine induced Hyperexia in rabbits. In bothmodels, the extract, at dose of 200 mg kg−1 body wt. and 400 mgkg−1body weight, produced significant ($p<0.001$) reduction inelevated body temperature in a dose dependent manner. Theantipyretic effect of the extract was comparable to that ofparacetamol (150 mg kg−1 body weight, p.o.), a standardantipyretic agent.

Analgesic and Anti-Inflammatory Activities: *S.chirayita*is described to be pitta shaamak, sophahar in variousAyurvedic texts. Pharmacological screening ofethanolic root extract of Swertiachirata was chosen for analgesicand anti-inflammatory activities in animal models. For assessinganti-inflammatory activity carrageenan-induced rat paw edemamodel was used. The analgesic effect was measured using theacetic acid-induced writhing test and the radiant heat tail-flickmethod in rats. In the acetic acid-induced writhing test in mice,the extract at 200 and 400 mg/kg doses level showed 41.76%($p<0.001$) and 58.29% ($p<0.001$) inhibition of

writhing,respectively. In rat paw edema model induced by carrageenan, theextract was found to reduce significantly ($p<0.001$) the formationof edema at the 400 mg/kg dose level. It showed 57.81%($p<0.001$) inhibition of edema volume at the end of 3 hour. In radiantheat tail-flick method, the root extract produced 43.88%($p<0.001$) and 64.81% ($p<0.001$) increase in reaction time 30 minafter oral administration at the 200 and 400 mg/kg doses level,respectively. The results signify the traditional uses of *Swertiachirata*, for inflammation and pain.

Blood Sugar Lowering Activity: *S.chirayita*is described to be useful in Prameha in variousAyurvedic texts.Ninety five percent ethanol extractof *Swertiachirata*(Buch-Ham) was fed to healthy albino ratsconsisting of fed, fasted and glucose loaded models. Significantblood sugar lowering effect was observed in thesemodels. *Swertiachirata*(Buch-Ham) fed orally causedenhancement of the blood sugar lowering effect of tolbutamide inhealthy albino rats.

Protective effect in gastric ulcers: *S.chirayita*has been described as useful in agnimandhya,arochak, grahani separately and in the form of variousformulations in Ayurveda. The effect of *S. chirayita*hasbeen studied on experimentally induced gastric ulcers in rats. Theethanolic extract of chirata significantly reduced the intensity ofgastric mucosal damage induced by indomethacin and necrotizingagents. It produced a significant decrease in gastric secretion inpylorus-ligated rats. The extract inhibited acetylcholine-induced**m**contraction of guinea pig ileum, suggesting its anti-cholinergic**m**activity. Pretreatment of rats with the extract significantlyprevented ethanol-induced gastric wall mucus depletion andrestored the non-protein sulfhydryl (NP-SH) content in theglandular stomachs. These findings support the use of chirata forthe treatment of gastric ulcers in traditional medicine.

Anticarcinogenic activity: The present study reports the anticarcinogenic activity of *Swertiachirayita*Roxb., an Indian medicinal plant. All the fourdetoxification enzymes studied *viz*, GST, GPx, SOD and CATwere found to be activated in different degrees followingtreatment with infusion of *Swertiachirayita*Roxb., its crudeextract and a purified 'Amarogentin' rich extract. The activation18of the enzymes was accompanied by significant reduction in lipidperoxidation and inhibition of incidence as well as multiplicity ofDimethylbenz(a)anthracene (DMBA) induced papillomas. Theeffect of *S.chirata*(Buch-Ham) on apoptosis and cellproliferation was also studied in mice skin exposed to DMBA.Both the crude and purified extracts significantly inhibited cellproliferation and

induced apoptosis. This is the first report of itskind and the observation suggests the chemopreventive potentialof *Swertiachirayita*Roxb.

Antihepatotoxic activity: *S.chirayita*has been described as useful in kamala and pandu inthe form of various formulations in Ayurveda. Themethanol extract of *Swertiachirayita*Roxb. was evaluated forantihepatotoxic activity against carbon tetrachloride induced livertoxicity in experimental rats. The extract was found to be activeand on fractionation into butanol soluble and chloroform solublefractions, the activity was traced and found more profound in thechloroform soluble fraction. The butanol soluble bitter richfraction showed marginal activity. The results based onbiochemical estimations have been expressed statistically and areadditionally supported by histopathological examination of theliver of experimental rats and pentobarbitone induced sleep timestudies in mice.

Antiviral activity: Krimighna property of *S.chirayita*is described in various texts ofAyurveda.The antiviral activityof *Swertiachirata*(Buch-Ham) was tested against Herpessimplex virus (HSV) type-1, using multiple approaches both atcellular and molecular level. Cytotoxicity, plaque reduction, virusinfectivity, antigen expression and polymerase chain reaction(PCR) assays were conducted to test the antiviral activity of theplant extract. *Swertia*plant crude extract (1gm/mL) at 1:64dilution inhibited HSV-1, plaque formation at more than 70%level. HSV antigen expression and time kinetics experimentsconducted by indirect immunofluorescence (IFA) test, revealed acharacteristic pattern of small foci of single fluorescent cellsin *Swertia*extract treated HSV-1 infected cells at 4 hours postinfection dose, suggested drug inhibited viral dissemination.Infected cell cultures treated with *Swertia*extract at various timeintervals, tested by PCR, failed to show amplification at 12, 24-72 hours. HSV-1 infected cells treated with Acyclovir (antiviraldrug) did not show any amplification by PCR. In this preliminarystudy, extract of *Swertiachirata*(Buch-Ham) showed antiviralproperties against Herpes simplex virus type-1.

Antimicrobial activity: Krimighna property of *S.chirayita*is described in various texts ofAyurveda.*S.chirayita*(Buch-Ham) extracts are moreactive against gram positive than against gram negative bacteria.They were inactive against all the fungi.

CNS depression activity: *S.chirayita*is used for the treatment of soka, artiapasmar,unmadAlcohol and water extracts of *S.chirata*(Buch-Ham) showed that it possesses CNS depressant activity. Higherdose produced CNS depression without loss of reflexes.

Anti-oxidant activity: *S.chirayita*is used for the treatment of kasa (cough)and swasa (asthma),which is described in various texts ofAyurveda[Table 3]. *Swertiachirayita*Roxb. extract-SCEexhibited strong antioxidant ability invitro. The liver and kidneyof CCl4-intoxicated animals exhibited a significant ($p < 0.001$)decrease in SOD, CAT, and GSH levels. Additionally, theseorgans exhibited a significant ($p < 0.001$) increase in MDA level.CCl4 did not exhibit toxicity on mice treated with SCE andVitamin E. The effects of *Swertiachirayita*(three dosages) werecomparable to those of Vitamin E, except in MDA level in theliver and GSH level in the kidney ($p < 0.05$).This study suggeststhat the ethanolic extract of *Swertiachirayita*Roxb. possessed invitro and in vivo antioxidant effects.

Anti-hepatitis B virus activity: Krimighna property of *S.chirayita*is described in various texts ofAyurveda. Four new compounds swertiachiralatone A(1), swertiachoside A (2), swertiachirdiol A (3) andswertiachoside B (4), together with twenty-six known ones wereisolated from the ethanol extract of *Swertiachirayita*Roxb. Theirstructures were elucidated by extensive spectroscopic analyses(1D- and 2D-NMR, HRESIMS, UV, IR and [α]D).

Mizaj (Temperment): Hot 2^0 and dry 2^0

Musleh (Correction): Asl-us-sus, Anisun

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 6 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 10 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 10 per cent, Appendix 2.2.7

Absence of tannin: On addition of Ferric Chloride to aqueous or alchoholic extract no blue black colour develops.

Assay: Contains not less than 1.3 percent, of the bitter principle as determined by the following method:

Mix 20 gm in powder (No. 60 sieve) with boiling water containing 0.5 gm of Calcium Caarbonate and extract with boiling water till the last portion of the extract is devoid of bitterness; concentrate in vacuum and dissolve the residue in hot Alcohol; Filter while hot and wash the residue thrice on the filter with 10 ml portions of hot Alcohol; remove the alcohol from the filtrate and take up the residue repeatedly with 25,15,15,15, and 15 ml. of hot water. Shake the aqueous extract repeatedly with 25,20,15,15 and 10 ml of Ethyl Acetate, collect the Ethyl Acetate extracts, evaporate, dry and weigh.

Aa'mal-e-Advia (Pharmacological action) : Musaffi-e-Dam, Mohallil-e-Waram, Mudirr-e-Baul, Mulattif,Qabiz, Muqawwi-e-Meda, Kasir-e-Riyah, Mudirr-e-Haiz, Muqawwi-e-Kabid, Mushahhi.

Mahall-e-Istemalat (Therapeutic uses): Su-e-Hazm, Nafkh-e-Shikam, Fasad-ud-Dam, Istisqa-e-Ziqqi, Busoor, Taqteerul Baul, Zof-e-Ishteha

Meqdar-e-khorak (Dose): 5 to 7 gm

Side-effects: Chirata is likely safe when taken by mouth in the amounts found in beverages. However, there isn't enough information available to know if chirata is safe in larger medicinal amounts.

Important formulations: Majoon-e-Musaffi-e-Khoon, Majoon-e-Masikul-Baul, Arq-e-Juzam.

CHIRCHITA

(Root)

The drug Chircjita consists of dried root *Achyranthes aspera* Linn of Amaranthaceae family,a stiff erect 0.1-0.9 meter high herb, found commonly as a weed throughout the country up to 900 meter high.

Other names **:**

Botanical name **:***Achyranthes aspera* Linn

Family **:** Amaranthaceae

Bengali **:** Apang

English name **:**Chaff flower, Devils horsewhip

Description:

General : Chircjita is an annual or perennial herb. Stem erect, 0.5-2.0 meter in high, base woody, angular or ribbed, simple or branched, often tinged with pink colour; nodes bulged.

Macroscopic: Tap root cylindrical slightly ribbed, upto 1.0 cm in thickness, gradually tapering, rough due to presence of some root scars; secondary and tertiary roots present; yellowish brown; odour not distinct; taste not characteristic.

Microscopic: Mature root shows 6-10 layered, rectangular, tangentially elongated, thin-walled cork cells; secondary cortex consisting of 6-9 layers, oval to rectangular thin walled parenchymatous cells having scattered thick-walled, irregular lignified stone cells, followed by 5-6 discontinuous rings of anomalous secondary thickening, composed of vascular tissues , small patches of sieve tubes are distinct in the phloem parenchyma demarcating the xylem rings. Secondary xylem composed tracheeds, fibres and parenchyma; vessels with both simple and bordered pits and with scalariform thickening measuring 135-348 µ in length and 32-64 µin width; fibres pointed at both ends with walls moder- ately thickened, measuring 260-740 µ in length and 12-24 µ in width; tracheids have tapering ends, measuring 165-535 µ in length and 17-34 µ in width.

Powder: Yellowish-brown; shows fragments of rectangular cork cells, stone cells, ves-sels showing bordered pits and scalariforn thickening, fibres and a few prismatic crystals of calcium oxalate.

Parts used : Root

Habitat : This plant is found in the temperate area of the country as well as in this sub-continent.

Phyto Constituents: Triterpenoid saponins which possess oleanolic acid as the aglycone. Ecdysterone, an insect moulting hormone, and long chain alcohols are also found in Achyranthes aspera. Other chemical constituents such as achyranthine, betaine, pentatriacontane, 6-pentatriacontanone, hexatriacontane, and tritriacontaneare also present.

Af'aal-e-Advia (Pharmacological activities) :

Spermicidal activity: Extracts from roots of A.asperahave been reported to possess spermicidal activity in human and rat sperm, as studied. The study was made on hydroethanolic, n-hexane and chloroform extracts, which were found to be most effective for sperm immobilization, sperm viability. Researchers reported the ethanolic extract of the roots of A. aspera showed post coital antifertility activity in female albino rats. According to their study, the extract exhibited 83.3% anti-implantation activity when given orally at 200 mg/kg body weight.

Antiparasitic activity: The ethyl acetate extract of A.asperawas found showing antiparasitic activity [18]. It has been studied that dried leaf, flower and seed extract of A.asperawhich showed activity against the larvae of cattle tick Rhipicephalus (Boophilus)microplus (Acari:lxodidae),sheep internal parasite Paramphistomumcervi.

Hypoglyceamic activity: Aqueous methanolic extract of the whole plant have been shown to possess hypoglycaemic activity.

Anticancer activity: Methanolic extract of the leaves of A.asperahas shown to have anticancer activity on Epstein- Barr virus early antigen activation induced by tumor promoter 12-O-tetradeca- oylphorbol-13-acetate in Raji cells.

Hepatoprotective Activity: The methanolic extract of the aerial parts of A. aspera showed hepatoprotective activity on rifampicin induced hepatotoxicity in albino rats. It showed dose dependent decrease in the levels of SGPT, SGOT, ALKP and total bilirubin.

Anti-inflammatory: Alcoholic extract of the roots of A.aspera, was found to exhibit anti-inflammatory activity in Wistar rats using carrageenan-induced paw edema method and cotton pellet granuloma test.

Nephroprotective Activity: Methanolic extract of the whole plant of A.asperawas shown to produce nephroprotective activity against lead acetate induced nephrotoxicity in male albino rats, as reported.

Anti-depressant Activity: Researcher showed that Methanolic extract of the leaves of A.asperashowed anti-depressant effect in mice and rats using forced swimming test in mice and rats and tail suspension test in rats.

Cardiovascular Activity: Achyranthine, a water-soluble alkaloid isolated from Achyranthes aspera, decreased blood pressure and heart rate, dilated blood vessels, and increased the rate and amplitude of respiration in dogs and frogs. The contractile effect of the alkaloid at 0.5 mg/ml on frog rectus abdominal muscle was less than that of acetylcholine (0.1 mg/ml), and its spasmo- genic effect was not blocked by tubocurarine.

Bronchoprotective Activity: Ethanolic extract of A.asperashowed bronchoprotective effect in toluene diisocyanate (TDI) induced occupational asthma in Wistar rats as reported by Goyal. The total and differential leucocytes werecounted in blood and bronchoalveolar (BAL) fluid. Liver homogenate was utilized for assessment of oxidative stress and lung histological examination was performed to investigate the inflammatory status of airway. The results suggest that A. aspera treated rats did not show any airway abnormality.

Anti-allergic Activity: Researchers reported that the petroleum ether extract (200 mg/kg, i.p.) of the plant shows significant antiallergic activity in both milk induced leukocytosis and milk induced eosinophilia in mice. Thus the antiallergic activity of A.asperamay be due to the presence of steroids.

Wound Healing Activity: The ethanolic and aqueous extracts of leaves of Achyranthes aspera for wound healing activity.

Anti-oxidant activity: Some workers also reported antioxidant activity on leaves and roots.

Mizaj (Temperament) : Hot 2^0 and dry 2^0

Musleh (Correction) : Filfil Siyah, Honey

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 9 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 2 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 10 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract on silica gel 'G' plate using Chloroform : Methanol (95:5) shows wider U.V.(366 nm) a fluorescent zones at Rf. 0.05, 0.19, 0.43, 0.50 and 0.97 (all light blue). On exposure to Iodine Vapour six spots appear at Rf. 0.05, 0.12, 0.43, 0.50 and 0.92 and 0.97(all yellow). On spraying with Dragendroff's reagent followed by 5% Methanolic Sulphuric acid reagent two spots appear at Rf. 0.12 and 0.97 (both light orange). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action) : Daf-e-Zahar-e-Aqrab, Kasir-e-Riyah, Muqawwi-e-Meda, Mudirr-e-Baul, Mohallil-e-Auram, Munaffis-e-Balgham, Musaffi-e-Dam.

Mahall-e-Istemalat (Therapeutic uses): Nafakh wa Dard-e-Shikam, Sual, Zeeq-un-Nafas,Sang-e-Masana,Bawaseer-Khooni.

Meqdar-e-khorak (Dose): 1-3 gm

Side-effects : The Apamarg(Chirchita) plant should be used with great care as it can cause some side effects as mentioned below:

- An overdose can induce vomiting and nausea-like symptoms.
- Pregnant and lactating mothers should refrain from ingesting this plant entirely. They can apply it on their body but should not consume it in any form.
- It is not suitable for people undergoing infertility treatment.

Important formulations: Namak Chirchita

D H A T U R A

(Seed)

Datura stramonium is an erectannualherb forming a bush up to 1-1.5 m tall. The drug Dhatura consists of dried seeds of Datura plant. A perennial shrub found throughout Bangladesh. The plant occurs throughout the year. Flowering and fruiting take places during August - December. The leaves are soft, irregularly undulate, and toothed. The fragrant flowers are trumpet-shaped, white to creamy or violet, and 6.5 to 9 cm long. They rarely open completely. The egg-shaped seedcapsule is walnut-sized and either covered with spines or bald. At maturity it splits into four chambers, each with dozens of small seeds.

Other names:

a) Botanical name: *Datura stramonium*

b) Family: Solanaceae

c) Bengali name: Dhutra

d) English name: Datura, Jimson weed, Dowhy, Devil's snare, Thorn apple,

Description:

a) General: Datura plants grow quickly and may get up to 4 feet tall. The blooms are fragrant and particularly so at night. Most flowers are white but they may also be yellow, purple, lavender and red. Stems are soft, but erect, and they have a grayish green tinge. Leaves are lobed and lightly furred. The flowers are the standout at several inches in width. The plant is generally an annual but self seeds vigorously and seedlings grow at a furious rate to adult plants in one season. This self-seeding behavior ensures Datura plant growing year after year.

b) Macroscopic:A pear shaped 3.3-5.6 mm long and 3 mm broad thick, flattened, finally pitted, yellowish brown to brown in colour. The margin is wavy and thickened at the curved point. The very characteristic external feature of the seed is the edge of the seed is triple ridged. A large strophe is found near the micropyle. The taste is bitter and having no odour.

c) Microscopic: In transverse section the seed showed the seed-coat consisted of single layered epidermis which contains radially elongated parenchymatous cells with thick walls. These cells are coated with cuticle on the outer side. The cells are found possessing yellowish-brown contents. This is followed by 3-6 layers of polygonal to oval thin walled parenchymatous cells.

The epidermis of cotyledons composed of oval or squarish and slightly thick walled possessing yellowish-brown contents. Rest part of the cotyledons is made up of many layers of thin walled polygonal parenchymatous cells wthich contain almone grains. The cells of the outer region are radially elongated. The radical of the seed in sectional view showed the epidermis consisted of hexagonal parenchymatous cells. The cortical region consisted of several layers of thin walled polygonal to oval parenchymatous cells which contain aleurone grains.

Powder: Powder analysis of the crude drug revealed that tannins of seed coat and cotyledon are present in abundance. The aleurone grains are also present which are numerous and oval to round in shape. The fragment of radicle in powder are observed occasionally. Besides these fragments few single parenchymatous cells are also present.

Parts used: Seed

Habitat: Grows in country atroadsides, agricultural lands, disturbed areas, riverbanks.

Phytoconstituents: Aklaloids, glyocosides, steroids, resins, tannins, proteins, iron, sodium; potassium, calcium and chloride.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Antiasthmatic activity: D. stramonium contains a variety of alkaloids, including atropine and scopolamine, having anticholinergic and bronchodilating activity. Atropine and scopolamine act on the muscarinic receptors by blocking them (particularly the M2 receptors) on airway smooth muscle and submucosal gland cells, which dilate bronchial smooth muscle and ease asthmatic attacks. Charpin et al reported that using D. stramonium as an antiasthmatic cigarette is an effective bronchodilator in asthmatic patients with mild airway obstruction. However, the exposure of D. stramonium to the fetus when a mother uses it for asthma will cause a continuous release of acetylcholine, resulting in the desensitizing of nicotinic receptors, which could ultimately result in permanent damage to the fetus.

Antimicrobial Activity: The methanol extracts of D. stromonium and Datura inoxia showed activity against Gram positive bacteria in a dose dependent manner. Little or no antimicrobial activity was found against Escherichia coli and Psuedomonas aeruginosa. The anti-microbial activity of combined crude ethanolic extract of *D. stromonium*, *Terminalia Arjuna* and Withania somnifera in cup plate diffusion method for antibacterial and antifungal activity. The extracts were subjected to screening to detect potential antimicrobial activity against Staphylococcus aureus, Bacillus subtilus, Escherichia coli, Klebsiella pneumoniae, Micrococcus luteus and Candida albicans with compare Ciprofloxacin standard drug.

Antiinflamatory activity: The ethanolic extract of D. stramonium leaf showed significant anti-inflammatory activity against carrageenaninduced paw edema in rats. In one experiment, 39.43% inhibition of the edema was observed after 3 h of oral administration of 200 mg/kg extracts. Maximum activity was observed when the extract was administered in doses of 3-hour intervals. Since the extract of D. stramonium inhibited the carrageenan-induced edema that involves the release of histamine and serotonin in the first phase, the inhibitory effect of the extracts could be partly due to inhibition of mast cell mediator release.

Larvicidal and mosquito repellent activities: Ethanolic extracts of leaves of D. stromonium were evaluated for larvicidal and mosquito repellent activities against Aedes aegypti, Anopheles stephensi and Culex quinquefasciatus. The LD50 values for larvicidal activity

were found to be 86.25, 16.07 and 6.25 mg/L against Aedes aegypti, Anopheles stephensi and Culex quinquefasciatus respectively. The ethanolic leaves extract of D. stromonium provided complete protection time (mosquito repellency) of 2.7, 71.7 and 117.7 min against Aedes aegypti, Anopheles stephensi and Culex quinquefasciatus at higher concentration (1%).

Antifungal activity: Acetone extracts of D. stramonium have been reported to have antifungal activity against several fungi including Penicillium expansum, Aspergillus niger, Aspergillus parasiticus, Colletotrichum gloeosporioides, Fusarium oxysporum, Trichoderma harzianum, Phytophthora nicotiana, Pythium ultimum and Rhizoctonia solani. The MIC of D. stramonium extracts ranges from 1.25 to 2.5 mg/mL. The fungicidal effects of the extracts indicate the potential of D. stramonium seeds as a natural source of antifungal agent.

Vibriocidal activity: A simple in vitro screening assay was employed for the standard strain of Vibrio cholerae, 12 isolates of Vibrio cholerae non-O1, and Vibrio parahaemolyticus. Aqueous and organic solvent extracts of different parts of the plants were investigated by using the disk diffusion method. Extracts from 16 medicinal plants were selected on account of the reported traditional uses for the treatment of cholera and gastrointestinal diseases, and they were assayed for vibriocidal activitie. The results indicated that Lawsonia inermis, Saraca indica, Syzygium cumini, Terminalia belerica, Allium sativum, and D. stromonium served as broad-spectrum vibriocidal agents.

Mizaj (Temperament): Hot 4° Dry 4°

Musleeh (Corrective): Roghan-e-Zard

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	- Not more than 2%, Appendix 2.2.2
Total Ash	-Not more than 5%, Appendix 2.2.3
Acid insoluble ash	- Not more than 2%, Appendix 2.2.4
Alcohol-soluble extractives	- Not less than I I%, Appendix 2.2.6
Water-soluble extractives	- Not less than 7%, Appendix 2.2.7

TLC behaviour of petroleum ether (60-80^0) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Pure Chloroform	2% Ethanolic H_2SO_4	1	0.07

Aa'maal-e-Adviya (Pharmacological Action):

Musakkin-e-Alam, Mukhaddir, Mujaffif, Musakkin, Daf-e-Tashannuj, Mukhrij-e-Balgham, Mohallil-e-Waram.

Mahall-e-Istemalat (Therapeutic use):

Waj-ul-Mafasil, Niqras, lrq-un-Nisa, Waj-ul-Asab, Shaheeqa, Zeeq-un-Nafas.

Meqdar-e-Khorak (Dose): 500 mg to 750 mg

Side-effects / Adverse-effects: No significant side effects have been observed if Dhatura seeds are used with proper detoxification and proper dose.

Important formulations: Habb-e-Shifa, Habb-e-Sekran

DOOB

(Root)

Cynodon dactylon, also known as Vilfa stellata Bermuda grass, Dhoob, dog's tooth grass, devil's grass, couch grass, etc is a grass that originated in Africa. The drug Doob consists of dried fibrous roots of *Cynodon dactylon* (Linn) an elegant, hard, perennial grass growing throughout the country and ascending to 2440 meter.

Other names:

Botanical name : *Cynodon dactylon*

Family : Poaceae

Bengali name : Durva

English name : Creeping cynodon, Lawn grass

Description:

General: *Cynodon dactylon* is a long-lived (perennial) grass, forming thick mats by means of stolons and rhizomes (horizontal, root-like stem usually found underground) (Gibbs Russell et al. 1991). The culms take root at the lower nodes. The leaf blade is flattened with a sharp tip, and is hairy or glabrous (hairless).

Macroscopic: Roots fibrous, cylindrical, upto 4 mm thick, minute hair-like roots arise from the main roots, cream coloured.

Microscopic: Mature root show epiblema or piliferous layer composed of single layered, thin-walled radially elongated to cubical cells; hypodermis composed of 1-2 layered, thin-walled, tangentially elongated to irregular shaped cells; cortex differentiated into two zones, 1 or 2 layers of smaller, thin-walled, polygonal, lignified sclerenchymatous and 4-6 layers of thin-walled, elongated parenchymatous being larger;endodermis quite distinct being single layers, thick walledtangentially elongated cells; pericycle 1-2 layers composed of thin-walled sclerenchymatous cells; vascular bundles consisting of xylem and phloem, arranged in a ring on different radii; xylem exarch, having usual elements; centre occupied by wide pith, composed of oval to rounded thick walled parenchymatous cells containing numerous simple, round to oval or angular starch grains measuring 4-16 µ in diameter and compound starch grains having 2-4 components.

Powder: Cream coloured; fragments of xylem vessels with pitted walls, thick-walled lignified sclerenchymatous cells numerous simple rounds to oval or angular starch grains measuring 4-16 µ in diameter and compound starch grains having 2-4 components.

Parts used : Whole plant

Habitat: Cynodon dactylon is widely cultivated in warm climates all over the world between about 30° S and 30° N latitude, and that get between 625 and 1,750 mm (24.6 and 68.9 in) of rainfall a year (or less, if irrigation is available). It is also found in the U.S., mostly in the southern half of the country and in warm climates.

Phyto Constituents: Phenolic toxins and Flavonoids

Af'aal-e-Advia (Pharmacological activities):

Antidiabetic effect: The antidiabetic effect of ethyl acetate (70%) extract of *Cynodondactylon*root and stem, was investigated in diabetes induced by a combination of ketamine (60 mg/Kg) and xylazine (10 mg/Kg) in mice, which induced a sustained hyperglycemia. Mice were treated with 50 and 100mg/Kg *Cynodondactylon*extract. Both dosages of *Cynodondactylon* extract had significant lowering effect on blood glucose level.

The first dose was more effective than the second, and its impact was just like insulin. 250, 500 and 1000 mg/kg bw of aqueous extract of *Cynodondactylon*were evaluated in diabetic rats and the dose of 500 mg/kg orally was the most effective dose. It lowered blood glucose level around 31% after 4 h of administration in normal rats [68-69]. Aqueous and non-polysaccharide fraction of *Cynodondactylon*exhibited significant antihyperglycaemic activity in diabetic rats and decreased the glucose, cholesterol, triglyceride, high density lipoprotein, low density lipoprotein and urea levels.

Antimicrobial effect: The *in vitro* antibacterial evaluation of the leaves extract of *Cynodondactylon*was carried out against *Escherichia coli, Staphylococcus aureus* and *Streptococcus pyogenes.* 10% concentration of extract was found to be most effective as antibacterial concentration. The aqueous extract of *Cynodondactylon*(50-400 mg/ml) was used to determine the antimicrobial activity against *Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Proteus mirabilis* and *Candida albicans*. The aqueous extract of *Cynodondactylon*exerted concentration dependent antimicrobial activity against all the tested microorganisms except *Candida albicans.* The hydroalcoholic extract of *Cynodondactylon*was investigated for its antibacterial activity against two Gram positive bacteria (*Staphylococcus aureus* and *Staphylococcus albus*) and two gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) using agar well diffusion method (zone of inhibition) and micro-dilution method (minimum inhibitory concentration). Hydroalcoholic extract of *Cynodondactylon*possessed an effective antibacterial activity, from results of minimum inhibitory concentration, it appeared that all tested bacterial strains were sensitive to *Cynodondactylon*extract.

Antiparasitic insecticidal and repellent effects: Anthelmintic activity of petroleum ether, methanol, and water extracts of *Cynodondactylon*was evaluated on adult Indian earthworm *Pheretimaposthuma*with the using of albendazole as a standard drug. The aqueous extract of *Cynodondactylon*exerted anthelmintic activity in comparison with the standard drug [58]. The of mosquito repellents activity of volatile oils of *Cynodondactylon*was studied against (*A. aegypti*). The distillates of the fruits of *Cynodondactylon*was effective for 3 hours. The mixture of *C. papaya* and *Cynodondactylon*was effective for 2.5 hours compared to that of *C. papaya* (2.5 hours) alone or *Cynodondactylon*(1.5 hours) alone.

Gastro-intestinal effect: The effect of 50% ethanolic extract of *Cynodondactylon*was evaluated in gastro-ulcerogenic potential of indomethacin. 50% ethanolic extract of

*Cynodondactylon*was administered in the dose of 300 and 600 mg/ kg orally 30 minutes prior to ulcer induction in male Sprague-Dawley rats by oral administration of indomethacin. Famotidine was used as a reference standard drug. The antiulcer activity was assessed by determining and comparing the ulcer index in the test drug group with that of the vehicle and standard groups. Both the doses, 300 and 600 mg/ kg of test drug showed a protective effect on indomethacin-induced ulcers with 56.74% and the gastro-protective effect of *Cynodondactylon*was studied in alcohol and indomethacin induced gastric mucosal damage. The control group received only ulcerogen, whereas the standard control group and test compound groups were pretreated with ranitidine (25mg/kg) and *Cynodondactylon*(300 and 450mg/kg of the plant juice powder, intragastrically) respectively, before exposure to ulcerogen. 4 hours after exposure to ulcerogen the rats were sacrificed, stomachs were dissected out and opened. The total number of ulcers, size of each ulcer was noted and ulcer index was calculated. In alcohol model the rats pretreated with *Cynodondactylon*showed significant protection as compared to control and ranitidine pretreated groups

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Antioxidant effects: The effect of ethyl acetate fractions of *Cynodondactylon*on the level of enzymatic and non enzymatic antioxidants was studied in Ehrlich's lymphoma ascite (ELA) transplanted mice. The levels of enzymatic antioxidants like super oxide dismutase, glutathione peroxidase and catalase and non enzymatic antioxidants like reduced glutathione, vitamin A and vitamin E, were decreased in ELA induced mice due to the liberation of free radicals from the liver.

Cardiovascular effects:*Cynodondactylon*caused rise in heart beat rate in zebra fish embryos significantly higher than that caused by betamethosone. The EC50 value of *Cynodondactylon*was found to be 3.738 μg/ml. The effects of hydroalcoholic extract of *Cynodondactylon*rhizomes was evaluated on cardiac contractility in normal hearts and on cardiac functions in right-heart failure in rats. Right-heart failure was induced by intraperitoneal injection of monocrotaline (50 mg/kg). Two weeks later, the animals were treated orally with different doses of the extract for fifteen days. At the end of the experiments, cardiac functions and markers of myocardial hypertrophy were measured. The treated rats showed very less signs of fatigue, peripheral cyanosis and dyspnea. The survival rate was high in the extract treated groups (90%). Administration of *Cynodondactylon*in monocrotaline-injected rats led to profound improvement in cardiac functions as demonstrated by decreased right ventricular end diastolic pressure (RVEDP) and elevated mean arterial

pressure. RVdP/dtmax, and RVdP/dt/P as indices of myocardial contractility were also markedly ($p<0.001$) increased by the extract. The extract reduced heart and lung congestion by decreasing tissue wet/dry and wet/body weight ratios ($p<0.01$). In the isolated rat hearts, the extract produced a remarkable ($p<0.001$) positive inotropic effect concomitant with a parallel decrease in LVEDP [95]. The phenolic fraction of *Cynodondactylon*(CDP) was evaluated for its cardio-protective activity using isolated frog's heart perfusion method. The CDP produced negative inotropic and chronotropic actions on isolated frog heart. These pharmacological effect were selectively inhibited by atropine, which indicated that these effects were mediated through muscarinic receptor.

Immunological and antiattergic effects: The possible antianaphylactic and mast cell stabilization mechanism of *Cynodondactylon*was evaluated by using compound 48/80 induced mast cell activation and level of nitric oxide in serum, rat peritoneal mast cells. The results showed that a *Cynodondactylon*compound (CDC) isolated by bio-assay guided fractionation, produced significant ($p<0.01$) inhibitory effect on compound 48/80 induced anaphylactic reaction and ($p<0.001$) mast cell activation. This CDC also inhibited significantly, compound 48/80 induced increased level of nitric oxide in rat serum and rat peritoneal mast cells. The immunomodulatory activity of *Cynodondactylon*was carried out in mice using the humoral antibody response. Oral administration of the juice at 250 and 500 mg/kg in mice increased humoral antibody response upon antigen challenge as evidenced by a dose-dependent, significant increase in antibody titer in the haem-agglutination antibody assay and plaque forming cell assay.

Antiinflammatory, antipyretic and analgesic effects: The anti-inflammatory activity of aqueous extracts of *Cynodondactylon*(200, 400, and 600 mg/kg of bw orally) was evaluated using the carrageenan, serotonin dextran and histamine induced rat paw edema. The results showed that all doses exerted significant anti-inflammatory activity in all models.

Anticancer effects: Anticancer activity of *Cynodondactylon extract* was evaluated in Swiss albino mice after inoculated with Ehrlich ascites carcinoma (EAC) cells. The extract were administered orally as three doses, 100, 200 and 400 mg/kg for ten consecutive days. Anticancer activity of the *Cynodondactylon*extracts was evaluated by mice life span, which increased based on mean survival time (MST).

Bronchodilatory effects: The bronchodilatory effect of *Cynodondactylon*was investigated by *in vitro* and *in vivo* models. Acetylcholine (Ach)-induced bronchospasm was conducted in guinea pig while isolated rat tracheal strip was suspended in organ bath to measure the concentration response curve using multichannel data acquisition system. The chloroform extract of *Cynodondactylon*(CECD) protected against Ach-induced bronchospasm in guinea pigs, similar to atropine. In the *in vitro* studies, CECD relaxed carbachol (CCh) and high K+ - induced contraction of rat tracheal strip, similar to atropine and verapamil, suggesting antimuscarinic and calcium channel blocking (CCB) activities, which were confirmed by right ward shifting of CCh and Ca+2 concentration response curve (CRC). The phosphodiestrase (PDE) inhibitory activity was confirmed by potentiation of isoprenaline-induced inhibitory response, similar to papaverine. Densitometry analyses led to the identification of scopoletin as an active ingredient. It significantly inhibited high K+, and Ca+2 induced contractile response, similar to verapamil. The phosphodiestrase inhibitory activity was confirmed by direct evidence of potentiation of isoprenaline-induced inhibitory response, similar to papaverine. The results revealed that the bronchodilator activity of CECD was partly due to presence of scopoletin, and mediated possibly through CCB and PDE inhibition.

Reproductive effect: The effect of administration of aqueous extract of entire plant of *Cynodondactylon*for thirty days on reproductive hormones and reproductive organ weight of female, was studied in Wistar rats. Administration of the extract produced significant increase ($p<0.001$) in the serum estradiol concentration whereas, follicle stimulating and luteinizing hormones were significantly ($p<0.001$) reduced. Furthermore, a significant increase ($p<0.001$) in the weight of the uterus and significant decrease in the weight of the ovaries ($p<0.001$) was observed in the treated group when compared to the control group. In addition, the estrous cycle was found to be irregular and disturbed.

Mizaj (Temperament): Moderate towards cold

Musleh (Correction): Filfil Siyah, Honey, Misry

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign matter : Not more than 2 per cent, Appendix 2.2.2

Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 3 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 1 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 5 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract on silica gel 'G' plate using n-Butanol : Acetic Acid: Water (4 : 1 : 5) shows under U.V.(366 nm) three fluorescent zones at Rf. 0.70, 0.89 (both blue) and 0.92 (pink) . On exposure to Iodine Vapour six spots appear at Rf. 0.22, 0.30, 0.37, 0.80, 0.89 and 0.92 (all yellow). On spraying 5% Methanolic Sulphuric acid reagent and heating the plate at 105^0 C for ten minutes six spots appear at Rf. 0.22, 0.30, 0.37, 0.80, 0.89 and 0.92 (all grey).Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action: Musakkin-e-Meda, Musakkin-e-Hararat, Mudirre-e-Baul

Mahall-e-Istemalat (Therapeutic uses): Surkh Bada, Shara, Sozish-e-Baul, Qai.

Meqdar-e-khorak (Dose) :3-5 gm

Side-effects : No significant side-effecct have been observed.

Important formulations : Not available

FILFIL SIYAH

(Fruit)

The drug Filfil Siyahconsists of fully mature dried fruit of *Piper nigrum* Linn which has many medicinal properties for the human body.

Other names :

Botanical name **:** *Piper nigrum*

Family **:** Piperaceae

Bengali name **:**Golmorich, Kalamorich, Morich

English name **:** Black pepper

Description :

General: *Piper nigrum*, is a climbing perennial plant in the family Piperaceae which is grown for its fruits. The fruits are used to produce black, white and green peppercorns which are commonly used as a spice in cooking. Black pepper may be vining or have bushy, wooden stems. Each stem can produce 20–30 spikes.

Macroscopic: Fruits black to black, hard, wrinkled 0.4-0.5 cm in diameter odour aro-matic taste pungent.

Microscopic: Fruit consists of a thick pericrap for about one third of fruit and an inner mass of perisperm, enclosing a small embryo; pericrap consists of epicrap, mesocrap and endocarp; epicrap composed of single layered, slightly sinuous, tabular cells forming epidermis, below which, are present 1 or 2 layers radially elongated, lignified stone cells adjacent to group of cells parenchyma; mesocrap wide, composed of band of tangentially elongated parenchymatous cells having a few isolated, tangentially elongated oil cells present in outer region and few fibro vascular bundles, a single row of oil cells in the inner region mesocrap; endocarp composed of a row of breaker- shaped stone cells; testa single layered, yellow coloured, thick-walled sclerenchymatous cells; perisperm contains perenchymatous cells having a few oil globules and packed with abundant, oval or round simple and compound starch grains measuring 5.5-11.0 µ in diameter, having 2-3 components and a few minute aleurone grains.

Powder: Blackish-grey, shows more or less iso-diametric or slightly elongated stone cells, interspersed with thin-walled, polygonal hypo-dermal cells; beaker-shaped stone cells from endocarp and abundant polyhedral, elongated cells from perisperm, packed tightly with masses of minute compound 2-3 and single, oval to round, starch grains measuring 5.5-11.0 µ in diameter and a few aleu-rone grains and oil globules.

Parts used : Dried ripen fruits

Habitat: Piper species have a pantropical distribution, and are most commonly found in the understory of lowland tropical rainforests, but can also occur in clearings and in higher elevation life zones such as cloud forests. It is subtropical and can tolerate light winter frost and are often dominant species where they are found.

Phytoconstituents : Alkaloids (Piperine, Chavicine; - Piperidine, Piperetine), Essential Oil

Af'aal-e-Advia (Pharmacological activities):

Antioxidant Activity: Free radicals are responsible for causing many diseases. Different kinds of free radicals can attack the cell membrane, and cause or alter membrane permeability, membrane damage, oxidation of lipids, loss of different enzymatic activities, and ultimately disrupt proper cell function and body physiology, which may cause cancer. There are many antioxidants in our body to scavenge the free radical generated normally during metabolism. However, it can be insufficient sometimes. When there is imbalance between the free radical generation and antioxidant activity, oxidative stress is induced; which is harmful to our body,

causing many side effects from simple health problems to cancer. Antioxidant activity of our body system includes enzymes like catalase, ascorbate, peroxidase, and superoxide dismutase, which are responsible for scavenging both free radicals and related oxygen species. Plants are a potent source of antioxidant activity from ethnomedicinal practices to today's finding.
Many scientific findings prove its great antioxidant potency. Piperine and *P. nigrum* maintain superoxide dismutase, glutathione peroxidase, catalase, glutathione-s-transferase, glutathione levels and reduce high fat diet induced oxidative stress. Many screenings, using different solvent system for extraction of *P. nigrum* constituents, prove this potency

Antimicrobial Activity: An antimicrobial is an agent that kills micro-organism or inhibits their further growth. These antimicrobial agents can be grouped into different categories according to their primary activity, like antibacterial, antifungal, antiviral, anti-parasitic, pesticide, *etc*. Many plants have been used as an antimicrobial agent throughout time and will be in future. Although any modern synthetic antimicrobial agents are developed rapidly, the resistance towards them is also growing rapidly. Usually the resistant against plant source seems less when compared to modern chemical drugs, this may be due to presence of a wide variety of different chemical constituent within a single plant.
Many literature reviews have shown the antimicrobial potency of black pepper. Extract of black pepper using solvent *viz*. carbon tetrachloride, benzene, ethyl acetate, acetone, methanol, ethanol, and distilled water were tested against gram-positive and gram-negative bacteria *viz. Staphylococcus albus, S. typhi, E. coli, B. megaterium, P. aeruginosa* and one fungus, *Pseudomonas aeruginosa*. Against different bacteria, the strongest antibacterial and antifungal activity was shown at the concentration of 40µg/disc [50]. Using *P. nigrum* leaf and stem extract, the silver nanoparticle was synthesized, and the antibacterial activity was examined against the agricultural plant pathogen which showed excellent activity, thus the author concluded its beneficial application in the field of agricultural nanotechnology [62]. All 20 strains of *K. pneumoniae* were isolated from the urine culture of a hospitalized patient suffering from urinary tract infection (UTI) and alcoholic extract of *P. nigrum* was tested against it, which showed good activity against antibiotic resistant *Klebsiella pneumonia* with MIC and MBC value at 0.62 mg/ml [51].

Analgesic, Antipyretic and Anti-Inflammatory Activity: *In-vivo* analgesic activity of piperine was evaluated in mice. The analgesic activity was tested by using acetic acid-induced writhing, tail flick assay. After intraperitoneal (i.p.) injection of piperine (30, 50 and 70 mg/kg), the acetic acid-induced writhing in mice was observed and found to be significantly

inhibited (P<0.01), like the effect of indomethacin- an NSAID drug (20 mg/kg, i.p.). In the tail flick assay, morphine (5 mg/kg, i.p.) and piperine (30 and 50 mg/kg, i.p.) showed a significant increase (P<0.01) in the reaction time of mice. Animals with naloxone pre-treatment (5 mg/kg i.p.), reversed the analgesic effects of both morphine and piperine. All these findings reveal that piperine exhibits analgesic effects possibly mediated *via* opioid pathway [63].

Analgesic activity of piperine was tested in mice (20 and 30 mg/kg, i.p.); acetic acid and hot plate reaction test was used. Indomethacin (10 mg/kg) was taken as reference standard. Piperine showed significant (p<0.5) dose dependent delayed response towards pain. The antipyretic activity of piperine was observed by using yeast-induced pyrexia in mice model. The rectal temperature was measured in piperine (20 and 30 mg/kg) treated mice as compared to the control group. Where the significant (p<0.5) increase in temperature in the control group mice was observed [6]. The experiment revealed that anti-inflammatory, analgesic, and anti-arthritic activity of piperine in arthritis model of rat. For measuring *in-vitro* anti-inflammatory activity, the interleukin 1β stimulated synoviocytes taken from rheumatoid arthritis was used. While the anti-arthritic including analgesic potency was carried out on carrageen, an induced acute paw model or arthritis and pain in rat. The cyclo-oxygenase 2, interleukin 6, prostaglandin E2 and matrix metallo-protease levels were tested by RT-PCR and ELISA analysis method. At concentration of 10-100µg/mL, piperine treated group were found to reduce synthesis of PGE2 in a dose dependent manner. Even at 10 µg/mL it significantly inhibits the synthesis of PGE2. The expression of metallo-proteinase 13 and interleukin 6 were also inhibited [65]. Which concludes the potency of piperine for the titled topic.

Anticonvulsant Effects: The mice model for anticonvulsant activity of piperine was evaluated by inducing seizure with pentylenetetrazol (PTZ)- and picrotoxin (PIC) in mice. On administering piperine (30, 50 and 70 mg/kg, i.p.) and reference standard drugs, valproic acid (200 mg/kg, i.p.), diazepam (1 mg/kg, i.p.) and carbamazepine (30 mg/kg, i.p.) which showed significantly (P<0.01) delayed onset of PTZ-and PIC-induced seizures in mice. Which indicate that piperine exhibits anticonvulsant effects possibly mediated *via* GABA-ergic pathways.

Antitussive and Bronchodilator: Many traditional practices prove it as well. *P. nigrum* is widely used in many herbal cough syrups due to its potent antitussive and bronchodilator properties [60]. Many old people and herbal practitioners believed that the addition of little

amounts of powered peppercorn in a green tea significantly reduces asthma [4]. The oral administration of piperine in different amount to mice reduced and suppressed the hyper responsiveness, infiltration of eosinophils and inflammation possibly due to suppression of production of histamine, immunoglobulin E, interleukin 4 and interleukin.

Anti-obesity Activity: Obesity is becoming a global problem, since it is a socially stigmatized health problem. The modern treatments are only effective when they are used, and the problem progresses again after stopping drug use. On the other hand, the drugs have more side effects. So, experiments are now focusing on herbal medicine and other non-pharmacological way of management of obesity like exercise, yoga, meditation, diet control *etc*.

There are so many plants that have anti-obesity potency among them, *P. nigrum* is one. In an anti-adipogenesis study of *P. nigrum* extract and piperine in 3T3-L1 preadipocytes both the black pepper extract and piperine strongly inhibited the adipocyte differentiation of 3T3-L1 cells, without affecting cytotoxicity. The mRNA expression of masteradipogenic transcription factor, SREBP-1c, C/EBPβ and PPARγ were significantly decreased. Piperine disrupts the rosiglitazone- dependent interaction between PPARγ and cofactor CBP in GST pull down assay.

Antimutagenic, Antitumor and Anticancer Activity: Cancer is becoming global challenge in today's health system. Although enormous efforts are done and going on to find new technology, drugs, research, surgery, it is still insufficient. So, we need to search such systems where negligible side effect with high therapeutic outcomes. Chemo-therapy is very painful to a patient and has other serious adverse effects. Many herbal medicines are used in different systems of medicine, such as Ayurveda, Chinese, Homeopathy, and so on. Plant sources are believed having no/negligible side effects. We should use herbal medicine in our daily life along with food to avoid cancer and tumors in our lives. To signify this potency, black pepper has been used as an anticancer and antitumor agent. *P. nigrum* has been reported in many literatures as having the potency to inhibit tumor formation in different experimental models.

Anxiolytic and Antidepressant Activity: In this globalized world, people are more stressed. Suicide and mental sub-activity is a big problem in today's society. Many herbs are used as a memory enhancer. Among which, black pepper has been used for a long time in herbal and ethnomedicinal practice . Today's more scientific experimental model findings prove it is useful. Anxiolytic and antidepressant activity of the methanolic extract of *P. nigrum* fruits in

beta-amyloid (1-42) treated rat model of Alzheimer's disease showed increase in immobility and decrease in swimming time within forced swimming test. Whereas decreases in % of time spent, exploratory activity and number of entries in open arm within elevated plus-maze test. This showed the methanolic extract significantly exhibited antidepressant and anxiolytic effects by attenuation of oxidative stress

Digestive and Hepatoprotective Activity: Many experimental findings show the hepatoprotective effect of *P. nigrum* in animal and human model [4]. The methanolic extract from black pepper (MEPN) fruits (100 and 200 mg/kg, p.o. for 15 days) and piperine (50 mg/kg, p.o. for 15 days) were tested against ethanol-CCl_4 induced hepatotoxicity Wistar rats, which reveals the significant activity of black pepper in decreasing the hepatic biomarker level like TG, AST, ALT, ALP and bilirubin, which were increased on ethanol-CCl_4administration. The significantly decreased level of SOD, GSH and CAT after ethanol-CCl_4 administration were restored with MEPN and piperine. These results were like the reference standard Liv 52 (1ml/kg, p.o., 15 days).

Other Pharmacological Activities and Use: *P. nigrum* (Black pepper) exhibits many pharmacological actions like antiplatelets, anti-hypertensive, antispasmodic, antiprotozoal, bioavailability enhancer, memory enhancer, antimutagenic, insecticidal, immunomodulator, antithyroid, anti-asthmatic, anxiolytic activities *etc.*

Mizaj (Temperament) : Hot 3^0 and dry 3^0

Musleh (Correction) : Vinegar, Honey, Cold product

Badal (Proximal substitute) : Piper longum

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 3 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 1 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 5 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract on silica gel 'G' plate using Toluene: Ethylacetate (7:3) shows invisible lights four spots at Rf. 0.05, 0.08 (both light green), 0.27 (light yellow), and 0.52

(yellow). Under UV (366 nm) ten fluorescent zones are visible at Rf. 0.05, 0.08 (both light brown), 0.20 (light) and 0.97 (both blue). On exposure to Iodine Vapour eleven spots appear at Rf. 0.05, 0.08, 0.14, 0.20, 0.27, 0.34, 0.46, 0.57, 0.66, 0.74 and 0.97 (all yellow). On spraying with dragendroff's reagent followed by 5% Methanolic Sulphuric acid reagent nine spots appear at Rf. 0.05 (light orange), 0.14, 0.20, 0.27 (all orange), 0.46. 0.57 (both yellowish orange), 0.66, 0.74 (both orange) and 0.91 (light orange). On Spraying with Vanillin Sulphuric acid reagent and heating the plate for ten minutes at 110^0 C tweleve spots appear at Rf. 0.05, 0.08, 0.20, 0.27, 0.46; 0.52, 0.57, 0.66, 0.74, 0.82, 0.90 and 0.97 (all violet). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action) :

Externally: Jali, Jazib-e-Khoon, Musakkin.

Internally: Muharrik,Muqawwi-e-Meda, Jigar wa Asab, Kasir-e-Riyah, Mudirr-e-baul wa Haiz, Muqawwi-e- Bah, Munaffis-e-Balgham, Tiryaq-e-Meda.

Mahall-e-Istemalat (Therapeutic uses): Nafkh-e-Shikam, Fasad-e-Hazm, Zof-e-Hazm, Kasrat-e-Riya, Bars-o-Bahaq.

Meqdar-e-khorak (Dose):1-2 gm

Side-effects : Black pepper and white pepper are safe when used in food amounts and might be safe for most people when used in medicinal amounts. Pepper might have a burning aftertaste. Taking large amounts of black and white pepper by mouth, which can accidentally get into the lungs, has been reported to cause death. This is especially true in children.Black pepper and white pepper, when applied directly to the skin, are safe for most adults. However, there isn't enough information to know if use on the skin is safe for children. Black pepper and white pepper may cause redness and burning if they get into the eyes.

Important formulations : Dawa-ul-Shifa, Jawarish Kamoni, Jawarish Kamooni kabir, Jawarish Falafali.

FUFAL

(Seeds)

Drug Fufal consists of dried ripe seeds of *Areca catechu* Linn of Palmae family. The nut is used to make medicine for schizophrenia and an eye disorder called glaucoma; as a mild stimulant; and as a digestive aid. Areca nut is chewed alone or in the form of quids, a mixture of tobacco, powdered or sliced areca nut, and slaked lime wrapped in the leaf of "betel" vine (Piper betel).

Other names :

Botanical :*Areca catechu* Linn

Family : Palmae

Bengali : Supari, Gua

English name : Areca Nut, Betel Nut

Description:

General: Areca is a plant. Drug yielding plant is a graceful, slender, stemmed perennial palm, trunk reaching a height of about 25 meter, cultivated in the coastal regions of this sub-continent up to an altitude of 1000 meter.

Macroscopic: Ovoid, externally pale, reddish-brown to light yellowish-brown, marked with a net work of paler lines, frequently with adhering portions of silvery brittle endocarp and adhering fibers of mesocarp at base of seed, seed hard with ruminate endosperm of brownish tissue alternating with whitish tissue; odour, characteristic, astringent.

Microscopic: Transverse section of seed shows a seed coat consisting of several rows of cells, tangentially elongated, with inner walls more or less thickened; whitish cells of endosperm tissue with thick porous walls containing oil globules and aleurone grains; brown perisperm tissue with thick-walled cells and delicate tracheae.

Powder: Reddish brown to light brown; under microscope shows fragments of endosperm tissue with porous walls, irregularly thickened and small stone cells of seed coat, a few aleurone grains and oil globules and a few delicate tracheae; starch absent.

Parts Used **:** Dried ripe seeds

Habitat **:** *Areca catechu*however thrives in areas of high rainfall. Although tolerant to moderate elevations on mountains, it generally does best in low altitudes. Being a shade-loving species, arecanut always does well when grown as a mixed crop with fruit trees.

Phyto Constituents: Alkaloid (arecoline), tannins and fats

Af'aal-e-Advia (Pharmacological activities):

Blood Pressure Regulating Activity: *Areca* tannin has been suggested as having a blood pressureregulatory effect through its ability to inhibit the pressor responseto both angiotensin I and II15. As genetic and environmentalfactors determine the susceptibility and development of diseasesand no report has been published concerning the genetic interactionof metabolic effects in areca nut/betel quid (BQ) chewers, it is proposedthat the cardiovascular effects of chronic BQ usage can beaffected by the polymorphism of the angiotensin converting enzyme(ACE) gene16. In a recent report17 by the authors, it was observed that*ACE* insertion/deletion (I/D) polymorphism is associated with therisk of oral mucosal lesions in BQ chewers, which indicates the relativecontribution of genetic and environmental factors that determinethe susceptibility and development of diseases.

Hypoglycemic Activity: Arecoline was investigated and reported to have hypoglycemicactivity in an animal model of diabetes upon subcutaneousadministration. The Subcutaneous administration of alkaloid fractionof *Areca catechu* (0.05_/0.5 mg/kg) in alloxanized rabbits (140mg/kg) showed significant hypoglycemic effect lasting for 4/6 hours18.Recently, it was observed that chronic BQ use is associated with ahigher risk of type 2 diabetes mellitus and metabolic syndrome, determinedby a epidemiologic survey in Taiwan.

Platelet Aggregation Activity: *Areca* nut (AN), a Bittle Quid component, modulates arachidonicacid (AA) metabolism, which is crucial for platelet function. ANextract (1 and 2 mg/ml) stimulated rabbit platelet aggregation, withinduction of thromboxane B2 (TXB2) production. Catalase, superoxidedismutase, and dimethylthiourea (DMT) showed little effect onAN-induced platelet aggregation, whereas catalase and DMT inhibitedthe AN-induced TXB2 production. These results suggest thatAN-induced platelet aggregation is associated with iron-mediatedreactive oxygen species production, calcium mobilization, phospholipaseC activation, and TXB2 production21.

Anti-HIV Activity: Various active constituents like procyanidins, arecatanninB1 and extracts of seed showed HIV protease inhibition activity.

Proteasome Inhibitors: The proteasome hydrolyze various cell cycle regulators, transcriptionfactors and antigenic proteins, it is a promising target forthe development of drug for the treatment of a range of pathologiessuch as cancer, inflammation, immune diseases and others. Thedevelopment of proteasome inhibitors into novel therapeutic agentsrepresents a new approach and now classes of these substances arein clinical trials or used to study the role of the ubiquitin–proteasomepathway in various cellular processes. A number of tripeptidic sequencesderivatized at the N- and C-terminal with arecoline derivativesthat were able to efficiently interact with the catalytic subsitesof the proteasome 20S was identified.

Molluscicidal Activity: In *in vivo* and *in vitro* exposure of arecoline (active componentof *Areca catechu* seed) significantly inhibited the acetylcholinesterase(AChE), acid and alkaline phosphatase (ACP/ALP) activityin the nervous tissue of L. acuminata. The inhibition kinetics ofthese enzymes indicates that arecoline caused competitive inhibitionof AChE, competitive–non-competitive inhibition of ACP/ALP. Thusthe inhibition of AChE, ACP and ALP by arecoline may be the causeof molluscicidal activity of *Areca catechu*.

Antidepressant Activity: It has been previously shown that among various alkaloidconstituents from areca nut, alkaloids in dichloromethane fractionwere found to be biologically active both in vivo and in vitro. Thisfraction potently inhibits monoamine oxidase-A activity and thusrestores or increases bioavailability of monoamines, 5-hydroxytryptamineor noradrenaline in the brain. Additionally, forced swimmingand tail-suspension tests supported that the dichloromethanefraction has antidepressant activity.

Anticonvulsant Activity: Arecaidine and guvacine, constituents of the nut of *Arecacatechu*, inhibited the uptake of GABA and â-alanine, but not that ofglycine, by slices of cat spinal cord. Large doses of arecaidine (1 g/kgsubcutaneous) marginally reduced the lethal effects of bicuculline inmice but appeared to have little or no anticonvulsant activity.

Central Nervous System Stimulant: Betel nut may cause stimulant and euphoric effects. As aresult, it is sometimes used recreationally. However, the known toxicitiesof chewing betel nut likely outweigh any possible benefits29. Asevere skin inflammatory reaction halted the development of atransdermal device to systemically deliver arecoline, a cholinergicagonist, for use in the management of a human neurological disorder.

Prevention of Dental cavities: Betel nut was once used in toothpaste to prevent cavities.Laboratory studies suggest that betel nut may have antibacterialeffects31, which may reduce the development of cavities. However,other therapies to prevent tooth decay are safer, and the risks associatedwith betel nut likely do not outweigh the possible benefits.*Areca* Nut is made into a dentrifrice on account of its astringentproperties1. It is considered to strengthen the gum, sweeten breath.The seed, reduced to charcoal and powered, forms an excellentdentrifrices**.**

Saliva stimulant: Betel nut has been shown to produce large amounts of salivain people who chew betel nut. However, the toxic effects associatedwith its use probably do not outweigh the benefits.

Anti-venom activity: Tannin is one snake venom antidote found34 widely distributedin the plant kingdom. Tannins from plants have been shown tointeract with snake enzyme systems. Plant polyphenols from the aqueousextracts of *Areca* was tested for their inhibitory activities against*Najakaouthia*(NK) venom by in vitro neutralization method**.** Clinicalapplications of this plant polyphenols should therefore be very usefulfor first aid treatment of snakebite victims.

Antioxidant Activity: The active-oxygen scavenging activity of methanolic extractof *Areca catechu* used in China and Japan as nourishing tonicswas evaluated by electron spin resonance (ESR) technique, in orderto evaluate its effectiveness for anti-aging and to search for newactive-oxygen scavengers from natural resources. It especially showedstrong scavenging activity against super- oxide anion radical.

Oxytocic Activity and Anti-fertility Activity: The ethanolic extract of nuts has shown remarkable oxytocicactivity at a dose of 100 mg on isolated rat uterus. The oil obtainedfrom nuts, at a dose of 500 mg / kg exerted resorption of implants. Ata dose of 100 mg/ kg oil exerted 40% antifertility activity.

Antimicrobial Activity: The alcoholic extract of nut showed38 antimicrobial activityagainst Escherichia coli, Candida albicans, C. tropicalis, andTricophytoninterdigitale. A variety of human and veterinary isolates,both Gram + ve and Gram – ve were tested against Areca nut extractby measuring growth of organisms by spectrometric method. It isfound that both Gram + ve and Gram – ve organisms are susceptibleto Areca nut extract. Concentration needed for 100% inhibition ofgrowth was found in order of 3.3-7 mg/mL for Gram – ve and 16 mg/mLfor Gram + ve. Extract was also inhibit aflatoxin production by Aspergillusflavus and also inhibit the viral growth of New Castle DiseaseVirus and egg Drop Syndrome Virus growth in embryo calture.

Other Pharmacological Activities: Different extracts like aqueous, alcoholic, alkaline and acidextracts resulted in the constriction of capillaries to varying degreewhen tested by rat hind limb perfusion technique. 50% alcoholicextracts of leaves exhibited various pharmacological properties likeeffects on respiration and CVS in cat/dog and antispasmodic propertyon isolated guinea pig ileum39. Hamsters chewing betel quid orareca nut directly show a decrease in body weight. These resultsindicate that *Areca* nut and Bittle quid components may induce alterationsin proliferation and differentiation of oral epithelial cells. Animalmodel of chewing BQ or AN can be useful for future tumor initiation,promotion and chemoprevention experiments simulating thecondition of BQ chewing in humans. The action of Arecain resemblesthat of Muscarine and Pilocarpine externally, internally used it contractsthe pupils.

Mizaj (Temperment): Cold 2^0 and Dry 2^0

Musleh (Correction): Ghee, Milk

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 1 per cent, Appendix 2.2.2
Total ash	: Not more than 3 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 0.4 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 19 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 10 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Qabiz, Mohallil-e-Waram, Rade, Habis

Mahall-e-Istemalat (Therapeutic uses): Ishal, Sailan-ur-Rahem, Jiryan

Meqdar-e-khorak (Dose):3 to 5 gm

Side-effects: Not enough side-effect is known about the safety of taking betel nut by mouth short-term. However, betel nut is considered likely unsafe when taken by mouth long-term or in high doses. Some of the chemicals in betel nut have been associated with cancer. Other chemicals are poisonous.

Eating 8-30 grams of betel nut can cause death. Chewing betel nut can make your mouth, lips, and stool turn red. It can cause stimulant effects similar to caffeine and tobacco use. It can also cause more severe effects including vomiting, diarrhea, gum problems, increased saliva, chest pain, abnormal heart beats, low blood pressure, shortness of breath and rapid breathing, heart attack, coma, and death.

Important formulations: Habb-e-Hamal, Majoon-e-Muqawwi-e-Rahem, Majoon Supari Pak.

GILO

(Leaves)

Drug Gilo consists of dried, matured pieces of stem of *Tinospora cordifolia*Willd.of Menispermaceae family. Drug yielding plant is a perennial climber found throughout the country, drug collected during summer preferably in the month of May.

Other names :

Botanical :*Tinospra cordifolia*

Family : Menispermaceae

Bengali : Gulancha, Gilo, Gadancha, Guluncha, Ningilo, Golancha

English name : Gulancha, Tinospora

Description:

General: Tinospora cordifolia is a shrub that is native to India. Its root, stems and leaves are used in Traditional medicine.

Macroscopic : Drug occurs in pieces of varying thickness ranging from 0.6-5 cm. m diameter, young oreen with smooth surfaces and swelling at nodes, oldr ones show a light brown surface marked° with warty protuberances due to circular lenticels; transversely smoothened surface shows a radial structure with conspicuous medullary rays traversing porous tissue; taste bitter.

Microscopic : Transverse section of stem shows outer-most layer of cork, differentiating into outer zone of thick-walled brownish and compressed cells, inner zone of cork broken at some places due to opening of lanticels, followed by 5 or more rows of secondary cortex of which the cells of outer rows smaller than the inner one; just within the opening of lenticels, groups of sclereids consisting of 2-10 cells found in secondary cortex region, outer zone of cortex consists of 3-5 rows of irregularly arranged, tangentially elongated chlorenchymatous cells; cortical cells situated towards inner side, polygonal in shape and filled with plenty of starch grains, simple ovoid or irregularity ovoid-elliptical occasionally compound of 2-4 components several secretary cells; found scattered in the cortex; pericyclic fibers lignified with wide lumen and pointed ends, associated with a large number of crystal fibers containing a single prism in each chamber; vascular zone composed of 10-12 or more wedge-shaped strips of xylem, externally surrounded by semi-circular strips of phloem, alternating with wide medullaryrays; phloem consists of sieve tube companion cells and phloem parenchyma of polygonal or tangentially elongated cells some of them contain crystels of calcium oxalate; cambium composed of one or two layers of tangentially elongated cells in each vascular

bundle; xylem vessels comparatively narrow devoid of tyloses; secondary xylem elements thick-walled, lignified, vessels cylindrical in shape bearing boardered pits on their walls some large vessels possess several tyloses and often contain transverse septa; medullary rays 15-20 or more cells wide containing rounded, hemispherical, oblong, ovoid, with faintly marked concentric striations and central hillum appearing like a point, starch grains of 5.5 - 11.20 meter in length; pith composed of large, thin-walled cells mostly containing starch grains.

Parts Used: Dried, matured pieces of stem androot and leaves.

Habitat:*T.cordifolia* grows throughout tropical sub-continent, ascending to an altitude of 300meter. It is a large, glabrous, deciduous climbing shrub. The stems are rather succulent with long filiform fleshy aerial roots from the branches.

Phyto Constituents: Terepenoids and alkaloids

Af'aal-e-Advia (Pharmacological activities):

Anti-cancer/anti-tumor activity: Various experimental models of animal have been taken to show the anti-cancer activity of plant guduchi. The radio protective property is well characterized by this plant as it considerably increases the weight of various tissues as well as body weight. In addition to this, it also protects from the gamma radiation (sub-lethal range) radiated on the testes of mice (Swiss Albino). The cultured HeLa cells when exposed to different concentration of methylene chloride extracts of *T. cordifolia*such as 0,5,10,25,50,and 100 μg/ml ; it showed an increase in cell death or cell killing as compared to untreated cultured cell (control) in a dose-dependent manner.49 A study has also reported that, the hydroalcoholic extract of roots (aerial) of *T. cordifolia*on exposure to the liver as well as extrahepatic organs of mice (Swiss Albino) at 50 and 100mg/kg body weight shows an increase in Glutathione (GSH) level and other metabolizing enzymes. In addition to this, there is a significant decrease in production of malonaldehyde (MLD) level representing a decrease in free radical formation providing an antioxidative state of cell.

Anti-toxin activity: Guduchi have a potential ability to scavenge free radical and shows a protective effect by altering different hormone and mineral levels. *T. cordifolia*has reported to reverse the toxicity caused by aflatoxin in kidney (Swiss albino mice) where, it substantially elevates the hormone level (such as Glutathione) and enzyme activities (such as catalase, glutathione reductase); and decreases the reactive oxygen species (ROS). And this anti-toxin

activity is primarily brought by the alkaloids of this plant.58 Lead nitrate toxicity in swiss albino mice shows a decreased value in erythrocyte and leucocyte count in blood serum.

Anti-diabetic activity: The compounds such as alkaloids, cardiac glycosides, saponins, flavonoids, tannins and steroids isolated from guduchi possess anti-diabetic property. Hence, it makes possible to have wide application in clinical as well as experimental study. Alkaloids from guduchi stated to possess the effect like insulin hormone and shows insulin mediated actions.26 Gestational Diabetes can increase the GSH content and other reactive species that can act as a threat to the mother as well as fetus. However, a study stated that when *T. cordifolia*has been given in daily diet to a diabetic-pregnant rat (streptozocin induced diabetes), it shows a protective effect by reducing the oxidative load thereby preventing the relative incidence of diseases and any sort of birth defect.62 In diabetic rat model, root extracts of guduchi attenuate the brain mediated lipid level and downregulates the blood glucose and urinary glucose level emphasizing its anti-diabetic and lipid lowering activity.

The root extract of guduchi shows antihyperglycemic effect in alloxan induced diabetic model by decreasing its excess glucose level in urine as well as in blood to a range of normal.64 Medicinal herbal preparations like Ilogen-Excel, Hyponidd and Dihar consist of number of herbal plants including guduchi. When these preparations have been tested in diabetic rat models, it was seen that the anti-diabetic activity is solely due to *T. cordifolia*.

Immunomodulatory activity: Isolated chemical compounds such as cordifolioside A and syringin of guduchi are reported as immunomodulating agent in the clinical study. *T. cordifolia*stem alters the level of enzymes such as catalase and stimulates lymphocyte cells maintaining the immune strength, thus highlighting the immuno-protective role of this shrub. Macrophage cell when exposed to *T. cordifolia*extract, increases the production of different enzymes including ‘myeloperoxidase’ that enhances the anti-microbial action so as to protect the immunity. On the other hand, it also increases the phagocytic activity of macrophages. Additionally, it stimulates splenocytes and macrophages. Because of enhanced nitric oxide production signifying anti-tumor as well as immuno-protective activity. A clinical study stated that, *T. cordifolia*lotion causes a decline in the level of interleukin i.e. IL-1 and IL-6 in scabies animal model. It inhibits hyperkeratosis and infiltration of inflammatory cells into scabietic gash, showing its anti-scabies activity.75 Aqueous extract induces cellular mitosis, stimulates the production and activation of cytokine and immune effector cells.

Anti-microbial activity: A study reported that silver nanoparticles synthesized from the stem of *T. cordifolia*possess good antibacterial activity against the bacteria *Pseudomonas aeruginosa* found in the patient suffering from burn injury. Various bacterial strains such as *S.typhi, K.Pneumoniae, E.coli, Aeruginosa* and other bacteria have been tested against extracts of *T. cordifolia*and showed potential anti-bacterial activity by either inhibiting their growth or mitigating the very existence of these bacteria. An active chemical compound that has been found from the stem of *T. cordifolia*as reported, found to be effective against bacteria like *E.faecalis*and *B.subtilis*and fungus like *T. Simii and T.rubrum*. A hydro alcoholic extract of *T. cordifolia*was effective in the mammary inflammation induced in bovine model by enhancing the activity of granulocyte. As mastitis is due to the infection of *S. aureus*, prevention of this inflammation showed the antimicrobial activity of this plant.

Anti-oxidant activity: Various extracts of *T. cordifolia*exhibits an anti-oxidant potential by scavenging the free radicals and other reactive species respectively.*T. cordifolia*significantly reduces the regulation of lipid peroxidation process thereby decreasing the level of reactive free radical species in a diabetic rat model (alloxan induced diabetes) and up regulates anti-oxidant enzymes like catalase and glutathione indicating its anti-oxidant effects. A clinical research has reported that the extract shows anti-oxidant effect by raising the level of GSH and reducing the expression of inducible nitric oxide synthase gene, while it is also useful in treatment of cataract by inhibiting the enzyme aldol reductase. A study also suggests that TC bark extracts (ethanol) shows the higher free radical scavenging activity as well as the highest phenolic content compared to the methanol extracts.

Anti-hiv activity: *T. cordifolia*has been evaluated to found its importance in treating HIV positive patients by decreasing the patient's resistance to the retroviral regimen.104 The anti-HIV activity of *T. cordifolia*uncovers its application in managing the disease by increasing the CD4 T-cells count and decreasing eosinophil-(a type of WBC) count in HIV positive patients. *T. cordifolia*extract showed significantly enhanced phagocytic and intracellular bactericidal activity. *T. cordifolia*also stimulated peritoneal macrophage. Furthermore, *T. cordifolia*increases phagocytosis and intracellular killing property. *T. cordifolia*significantly stimulates B-lymphocytes, polymorph nuclear leucocytes and macrophages.

Anti-osteoporotic activity: An in vitro study suggests, that the alcoholic extract of guduchi is found to enhance the degree of proliferation and differentiation of the osteoblast cells of both human and rats. Over and above it also take part in the calcification process by producing

minerals by these bone forming cell models regulating the bone mineralization. A steroid named 'Beta- Ecdysone' (Ecd) or 20-hydroxyecdysone isolated from *T. cordifolia*showed to promote the building of muscle tissue in mesenchymal stem cells model of mouse preventing the incidence of osteoporosis.

Mizaj (Temperment): Hot 1^0 and dry 1^0

Musleh (Correction): Tabashir, Elachidana

Badal (Proximal substitute): Stem berk of Neem

Identity, purity & strength:

For dried drugs:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 16 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 3 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 3 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 11 per cent, Appendix 2.2.7

For fresh drug:

Foreign matter	: Nil
Moisture content	: 75 per cent

Aa'mal-e-Advia (Pharmacological action) : Daf-e-Humma, Muqawwi-e-Meda, Qabiz, Qatil-e-Deedan-e-Ama, Mohallil-e-Waram, Muddir-e-Baul, Musaffi-e-Dam.

Mahall-e-Istemalat (Therapeutic uses) : Humma, Ishal, Zaheer, Deedan-e-Ama

Meqdar-e-khorak (Dose): 5 to 10 gm

Side-effects: Tinospora cordifolia seems to be safe when used short-term. The safety of long-term use, more than 8 weeks, is not known.

Important formulations: Sufoof-e-Satt-e-Gilo, Sufoof-e-Satt-e-Gilo-Sartani

GUL-E-BANAFSHA

(Flower)

The plant*Viola odorata* is known as Banafsa, Banafsha or Banaksa and its flower is known as Gul-e-Banafsha. It is a hardy herbaceous, perennial flowering plant. Its heart shaped leaves often with scalloped or slightly serrated edges are dark green, smooth or sometimes downy underneath, and grow in a rosette at the base of the plant. Roots are creeping and send out runners. Gul-e-Banafsha (Flower) may be from deep purple or blue to pinkish or even yellow whitish.

Other names:

a) Botanical name: *Viola odorata* Linn.

b) Family: Violaceae

c) Bengali name: Bansa, Banafsha

d) English name: Wood violet, Sweet violet, Common violet, Garden violet,

Description:

a) General: The drug Gul-e-Banafsha consists of dried flowers of *Viola odorata* Linn. (Violaceae). A glabrous of pubescent herb about 15 cm in height arising from a root stock. The plant occurs October to August. Flowering and fruiting takes place during April to July.

b) Macroscopic: Flowers are pedicelate, deep violet in colour. Calyx consists of five sepals, green persistent and imbricate in bud. Corolla consists of 5 deep violet petals with a bluish white base. Androecium consists of 5 stamens. Gynoeciurn consists of three carpels which is syncarpous.

c) Microscopic: Transverse section of the pedicel shows almost circular in outline and a central stele. Single layered epidermis followed by multi layered cortex. The central stele is enclosed in common sclerenchymatouspericycle followed by a continuous phloem. The xylem is formed of vessels tracheids, fibres and parenchyma. The pith consists of straight walled parenchymatous cells. Rosettes of calcium oxalate crystals are observed in the cortical and phloem cells.

The sepal in transverse section shows an upper and lower epidermis made up of small rectangular cells. Epidermis is followed by 3-4 layers of parenchymatous cells loosely arranged with intercellular spaces. Calcium oxalate crystals are present in the cells of mesophyll.

Transverse section of the petal is similar to that of sepal. However, the cells of mesophyll and epidermis are comparatively smaller in size than cells of sepal.

Transverse section of anther shows four sporangia. The epidermis is single layered made uP of isodiamatric cells. The cells of the epidermis show lignilication on the radial and 'rifler tangential walls of the anther. The interior spurred anther shows a beak like structure when cut

longitudinally. The pollen grains are smooth thin walled spherical and having single germ pore.

Powder: The powder is brown in colour, without any definite smell. Powder analysis of the crude drug reveals the presence of fragments of calyx, corolla and epidermal cells of anther along with pollen grains. Tracheids of different size, cells of xylem parenchyma and occasionally trichomes born on pedicel are also observed under the microscope during powder analysis.

Parts used: Flowers or Whole Plant.

Habitat: The plant is found in hilli or mountain region. The plant occurs October to August. Flowering and fruiting takes place during April to July.

Phytoconstituents: The main chemical constituents are flavonoid, phenolic compounds, triterpenes, potassium, magnesium, sodium, iron, glycosides, alkaloids, steroids, terpenes, saponins and tannins. Its Roots & Rhizomes also contains Odoranite and Cycloviolacin O2 (CyO2). It is also contains Eugenol, Ferulic-acid, Kaempferol, Quercetin, Scopoletin.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Antihypertensive and Antidyslipidemic activities: Vasodilator effect of the plant extract is mediated through multiple pathways like inhibition of Ca++ influx via membranous Ca++ channels, its release from intracellular stores and NO-mediated pathways, which possibly explain the fall in BP. The plant also showed reduction in body weight and antidyslipidemic effect which may be due to the inhibition of synthesis and absorption of lipids and antioxidant activities. Thus, this study provides a pharmacologic rationale to the medicinal use of *Viola odorata* in hypertension and dyslipidemia.

Laxative activity by metabolic cage method: n-hexane, butanolic, methanolic and aqueous extract were subjected for laxative activity at dose level of 200 and 400 mg/kg body weight and it was found that the butanolic and methanolic extract at a dose level of 200 mg/kg showed good results. Aqueous extract at a dose level of 400 mg/kg showed good laxative activity.

Diuretic activity:-n-hexane, butanolic, methanolic and aqueous extract were subjected for diuretic study at dose level of 200 and 400 mg/kg body weight and it was found that all the extracts at a dose level of 400 mg/kg during first 5 hours showed good results and after 24 hours nhexane and Methanolic extracts showed best results. The Preliminary studies showed the presence of flavanoids in different extracts.

Phyto-analytical evaluation of rutin in Banafshan-an expectorant: The proposed, developed and validated HPTLC method was applied for quantitative estimation of rutin in different part of the plant and it was found that corolla of sweet violet flower have higher rutin content than all other parts.

Antioxidant and free radical scavenging activity of viola odorata: Phenols and polyphenolic compounds, such as flavonoids, are widely found in food products derived from plant sources, and they have been shown to possess significant antioxidant activities. The high amount of phenols and flavonoids in extracts may explain their high antioxidative activities.

Temperament: Cold 1^0 Moist 1°

Musleeh (Corrective): Not require

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	- Not more than 2%, Appendix 2.2.2.
Total Ash	- Not more than 11%, Appendix 2.2.3.
Acid insoluble ash	- Not more than 3%, Appendix 2.2.4
Alcohol-soluble extractives	- Not less than 1.5%, Appendix 2.2.6.
Water-soluble extractives	- Not less than I 1%, Appendix 2.2.7.

TLC behaviour of petroleum ether (60-80^0) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Chloroform	1_2 vapours	1	0.19

Aa'maal-e-Adviya (Pharmacological Action):

Mulaiyin, Munaffis-e-Balgham, Mohallil-e-Waram, Munawwem

Mahall-e-Istemalat (Therapeutic use):

Qabz, Sual, Nazla, Sahar

Meqdar-e-Khorak (Dose): 10 - 25 g

Side-effects / adverse-effects: No side effect is observed if it used with proper dose.

Important formulations:

Habb-e-Sil, Itrifal-e-Zamani, Khamira-e-Banafsha, Majoon-e-Antaki, Mufarreh Motadil, Mufarreh yaqootiBarid, Qairooti Bazr-e-Katan, Qarooti Mohallil, Zimad-e-Waram-e-Unsayain, Muzmin, Raughan-e-Banafsha, Sharbat-e-Banafsha, Sharbat-e-Ejaz, Habb-e-Ghariqoon, Dayaqooza.

GUL-E-MADER

(Flower)

Gul-e-Mader is a Flower of Calotropis*procera* (Ait.). A small erect and compact shrub covered with cotony tomentum, up to 5.4 m in height, found growing wild throughout Bangladesh in comparatively drier and warmer areas. Calotropis procera has been observed to grow mainly on coarse, sandy and alkaline soils. They are good soils binder and recommended for deserts. The life span of *Calotropisprocera*is 12 years. It will be seen that root-bark from older plants has a higher percentage of acrid and bitter resinous matter than that from younger plants. The morphological studies revealed the plant is erect, tall, large, much branched and perennial with milky latex throughout. *Calotropisprocera* have large bushy shrub, leaves decussate, inflorescence extra axillary umbellate panicale, corolla purple, lobes erect. The leaves are sub- sessile, 6-15 cm by 4.5-8 cm, broadly ovate, ovate-oblong, elliptic or obovate acute, pubescent; when young and glabrous on both sides when mature.

Other names:

a) Botanical name: *Calotropis procera* (Ait.) R.Br. Syn. *Calotropishamiltoni* Wall

b) Family: Asclepiadaceae

c) Bengali name: Akandful, Akandaful, Aakful

d) English name: Mader tree

Description:

a) General: The drug Gul-e-Madar is a dried flowers of *Calotropis procera* (Ait.) R.Br. Syn. *Calotropis hamiltoni*Wall (Asclepiadaceae). It is an erect shrub, young parts clothed with the white cottony tomentum. It is found more or less through out Bangladesh, Pakistan, and India in warm and dry places. It is also found in Afghanistan, Iran, Egypt and tropical Africa. The plant occours throught the year and flowering and fruiting take place from September to February.

b) Macroscopic: The flowers are pentamerous, calyx divided to the base, sepals ovate, acute, and glabrous. Corolla is whitish outside and violet on inner surface. Lobes of corona is compressed equaling the staminal column. The prismatic stigma is fused with the androecium forming the gynostagiums. All the pollen grains of each lobe aggregate together to form pollinium. Each pollinium is provided with a stalk called caudicle and sticky base called disc of corpusculum.

c) Microscopic: Cross section of sepal and petal reveals that they are parenchymatous, externally bounded by papillose epidermis bearing numerous hairs. Some of the cells in the inner side of the petals contain the violet pigments. Cross section cut through .gynostagium shows a peculiar outline. The carpel bears a bicarpillary ovary which contains numerous ovules. The pedicel shows similar structure to axis. They are circular in cross section the uniseriate epidermis bearing hairs and trichomes form outermost boundary. It is followed by a wide zone of cortex which shows abundance of branchy sclereids of varying size. The xylem bundles are arranged in a ring while the phloem lies, outer to xylem.

Powder: The powder is coarse, heterogenous, yellowish brown in colour with a characteristic aromatic odour and slightly bitter taste.

Parts used: Flower, Root, Leave

Habitat: It is found more or less throughout Bangladesh, Pakistan, India in warm and dry places. It is also found in Afghanistan, Iran, Egypt and tropical Africa.

Phytoconstituents: Steroids, terpenoids, phenolics, tannins, glycosides, proteins, carbohydrates, aluminium, iron, calcium, magnesium and sodium. Cyanidin-3-rhamnoglucoside isolated from flowers. Quercetin-3-rutinoside, new triterpine-calotropenyl acetate isolated and its structure elucidated.

Phytochemically the plant has been investigated for cardenolides from the latex and leaves, triterpenoids, anthocyanins from flowers and hydrocarbons.

A systematic study on fresh and undriedflowershas resulted in the isolation of pentacyclictriterpenethat calotropenyl acetate (urs-19(29)-en-3β-yl acetate) (A), Procesterol (B) (steroidal hydroxyl ketone).The chemical and spectral studies identified as C-6, C-24 diepimer of stigmast-4en-6β-ol-3-one. Calotropisprocera contain proceragenin an antibacterial cardenolide.

Leaves of Calotropisprocera: Calotropisprocera leaves contained principally calotropagenin (C), calactin (D), calotoxin, calotropin, taraxasteryl acetate, β-sitosterol (E), α-amyrins (F), βamyrins (G). Leaves also contain organic carbonate andstigmasterol (H).

The latexof C. procera contains about 88-93% water and water soluble. The chemical screening of its latex revealed that this plant contain cardinolides such as calotropin, calotoxin, uscharin, uscharidin, voruscharin.

The rootof C. procera contains procerursenyl acetate and proceranol contain n-Dotriacont-6-ene, glyceryl mono-oleolyl-2-phosphate, methyl myrisate, methyl behenate, glceryl-1, 2-dieapriate-3-phosphate.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Hepatoprotective activity: Hydro-ethanolic extract (70%) of flowers was prepared and tested for its hepatoprotective effect against paracetamol-induced hepatitis in rats by Setty et al (2007). Alteration in the levels of biochemical markers of hepatic damage like SGPT, SGOT, ALP, bilirubin, cholesterol, HDL, tissue GSH were tested in both treated and untreated groups. Paracetamol (2.0 g/kg) has enhanced the SGPT, SGOT, ALP, bilirubin and cholesterol levels and reduced the serum level of GSH. Treatment with hydro-ethanolic extract of Calotropis procera flowers (200 mg/kg and 400 mg/kg) has brought back the altered levels of biochemical markers to the near normal levels in the dose dependent manner.

Antinociceptive activity: This work evaluated the antinociceptive effect of proteins from the Calotropis procera (Asclepiadaceae) latex using three different experimental models of nociception in mice by Vasconcelos et al (2005). The latex protein fraction administered

intraperitoneally in male mice at the doses of 12.5, 25 and 50 mg/kg showed the antinociceptive effect in dose dependent manner compared to the respective controls in all assays.

Anti-inflammatory activity: The anti-inflammatory property of the Calotropis procera was studied on carrageenin and formalininduced rat paw edema model by Kumar et al (1994). A single dose of the aqueous suspension of the dried latex was effective to a significant level against the acute inflammatory response.

Anthelmintic activity: The anthelmintic activity of Calotropis procera flowers in comparison with levamisole was evaluated through in vitro and in vivo studies by Iqbal et al (2005). In vitro studies revealed anthelmintic effects ($P<0.05$) of crude aqueous and crude methanolic extracts of Calotropis procera flowers on live Haemonchus contortus as evident from their mortality or temporary paralysis. For in vivo studies, Calotropis procera flowers were administered as crude powder to sheep naturally infected with mixed species of gatrointrointestinal nematodes.

Anticancer activity:An attempt was made to evaluate free radical scavenging activity, cytotoxic activity and polyphenolic content of methanolic extract of Calotropis procera flowers. Free radical scavenging activity was estimated using in vitro models like 1,1,-diphenyl-2- picryl hydrazyl (DPPH), hydroxyl radical, hydrogen peroxide radical, reducing power and ferric thiocyanate method. Cytotoxicity was analysed following MTT assay using Hep2 and Vero cell lines and polyphenols were estimated using standard methods. The methanol extract of C. procera at 500 µg/ml showed better scavenging activity in ferric thiocyanade method (83.63 %) with the lowest IC50 of 100 µg/ml followed by hydrogen peroxide, hydroxyl radical scavenging and least activity was found to be present in DPPH assay (50.82 %). The extract had 100 % cytotoxicity on Hep2 cell lines.

Temperament: Hot 3° Dry 3°

Musleeh (Corrective): Dudh, Ghee

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	- Not more than 2%, Appendix 2.2.2
Total Ash	- Not more than 23%, Appendix 2.2.3

Acid insoluble ash	- Not more than 19%,	Appendix 2.2.4
Alcohol-soluble extractives	- Not less than 6%,	Appendix 2.2.6
Water-soluble extractives	- Notless than 20%,	Appendix 2.2.7

TLC behaviour of petroleum ether (60-80^0) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Pet. ether: Diethyl ether (4:1)	1_2 vapours	3	0.25, 0.44, 0.89

Aa'maal-e-Adviya (Pharmacological Action):

Musakkin-e-Alam, Mohallil, Muqawwi-e-Meda, Munaffis-e-Balgham

Mahall-e-Istemalat (Therapeutic use): Zeeq-un-Nafas, Zof-e-Meda,Wajaul Mafasil

Meqdar-e-Khorak (Dose): 125-375 mg

Side-effects / Adverse-effects: No significant side effects have been observed.

Important formulations: Habb-e-Papita Wilayati, Habb-e- Usher, Rowgan-e-Gul-e Akh

HABB-US-SALATEEN

(Seeds)

The drug Habb-us-Salateen consists of dried seeds of *Croton tiglium* Linn a small evergreen tree 5-7 meter high which is found throughout the tropical subcontinent.

Other names :

Botanical name **:** *Croton tiglium*

Family **:** Euphorbiaceae

Bengali name **:**Jaipala

English name **:** Croton

Description:

General:*Croton tiglium* is one of the 50 fundamental herbs used in traditional Chinese medicine, where it has the name bā dòu Japaala or "Jayapala" in Sinhala and used in Sinhala traditional medical system of Sri Lanka.and in other traditional medicine also .

Macroscopic: Seed albuminous, ovate, oblong, slightly quadrangular, convex on dorsal and somewhat flattened on ventral surface, about 12 mm in length and resemble castor seed in shape, dull cinnamon-brown often mottled with black due to abrasion in testa, crancle easily detatched and usually absent, hilum on ventral side less distinct than that of castor seed, raphe runs along ventral surface of seed, terminating in a dark chalaza at opposite extremity, kernel yellowish and oily, consisting of a large endosperm, enclosing papery cotyledons and a small radical, no marked odour; karnel gives at first oily taste followed by an unpleasant acridity.

Microscopic: Seed shows a hard testa, consisting of an epidermal layer, covered externally with a thick cuticle and composed of oval and tangentially elongated cells, filled with brownish content; epidermis followed by a layer of radially elongated, thin-walled cells; endosperm consists of polygonal parenchymatous cells filled with oil globules, a few cells having rosette crystals of calcium oxalate; central region of endosperm shows a dicotyledonous embryo consisting of thin-walled parenhymatous cells.

Powder: White with black fragments of testa; under microscope shows elongated cells containing reddish-brown and yellow contents, oil globules and a few rosette crystals of calcium oxalate.

Parts used : Seeds

Habitat : Habb-us-Salateen plant is an erect, evergreen shrub or small tree growing up to 7 metres tall.The plant has a very long history of herbal use, being employed as a powerful laxative and as an oil to treat a wide range of skin problems. It has been grown for these uses for more than 2,000 years and is still often cultivated nowadays. The plant is also sometimes grown as an ornamental. The roots, seeds and seeds oil are all locally traded in India and South-East Asia.

Phyto constituents : Major known chemical constituents are crotonoleic acid, glyceryl crotonate, crotonic acid, crotonic resin, and arious carcinogenic phorbol derivatives.

Af'aal-e-Advia (Pharmacological activities):

Antioxidant activity: Shahid M et al., 2012 showed highest specific activities of peroxidase (POD) in leaf extract and highconcentrationof Zn. Statistics data showed antioxidant and enzymatic activities were notably ($p< 0.05$) different betweenmedicinal plant, leaf and seed extract.

Antitumor activity: Xiao- Long- Zhang et al., during 2016 conducted a study to identify a cytotoxic effect of seed of *tiglium*and theyevaluated the compound 1-4 against hepatic tumor cell line (SNU 387 and SNU 398), and compound 4 exhibitedmost potent activity against SNU 387 with IC50 value 0.17 μm [5,12].Researchers studied twig and leaves andisolated 11

new tigliane- diterpenoid (1-11) and their result proved that HL- 60 cell line with IC50 value 1.61μmshow strongest activity. They have isolated 5 new phorbol ester as well as 4 known phorbol ester analogues.The result showed that compound 3 exhibited cyclooxygenases -1 and -2 inhibition with IC50 values of0.14 and 8.5μM. Researchers studiedVeeramezhugu, Siddha formulation which prescribed in cancer therapy. Resultsproved Siddha formulation established herbo-metallic preparation. They studied the cytotoxic effect on hepatictumor cell line.Croton seeds contain 8 new phorbol diester and the activity evaluated against hepatic tumor cell line(SNU387), compound III with IC50 values 1.2 μm show effective result.

Anti-HIV activity: Nakamura N, et al., 2004 reported that the extract of *Croton tiglium*showed inhibitory effects on proliferation ofHIV-1. They studied the compound 12-O-Acetylphorbol-13-decanoate and 12-O-decanoyl phorbol-13inhibited the cytopathic effect of HIV at IC100 value is 7.6ng/ml and 7.81μg/ml and minimum cytotoxicconcentration (CCo) value is 62.5 and 31.3 μg/ml. 12-O-Acetyl phorbol -13-decanoate showed no activation ofProtein kinase C.

Antidermatophytic activity: Han Chien Lin et al., 2016 conducted a study to evaluate the activity of stem, leaves and seeds of *C.tiglium*. Activitywas evaluated by disc diffusion and microdilution assay against Trichophyton mentagrophytes. Results showed theethanolic stem extract had great inhibitory activity with MIC at 0.16 mg/ml oleic and hexadecanoic acid have amajor constituent in the stem and demonstrate strong Antidermatophytic activity.

Antitermitic activity: Sohail Ahmed et al, 2007 studied about change in tunnelling behavior such as number of bacterial colonies inhindgut activation of enzyme in midget. Results showed that the low LT50(12.85 % and 2.65 h) at a concentration of50% and 100%. There was no tunnelling in soil treated with 100%.

Antimicrobial activity: Shahid M et al., 2008 studied antifungal and antibacterial activities and determined by purification and theirresultsshowed by SDS-PAGE and it revealed that the purified protein was monomer, which possess astrong and broadspectrum antimicrobial activity.

Antileukemia activity: Kupchan S, M et al., 1976 studied antileukemic activity against p388 lymphatic leukemia in mice. Results provedthat systematic fraction of Croton oil led to interpret 13- decanoate and phorbol-12 tailgate as an active principle.

Anticonvulsant activity

Mudium R, et al., 2014 evaluated the anticonvulsant effect of hydro-alcoholic seed extract of *tiglium*in ratsandmice and results showed the effect was less as compared to sodium valproate. There was the high percentage ofmortality in *tiglium*group in chemically induced convulsion when compared to sodium valproate.

Gastrointestinal activity: Mi Seong Kim et al., 2014 studied the effect of croton fructus extract (CFE) and croton oil (CO) on Lipolysis in OP9adipocytes, results showed CFE and CO play important role in thedevelopment of Lipolysis- stimulating agent inadipocytes [29]. They showed comparison between raw*tiglium*and processed *tiglium*to test GI motility. The LD50value of raw *tiglium*is 888mg/kg andprocessed *tiglium*2139mg/kg. It proved this processing procedure is simple,affordable and safe [30].Studied pharmacological effect and fraction on the GI tract, results proved that the n-BuOHand water fraction show spasmolytic activity with methanol extract, Polyethylene and ethyl acetate were showedspasmogenic effect. Data indicate the ethyl acetate fraction on GI are mediated, activation of M3muscarinicreceptor and Ca2+ influx through L-type Ca2+ channel [31]. Croton oil has dual action (contracting and relaxing)intestinal muscle contraction were induced by Croton oil, it implies that the action on gastrointestinal motility ismoderated by calcium channel results also suggested that Croton oil possess spasmolytic and spasmogenic property[32]. Studied ethanol extracts as laxative material using the intestinal transit method. Results showed that ethanolextract of *tiglium*seed at dosage 0.06ml/30g is effective as a laxative, the LD50 was 0.0707.

Larvicidal activity: Dophutica M et al., 2015 studied mosquito larvicidal potential against severalmosquito vectors and results revealedthat the crude petroleum ether extracts of the root *Croton tiglium*have remarkable larvicidal activity.

Detoxification activity: Shanavaskhan A E, et al., 1997 studied detoxification technique used by the traditional physician of Kerala, India topurify toxic herbal drug. Ten toxic herbs and relevant detoxificationtechnique they discussed.

Mizaj (Temperament): Hot 4^0 and dry 4^0

Musleh (Correction): Ghee, Katira gum, Curd

Badal (Proximal substitute) : Amaltas, Senna

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 3 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 1 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 5 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of alcoholic extract of the drug on silica gel 'G' plate using n-Butanol : Acetic Acid : Water (4 : 1 : 5) shows under U.V light (366 nm) three spots at Rf. 0.34,0.54, 0.84 (all violet). On exposure to Iodine Vapour six spots appear at Rf. 0.10, 0.29, 0.39, 0.49, 0.63 and 0.90 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 105^0C for ten minutes three spots appear at Rf. 0.34 (grey), 0.54 (yellow) and 0.84 (Brown).Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action) : Mushil-e-qavi, Munaffit.

Mahall-e-Istemalat (Therapeutic uses): Amraz-e-Balghamiwa Sawdavi, Daad, Ganj, Bars, Waja-ul-Mafasil, Qoolanj.

Meqdar-e-khorak (Dose):50 mg-100 mg

Side-effects : Croton seeds are unsafe when taken by mouth or put on the skin. One drop of croton seed oil can cause side effects and 20 drops of oil can cause death.Croton seeds can cause burning of the mouth, vomiting, dizziness, stupor, painful bowel movements, abortions in pregnant women, and collapse when taken by mouth. If croton seeds are put on the skin, they can cause itching, burning, and blistering.

Important formulations: Habb-e-Mushil, Habb-e-Mulaiyun, Dawa-e-Siyah Mushil.

HANZAL

(Root)

It's a dry root of Hanzal collected from the Hanzal Plant. It is an annual plant resembling the common watermelon.

Other names:

a) Botanical name: Citrullus colocynthis (Schrad.) Syn Cucumis colocynthis Linn.

b) Family: Cucurbitaceae

c) Bengali name: Indarjan, Makhal

d) English name: Bitter Apple Root, Colocynth

Description:

a) General: The drug Hanzal consists of dried roots of *Citrulluscolorcynthis*Schard. Syn *Cucumis colocynthis* Linn. (Cucurbitaceae). A perennial trailing scabrid herb. The plant occurs throughout the year. The stems are herbaceous and beset with rough hairs; the leaves stand alternately on long petioles. They are triangular, manycleft, variously sinuated, obtuse, hairy, a fine green on upper surface, rough and pale under. Flowers yellow, appearing singly at axils of leaves; fruit globular, size of an orange, yellow and smooth, when ripe contains within a hard coriaceous rind, a white spongy pulp enclosing numerous ovate compressed white or brownish seeds. Flowering and fruiting take place from July to October,


Citrullus colocynthis (L.) Schrad.

b) Macroscopic:

The dry roots are 5.0 to 7.0 cm in length, 1.5-2.8 cm in diameter and cylindrical. Outer surface is yellowish brown having longitudinal striations. The fracture is coarsely fibrous; internal colour yellow. Odour is distinctive and taste is bitter.

c) Microscopic: In transverse section the root shows a wavy circular outline and a narrow cork; a moderate cortex and a large wood. The phellem or cork cells are rectangular, radially flattened which are attached to phellogen. The phellogen or cork cambium cells are rectangular, tangentially elongated and almost uniform in shape which are several layer in thickness. The phelloderm or secondary cortex is consisted of thin walled parenchymatous cells, 10-15 cells in thickness containing several starch grains. The vascular system is consisted of well developed xylem and phloem region, scattered vessels in groups or singly are also found in small number in other part of the wood embedded in the parenchyma. The medullary rays are bi or tri-seriate and narrow. The parenchyma of wood contains starch grains which are simple or compound and oval to round in shape.

Powder: Powder analysis of the crude drug revealed the pressure of fragment of cork cells, cortical cells and xylem parenchyma containing starchgrains, xylem parenchyma trachieds, velleis and wood fibres. Free starch grains are also studied

Parts used: Fruit (Pulb) and Root

Habitat: The plant is a native of warmer parts of Asia and Africa. It is found in Arabia, Syria, Egypt and the Mediterranean region. It also found some areas of Bangladesh.

Phytoconstituents:

It contains Colocynthin, Glycosides, steroids, carbohydrates, phenolic, Tannins, Sodium, and Potassium, calcium, phosphorous & iron phosphate.

Phytochemical analysis of plant extracts revealed the presence of carbohydrate, protein, separated amino acid, tannins, saponins, phenolic, flavanoids, terpenoids, alkaloids, anthranol, steroids, Cucurbitacin A, B, C, D, E (α-elaterin), J, L, caffeic acid and cardic glycoloids(47-53) . The seeds of Citrullus colocynthis contained proteins 13.99 ± 0.06%, crude fibers 46.73 ± 0.15%, moisture 6.43 ± 0.15%, α-tocopherol 1.90 ± 0.020 g/100g, δ-tocopherol 0.32 ± 0.020 g/100g and fixed oil 17-28.5 % with high proportion of unsaturated fatty acids (79.80%), mainly linoleic acid, oleic acid, low percentage of saturated, total saturated 20.20% and a very low n-3 poly-unsaturated FA level (0.5%). However, the seed fat of Citrullus colocynthis consisted of palmitic 10.40%; stearic 6.52%; arachidic 1.70%; oleic 11.7-20.92%; linoleic 58.81-70%; and linolenic 1.65%(54-57) . Physicochemical properties of Citrullus colocynthis seed oil: iodine value: 114.46 g I2/100g, density at 15 °C 905.3: Kg/m3 , kinematic viscosity at 40 °C: 31.52 mm2 /s, saponification value : 204.44 mg KOH/g, acid value: 0.98 mg KOH/g, free fatty acid: 0.49%, caloric value: 39.37 MJ/kg, colour: 5Y + 0.4R and average molecular weight: 874g(54) . Phytochemical screening showed that it contained 0.74% (m/m) phenolics (calculated as gallic acid) and 0.13% (m/m) flavonoids (calculated as catechin equivalents per 100 g of fresh mass)(58) . The phenolic contents of Citrullus colocynthis seeds extracts [a crude aqueous extract (E1), a defatted aqueous extract (E2), a hydromethanolic extract (HM), an ethyl acetate extract (EA) and a n-butanol extract (n-B)] were studied. Catechic tannins and flavonoids were abundant in E1, HM and EA, whilst terpenoids were abundantly present in E1 and n-B but with low concentration in HM. Coumarins were found in E2, EA and n-B. Polyphenols (expressed as gallic acid equivalent, amounted, per 100 g plant matter), were 329, 1002 and 150 mg in EA, HM an E1 respectively. Flavonoids (expressed as catechin equivalent, amounted, per 100 g plant matter) were 620, 241 and 94 mg in EA, HM and E1 respectively. Comparable values were found in n-B and E1, with lower values in E2. Quercetin, myricetin and gallic acid were found in the EA and HM extracts(59) . Three flavone glucosides, isosaponarin, isovitexin and isoorientin 3'-O-methyl ether and two cucurbitacin glucosides, 2-O-β-D-glucopyranosylcucurbitacin I and 2-O-β-D-glucopyranosylcucurbitacin L were isolated from the fruits of Citrullus colocynthis(60) .

Mineral contents of the unfermented Citrullus colocynthis were: Ca 0.250 ± 0.04, Mg 0.139 ± 0.041, K 0.244 ± 0.04, Na 0.36 ± 0.02 and P 0.176 ± 0.022 mg/kg, while, mineral contents of the fermented Citrullus colocynthis were: Ca 0.341 ± 0.18, Mg 0.167 ± 0.12, K 0.327 ± 0.10, Na 0.034 ± 0.16 and P 0.097 ± 0.14 mg/kg.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Antimicrobial effect: Inhibitory and bactericidal activities of crude extracts, fractions and compounds of Citrullus colocynthis plant aerial parts and ripe deseeded fruits were performed against the drug sensitive standard strain of Mycobacterium tuberculosis H37Rv (ATCC 27294), 16 drug resistant strains of Mycobacterium tuberculosis and two Mycobacterium other than tuberculosis (MOTT) strains, using radiometric BACTEC system. Methanolic extract of ripe deseeded fruit of Citrullus colocynthis has shown good activity (MIC ≤ 62.5 µg/ml), one of the bioactive fractions demonstrated the best activity (MIC 31.2 µg/ml) against Mycobacterium tuberculosis H37Rv. However 3 bioactive fractions also inhibited 16 clinical isolates of Mycobacterium tuberculosis consisting of seven non-multidrug resistants, eight multidrug resistants, one extensively drug resistant and two of Mycobacterium other than tuberculosis (MOTT) bacilli with MICs in the range of 50-125, 31.2-125 and 62.5- 125 µg/ml, respectively. Ursolic acid and cucurbitacin E 2-0-β-d-glucopyranoside were identified as the main biomarkers active against Mycobacterium tuberculosis H37Rv (MICs 50 and 25 µg/ml respectively), as well as against the 18 clinical isolates. The maximum antimicrobial activity was exhibited by acetone, ethanol, methanol and distilled water extract of the fruits against Escherichia coli, Staphylococcus aureus, Salmonella typhi, Shigella shigella and Candida albicans. Whereas petroleum ether extract is less effective against test strains.

The ethanolic extract showed dose dependent inhibitory activity against Staphylococcus aureus more than water extract. 5 mg/ml fruits ethanolic extract possessed a similar inhibitory effect to novobiocin against standard Staphylococcus aureus strain.

MIC and MBC/MFC were determined for plant organs at different maturation stages. Aqueous and diluted acetone extracts (from the plant's roots, stems, leaves and three maturation stages of its fruit and seeds) were screened for activity against Gram-negative and Gram-positive bacteria (Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and Enterococcus faecalis) and various Candida spp. (Candida glabrata, Candida albicans, Candida parapsilosis and Candida kreusei). All extracts showed activity against all strains. The highest MICs and MBCs/MFCs were obtained from the fruit aqueous extracts (MIC 0.10

mg/ml against C. albicans and C. glabrata, 0.20 mg/ml against E. coli and P. aeruginosa), the lowest antibacterial and anticandidal activity was recorded for the root extracts of Citrullus colocynthis Schrad. The antimicrobial activity of alkaloid extracted from Citrullus colocynthis were examined against five local bacterial isolates (Escherichia coli, Staphylococcus aureus, Streptococcus sp., Bacillus subtilis, and Klipsella sp.) using agar disc diffusion method. The most active antimicrobial activity of extracted alkaloid were shown against Streptococcus Sp. Broth dilution methods were used to determine the minimum inhibitory concentration (MIC) for the extracted alkaloid. The study showed that MIC values of 600 µg/ ml, 3000 µg/ ml, were recorded against Staph. aureus, and E.coli isolates respectively(64) . The antifungal and antimycotoxigenic power of methanolic and aqueous extracts of Citrullus colocynthis seeds were studied in vitro. The antifungal and antimycotoxigenic activity of methanolic and aqueous extracts were screened against Aspergillus ochraceus and Aspergillus flavus. The results suggest that the extracts showed a very good antifungal activity against A. ochraceus, but not against A. flavus. The extracts have good antiochratoxigenic power in liquid medium.

Hypoglycemic: Agarwal V and et al examine the effect of root of C. colocynthis on the biochemical parameters of normal and alloxan-induced diabetic rats. Diabetes mellitus was induced by intraperitoneal (120 mg/kg b.w.) injection of alloxan monohydrate for three days and the animals showing blood glucose level in the range of 175-300 mg/dL were selected for study. The blood glucose concentrations of the animals were measured at the beginning of the study and the measurements were repeated on 3rd, 5th and 7th day after the start of the experiment. On day 7, blood was collected by cardiac puncture under mild ether anesthesia. Aqueous extract of roots of Citrullus colocynthis showed significant reduction in blood sugar level (58.70%) when compared with chloroform (34.72%) and ethanol extracts (36.60%) ($p<0.01$). The aqueous extracts showed improvement in parameters like body weight, serum creatinine, serum urea and serum protein as well as lipid profile and also restored the serum level of bilirubin total, conjugated bilirubin, serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transminase (SGPT) and alkaline phosphatase (ALP).

Anticandidal and antibacterial: Rasool Khatibi and et al assess in vitro antibacterial and Anticandidal activity of aqueous and diluted acetone extracts of C. colocynthis Schrad. MIC and MBC/MFC were determined for plant organs at different maturation stages. Aqueous and diluted acetone extracts (from the plant's roots, stems, leaves and three maturation stages of its fruit and seeds) were screened for activity against Gram-negative and Gram-positive bacteria (Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and Enterococcus faecalis) and various Candida spp. (Candida glabrata, Candida albicans, Candida parapsilosis

and Candida kreusei). All extracts showed activity against all strains. The highest MICs and MBCs/MFCs were obtained from the fruit aqueous extracts (MIC 0.10 mg/ml against C. albicans and C. glabrata, 0.20 mg/ml against E. coli and P. aeruginosa), lowest activity from the root extracts. C. colocynthis Schrad shows antibacterial and Anticandidal properties.

Antibacterial and Anticandidal: Marzouk B and et al assess in vitro antibacterial and Anticandidal activity of aqueous and diluted acetone extracts of Citrullus colocynthis Schrad. MIC and MBC/MFC were determined for plant organs at different maturation stages. Aqueous and diluted acetone extracts (from the plant's roots, stems, leaves and three maturation stages of its fruit and seeds) were screened for activity against Gramnegative and Gram-positive bacteria (Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and Enterococcus faecalis)-and various Candida spp. (Candida glabrata, Candida albicans, Candida parapsilosis and Candida kreusei). All extracts showed activity against all strains. The highest MICs and MBCs/MFCs were obtained from the fruit aqueous extracts (MIC 0.10mg/ml against Candida albicans and Candida glabrata, 0.20mg/ml against Escherichia coli and Pseudomonas aeruginosa), lowest activity from the root extracts.

Temperament: Hot 3^0 Dry 3^0

Musleeh (Corrective): Katera, Rogan-e-Badam, Gond Kekar, Samag-e-Arabi.

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	- Not more than 2%,	Appendix 2.2.2
Total ash	- Not more than 10%,	Appendix 2.2.3
Acid insoluble ash	- Not more than 5%,	Appendix 2.2.4
Alcohol-soluble extractives	- Not less than 4%.	Appendix 2.2.6
Water-soluble extractives	- Not less than 10%,	Appendix 2.2.7

TLC behaviour of petroleum ether ($60-80^0$) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Chloroform:	1_2 vapours	2	0.10, 0.32

Acetone (9:1)

Aa'maal-e-Adviya (Pharmacological Action):

Mushil, Mohallil, Musqit-e-Janeen,

Mahall-e-Istemalat (Therapeutic use):

Istisqa, Yarqan, Qabz-e-Daemi, Waram-e-Kabid, Zeabetus Shakre

Meqdar-e-Khorak (Dose): 125—250mg

Side-effects / Adverse-effects: **Gastric and intestinal irritation.**

Important formulations: Arq-e-Matbukh Haft Roza

HINA

(Leaf)

The drug Hina consists of dried leaves of *Lawsonia inermis* Linn. Syn. *Lawsoniaalba* Lam. (Lythraceae) commonly known in our sub-containt as Mehedi. Besides its medicinal values this plant is a worldwide known cosmetic agent used to stain hair, skin and nails.

Other names:

a) Botanical name:*Lawsoniainermis***linn. Syn.** *Lawsoniaalba* Lam.

b) Family: Lythraceae

c) Bengali name: Mehedi

d) English name: Henna, Samphire, Cypress shrub, Egyptian Privet

Description:

a) General: It is much branched, deciduous, glabrous, sometime spine scent shrub or small tree with grayish brown bark, attaining a height of 2.4-5 m. It is cultivated as a hedge plant throughout subcontinent, and as a commercial crop for its medicinal value and dye. Leaves are 1.3-3.2 by 0.6-1.6 cm, elliptic or broadly lanceolate, acute or obtuse, often mucronulate, base tapering; petioles very short. Flowers are numerous, less than 1.3 cm. across fragrant, white or rose-colored, in large terminal pyramidal panicled cymes; pedicels short, slender. Calyx 3-5 mm, long broadly campanulate; lobes 2.5-3 mm, long, suborbicular or subreniform, undulate. Stamens, inserted in pairs on the calyx-tube. Capsules 6 mm, diameter; hlobose, slightly veined outside, supported by the persistent calyx and tipped with the style. Seed capsules are red, globose, about the size of a pea, with numerous tiny pyramidal, brown pitted seeds.

b) Macroscopic:

Leaves are simple, entire greenish-brown to dull green lanceolate, apex mucronate, base tapering, short petiolate, glabrous, 2-3 cm in length and 1-1.5-cm in breadth. Odour when crushed, aromatic, taste sweet, mucilaginous and slightly astringent.

c) Microscopic: In transverse section the epidermis consists of single layer of mostly cubical cells, covered by thick and stratified cuticle. Beneath, which the collenchymatous cells are more or less circular or elliptical in shape with granular thickening. A thin strip of pericycle, composed of 2-4 layers of cells is present encircling the stele. The stele is composed of an inter-xylary phloem and continuous xylem cylinder within. A thin strip of cambium is present between the phloem and xylem tissue. In transverse section lamina shows an upper and lower epidermis, covered externally by the thick and striated cuticle. Both the epidermis are composed of tangentially elongated cells, some of which are specialized into mucilaginous sacs. These sacs are bigger in size than epidermal cells. Stomata are present on both the surfaces. These are ranunculaceous type. The Parenchymotous cells are oval or circular in shape, contain oil globules, rosette and monoclinic prisms of calcium oxalate crystals. The mid-rib has a structure almost similar to that of the petiole but some of the parenchymatous cells of the phloem get converted into thick walled cells and form an incomplete arc of sclerenchymatousfibres.

Powder: Powdered drug is olive to brownish green in colour. Microscopic examination shows many fragments of cuticle and leaf parenchyma, collenchyma, globular, mucilaginous sacs,

palisade tissue, epidermal cells with ranunculaceous stomata, rosette and prismatic crystals of calcium oxalate and oil globules. Some fragments of fibres and vessels are also present.

Parts used: leaves stem bark, roots, flowers and seeds.

Habitat: Dry tropical and subtropical zones, including North Africa, India, Bangladesh, Pakistan, Sri Lanka, and the Middle East.

Phytoconstituents:

A colouring matter, Hanno-tannic acid/ tannin, resin, alkaloids, steroids saponin, reducing sugars and mucilage.

Two new xanthones-laxanthones (1) and (11) isolated and characterised as 1, 3-dihydroxy-6, 7-diamethoxy xanthone and 1-hydroxy-3, 6 diacetsoxy-7- methoxyxanthone respectively. Laxanthone (111) isolated and identified as!-hydroxy-3, 7- dimetaxy-6-acetoxyxanthone.

2-Hydroxy-1,4-napthoquinone, 1,4dihydroxynaphthalene, 1,4-naphthoquinone, 1,2-dihydroxy-glucoyloxynaphtha

Af'aal-e-Adviya (Pharmacological Activities):

Several researchers have reported the different pharmacological activities of L. inermis which are discussed below.

Analgesic and Antipyretic Activity: The ethanolic extract of leaves of Lawsonia showed significant analgesic as well as antipyretic activity. The fixed oil obtained from seeds were screened for pharmacological activity both in-vitro and in-vivo. It was concluded that seed oil is devoid of behavioral and CNS effects and failed to produce any effect on isolated tissue though it possess significant analgesic activity.

Anti-Inflammatory Activity: Butanol and chloroform fractions showed potent anti-inflammatory, analgesic and antipyretic effects that aqueous fraction of crude ethanol extract of L. inermis in a dose dependent manner. Leaves showed significant anti-inflammatory effect with some active principles.

Antiarthritic Activity: Aqueous and ethanol leaf extract demonstrated anti-arthritic activity, as reflected by a reduction in paw oedema, paw diameter and body weight loss in both Freund's adjuvant-induced and formaldehyde-induced arthritis mice models, at doses of 200 and 400 mg/kg p.o., respectively. In this study, an oral dose of 10 mg/kg of diclofenac sodium was used as the positive control.

Anti-ulcer Activity: Aqueous, ethanol and chloroform leaf extracts showed a strong anti-ulcer activity in pylorus ligation- and aspirin-induced rats when compared to ranitidine, the positive control. In addition, significant reductions (p.o. = 0.001) in gastric acid secretions, total acidity and ulcer index were observed. Aqueous, ethanolic and chloroform extracts produced significant activity against acute and chronic gastric ulcers in two rat models at doses of 200 and 400 mg/kg p.o. when compared to the negative control gum acacia (2%, w/v). Sucralfate (250 mg/kg) served as the positive control. Aqueous, ethanolic and chloroform extracts were found to reduce ethanol-induced ulcers by up to 81, 94 and 88%, respectively, and cold-restraint stress-induced ulcers by up to 56%, 30% and 56%, respectively.

Ethanolic leaf extract showed antiulcer activity in indomethacin-induced gastric ulcers in pylorus ligation rat models by reducing the ulcer index for all three doses (100, 200 and 400 mg/kg p.o.) tested.

Antidiabetic activity: The ethanolic extract of leaves of Lawsonia inermis linn (400mg/kgBW) in alloxan induced diabetic rats showed significant hypoglycaemic activity after oral administration.

Ethanolic extract of Lawsonia inermis (500mg/kg body weight) significantly decreased level of blood glucose in streptozotocin induced diabetic rats.

Ethanol (70 %) extract of L. inermis showed significant hypoglycemic and hypolipidemic activities in alloxan induced diabetic mice after oral administration. The feeding of 0.8 g/kg of L. inermis extract decreased the concentration of glucose, cholesterol and triglycerides to normal. Methanol (95 %) extract of leaves of L. inermis showed significant in-vitro antihyperglycemic effect.

Antibacterial activity: Antibacterial activity of aqueous, methanol extracts of Hina (Lawsonia inermis) leaves were tested against three bacterial species including (Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa) using agar diffusion and minimum inhibitory concentration (MIC) as a determination method. Preliminary phytochemical screening revealed the presence of Alkaloids, Quinones, Glycosides, Tannins and saponins. The mehanolic extract displayed a potential antibacterial activity against all the bacterial species, than the aqueous extract.

The maximum activity was observed in methanolic extract against Staphylococcus aureus at inhibition zone of about (27 ± 1 mm) and minimum activity was observed in aqueous extract against Escherichia coli at inhibition zone of about (8.6 ± 1.2). MIC values for all the existing extracts at a concentration of 2.5mg/ml at Staphylococcus aureus and 10 mg/ml at Pseudomonas aeruginosa 30. Ethanolic extract of Lawsonia leaves were investigated for

antimicrobial property using Agar well diffusion method. It was found to inhibit the growth pattern of A. niger, F. oxysporun, Streptococcus sp and S. aureus.

Ethanolic extract of Lawsonia inermis was investigated for antimicrobial activity against different life threatening pathogenic microorganisms. It was found to possess good antibacterial properties over a wide range of disease causing gram positive (Bacillus subtilis, Bacillus megaterium, Bacillus fusiformis, Streptococcus faecalis, Streptococcus pyogenes, Streptococcus pneumonia, Staphyloccus aureus) as well as gram negative (Salmonella typhi, Pseudomonas aerogenosa, Escherichia coli, Shigella flexneri, Vibrio cholera, Enterobacter aerogenes, Klebsiella pneumoniae) bacteria.

Methanolic leaves extracts of Lawsonia inermis Linn inhibit the growth of micro organisms (Gram positive; B. subtilius, S. aureus and S. epidermidis and Gram negative; E. coli, S. flexneri, P. aeruginosa bacteria) in a dose dependent manner using disc diffusion method. The presence of flavonoids and glycosides as major constituents of the plant leaves that are commonly known to posses antimicrobial activity.

Antifungal Activity: L. inermis leaves extract showed a fungicidal effect against Trichophyton mentagrophytes and Candida albicans 44. It was reported that the sensitivity of dermatophytes toward henna was strong in Trichophyton mentagrophytes, T. rubrum, T. tonsurans, T. violaceum, T. verrocosum, T. schoenleinii, Epidermophyton floccosum, Microsporum ferrugineum, M. canis and sporotrichum schenckii. The effect of aqueous and methanolic extract of henna using 25 µl of the extracts against C. albicans and Microsporum was examined and confirmed.

Antiviral Activity: Hina definitely has an anti-viral effect that became clear by its action on warts, whitlow and herpes simplex. Henna was tried traditionally in many times especially on the warts which are resistant to cryo (Nitrogen liquid) treatment and prove effective on giant wart measuring 1.5x1.5cm on a child thumb which was resistant to all forms of treatment, at last the child referred to the plastic surgeon for operation, “we tried Hina on it, applied every other day over night and in few weeks it disappeared completely”. Hina was found very useful especially on multiple wars. On warts Hina applied as paste. The second proven and successful effect of hina on viral infections was after its application to herpes it was noticed that; it dried the vesicles at the site early, prevent ulceration and crust formation and it prevents secondary infection.

Antimalarial Activity: L. inermis is a potential antimalarial drug, having high in vitro and in vivo antiplasmodial activity. The in vitro combination of L. inermis and T. diversifolia (1:1) extracts against P. falciparum showed the highest synergy with IC50 of 0.4370.02 mg/mL and

2.5570.19 mg/mL against P. falciparum Chloroquine sensitive (D6) and resistant (W2) strains respectively. This study also indicates that, combination of L. inermis and T. diversifolia could serve as a potential antimalarial drug candidate in combination.

Anticarcinogenic activity: The anticarcinogenic activity of chloroform extract L. inermis leaves was carried using microculture tetrazolium salt assay on the human breast (MCF-7), colon (Caco-2), liver (HepG2) carcinoma cell lines and normal human liver cell lines (Chang Liver). The preliminary results showed that the henna extract displayed the cytotoxic effects against HepG2 and MCF-7 and IC-value of 0.3 and 24.85µg/ml respectively.

Hepatoprotective Activity of Henna: The aqueous extract of Lawsonia inermis was administered orally to the rats with hepatotoxicity induced by paracetamol. Silymarin was given as reference standard. The plant aqueous extract was effective in protecting the liver against the injury induced by Paracetamol in rats. This was evident from significant reduction in serum enzymes alkaline aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), Acid Phosphatase (ACP), Protein and Bilirubin.

The ABTS [2,2-azino-bis (3-ethyl benzthiazoline-6-sulfonic acid)], free radical scavenging assay depicted that all isolated compounds from hina exhibited antioxidant activity in an in vitro study comparable to that of ascorbic acid.

Diuretic activity: Aqueous and ethanolic extracts of Lawsonia inermis leaves showed diuretic activity in rats at a dose of 250mg/kg and 500mg/kg orally. The ethanolic extract shown more activity compared to aqueous extract.

Anticoagulant Effect: Lawsone and its oxazine derivatives isolated from leaves of L. inermis had proven to be potential anticoagulant agent.

Wound Healing Effects: Ethanolic extract of henna leaves and lawsone exhibited significant wound healing activity on rat excision and incision wound models. It was reported that the topical application of ethanolic extract as well as lawsone were more effective than the same given by oral route.

Mizaj (Temperament): Cold 20 – Dry 20

Musleeh (Corrective): Not require.

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	- Not more than 2%,	Appendix 2.2.2
Total Ash	- Not more than 7%,	Appendix 2.2.3
Acid insoluble ash	- Not more than 1.5%,	Appendix 2.2.4
Alcohol-soluble extractives	- Not less than 24%,	Appendix 2.2.6
Water-soluble extractives	- Not less than 27%,	Appendix 2.2.7

TLC behaviour of petroleum ether (60-80^0) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*
Benzene: Chloroform (1:1)	1_2 vapours	2	0.92, 0.98

Aa'maal-e-Adviya (Pharmacological Action):

Mudirr-e-Baul, Mohallil-e-Waram, Mujaffif, Musaffi-e-Dam, Many-e- Humma, Qatel-wa-Many-e-Jaraseem, Zeyabetus, Many-e-Qashf, Mohafez-e-Kabad, , Jamed, Mosakkin-eDard, Mundamil-e-Qurooh.

Mahall-e-Istemalat (Therapeutic use):

Suda, Shaqiqa, Qurooh, Qula, Qurooh-e-Aatishak, Ehtebas-e- Tams, Jarab, Amraz-e-Tehalwa Kabad, Jeyan-eKhoon, Qurrooh-e-Meda, Zeyabetus Shakri,

Meqdar-e-Khorak (Dose):2.25 - 4.5 g

Side-effects / adverse-effects:

No significant side effects have been observed.

Avoid to use in first trimester of pregnancy.

Important formulations:

Habb-e-Surkhbada, Marham-e-Jadwar, Marham- e-Kharish, Araq-e-Juzam, Araq-e-Musaffi-e-KhoonQawi.

HULBA

(Seed)

This drug is a dried seeds of *Trigonellafoenum-gracecum*Linn**.** It is commonlyknown in Bangladesh as Methi sag therefore, leaves are eaten as vegetable and seeds are also used as spice. It is cultivated whole over the country.

Other names:

a) Botanical name: Trigonellafoenum-gracecum Linn

b) Family: Fabaceae/Papilionaceae

c) Bengali name: Methi

d) English name: Fenugreek, Greek Hayes

Description:

a) General: Halba plant is 30-60 cm in height. The leaves are light green, pinnately trifoliate. Flowers are white or yellowish white and axillary. Fruits are legumes, 5-7.5cm long, narrow, curved, tapering with a slender point and containing 10-20 deeply furrowed seeds per pod. Flowering and fruiting takes place during February to March.

Hulbaseeds are bitter, mucilaginous and aromatic. When dry seeds are soaked in water they become mucilaginous.

b) Macroscopic: The drug consists of dried seeds, rhomboidal in shape and with a deep olive yellow colour, compressed, truncate at both ends, 3.0-7.0 mm in length, 2.8-4.0 mm in breadth and 2.2-2.5 mm in thickness. The funicular point on the lateral side and a "V" shaped narrow furrow starts just from the depression nearly at the center of the lateral side. The testa is smooth and hard. The taste is bitter, odour pungent and agreeable.

c) Microscopic: The transverse section of the seed coat consists of an outer palisade layer. Palisade cells are radially elongated and their tips are pointed and show thickenings on outer walls. Below the palisade layers there is a parenchymatous layer of oval to round cells, 1-2 cells in thickness, followed by 2-3 layers of squarish or tangentially elongated cells of parenchyma. Just beneath is another layer of oval to round parenchymatous cells. Certain cells of this layer arc thick walled containing fixed oil, The parenchymatous cells of the endosperm

are thin walled and oval to polygonal in shape. The epidermis of the cotyledons consists of small, hexagonal to polygonal cells with thickening in outer walls. Belowthis, a multilayered polygonal parenchymatous layer of cells containing aleurone grains.

The radical is situated in radicular pocket on the lateral side of the seed. The covering of the radical pocket is anatomically similar to that of the seed. The epidermis of radical consists of oval to round parenchyrmatous cells with their outer walls thickened. Rest of the radical is composed of thin walled parenchymatous cells which are oval to round in shape with inter cellular spaces.

Parts used: Seeds. Leaves, Whole plant

Habitat: It is native of South Eastern Europe and West Asia. It is cultivated whole over the Bangladesh andalso foundin India, Pakistan, and Srilanka.

Phytoconstituents:

Alkaloids, flavonoids, glycosides, proteins, aminoacids, reducing suger, saponins, steroids, triterpenes, tannins, fixed oils, sodium, Potassium, magnesium, phosphates, iron,sulphates and chloride. A glycoside of furost-5 -en-3B -22, 26 trial with glucose, rhamonose, and xylose as sugars isolated from seeds. Two new furostanol, glycoside isolated as their methyl ethers-trigofoenosides A-1 and D-1 from seeds.

Alkaloids: Trimethylamine, Neurin, Trigonelline, Choline, Gentianine, Carpaine and Betain.

Amino acids: Isoleucine, 4-Hydroxyisoleucine, Histidine, Leucine, lysine, L-tryptophan, Argenine.

Saponins: Graecunins, fenugrin B, fenugreekine, trigofoenosides A-G.

Steroidal sapinogens: Yamogenin, diosgenin, smilagenin, sarsasapogenin, tigogenin, neotigogenin, gitogenin, neogitogenin, yuccagenin, saponaretin.

Flavonoids: Quercetin, rutin, vetixinisovetixin.

Fibers: Gum, neutral detergent, fiber

Other: Coumarin, lipids, vitamins, minerals;Mucilage 28%;proteins 22%;fixed oil 5%.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Antidiabetic and hypoglycaemic effect: Fenugreek seeds have blood sugar lowering effect. This may be due to the presence of various phytochemicals (galactomannan-rich soluble fiber,

amino acid 4-hydroxyisoleucine) in seeds. The amino acid present in seeds causes direct pancreatic β-cell stimulation. A study of alloxan-induced diabetic mice has shown that the hypoglycaemic activity of dialysed fenugreek seed extract was comparable to that of insulin.

Demulcent: The aqueous extract of fenugreek seeds has demulcent (relieving inflammation or irritation) properties. In an experiment done on rats, it promoted healing of gastric ulcers. It also exhibited a smooth muscle relaxing effect in rabbits without affecting either the heart or blood pressure.

Blood cholesterol lowering: The oral intake of fenugreek seeds reduces cholesterol level. This may be due to interaction of saponins and bile acids, resulting in formation of large micelles which are not absorbed in digestive tract, this further results in increased faecal bile acid and cholesterol excretion.

Blood lipids lowering: The fibrous fraction of seeds causes a reduction in blood lipids.

Seeds also possess Anticancer, Anti-Inflammatory, Antiseptic, Aphrodisiac, Astringent, Emollient, Expectorantand Anthelmintic, Wound healing, Gastro protective and Antioxidant properties. World Health Organisation WHO recommends use of fenugreek seeds in adjuvant therapy for diabetes mellitus, anorexia, also in hypercholesterolemia (excess of cholesterol in the bloodstream).

Mizaj (Temperament): Hot 2° Dry 2^{o}

Musleeh (Corrective): Not require.

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	- Not more than 2%, Appendix 2.2.2
Total Ash	- Not more than 4%, Appendix 2.2.3
Acid insoluble ash	- Not more than 1%, Appendix 2.2.4
Alcohol-soluble extractives	- Not less than 3%, Appendix 2.2.6
Water-soluble extractives	- Not less than 10%, Appendix 2.2.7

TLC behaviour of petroleum ether ($60\text{-}80^{0}$) extract:

Solvent system	*Spray/reagent treatment*	*No. of spots*	*Rf value*

Toluene Ethyl acetate (9:1)	Phosphoric acid	4	0.43, 0.56, 0.71, 0.84

Aa'maal-e-Adviya (Pharmacological Action):

Mulattif, Mudirr-e-Baul, Many-e-Zeyabetus, Mudirr-e-Haiz, Mulaiyin, Munaffis-e-Balghum, Mohallil-e Waram

Mahall-e-Istemalat (Therapeutic use):

Sara, Istirkha, Zeyabetus, Niqras, Istiska-e-Ziqqi, Sual-e-Muzmin, lzm-e-Tehal, Waram-e-Rahem, Bawaseer, Taqleel-e-Shaham

Meqdar-e-Khorak (Dose): 3.5 - 7 gm

Side-effects / Adverse-effects: No significant side effects have been observed.

Important formulations: Laooq-e-Hulba, Laooq-e- Zeeq-un-Nafas, Qairooti-e-Aarad-e-Karsana, Zimad-e-Khanazeer, Zamad-e-Kibreet, Habb-e-Khabsulhadeed, DawaulLuk, MarhamDakhliyun.

INDERJAO SHIREEN

(Seed)

The drug InderjaoShireen consists of dried seeds of *Wrightia tinctoria* (Roxb) R. Br. Syn. *Neriumlinctorium*Roxb (Apocynaceae). A small deciduos tree found in the hills.

Other names:

a) Botanical name: *Wrightiatinctoria* (Roxb) R. Br. Syn. *Neriumlinctorium*Roxb.

b) Family: Apocynaceae

c) Bengali name: Inderjou/indrayava

d) English name: Sweet inderjao

Description:

a) General: It is a seed of small to medium-sized deciduous shrub or tree, ranging from 3 m to 15 m in height but also reaching up to 18 m. The bark is smooth, yellowish-brown and about 10 mm thick, producing a milky-white latex. Leaves are simple, oppositely arranged, ovate, obtusely acuminate and are 10–20 cm long and 5 cm wide. Leaves are glabrous and sometimes pubescent beneath. Leaf stalks are very short. The flowers appear from March to May, peaking from April to June. White flowers appear in corymb-like cymes, 5–15 cm across, at the end of branches. Flowers have five white petals 2–3 cm long which turn creamish yellow as they age. The flowers have oblong petals which are rounded at the tip, and are similar to flowers of frangipani. Fruiting is in August and the fruit is cylindrical, blackish-green speckled with white, long horn-like and united at tip. The seeds are brown and flat with bunch of white hairs. Seed dispersal is by wind and pollination is by insects.

b) Macroscopic:

The seeds are greenish in colour, 1.0 -1.9 cm in length and 2-3 mm in breadth, apex slightly pointed. The base of the seeds has the coma of hairs. In dried seeds these are shaded. At one side it is Flat or slightly longitudinally grooved, The seeds when soaked in water release greenish colouring matter.

c) Microscopic: In cross section, the inner most layer of the testa is followed by three layers of more or less tangentially elongated cells of endosperm filled with globular contents. The cotyledonary tissue consists of single layered, usually tangentially elongated outer and inner epidermis and the ground tissue in between. The crude drug powder is brown in colour and

shows the pieces of sclerenchvmatous cells of seed coat, isodiametric cells of endosperm, epidermis and radially elongated parenchymatous cells of cotyledons. Prismatic crystals of calcium oxalate are also observed.

Parts used: Flowers, Leave, Seeds, Bark, Root,.

Habitat: It is mainly found in Bangladesh, Australia, India, Myanmar, Nepal, Timor and Vietnam.It is a slow to moderate-growing plant. Plants commence flowering when about 5–8 years old. It grows in a wide range of soil types ranging from arid, semi-arid, gravely or rocky soils and moist regions, especially on dry sandy sites or hillsides and valleys. The tree responds well to coppicing, and also produces root suckers. It tolerates moderate shading and is often found as undergrowth in deciduous forests. It also tolerates high uranium levels in soils.

Phytoconstituents:

Alkaloids, steroids, saponins and reducing sugars.

Lupeol, Chlorogenic acid, Dihydrocanaric acid, Glycerol, Erythritol, Thritol, Dgalactose, D-mannose, 14 α-methyl zymosterol, Desmosterol, Clerosterol, 24- methylene-25-methyl cholesterol, 24- dehydropollinastanol, 24-methylcholesterol, 24-methylene cholesterol, 24-ethyl cholesterol, 24 ethyl 22 Edehydrocholesterol, Isofucosterol, cholesterol, Palmetic acid, stearic acid, Behenic acid, Arachidic acid.

Mature seedpods: α- and β-amyrin, Lupeol, Ursolic acid, Oleanolic acid, Isoricinolic acid, βsitosterol.

Immature seedpods: α- and β-amyrin, Cycloartenone, Cycloeucalenol, Wrightial, β-sitosterol.

Af'aal-e-Adviya (Pharmacological Activities):

Some of Af'aal-e-Adviya (Pharmacological activities) are describe here.

Anti-microbial activity: Various diseases caused by microbes are treated by available drugs. They treated the human population by the resistance of microorganisms to the available drugs. Wrightia tinctoria is used for skin disorders in different parts of the country. The terpenoids and flavonoids of W.tinctoria are found to have anti-microbial property against pathogenic bacteria, fungus, virus and protozoans has been reviewed below: Anti-bacterial activity Activities against Staphylococcus, Salmonella, Pseudomonas, Klebsiella, Micrococcus sp. and E.coli have been reported. Ranjani et al (2012) showed that Methanol and ethanol extracts of

W.tinctoria leaves were found to have strong inhibitory activity against Staphylococcus, Bacillus species. Kyade and vaikos (2011) showed that the antibacterial activity of Wt bark extract at 100 mg/ml was not very broad. Chloroform, acetone and methanol extracts showed moderate activity against S.typhi, B.subtilis, B.megaterium, E.coli, P.aeruginosa and M.luteus. None of the extracts showed activity against K.Planticola. The aqueous and methanol extract of W.tinctoria leaves showed potent antibacterial activity in different studies. Ethanol extract of W.tinctoria flower also showed potent activity against both gram positive and gram negative bacteria.

Anti-fungal activity: Pityrosporum ovale is a fungi belonging to the family Basidiomytes, which is causing major cosmetic problem of dandruff. The active constituents in Wrightia tinctoria have shown significant inhibition against P.ovale and C.albiccans. The hexane extract of W.tinctoria leaves was found to have very good anti-dermatophytic activity against Trichophyton and Epidermophyton species. The chloroform extract of W.tinctoria leaves showed anti-fungal activity against most of the dermatophytes with MIC in the range of 0.5-4 mg/ml. The ethanol extract of W.tinctoria leaves was found to inhibit a wide range of fungal genera viz. Curvularia, Botrytis, Aspergillus was found to have highly significant inhibition against dermatophytes with extract concentration upto 1000 ppm. Methanol and aqueous extract of W.tinctoria leaves also found to have effective against Curvularia sp. indirubin is the major phyto compound from chloroform extract of W.tinctoria leaves and was found to have anti-fungal activity (MIC 6.25-50 µg/ml) against dermatophytes, non-dermatophytes and yeast. The aqueous extract of W.tinctoria leaves and seeds were ineffective against Aspergillus, Mucor and dermatophytic species. Whereas methanol extract was moderately active against Aspergillus and Mucor species. Chloroform and methanol extract of W.tinctoria woody stem were found to be effective against non-dermatophytic fungi.

Anti-leishmanial activity/ Anti-plasmodial activity: An indole alkaloid of tryptanthrin is naturally found in W.tinctoria leaves had been found to be active against Leishmania species and Plasmodium falsiparum. Various tryptanthrin derivatives are being used for the drug development against these protozoans. Anti-viral activity The methanol extract of the W.tinctoria leaves was found to be have anti-viral activity against hepatitis C virus using Huh 5.2 cell line (a cell line with a persistent viral replication). The aqueous leaf extract having flavonoids, particularly isatin and its derivatives found to have anti-HIV activity by inhibiting HIV-1 integrase enzyme during its 3' processing and strand tranfer with IC50 of 1.9 ± 0.5 µg/ml and 1.4 ± 0.3 µg/ml respectively. Hence W.tinctoria can also be used for the current menace, AIDS. Anti-psoriatic activity Psoriasis is an autoimmune disorder of skin that is

characterized by skin redness, itching and patchy looks. Traditionally, W.tinctoria is used to treat psoriasis, eczema, scabies etc. and that was clinically proved. Hydro-alcoholic extract of W.tinctoria was found to have antipsoriatic activity.

Anti-helminthic activity: Helminths are parasitic worms affecting human beings via contaminated food and water or find their way into human body through soil. They dependent on their hosts for nutrition andmaking them weak and susceptible to other diseases or affect the organ where they placed. In one of the study when compared to the chloroform extract of W.tinctoria leaves with the standard drug of piperazine, the chloroform extract of W.tinctoria were found to be more potent against the Pheretimaposthuma. In another study, methanol and aqueous extracts of W.tinctoria leaves showed comparable anti-helminthic activity.

Anti-diarrhoeal activity: Ethanol extract of Wrightia tinctoria bark and steroidal alkaloid fraction derived from it were found to have anti-diarrhoeal activity by showing its effect on prostaglandin inhibition and decreasing intestinal propulsive / spasmodic movement.

Anti-oxidant activity: Oxidative stress in various diseases causing the damage of cells and tissues. Anti-oxidants are more important to combat these free radicals in our body. Ethanol extract of W.tinctoria bark and flowers was found to be effective in reducing Fe3+ to Fe2+ and also have superoxidebradical scavenging activity which makes it a potential anti-oxidant agent. Dihydrocanaric acid found in W.tinctoria is a powerful anti-oxidant agent. The hydroalcoholic extract of W.tinctoria leaves showed very good anti-oxidant activity in DPPH, H2O2 and nitric acid scavenging assays.

Anti-inflammatoty / immunomodulatory activity: The use of Wrightia to treat anti-arthritic/anti-inflammatory conditions had been reported in different reviews. Anti-inflammatory activity in W.tinctoria bark was first reported by Tharkar et al. in 2010 where the aqueous, chloroform and methanol extracts were proposed to inhibit the kinin- and prostaglandin- like mediators, and were also involved in the suppression of the proliferative stages of inflammation at the dose of 200 mg/kg. Though the result was found to be statistically significant, the level of inhibition was less as compared to the standard drug, diclofenac. The petroleum ether and methanol extracts of the W.tinctoria woody stem at the doses of 100, 200 and 400 mg/kg caused a significant inhibition on inflammation in the carrageenan- and histamine- induced rat paw oedema which can be attributed to the presence and synergistic action of flavonoids, steroids and triterpenoids. The ethyl acetate and aqueous fraction of W.tinctoria leaves showed significant anti-inflammatory activity. The bark of W.tinctoria was successively extracted with Petroleum ether, alcohol and aqueous alcohol. The Petroleum ether and alcohol extracts showed certain immunomodulatory activity by rat

paw oedema test and macrophage clearance phagocytic index. Whereas the aqueous alcohol extract didn't possess any immunomodulatory activity. The W.tinctoria possess both immunomodulatory and anti-inflammatory activity. Therefore, W.tinctoria may be a potential for skin problems at an earlier stage of infection.

CNS Activity: The methanol extract of W.tinctoria leaves showed modulatory role in the expression level of serotonin, nor-epinephrine and dopamine in brain, which may be particularly useful to combat anxiety and depression. [51] W.tinctoria had been explored for CNS activity in a study by Bigoniya and Rana and they found that the 70% ethanol extract of W.tinctoria bark had no effect on CNS up to a concentration of 1000 mg/kg in albino rats. However, Isatin, one of the compound isolated from W.tinctoria leaves, and its derivatives are known to possess anticonvulsant activity. Owing to its traditional usage for treating convulsions, more work on W.tinctoria is required to understand the pharmacological activity of this plant in connection to Central Nervous System.

Anti-nociceptive/Anti-analgesic activity: Wrightia tinctoria bark was evaluated using acetic acid-induced writhing test, in which methanol extract showed to have Anti-nociceptive activity comparable to acetyl salicyclic acid. More work is needed to know about the active compounds responsible for the activity. The ethanol extract of bark showed Anti-nociceptive effect and moderate analgesic effect against thermal and chemical stimuli but not mechanical stimulus, which may be due to the presence of steroids. The study also concluded that W.tinctoria didn't have any sedative effects. Ethyl acetate fraction of W.tinctoria leaves showed analgesic activity and was found to be effective in inhibiting both centrally and peripherally acting pain mechanisms.

Anti-diabetic activity: Streptozotocin induced assay in albino Wister rats were used to analyze the anti-diabetic activity of the plant. Chloroform extract of W.tinctoria leaves significantly reduced the blood glucose level at the dose of 200 mg/kg and was comparable to the action of known drug, glibenclamide.[45] W.tinctoria exhibited hypoglycemic activity at 250 mg/kg but the mode of action is unknown, Ashok Raj et al. reported that the petroleum ether extract of W.tinctoria leaves exhibited hypocholersterolemic and hypotriglyceridemic effects which is possibly modulated via some unknown extra pancreatic mechanism and they concluded that the petroleum ether leaf extract not only lowered the blood glucose level at 400 mg/kg but also modulated the blood lipid abnormalities which is a secondary complication arising out of diabetes thereby lowering the cardiovascular risk, thus may have significant role in combating diabetes mellitus. Wrightia tinctoria bark was also found to possess alphaglycosidase

inhibitory activity at 1500 µg/ml which can be further investigated for controlling blood glucose level in diabetic patients.

Diuretic activity: Aqueous and alcohol extracts of W.tinctoria leaves were found to be significantly and comparably active in increasing the urinary water and electrolyte (Na+, Cl-, K+) concentration when compared to standard drug furosemide, in an experiment done according to the CPCSEA guidelines by sathianarayanan et al. In another study also, the hydroalcohol extract of W.tinctoria bark was found to increase Na+ and Cl- ions, thus strongly kaliuretic. Therefore, W.tinctoria can be further explored for its diuretic potential for management of hypertension, kidney disorders, heart problems etc.

Wound healing: The petroleum ether and methanol extract showed significant wound healing properties, which probably were due to increase in the collagen and fibrin content as determined by the tensile strength of the resutured wound. This may be due to the anti-oxidant and antiinflammatory activity exerted due to the presence of terpenoids, steroids and flavonoids in the plant extract. [44] Traditionally, the latex from W.tinctoria is used to stop bleeding. Anti-ulcer activity Hydrochloric acid extract of W.tinctoria bark at 1000 mg/ml was found to possess significant antiulcer activity based on evaluating the factors relating to gastric juice, acidity level, protein and carbohydrate content in gastric mucous substances.[45] The abdominal distress caused by ulcer due to bacterial action and food habits is an important area of concern. However, more work in W.tinctoria is required to gain insight into its efficacy against ulcer.

Mizaj (Temperament): Cold 2^0Dry 2^0

Musleeh (Corrective): Not require.

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign Matter	- Not more than 2%, Appendix 2.2.2
Total Ash	- Not more than 7%, Appendix 2.2.3
Acid insoluble ash	- Not more than 2%, Appendix 2.2.4
Alcohol-soluble extractives	- Not less than 20%, Appendix 2.2.6
Water-soluble extractives	- Not less than 29%, Appendix 2.2.7

TLC behaviour of petroleum ether (60-80^0) extract:

Solvent system	Spray/reagent treatment	No. of spots	Rf value
Benzene: Pet. ether (2:3)	I_2 vapours	4	0.34, 0.44, 0.84

Aa'maal-e-Adviya (Pharmacological Action):

Mohallil-e-Waram, Kasir-e-Riyah, Musakkin, Habis, Qatel-e-Dedan, Moqavvi-e-Bah, Taqlil-e-Hararat

Mahall-e-Istemalat (Therapeutic use):

Ramad, Yarqan, Warame-e-Tehal, Namal, Bawaseer, Nafakh-e-Shkikam, Zaheer, Dedan-e-Amya, Zouf-Zakar, Humma.

Meqdar-e-Khorak (Dose): 1-3 g, also used externally

Side-effects / Adverse-effects: No significant side effects have been observed.

Important formulations: Qurs-e-Habis, Laboob-e-Kabir, Majoon-e-Kalkalanaj, Majoon-e-Khadar, Majoon-e-Muluki, ltrifal-e-Kabir.

JAL BRAHMI

(Whole plant)

The drug Jal Brahmi consists of dried whole plant of *Bacopo monniera* Linn, a glabrous, succulent, small, prostrate or creeping annual herb, found throughout in wet and damp places of the country.

Other names :

Botanical name **:***Bacopo monniera* Linn

Family **:** Scrophulariaceae

Bengali name **:** Brahmi

English name **:** Waterhyssop, Brahmi

Description:

General: Bacopa is a succulent, glabrous, creeping herb, with rooting at nodes. The plant is easily recognized by its spreading habit, sessile and fleshy leaves, and light bluish, purple or white flowers. Leaves are ovate and opposite with dotted lower surface.

Macroscopic:

Root: Thin wiry, small, branched creamish-Yellow

Stem: Thin, Green or purplish Green, about 1-2 mm thick soft, nodes and internoodes prominent, globrous testa, slightly bitter.

Leaf: Simple, opposite decussate, Green, sessile, 1-2 cm long, obovate-oblong, taste; slightly bitter.

Flower: Small, solitary axillary, pedicels, 6-30 mm long, bracteoles shorter than pedicels.

Fruit: Capsules upto 5mm long, ovoid and glabrous.

Microscopic: Root shows a single layer of epidermis, cortex having air cavities; endodermis single layered pericycle not disitinct; stele consists of a thin layer of phloem with a few sieve elements and isolated material from xylem shows vessels with reticulate thickenings.

Stem shows single layer of epidermis followed by a wide cortex of thin-walled cells with very large intercellular spaces; endodermis single layered; pericycle 3 consisting of 1-2 layers; vascular ring continuous, composed of a narrow zone of phloem towards periphery and a wide ring of xylem towards centre; centre occupied by a small pith with distinct intercellular spaces; starch grains simple, round to oval, present in a few cells of cortex and endodermis, measuring 4-14 µ in diameter and 8.0-14.0 x 2.5–9.0 µ diameter respectively.

Leaf shows a single layer of upper and lower epidermis covered with thin cuticle; glamdular hairs sessile, subsidiary cells present on both surfaces; a few prismatic erystals of calcium oxalate occasionally found distributed in mesophyll cells; mesophyll traversed by small veins surrounded by bundle sheath; no distinct midrib present.

Powder: Yellowish – brown; shows xylem vessels with reticulate thickening, glandular hairs, simple, round and oval starch grains, measuring 4-14 µ in diameter.

Parts used : Whole plant

Habitat : Bacopa monnieri commonly grows in marshy areas throughout India, Nepal, Sri Lanka, China, Pakistan, Taiwan, and Vietnam. It is also found in Florida, Hawaii and other southern states of the United States where it can be grown in damp conditions by a pond or

bog garden. This plant can be grown hydroponically. It is abundantly found throughout the country.

Phyto constituents: The best characterized chemicals in Bacopa monnieri are dammarane-type triterpenoid saponins known as bacosides, with jujubogenin or pseudo jujubogenin moieties as aglycone units. Bacosides comprise a family of 12 known analogs. Other saponins called bacopasides I–XII were identified. The alkaloids brahmine, nicotine, and herpestine have been catalogued, along with D-mannitol, apigenin, hersaponin, monnierasides I–III, cucurbitacin and plantainoside B.

Af'aal-e-Advia (Pharmacological activities):

Antidepressant and Antianxiety Effects: Research using a rat model of clinical anxiety demonstratedthata BM extract containing 25% bacoside A exertedanxiolytic activity comparable to lorazepam, a commonbenzodiazepine anxiolytic drug, and it was attentively notedthat the BM extract did not induce amnesia,side effectsassociated with lorazepam, but instead had a memory enhancingeffect. Theantidepressant potential of BMhas been evaluated in an earlier study, wherein it showeda significant antidepressant activity in the most commonlyused behaviour paradigms in animal models of depression,namely, forced swim test and learned helplessness tests.[36] Inthe study, the BM extract in the dose range of 20-40 mg/kgwas given once daily for 5 days and it was found comparableto standard anti-depressant drug imipramine in antidepressantactivity in rodent animals. The same study haspostulated the role of serotonin and GABA (gamma aminobutyric acid) in the mechanism of action attributed for itsantidepressant action along with its anxiolytic potential,based on the compelling evidence that the symptoms ofanxiety and depression overlap each other.

Anti-Epileptic Effects: Although BM has been indicated as a remedy for epilepsyin Ayurvedic medicine,[38] research in animals showedanticonvulsant activity only at high doses over extendedperiods of time. Early research in India demonstrated thathersaponin (an active constituent) exhibited protectionagainst seizures in mice and mentioned the possibilityof its use as an adjuvant in treatment of epilepsy.[39] OneIndian study examined the anticonvulsant properties ofBM extracts in mice and rats. Researchers determinedthat intraperitoneal injections of high doses of BM extract(close to 50% of LD50) given for 15 days demonstratedanticonvulsant activity. When administered acutely at lowerdoses (approaching 25% of LD50), anticonvulsant activitywas not observed.[40] It is postulated that

the anti-convulsiveeffects could be mediated through GABA which is involvedin neural impulse transmission, because substances whichstimulate GABA are known to possess anticonvulsant, painrelieving and sedative activities.

Antioxidant and Adaptogenic Properties: BM extract or bacosides have shown an antioxidantactivity and antistress. A previous study suggests aninvolvement of the GABA-ergic system in the mediationof these central nervous system effects of BM. Basedon animal study results, bacosides were shown to haveantioxidant activity in the hippocampus, frontal cortex andstriatum.Animal research has shown that the BM extractsmodulate the expression of certain enzymes involved ingeneration and scavenging of reactive oxygen species in thebrain. It was suggested that the adaptogenic properties ofthe herb would be beneficial in the management of stressrelated conditions as BM showed the potential to be effectivein stress in a study on rats. In the study, BME was foundnot only to induce the constitute expression of heat-shockprotein (HSP 70) but also induce the CYP 450enzymes inall regions of brain. The level of Hsp70 was found to beincreased in brain as a response to stress. On the other hand,thegroup that was pre-treated for 1 week with 20-40 mg/kg/daily, before giving stress, the Hsp70 was found to bein lower concentration. An increase in the activityof CYP450-dependent enzymes 7-pentoxyresorufin-odealkkylase(PROD) and 7-ethoxyresorufin-o-deethylase *(*EROD) wasobserved in all the brain regions after exposure to stressalone and with both doses of BME although the magnitudeof induction observed was less with a higher dose of thesame. Thus, it was suggested that the BM primed the brainfor stress by stockpiling these useful enzymes even beforestressful conditions and that our susceptibility to stresscould be lowered by using this medicinal herb. It wasspeculated that this induction may be an adaptive responseto the stress which needs further investigation. The level ofSOD was also increased in brain in the groups pre-treatedwith BME. The data indicated that BME has apotential tomodulate the activities of HSP 70, CYP 450 and SOD andthereby possibly allowing the brain to be prepared to actunder adverse condition like stress.

Gastrointestinal Effects: Some *in vitro*, animal and human studies have investigatedthe effects of BME on the gastrointestinal tract. *In vitro*studies have demonstrated direct spasmolytic activity onintestinal smooth muscle, via inhibition of calcium influxacross cell membrane channels. This property suggeststhat BME may be of benefit in conditions characterizedby intestinal spasm such as irritable bowel syndrome(IBS). The results indicated

the direct action of theextract on smooth muscles. Also, calcium chloride-inducedresponses observed in the rabbits' blood vessels and jejunumwere reduced in the presence of the BME (10-700 mcg/mL),suggesting direct interference with the influx of calciumions. However, since the extract did not affect contractionsinduced by noradrenalin or caffeine, the authors concludedthat the extract had no appreciable effect on the mobilizationof intracellular calcium. Based on the results of theexperiment, it is postulated that the spasmolytic effectof BME on smooth muscles is predominantly due to theinhibition of calcium influx, applicable to bothelectricalimpulse-mediated and receptor-mediated calcium channelsin the cell membrane. Animal and *invitro* studies suggestedthat BM may have a protective and curative effect on gastriculcers, and studies were reported for its antiulcerogenicactivity. In rats, a BME standardized for bacoside Awas evaluated for its prophylactic and healing effects infive models of gastric ulcers. At a dose of 20 mg/kg for 10days, BME significantly healed penetrating ulcers inducedby acetic acid, significantly strengthened themucosalbarrier and decreased mucosal exfoliation. The extract alsoalleviated stress-induced ulcers asobserved by significantreduction in LPO in rat gastric mucosa. BM's antioxidantproperties and its ability to balance SOD and catalaselevels were postulated to account for this effect.A recent*in vitro* study also demonstrated its specific anti-microbialactivity against *Helicobacter pylori*, a bacterium associatedwith chronic gastric ulcers. When the extract was incubatedwith human colonic muscosal cells and *H. pylori*, it resultedin the accumulation of prostaglandin E and prostacycline,prostaglandins known to be protective for gastricmucosa.

Anxiety and Depression: The traditional use of BM as an anti-anxiety remedy inAyurvedic medicine is supported by both animal andclinical research. A 1-month, limited clinical trial of 35patients with diagnosed anxiety neurosis demonstrated thatadministration of brahmi syrup (30 mL daily in two divideddoses, equivalent to 12 g dry crude extract of bacopa)resulted in a significant decrease in anxietysymptoms,level of anxiety, level of disability and mental fatigue and anincrease in immediate memory span.[82] In one latest study,effects of a standardized BME (300 mg/day) on cognitiveperformance, anxiety and depression in the elderlywere evaluated in a randomized, double-blind, placebocontrolledclinical trial with a placebo run-in of 6 weeksand a treatment period of 12 weeks. BM participants hadenhanced Auditory Verbal Learning Test (AVLT), delayedword recall memory scores relative to placebo, decreasedCenter for Epidemiologic Studies Depression scale(CESD10)depression scores, combined state plus traitanxiety scores and heart rate over time compared to thatof the

placebo group. This study provided further evidencethat BM has a good potential for safely enhancing cognitiveperformance in the ageing.

Gastrointestinal Disorders: A double-blind, randomized, placebo-controlled trial of169 patients with IBS compared the effects of an Ayurvedicpreparation containing BM and *Aegle marmelos*to standardtherapy (clidinium bromide, chlordiazepoxide andpsyllium).[84] Subjects were divided into five subgroupsbased on type of IBS, and randomly assigned to standarddrug treatment, botanical treatment or placebo for 6 weeks.Treatment was administered orally as 5 g drug, botanical orplacebo three times daily. Data analysis revealed standarddrug therapy to be superior to the Ayurvedic preparation,except in patients with IBS characterized by diarrhoea. Thisresult was attributed to the *Aegle marmelos*, a commonlyknownantidiarrhoeal in India, although the two botanicalswere not given separately, so individual effects could notbe confirmed.

Mizaj (Temperament): Unknown

Musleh (Correction): Unknown

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 3 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 1 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 5 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Muqawwi-e-Dimagh Wa Hafiza, Musakkin, Musaffi-e-Dam, Mudir-e-Baul, Waja-ul-Asab, Hirkat-ul-baul.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Dimagh wa Hafiza, Sozish-e-baul.

Meqdar-e-khorak (Dose): 3-5 gm

Side-effects: Bacopa extract is possibly safefor adults when taken by mouth appropriately and short-term, up to 12 weeks. Common side effects include increased bowel movements, stomach cramps, nausea, dry mouth, and fatigue.

JAMUN

(Stem Bark)

The drug jamun consists of dried stem brak of *Syzygium cuminii* (Linn) skeels (Fam. Myrtaceae); a lorge evergreen tree, attaining a height of 30 meter and a girth of 3.6 m with a bole up 15 meter found throughout this subcontinent upto an altitude of 1,800 meter.

Other names :

Botanical name **:** *Syzygium cuminii*

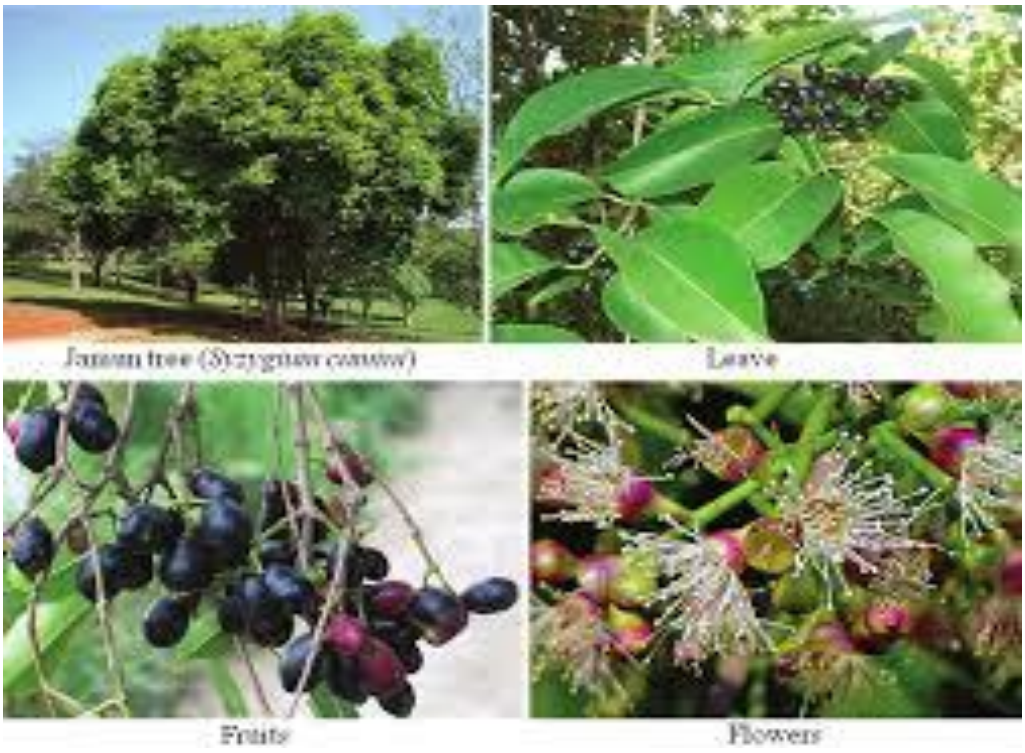
Family **:** Myrtaceae

Bengali name **:** Jaam

English name **:** Blackberry

Description:

General:A slow growing species, it can reach heights of up to 30 meter and can live more than 100 years. Its dense foliage provides shade and is grown just for its ornamental value. At the base of the tree, the bark is rough and dark grey, becoming lighter grey and smoother higher up. The wood is water resistant. Because of this it is used in railway sleepers and to install motors in wells. It is sometimes used to make cheap furniture and village dwellings though it is relatively hard to work on.



Macroscopic: Drug occurs in slightly curved or flat pieces, 0.5-2.5 cm thick, younger bark mostly channeled, external surface more or less rough and rugged due to exfoliation and vertical cracks, light grey to ash coloured, internal surface fibrous, rough and reddish-brown, and fracture short and splintery; taste astringent.

Microscopic: Mature stem bark shows a wide zone of cork differentiated into upper and lower cork zones, forming a rhytidoma; cork consisting of tangentially elongated rectangular cells, upper few layers thick, stratified and reddish–brown , having groups of 2-4 stone cells and crushed elements of phloem; lower cork thin and colourless; cork cambium not distinct; secondary phloem composed of sieve elements, and phloem rays; phloem parenchyma thin-walled and polyhedral in shape; stone cells, oval to angular, elongated; fibres aseptate; both stone cells and fibres single or in groups present throughout this region; phloem rays 1-4 cells wide; reddish-brown content, rosette crystals of calcium oxalate and simple, round to oval starch grains, measuring 5-11 µ in diameter.

Powder: Light brown; shows fragments of thin- walled cork cells, aseptate fibres; single or in groups; oval to angular, elongated, stone cells, rosette and prismatic crystals of calcium oxalate and simple, round to oval starch grains, measuring 5-11 µ in diameter.

Parts used: The leaf, root, and fruit (berry) are used to make medicine.

Habitat: Trailing blackberry is often found in fairly open to dense woods. It appears to thrive in clear-cuts, fire scars, logged-one areas and under transmission lines. It is also commonly found next to or intertwined with Rubus Procerus, the Himalayan blackberry.

Phyto constituents: Tannins

Af'aal-e-Advia (Pharmacological activities):

Anti-allergic action: Allergy is an abnormal reaction of the body to the allergen introduced by ingestion, injection,inhalation or skin contact. A novel, safe and effective remedy is required for this ailment. In aninvestigation, the aqueous extract of SC leaves (25-100mg/kg, p.o.) inhibited the rat paw edemainduced by 48/80 (allergenic compound), histamine and 5-HT. However, the extract could notproduce any beneficial effects against the platelet aggregating factor-induced paw edema.

Antibacterial activity: Now a days, people have started using antibiotics as OTC (Over The Counter) drugs which hasled to antibiotic resistance, thus safer novel antibacterial agents are required. In case of SC, itsstem, leaf and fruit extracts were found to be effective against all the bacterial strains used in thestudy. Best results were observed against *Roultellaplantikola*(zone of inhibition-25 mm).Microbroth dilution and Agar well diffusion assays were utilized to study the antibacterial effectsof SC seeds against multidrug-resistant human bacterial pathogens and it was found that the ethylacetate fraction from the ethanol extract was most effective. Then, the ethyl acetate fraction wassubjected to phytochemical analysis and TLC-bioautography which exhibited the phenolics to bethe main component responsible for the activity.Ethyl acetate, petroleum ether and methanolic extracts of the SC leaf were found to be effectiveagainst *Salmonella typhimurium, Bacillus subtilis, Pseudomonas aeruginosa, Staphylococcusaureus and Enterobacter aerogenes*.Acetone, aqueous and ethanolic bark extracts were evaluated for their antibacterial effectsagainst twelve strains of *Vibrio cholera*, of which the ethanolic extract was found to be mosteffective.Aqueous leaf extract of SC has shown beneficial effects against *Klebsiella sp., Salmonellaparatyphi A & B, Citrobacter sp., Proteus mirabilis, Escherichia coli, Staphylococcus aureus,Shigella sonnei, Pseudomonas aeruginosa, Salmonella typhimurium, Shigella boydii,Streptococcus faecalis, Shigella flexneri*and *Salmonella typhi*.

Anti-cancer: Various treatment strategies for cancer involve surgery, hormonal therapy, chemotherapy,radiation therapy and targeted therapy (e.g. monoclonal antibody therapy and immunotherapy).Apart from killing cancerous cells, some normal, healthy cells may be destroyed and may affectmany vital organs such as kidney, heart, lungs, nervous system etc. Many herbal anti-cancerdrugs are being used to avoid the unwanted side effects.Ellagitannins isolated from SC have shown to inhibit Wnt signaling in a transfected human 293Tcell line.
A few of the current investigations have proved the selective cytotoxic activity of jamun fruit extract after studying its pro-apoptotic and antiproliferative effects on estrogen independent (MDA-MB-231) breast cancer cells, estrogen dependent/aromatase positive (MCF-7aro)and normal/nontumorigenic (MCF-10A) breast cell line.Anti-cancer effects of 40% SC extract have been studied on human cervical cancer cells (11.8%growth inhibition observed in SiHa (HPV-16 positive) cells and 14.4% in HeLa (HPV-18 positive) cells).

Anticlastogenic: Anticlastogenic agent is one which protects the disruption or breakages of chromosomes. SCextract has exhibited its utility in mutagenesis prevention and

carcinogenesis initiation. Thealcoholic seed extract decreased the hydroxyl radical induced strand breaks in pBR322 DNA invitro and the aqueous extract was found to reduce the chromosomal aberrations in mice (inducedby DBMA and urethane).

Antifungal: The indiscriminate utilization of medicines has led to resistance against some fungal species,thus there is a requirement of a safer remedy.The methanolic fruit extract of SC has shown excellent antifungal action against the targetedpathogenic fungi - *Fusarium oxysporium, Rhizoctonia solani and Sclerotium rolfsii*.

Anti-hyperlipidemic: Of the various lipid-lowering drugs available in the market, the herbal drugs are found to bemore safe and efficacious. The anti-hyperlipidemic potential of SC fruit pulp was evaluated indiet induced hyperlipidaemic rats. The results revealed that the fruit pulp was as potent assimvastatin in reducing serum LDL cholesterol, triglycerides & total cholesterol and elevatingHDL cholesterol.

Anti-inflammatory: The anti-inflammatory drugs are those which help to overcome a localized physical condition inwhich part of the body becomes reddened, swollen, hot, and often painful, especially as areaction to injury or infection.
Ethyl-acetate and methanolic extracts of SC leaves and seeds (both at the doses of 200 and 400mg/kg p.o.) showed a significant anti-inflammatory activity in carrageenan induced paw oedema in wistar rats.

Antilieshmanial: Antilieshmanial agents are those that destroy protozoa of the genus *Leishmania*. The essential oilof SC and its main component α-pinene was evaluated for its antilieshmanial action against*Leishmania amazonensis*. α-pinene showed its efficacy with IC50 of 19.7 mg/ml.

Antioxidant: Generation of free radicals initiates/aggravates various diseases like cancer, AIDS, arthiritis,Alzheimer and diabetic complications. Thus, there is a requirement of safer drugs that haveproperty of scavenging the free radicals.With regard to SC fruit, polyphenols have shown outstanding antioxidant capacity whencompared to the standard polyphenols.The methanolic extract of leaves, bark and seeds of SC were fractionated in different solvents: nhexane,chloroform, ethyl acetate, butanol and water. These fractions were studied for theirantioxidant and free radical scavenging activities. Of all the fractions, the polar ones i.e.,

ethylacetate and water fractions showed excellent results.The leaf and seed extract of SC exhibited a significant antioxidant activity when they wereassessed by various in vitro methods such as Ferric reducing antioxidant power (FRAP) assay,2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging assay, Nitric oxide radical scavenging, ABTSAssay, Total Reducing antioxidant potential, Total antioxidant activity, Reducing power andHydroxyl radical scavenging activity.RSC (Radical Scavenger Capacity) of SC was determined by using DPPH (2, 2-diphenyl-1-picrylhydrazyl radical) assay. The second order rate constants-k2 was evaluated to determineRSC and then these were compared to natural and synthetic antioxidants. The k2 value of SCwas determined to be 15.60 L/mol g s in methanol at 25°C proving that it has a excellent antioxidantpotential.

Antiviral: With the changing environment, new viral diseases are being identified, so there is a demand fora safer, non-toxic remedy. The cold and hot aqueous extracts of leaves and barks of SC wereevaluated for their antiviral potential against H5N1 (avian influenza virus which causes a highlycontagious disease of poultry) using CPE reduction assay to establish virucidal, pre-exposure andpost-exposure potential of these extracts. With hot and cold aqueous bark extracts and hotaqueous leaf extracts, 100% inhibition of the virus was observed in virus yield reduction assayand in egg based in ovo assay. CC50/EC50 (selective index) for cold aqueous extract (43.5) andhot aqueous extract (248) of bark exhibited their potency against H5N1 virus. The aqueousextract of leaves was also found to inhibit the goatpox virus and the buffalopox virus.

Cardioprotective: In case of SC, the hydroalcoholic extract of leaves was evaluated in spontaneously hypertensiveand normotensive wistar rats. The findings of the research investigation revealed that the extractdecreased the blood pressure as well as the heart rate. Extracellular calcium influx and inhibitionof arterial tone were suggested as the most probable mechanism of action. Thehydroalcoholic extract of SC was evaluated for its antihypertensive, and vasorelaxant effect.Polyethylene catheters were inserted into the inferior vena cava and lower abdominal aorta in theanaesthetized rats for dosing and measuring blood pressure. The extract at the doses of 0.5; 1; 5;10; 20 and 30 mg/kg, i.v. was able to induce hypotension (due to reduction in endotheliummediated peripheral resistance) and bradycardia (due to meandering cardiac muscarinicactivation).The elevated serum levels of alanine transaminase (ALT), serum creatine phosphokinase (CPK),aspartate transaminase (AST), lactate dehydrogenase (LDH), HDL-cholesterol due toDoxorubicin(1.5 mg / kg/b.w., 15 days)

induced cardiotoxicity were brought to normal rangeafter the administration of aqueous suspension of SC seed extract (100 mg/kg/b.w. for 15 days).

The oral administration of the methanolic extract of SC at the doses of 250 mg/kg and 500 mg/kgconsecutively for 30 days reversed and retained the activity of AST, ALT, LDH and CPK tonormal levels against the isoproterenol- induced myocardial infarction.

Hepatoprotective: Hepatoprotective agents are those that provide protection to the liver (which performs importantfunctions like metabolism, secretion, storage, and detoxification of endogenous and exogenoussubstances).The alcoholic extract of the pulp of SC (100 and 200mg/kg/day) exhibited a significanthepatoprotective action on paracetamol (PCM)-induced hepatotoxicity in albino rats. Theelevated serum levels of ALT, AST, AP were decreased and histopathological studies depicted areduction in fibrosis and necrosis.The anthocyanins rich SC pulp extract (50 to 500 ppm) has shown its beneficial effects in

preventing the CCl4 induced liver damage by declining the lipid peroxidation, suppressing theCCl4-induced release of LDH, and elevating the GPx (antioxidant enzyme) activity.

Aqueous leaf extract and methanolic seed extract have also shown hepatoprtective

effects through biochemical estimations and histopathological studies.

Radioprotective: Radioprotective agents are those that reduce the effect of radiation on tissues. SC leaf extractprovided protection against radiation induced intestinal mucosal damage due to exposure ofdifferent doses of gamma radiations.Dichloromethane extract of SC leaf and Hydroalcoholic seed extract when administeredintraperitoneally exhibited radioprotective effects. SC leaf extract in variousconcentrations (0.0, 1.56, 3.125, 6.25, 12.5, 25, 50 and 100 µg/ml) was found to reduce theradiation induced DNA damage in the cultured human peripheral blood lymphocytes.

Temperament: Cold 2^0 and Dry 3^0.

Musleh (Correction) : Honey, Hot temperament product

Badal (Proximal substitute) : Another sepsis of *Syzygiumcumini*.

Identity, purity and strength:

Foreign matter : Not more than 2 per cent, Appendix 2.2.2

Total ash : Not more than 7 per cent, Appendix 2.2.3

Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 9 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 11 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Habis-e-Ishal, Muqawwi-e-Meda, Muqawwi-e-lissa.

Mahall-e-Istemalat (Therapeutic uses): Ishal, Zof-e-Meda, Zof-e-Lissa

Meqdar-e-khorak (Dose): 2-5 gm

Side-effects : Blackberry is safe in amounts used as food. There isn't enough information available to know if blackberry is safe in the larger amounts used as medicine.

JAMUN

(Seeds)

The drug jamun consists of dried seeds of *Syzygium cuminii* (Linn) skeels (Fam. Myrtaceae); a large evergreen tree, attaining a height of 30 meter and a girth of 3.6 meter with a bole up 15 meter found throughout this subcontinent upto an altitude of 1,800 meter.

Other names :

Botanical name **:** *Syzygium cuminii*

Family **:** Myrtaceae

Bengali name **:** Jaam

English name **:** Blackberry

Description:

General:A slow growing species, it can reach heights of up to 30 meter and can live more than 100 years. Its dense foliage provides shade and is grown just for its ornamental value. At the base of the tree, the bark is rough and dark grey, becoming lighter grey and smoother higher up. The wood is water resistant. Because of this it is used in railway sleepers and to install motors in wells. It is sometimes used to make cheap furniture and village dwellings though it is relatively hard to work on.

Macroscopic: 2-5 seeds, compressed together into a mass resembling a single seed, the whole seed enclosed in a cream coloured, coriaceous covering, smooth, oval or round, 1 cm long, 1 cm wide brownish-black; taste, astringent

Microscopic: Seed shows cotyledons consisting of single layered epidermis, mesophyll composed of isodiametric, thin-walled, parenchymatous cells fully packed with simple starch grains, oval rounded measuring 7-28 µ in diameter, a few schizogenous cavities are also found.

Powder: Brown coloured; shows a few parenchymatous cells and numerous oval, rounded starch grains, measuring 7-28 µ in diameter.

Parts used : The leaf, root, and fruit (berry) are used to make medicine.

Habitat: Trailing blackberry is often found in fairly open to dense woods. It appears to thrive in clear-cuts, fire scars, logged-one areas and under transmission lines. It is also commonly found next to or intertwined with Rubus Procerus, the Himalayan blackberry.

Phyto constituents: Glycoside (Jamboline), Tannin, Ellagic acid and Gallic acid.

Af'aal-e-Advia (Pharmacological activities):

Anti-diabetic: Various preclinical and clinical studies have been performed to evaluate the anti-diabeticpotential of SC.Numerous investigations performed in the past have indicated that SC seeds, fruit pulp, whole fruit, bark, leaves and flowers possess anti-diabetic activity.Mycaminose (50 mg/kg) - a compound isolated form SC seeds and ethyl acetate & methanolfraction at the doses of 200 and 400 mg/kg showed a significant ($p<0.05$) decrease in bloodglucose level when evaluated for the anti-diabetic activity in streptozotocin (STZ)-induceddiabetes in rats.

The aqueous and alcoholic SC extracts were evaluated for their anti-diabetic potential in alloxaninduced diabetic rabbits. It was found that the aqueous extract was more effective in improvingblood glucose in glucose tolerance test and in decreasing fasting blood glucose.Numerous studies have been performed to show the beneficial effects of SC extract in normalizing the elevated lipid profiles of diabetic rats, elevating the serum insulin and increasing SOD and GPx activities. The SC seeds possess protective effectagainst diabetes

related complications like neuropathy, gastropathy, nephropathy,diabetic cataract and also reduced peptic ulceration.

SC possesses the potential to inhibit the carbohydrate hydrolyzing enzymes. A polyherbalformulation (ADJ6) containing SC and some other antidiabetic herbs have shown a significantinhibitory action against α-glucosidase and α-amylase. SC seeds have shown the pancreaticislet cells regeneration potential in streptozotocin and alloxan diabetic rats.

Various clinical studies have been performed to validate the use of SC in diabetes. In arecent open labeled randomized parallel designed controlled study, Type II diabetic individualswere administered the standardized SC seed powder which exhibited a reduction in fasting bloodsugar, insulin resistance and elevation in HDL cholesterol at the end of 3rd month.

Anti-cancer: Various treatment strategies for cancer involve surgery, hormonal therapy, chemotherapy,radiation therapy and targeted therapy (e.g. monoclonal antibody therapy and immunotherapy).Apart from killing cancerous cells, some normal, healthy cells may be destroyed and may affectmany vital organs such as kidney, heart, lungs, nervous system etc. Many herbal anti-cancerdrugs are being used to avoid the unwanted side effects.Ellagitannins isolated from SC have shown to inhibit Wnt signaling in a transfected human 293Tcell line.

A few of the current investigations have proved the selective cytotoxic activity of jamun fruit extract after studying its pro-apoptotic and antiproliferative effects on estrogen independent (MDA-MB-231) breast cancer cells, estrogen dependent/aromatase positive (MCF-7aro)and normal/nontumorigenic (MCF-10A) breast cell line.Anti-cancer effects of 40% SC extract have been studied on human cervical cancer cells (11.8%growth inhibition observed in SiHa (HPV-16 positive) cells and 14.4% in HeLa (HPV-18 positive) cells).

Anti-diarrheal: Natural products are a drug of choice for diseases like diarrhea. SC ethanolic extract (400 mg/kg)administered orally has exhibited a reduction in gastrointestinal activity in PGE2 inducedenteropooling and castor oil induced diarrhea in rats.

Anti-fertility:A review has stated that oleanolic acid – a phytoconstituent isolated from the flowers of SC hasthe potential to arrest spermatogenesis, thus exhibiting the anti-fertility action in the male albinorats.

Antioxidant: Generation of free radicals initiates/aggravates various diseases like cancer, AIDS, arthiritis,Alzheimer and diabetic complications. Thus, there is a requirement of safer

drugs that haveproperty of scavenging the free radicals.With regard to SC fruit, polyphenols have shown outstanding antioxidant capacity whencompared to the standard polyphenols.The methanolic extract of leaves, bark and seeds of SC were fractionated in different solvents: nhexane,chloroform, ethyl acetate, butanol and water. These fractions were studied for theirantioxidant and free radical scavenging activities. Of all the fractions, the polar ones i.e., ethylacetate and water fractions showed excellent results.The leaf and seed extract of SC exhibited a significant antioxidant activity when they wereassessed by various in vitro methods such as Ferric reducing antioxidant power (FRAP) assay,2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging assay, Nitric oxide radical scavenging, ABTSAssay, Total Reducing antioxidant potential, Total antioxidant activity, Reducing power andHydroxyl radical scavenging activity.RSC (Radical Scavenger Capacity) of SC was determined by using DPPH (2, 2-diphenyl-1-picrylhydrazyl radical) assay. The second order rate constants-k2 was evaluated to determineRSC and then these were compared to natural and synthetic antioxidants. The k2 value of SCwas determined to be 15.60 L/mol g s in methanol at 25°C proving that it has a excellent antioxidantpotential.

Diuretic: The Diuretics are used for the treatment of various human ailments such as heart failure, highblood pressure, liver disease, some types of kidney disease and also in cases overdose orpoisoning. Now day's herbs are a better option as diuretics.

Gastroprotective: Natural products provide a safer remedy to protect the gastric mucosa of aggressive or irritatingagents.Seed kernel extract of SC (200 mg/kg) was evaluated for its antiulcer activity. First, the diabeteswas induced using low dose streptozotocin (35mg/kg) in combination with high fat diet. Then,the gastric ulceration was produced in diabetic rat's ethanol and indomethacin models. It wasobserved that there was a significant decrease in the gastric ulcer index after the administrationSC extract alone and as well as in combination with Acarbose (5mg/kg).

Temperament: Cold 2^0 and Dry 3^0.

Musleh (Correction) : Honey, Hot temperament product

Badal (Proximal substitute) : Another sepsis of *Syzygiumcumini*.

Identity, purity and strength:

Foreign matter : Not more than 2 per cent, Appendix 2.2.2

Total ash	: Not more than 5 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 6 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 15 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of alcoholic extract of the drug on silica gel 'G' plate using Tolune : Ethyl acetate (90:10) shows under U.V. (366 nm) one flurorescent zone at Rf. 0.30 (blue). On exposure to iodine vapour four spots appear at RF. 0.12, 0.20. 0.30 and 0.95(all yellow). On spraying with Vanillin Sulphuric acid reagent and heating the plate for 10 minute at 105^0 C, three spots appear at Rf. 0.20, 0.30 and 0.95 (All Violet).Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action) : Muqawwi-e-Meda wa Jigar, Moharrik-e-Ishtaha Qabiz,Musakkin-e-hararat.

Mahall-e-Istemalat (Therapeutic uses): Zof-e- Meda wa Jigar, Zof-e-Ishtahala, Musakkin-e-Sozish,Ishal e-Damvi wa Safravi, Ziyabetus.

Meqdar-e-khorak (Dose) :3-5 gm

Side-effects: Blackberry is safe in amounts used as food. There isn't enough information available to know if blackberry is safe in the larger amounts used as medicine.

Important formulations: Safoof Ziyabetus, Qurs Ziyabetus, Safoof Khasta.

KARANJ

(Roots)

The drug Karanj consists of roots of Pongamia pinnata (Linn.) of Leguminaceae family. Drug yielding plant is a medium sized glabrous tree with a short bole and spreading crown and found almost throughout this subcontinent up to an altitude of 1200 meter.

Other names :

Botanical **:***Pongamia pinnata* (linn.)

Family **:** Leguminaceae

Bengali **:**Karamcha

English name : Smooth Leaved Pongamia, Indian Beach Physic.

Description :

General **:** The 'Pongam Tree' is known as one of the richest and brightest trees of this sub-continent. The tree is named as '*Pongamia pinnata*' in science. The name 'Pongamia' has derived from the Tamil name, 'pinnata' that refers to the 'Pinnate leaves'. The tree is a member of the 'leguminosae' family. Its sub family is 'Papilionaceae'.

Macroscopic: Seed usually one and rarely two elliptic of remiform in shape, 1.7-2 cm long and 1.2-1.8 cm broad, wrinkled with reddish leathery testa; micropylar end of cotyledons slightly depressed while other side semi-circular in shape.

Microscopic: Transverse section of seed shows, testa composed of layer of palisade like outer epidermis, filled with brown pigment, covered externally with a thick cuticle, a layer of large, thin walled, somewhat rectangular cells, 2-4 layers of thick-walled parenchyma cells, a few rows of cells with small intercellular spaces, 2-3 layers of thick-walled elongated cells; a few layers of spongy parenchyma having large inter-cellular spaces, a number of parenchyma cells containing brown pigment; cotyledons composed of outer layer of epidermis with cylindrical cells, externally covered with thin cuticlue; epidermis followed by rectangular to polygonal cells of mesophyll, filled with globules, also present scattered in this region.

Parts Used : Roots

Habitat **:** The 'Pongam Tree' is a medium-sized tree that grows rapidly. It grows wild in the coastal forests throughout the country and beside the streams and rivers.

Phyto Constituents: Fixed oil, flavones and traces of essential oil,

Af'aal-e-Advia (Pharmacological activities):

Anti-ulcer Activity: It has been reported that methanolic extract of *Pongamiapinnata* roots showed significantly protection against aspirin, but not against ethanol-induced ulceration. It showed tendency to decrease acetic acid-induced ulcers after 10-day treatment. Ulcer protective effect of PPRM was due to augmentation of mucosal cells, mucosal cell glycoproteins, cell proliferation and prevention of lipid per oxidation rather than on the offensive acid-pepsin secretion.

Anti-diarrhoeal Activity: It has been evaluated that anti-microbial effect of crude decoction of dried leaves of *Pongamiapinnata* and also evaluated its effect on production and action of enterotoxins (cholera toxin, *Escherichia coli* labile toxin and *E. coli*, stable toxin) and adherence of enteropathogenic *E. coli* and invasion of enteroinvasive *E. coli* and *Shigella flexneri* to epithelial cells. The decoction had no anti-bacterial, anti-giardial, and anti-rotaviral activities, but reduced production of cholera toxin and bacterial invasion to epithelial cells. The observed result indicated that decoction of *Pongamiapinnata* has selective anti-diarrhoeal action with efficacy against cholera and enteroinvasive bacterial strains causing bloody diarrhoeal episode.

Anti-oxidant and Anti-hyperammonemic: It has been observed that effect of *Pongamiapinnata* leaf extract on circulatory lipid peroxidation and antioxidant status was evaluated in ammonium chloride-induced hyperammonium rats. It enhanced lipid peroxidation in the circulation of ammonium chloride-treated rats was accompanied by a significant decrease in the levels of Vitamin- A, Vitamin-C, Vitamin-E reduced glutathione, glutathione peroxidase, superoxide dismutase and catalase. It showed that PPET modulates by reversing the oxidant-antioxidant imbalance during ammonium chloride-induced hyperammonemia and this could be due to its anti-hyperammonemic effect by means of detoxifying excess ammonia, urea and creatinine and antioxidant property.

Anti-plasmodial Activity: It has been reported that *Pongamiapinnata* is one the plant, which shows antiplasmodial activity against *plasmodium falciparum.*

Anti-hyperglycaemic and Anti-lipidperoxidative Activity: It has been reported that oral administration of ethanolic extract of *Pongamiapinnata* flower shows significant anti-hyperglycaemic and anti-lipidperoxidative effect and enhancement in antioxidant defense system in alloxan-induced diabetic. These results suggested that the treatment

of *Pongamiapinnata* extract could be used as a safe alternative anti-hyperglycaemic drug for diabetic patients.

Anti-inflammatory Activity: It has been reported that the 70% ethanolic extract of *Pongamiapinnata* leaves has potent anti-inflammatory activity against different phases (acute, sub- acute and chronic) of inflammation without side effect on gastric mucosa. They also observed significant anti-pyretic action of the extract against Brewer's yeast-induced pyrexia.

Anti-viral activity: Viral inhibition studies with the extract of *Pongamiapinnata* seeds against HSV-1 and HSV-2 were evaluated *in vitro*. The most striking observation was the total inhibition of growth of HSV-1 and HSV-2 at concentrations of 1mg/ml and 20mg/ml w/v respectively, whereas even at the highest concentrations the extract was not toxic for Vero cells [29]. Acute and Chronic toxicological studies conducted in Swiss albino rats showed the safety of the *Pongamiapinnata* seed extract**.**

Anti-bacterial Activity: It is reported that the leaves of *Pongamiapinnata* show antibacterial effect. It is clear that the extracts have great potential as antibacterial compounds against enteric pathogens and that they can be used in the treatment of enteric infectious. This plant can be used to discover bioactive natural products that may serve as leads for the development of new pharmaceuticals that address hither to unmet therapeutic needs. It is hoped that this study would lead to the establishment of some compounds that used to formulate new and more potent antimicrobial drugs of natural origin.

Anti-lice Activity: Growing patterns of pediculocidal drug resistance towards head louse laid the foundation for research in exploring novel anti-lice [34, 35]agents from medicinal plants. In the study, various extracts of *Pongamiapinnata* leaves tested against the head louse *Pediculus humanus* Capitis [36]. A filter paper diffusion method was conducted for determining the potential pediculocidal and ovicidal activity of chloroform, petroleum ether, methanol and water extracts of *Pongamiapinnata* leaves. The findings revealed that petroleum ether extracts possess excellent anti-lice activity with values ranging between 50.3% and 100% where as chloroform and methanol extracts showed moderate pediculocidal effects.

The chloroform and methanol extracts were also successful in inhibiting nymph emergence and the petroleum ether extracts was the most effective with a complete inhibition of

emergence. Water extract was devoid of both pediculocidal and ovicidal activities. All the results were well comparable with the benzoyl benzoate (25% w/v). These showed the prospect of using *Pongamiapinnata* leave extracts against *Pediculus humanus Capitis*.

Mizaj (Temperment): Hot 2^0 and dry 3^0

Musleh (Correction): Katira gum

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 1 per cent, Appendix 2.2.2
Total ash	: Not more than 3 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 0.1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 23 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 13 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Musaffi-e-Dam, Habis, Daf-e-Taffun.

Mahall-e-Istemalat (Therapeutic uses) : Hikka, Hirqat-ul-Baul, Surfa, Nafs-ud-dam

Meqdar-e-khorak (Dose) :1 to 2 gm

Side-effects : No significant side-effects have been observed.

lmportant formulations: Qurs-e-Deedan.

KARELA

(Fresh Fruit)

The drug Karela consists of fruit of *Momordica charantia* Linn. (Fam. Cucurbitaceeae); a monoecious climber found throughout the country often under cultivation, upto an altitude of 1500meter .

Other names :

Botanical name **:** *Momordica charantia*

Family **:** Cucur-bitaceeae

Bengali name **:** Karolla

English name **:** Bitter gourd

Description:

General: The fruit has a distinct warty exterior and an oblong shape. It is hollow in cross-section, with a relatively thin layer of flesh surrounding a central seed cavity filled with large, flat seeds and pith. The fruit is most often eaten green, or as it is beginning to turn yellow. At this stage, the fruit's flesh is crunchy and watery in texture, similar to cucumber, chayote or green bell pepper, but bitter. The skin is tender and edible. Seeds and pith appear white in unripe fruits; they are not intensely bitter and can be removed before cooking.

Macroscopic: Fruit 2.5 cm long, oblong, pendulous, fusiform, usually pointed or beaked, ribbed and bearing numerous triangular tubercles, 3 valved at the apex when mature, surface rough; light green to green in colour containing numerous seed; extremely bitter.

Parts used: Fresh fruit

Habitat: Bitter melon originated from the South Indian state of Kerala and was introduced into China in the 14th century. It is widely used in the cuisines of East Asia, South Asia, and Southeast Asia.

Phyto constituents: Alkaloid (Momoridicine) and Glycosides

Af'aal-e-Advia (Pharmacological activities):

Antidiabetic Activity*: Momordica charantia*contains bitter chemicals like, vicine, charantin, glycosides and karavilosides along with polypeptide-p plant insulin, which are hypoglycemic in action and improve blood sugar levels by increasing glucose uptake and glycogen synthesis in the liver, muscles and fat cells. Some of research reports indicate that they also improve insulin release from pancreatic beta cells, and repair or promote new growth of insulin-secreting beta cells. P-Insulin, a polypeptide from the fruits and seeds rapidly decreased and normalized the blood sugar level in rats. Bitter melon contains another bioactive compound i.e. lectin that has insulin like activity. The insulin-like bioactivity of lectin is due to its linking together 2 insulin receptors. This lectin lowers blood glucose concentrations by acting on peripheral tissues and, similar to insulin's effects in the brain, suppressing appetite. This lectin is a major contributor to the hypoglycemic effect that develops after eating *Momordica charantia*. Charantin extracted by alcohol, is a potent hypoglycemic agent composed of mixed steroid swhich is sometimes used in the treatment of diabetes to lower the blood sugar levels**.**

Antimicrobial Activity: The *In vitro* studies have shown bitter melon extracts and the MAP30 protein analog, isolated from the seeds of *Momordica charantia*extracts, possess broad-spectrum antimicrobial activity. *Momordica charantia*extracts inhibit infection and growth of several viruses, including HIV, Epstein Barr virus.2 A and 24 *Herpes simplex*, preliminary report on the effect of *Momordica charantia*extract in three HIV patients showed a normalization of CD4/CD8 ratios with *Momordica charantia*treatment. It is believed *Momordica charantia*extracts inhibit HIV replication by preventing syncytial formation and cell-to-cell infection. *Momordica charantia*extracts also appear to inhibit the growth of

numerous gram-negative and gram-positive bacteria, including Salmonella, *E. coli*, Shigella, Staphylococcus, Pseudomonas, Streptococcus, Streptobacillus, &*H. pylori*, and parasitic organisms *E. histolytica* and *Plasmodium falciparum*.

Anti-Cancer Activity:The clinical trials have not been conducted using *Momordica charantia*extracts in cancer patients, *in vitro* studies indicate bitter melon fruit and seed extracts inhibit the growth of a number of cancer cell lines, including prostate adenocarcinoma, human colon cancer (Caco-2 cells), and the very much metastatic breast cancer cell line MDAMB.

Anti-Malarial Activity*: Momordica charantia*is traditionally regarded by Asians, as well as Panamanians and Colombians, as useful plant for preventing against used treating malaria. Laboratory studies have confirmed that various species of *Momordica charantia*have anti-malarial activity. Leaves brewed in hot water to create a tea to treat malaria**.**

Antioxidant Activity*:* Different parts of the plant *Momordica charantia*have been used in the Indian medicinal system for a number of ailments besides diabetes. Antioxidant activity of extracted phenolic compound from bitter melon has been reported the Antioxidant properties of *Momordica charantia*Seeds on Streptozotocin induced-diabetic rats has been studied and results clearly suggest that seeds of *Momordica charantia*may effectively normalize the impaired antioxidant status in streptozotocin induced-diabetes**.**

Immunomodulatory activity: Immunomodulatory activity of *Momordica charantia*showed that it has a variable effect on the immune system in some conditions, like allograft rejection, someplace it was shown to have immunosuppressive effect and in some other cases immunostimulant. Immunomodulatory activity has been attributed to increase in interferon production and natural killer cell activity**.**

Mizaj(Temperament): Hot 2^0 and dry 2^0.

Musleh (Correction) : Unknown

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 8.5 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 0.6 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 6 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 28 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of alcoholic extract of the drug on silica gel 'G' plate using Chloroform : Methanol (90 : 10) shows under U.V. (366 nm) one flurorescent zone at Rf. 0.23 (red), 0.61 (sky blue), 0.96 (sky blue), 0.98 (red & sky blue). On exposure to Iodine Vapour four spots appear at Rf. 0.17, 0.46, 0.67 and 0.98 (all yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent nine spots appear at Rf. 0.03, 0.16, 0.34, 0.43, 0.50, 0.60, 0.75, 0.81 and 0.98 (all blue). Appendix 2.2.10.

Aa'mal-e-Advia (Pharmacological action) : Muqawwi-e-Meda, Mulaiyin-e-Taba, Qat-e-Balgham, Qatil-e-Kirm-e-Shikam, Mohallil-e-Auram.

Mahall-e-Istemalat(Therapeutic uses): Waja-ul-Mafasil, Niqras, Istisqa, Deedan-e-Shikam, Saul, Dama.

Meqdar-e-khorak (Dose): 10-20 gm

Side-effects: Bitter melon is possibly safe for most people when taken by mouth short-term (up to 3 months). Bitter melon may cause an upset stomach in some people. The safety of long-term use of bitter melon is not known.

Important formulations: Sufoof Ziabetus

KATAN

(Seeds)

The drug Katan consists of dried ripe seeds of *Linum usitatissimum* of Linacae family. Drug yielding plant is an erect annual herb 0.6-1.2 meter high extensively cultivated throughout this subcontinent up to an altitude of 800 meter; capsule ripen by end of June, dried seeds separated from capsule by thrashing.

Other names :

Botanical :*Linum usitatissimum*

Family : Linacae

Bengali : Masina, Alasi, Tisi

English name : Linseed, Flax Plant Common flax

Description:

General: Flax is a food and fiber crop that grows in Europe, Asia, and the Mediterranean. Flaxseeds are the golden yellow to reddish brown seeds of flax. These seeds contain phytoestrogens, which are similar to the hormone estrogen, as well as soluble fiber and oil. Flaxseed oil contains the essential omega-3 fatty acid alpha-linolenic acid (ALA). Flaxseed has been eaten as a food or used as a medicine since 5000 BC.

Macroscopic: Seed small brown, glossy with minutely pitted surface, about 4-6 mm long and 2-2.5 mm in maximum width, elongated-ovoid flattened, rounded at one end and obliquely pointed at the other, near which on one edge, a light depression enclosing hilum and micropyle; embryo consisting of two yellowish-which, flattened planoconvex cotyledons and a radical nearly fills the seed and embryo oily; testa mucilaginous when soaked in water, odour, characteristic; taste, oily when chewed.

Microscopic: Transverse section of seed shows testa consists of isodiametric cells with mucilaginous outer walls, collenchymatous cells of middle layer of seed coat cylindrical; single layered, yellowish brown, longitudinally elongated, about 120-190 mm long and 14-47mm wide, thick, lignified and with pitted walls; single layer of flattened polygonal pigment cells with reddish-brown conrents; aleurone grains in the cotyledons, upto 20 in dimeter , each with globoid and crystalloid; abundant globule of fixed oil and occasional starch grains present.

Parts Used: Dried ripe seeds

Habitat: The *Linum usitatissimum* is present in almost all areas of the world, but with some important shortcomings of continental nature or climatic zones. The origin of the plant seems to be in the area between Europe and the Caucasus.

Phyto Constituents: Fixed oil, Mucilage and protein.

Af'aal-e-Advia (Pharmacological activities):

Analgesic: Analgesic effect of linseed fixed oil was evaluated using tailimmersion and acetic acid inducedwrithing responsemethods. In tail immersion method linseed oil showed someanalgesic effect but it was significantly lower than morphine.Acetic acid induced writhing response method showed thatthe analgesic activity of the oil is peripherally mediated andnot centrally mediated.

Anticancer: A study shows that flaxseeds eaten in a quantity of 40 gmevery day may have a metabolicimpact which could reduceestrogen excess. This impact may be considered as favourablein the prevention and slowing down the evolution of breastcancer with positive hormonal receptors.Omega-3 fatty acid i.e. fats with natural or enriched higherconcentration

from flaxseed oil, plays a significant role ininhibiting development of chemically induced tumours inlaboratory animals thus reducing chances of colon cancerinitiation.Flaxseed cotyledons based diet feed to tumour induced mice(82g/kg) for a period of 8 weeks significantly lowersthe cellproliferation process and reduces tumour growth area [29].In other study it wasreported that a 10 mg/kg dose ofenterolactone of linseed, by subcutaneous injection 3 timesper week, reduced the expression of colon 201 human coloncancer cells in athymic mice. Usingvarious testing protocols,it is concluded that the tumor suppression was due toapoptosis and decreased cell proliferation.

Antidepressant: A study has been conducted to evaluate the antidepressant activity of extracts of linseed in wistar albino rats by locomotor activity, forced swimming test and tail suspension test. Linseeds have been found to have less significantantidepressant activity in comparison to standard fluoxetine, chlorpromazine and imipramine.

Antidiabetic: The effect of ethanolic extract of linseed was evaluated in hyperglycemia associated oxygen reactive species production in peripheral blood mononuclear cells and pancreatic cells andpancreatic antioxidant enzymes in alloxan induced diabetic rats. The result showed the serum glucose level was significantly reduced in both acute and sub-acute study.

Antiinflammatory: The anti-inflammatory activity of linseed fixed oil was evaluated against the carrageenan and prostaglandin E2 (PGE2) induced paw edema in rats following administration of oil by oral, intramuscular and intraperitoneal routs. In carrageenan-induced paw edema model significant inhibition of paw oedema was observed after oral administration of oil but the extent of edema inhibition was inferior to that observed with intramuscular and intraperitoneal administration. Similarly in prostaglandin induced oedema model oral administration of the oil inhibition was much smaller than the oedema inhibition obtained with intramuscular and intraperitoneal administration.

Antimicrobial: An experimental study was carried out to evaluate the antimicrobial activity of ethanol and chloroform extracts of flaxseeds against five microorganisms i.e. Salmonella typhii, Enterococcus, Escherichia coli, Bacillus subtilis and Staphylococcus aureus. The result reveals that chloroform extract is more effective than ethanol extract against microorganisms. Chloroform extracts showed antimicrobial activity against all the five microorganisms. While ethanol extract did not show any antimicrobial activity against Esherichia coli.

Antioxidant: A study was carried out to evaluate the antioxidant activity of secoisolariciresinoldiglucoside (SDG), a plant lignan isolated from linseed. It is platelet activating receptor antagonists thatwould inhibit the production of oxygen radicals by polymorph nuclear leucocytes. The anti-oxidant activity of ethanolic extract of Linumusitatissimum EE-LU (100, 200, 300, 400and 500 μg/ml) in an In vitro model has been evaluated. The result indicated significant dose dependent inhibition against DPPH radical, reducing power, superoxide anion radicalscavenging, hydroxyl radical scavenging, metal chelating and hydrogen peroxide scavenging by EE-LU and α-tocopherol.

Antipyretic: The antipyretic activity of linseed oil was evaluated by testing against typhoid-paratyphoid A/B vaccine induced pyrexia in rats. It was observed that the oil had a definite antipyreticproperty, when given intraperitoneally at a dose of 1 ml/kg and above. Appreciable reduction in the temperature was noted within the 2nd and 4th hour of oil administration. Antipyretic activity of fixed oil at 3ml/kg dose was comparable to aspirin.

Anti-ulcer: In a study flaxseed oil and flaxseed mucilage was found to have significant protective activity against ethanol inducedgastric ulcers. The result showed that pre-treatment of rats with flaxseeds oil and flaxseed mucilage significantly reduced the number and length of gastric ulcers induced by ethanol.

Laxative: Linseeds are used as laxative due to its dietary fibre content. These effects are attributed to the bulk materials and in particular to the mucilage that binds with water and swells toform a demulcent gel in the intestine. Water is held back in the intestine due to the swelling of the mucilage. Faeces become softer. The volume of the intestinal content increasesand causes a stretch stimulus, which results in a decrease in transit time. The swollen mass of mucilage forms a lubrication layer facilitating the transit of intestinal content.

Bone Development: Flaxseed, in particular lignans could influence bone development. In a study rats exposed to 88 or 177.3 mg SDG/kg of body weight/day had higher bone strength than thebasal diet at 50 days post-natal. However, by post-natal day 132, no differences in bone strength, bone mineral density were observed. Exposure to SDG did not have negative effecton bone strength.

Hair Growth: A study has shown that linseeds increases hair length (+26%) with a slight positive effect on hair diameter. Linseed ingestion has a positive effect on hair density.

Atherosclerosis: The result of a study shows that linseed SDG is effective in reducing Hypercholesterolemic atherosclerosis by reducing oxidative stress and lowering serum levels of HDL-C in theearly stage. SDG therefore may be useful in preventing Hypercholesterolemic atherosclerosis and lowering the relative risk of coronary artery disease.

Polycystic Ovarian Syndrome: In a prospective, open label, interventional study, linseed supplementation has resulted in significant reduction in ovarian volume and number of follicles in polycystic ovaries,improvement in frequency of menstrual cycles and has no effect on body weight, blood sugar and hirsutism. The positive effect of flaxseed powder (FSP) could be due toreduction in testosterone, oestrogen, LH and insulin levels contributing to follicular maturation and the anti-inflammatory actions to the reduction in ovarian volume. Considering the improvement in ovarian function and menstrual cycle, flaxseeds appear to be an alternative source of future drug development for PCOS.

Memory: Loss in spatial memory is very much associated with accumulation of lipid peroxide in the hippocampus. Higher levels of flaxseed nutritional as well as non-nutritional components like antioxidants in the form N-3 fatty acids most often referred as ω-3 fatty acids i.e. ALA, docosahexaenoic acid (DHA) and dietary fibers i.e. lignans, in addition to reduction of body mass reduces levels of lipid peroxide in the hippocampus. Studies on flax feed dam suggest thatimprovement in hippocampus ALA and DHA concentration results in reduction of spatial memory inhibitors thus increases learning ability of flaxseed feed dams.

Cardiovascular Diseases: Eicosanoides derived from omega-3-fatty acids, present in flaxseed primarily improves heart function by reducing blood cholesterol. A proportionate effect on blood cholesterolconcentration and low-density lipoprotein fraction has been linked with higher concentrations of flaxseeds in the diets indicating greater reduction in LDL protein, serum and liver cholesterol.

Blood Pressure: ω-3 fatty acids present in flaxseed have been found to regulate transcription and expression of genes, thereby altering enzyme synthesis and modifying several risk factors for coronary heart diseases, including reducing serum triglycerides and blood pressure.

Breast Cancer: The structure of flaxseed lignans, are similar to that of endogenous sex steroid hormones thus, it acts In vivo to alter hormone metabolism and reduce subsequent cancer risk in postmenopausal women. In human objects, the influence of flaxseed and its lignans onbreast health in postmenopausal women was examined. The study found that higher blood concentrations of SDG resulted in significant reduction in breast cancer risk.
In another study, the animals were given a flaxseed supplement along with a carcinogen and a high fat diet. The result was a highly significant reduction in size and number of breast tumors.

Prostate Cancer: There are numerous reports on the potential tumour suppressive influence of lignans. Beside estrogenic activity, flaxseed can interfere with steroid metabolism and bioavailability, and also inhibit enzymes, such as tyrosine kinase and topoisomerase, which are crucial to cellularproliferation and hence may contribute to lower incidences of prostate cancer.

Mizaj (Temperment): Hot 1^0 and dry 1^0

Musleh (Correction): Kishneez

Badal (Proximal substitute): Hulba.

Identity, purity & strength:

Foreign matter	: Not more than 1 per cent, Appendix 2.2.2
Total ash	: Not more than 5 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 2 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 30 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 15 per cent, Appendix 2.2.7
Fixed Oil	: Not less than 25 per cent, Appendix 2.2.8

Aa'mal-e-Advia (Pharmacological action) : Mohallil-e-Waram, Mounzij, Jali, Musakkin-e-sual, Munaffis-e-Balgham.

Mahall-e-Istemalat (Therapeutic uses): Sual, Zeequn Nafas, Zat-ul-Janb, Zat-ur-Riya, Humuzat-e-Meda, Zaheer,Waj-ul-Mafasil, Haraq.

Meqdar-e-khorak (Dose): 5 to 10gm

Side-effects: Flaxseed is likely safe for most adults when taken by mouth. Adding flaxseed to the diet might increase the number of bowel movements each day. It might also cause gastrointestinal (GI) side effects such as bloating, gas, abdominal pain, constipation, diarrhea, stomachache, and nausea. Higher doses are likely to cause more GI side effects.

There is some concern that taking large amounts of flaxseed could block the intestines due to the bulk-forming laxative effects of flaxseed. Flaxseed should be taken with plenty of water to preventthisfromhappening.

Important formulations: Qairooti Bazr-e-Katan, Qairroti-e-Mohallil, Laooq-e-Katan, Zamad-e-Khanazeer, Marham-e-Dakhilyun.

KISHNEEZ

(Seeds)

The drug Kishneez consists of dried ripe fruits of *Coriandrum sativum* Linn of family Umbelliferae. Drug yielding plant is a slender, glabrous, branched, annual herb cultivated all over Bangladesh and India, 30-90 cm high, giving characteristic aroma when rubbed, crop matures in 2-3 months after sowing, herb is pulled out with roots, after drying, fruits thrashed out and dried in sun, winnowed and stored in bags.

Other names :

Botanical **:** *Coriandrum sativum* Linn

Family **:** Umbelliferae

Bengali **:** Dhana, Dhania, Bhoti

English name : Coriander

Description:

General: Coriander is a plant.. The leaves are variable in shape, broadly lobed at the base of the plant, and slender and feathery higher on the flowering stems. The flowers are borne in small umbels, white or very pale pink, asymmetrical, with the petals pointing away from the center of the umbel longer (5–6 mm or 0.20–0.24 in) than those pointing toward it (only 1–3 mm or 0.039–0.118 in long). The fruit is a globular, dry schizocarp 3–5 mm (0.12–0.20 in) in diameter. Pollen size is approximately 33 microns.

Macroscopic: Fruit globular, mericarps usually united by their margins forming a cremicarp about 2-4 mm in diameter, uniformly brownish-yellow or brown, glabrous, sometimes crowned by the remains of sepals and styles, primary ridges 10, wavy and slightly inconspicuous secondary ridges 8, straight, and more prominent; endosperm coelospermous; Odour aromatic; taste spicy and characteristic.

Microscopic: Transverse section of fruit shows pericarp with outer epidermis, when present with slightly thickened anticlinal wall; a few stomata, many cells with small prisms of calcium Oxalate; trichomes absent; Outer layers of mesocarp parenchymatous with inner cells in wavy longitudinal rows and degenerated vittae as tangentially flattened cavities; middle layer of mesocarp sclerenchymatous forming a thick layers of fusiform, pitted cells in very sinuous tows, layers often crossing at the right angles with difinit longitudinal strands in the secondary ridges; sinuous primary costae with some spiral vessel; inner cells of mecrocarp, large, hexagonal with rather thin, lignlfied walls; inner epidermis of very narrow thin-walled cells slightly sinous anticlinal wall thowing parquetry arrangement; two or rarely more, normal vittae occurring on commissural side of each mesocarp containing volatile oil; endosperm of thick-walled cellulosic parenchyma containing much fixed oil numerous aleurone grains, about 4-8 in diameter containing micro-rosettes of calcium oxalate split carpohore passing at apex of each mericarp into raphe adjacent to which a large cavity and on inner side of this a flattened vascular strand; carpohore consisting of fibre surrounded by spiral vessels.

Powder: Fawn to brown epidermal cells of pericarp when present, slightly thick-walled and many containing small prism of calcium oxalate; parenchymatous cells of mesocarp without reticulate thickening; masses of sclerenchymatous cells of mesocarp in sinuous rows, often crossing at right angle large bubular hexagonal rather thin-walled sclerenchymatous cells of endocarp; cells of inner epidermis with slightly sinuous anticlinal walls; thick-walled polygonal parenchymatous cells of endosperm, containing fixed oil and numerous small alerurone grains, micro-rosettes of calcium oxalate.

Parts Used: Seeds of dried ripe fruits

Habitat: Coriander is a soft plant growing to 50 cm (20 in) tall. It is native to regions spanning from southern Europe and northern Africa to southwestern Asia.

Phyto Constituents: Essential Oil (coriandroal)

Af'aal-e-Advia (Pharmacological activities):

Anxiolytic effect: The anxiolytic effect of aqueous extract (50, 100, 200 mg/kg, ip) was examined in male albino mice using elevated plus- maze as an animal model of anxiety. In the elevated plus-maze, aqueous extract at 200 mg/kg showed an anxiolytic effect by increasing the time spent on open arms and the percentage of open arm entries, compared to control group. The anxiolytic effect of Coriandrum sativum (CS) aqueous extract was evaluated in mice. The antianxiety effect was assessed by elevated plus maze (EPM). In EPM, 50, 100, and 200 mg/kg of CS were significantly ($P<0.001$) increases the number of entries in open arms compared to control. The time spent in open arms also increased in all the doses of CS extract significantly. The anti-anxiety activity of hydroalcoholic extract of Coriandrum sativum was studied using different animal models (elevated plus maze, open field test, light and dark test and social interaction test) of anxiety in mice. Diazepam (0.5 mg/kg) was used as astandard drug and hydroalcoholic extract of Coriandrum sativum fruit was used in dose of (50, 100 and 200 mg/kg) to study the antianxiety effect. Results revealed that the extract of Coriandrum sativum at 100 and 200 mg/kg dose produced anti-anxiety effects almost similar to diazepam, while, at 50 mg/kg dose, it did not produce anti-anxiety activity in all models. The anxiolytic effect of the aqueous extract of Coriandrum sativum seed and its effect on spontaneous activity and neuromuscular coordination were evaluated in mice. The anxiolytic effect of aqueous extract (10, 25, 50, 100 mg/kg, ip) was examined in male albino mice using elevated

plus-maze as an animal model of anxiety. The effects of the extract on spontaneous activity and neuromuscular coordination were assessed using Animex Activity Meter and rotarod. In the elevated plus-maze, 100 mg/kg of the aqueous extract showed an anxiolytic effect by increasing the time spent on open arms and the percentage of open arm entries, compared to control group.

Antidepressant effect: Diethyl ether extract of seeds of *Coriandrum sativum* showed more significant antidepressant effect than that of aqueous extract through interaction with adrenergic, dopamine-ergic and GABA-ergic system.

Sedative-hypnotic effects: The aqueous, hydroalcoholic extracts and essential oil of coriander seeds possessed sedative-hypnotic activity. The aqueous, hydroalcoholic extracts and essential oil of coriander seeds (100, 200, 400 and 600 mg/kg) were intraperitoneally administered to male albino mice, 30 minutes before pentobarbital injection (40 mg/kg). Latency to sleep and sleep duration were recorded. Aqueous extract prolonged pentobarbital-induced sleeping time at 200, 400 and 600 mg/kg. Hydroalcoholic extract at doses of 400 and 600 mg/kg increased pentobarbital induced sleeping time compared to saline-treated group. The essential oil increased pentobarbital-induced sleeping time only at 600 mg/kg.

Anticonvulsant effect: The effects of hydroalcoholic extract of aerial parts of the plants (100, 500 and 1000 mg/kg) on brain tissues oxidative damages following seizures induced by pentylenetetrazole (PTZ) was investigated in rats. The extract significantly increased the MCS (latencies to the first minimal clonic seizures) and GTCS (latencies to the first generalized tonic-clonic seizures) ($P<0.01$, $P<0.001$) following PTZ-induced seizures. The malondialdehyde (MDA) levels in both cortical and hippocampal tissues of PTZ group were significantly higher than those of the control animals ($P<0.001$). Pretreatment with the extract prevented elevation of the MDA levels ($P<0.010$ - $P<0.001$). Following PTZ administration, a significant reduction in total thiol groups was observed in both cortical and hippocampal tissues ($P<0.050$). Pre-treatment with the 500 mg/kg of the extract caused a significant decreased in total thiol concentration in the cortical tissues ($P<0.010$).

Effect on memory: The effects of inhaled coriander volatile oil (1% and 3%, daily, for 21days) on spatial memory performance were assessed in an Aβ(1-42) rat model of Alzheimer's disease.

Neuroprotective effect The neuroprotective effect of *Coriandrum sativum* was evaluated against ischemic-reperfusion insult in brain. The global cerebral ischemia in albino rats was induced by blocking common carotid arteries for 30 mins followed by 45 mins of reperfusion. At the end of reperfusion period, histological changes, levels of lipid peroxidation, superoxide dismutase, catalase, glutathion, calcium and total protein were measured. Bilateral common carotid artery occlusion produced significant elevation in lipid peroxidation, calcium levels and infarct size, and decrease in endogenous antioxidants such as reduced glutathion, superoxide dismutase and catalase levels. Pretreatment with methanolic extract of leaves of *Coriandrum sativum* (200 mg/kg, po) for 15 days increased endogenous enzyme levels of superoxide dismutase, glutathion, catalase and total protein levels, and reduces cerebral infarct size, lipid peroxidation and calcium levels. It also attenuated reactive changes in brain histology like gliosis, lymphocytic infilteration and cellular edema. Accordingly, *Coriandrum sativum* possessed protective effect in ischemic-reperfusion injury and cerebrovascular insufficiency states

Antibacterial, antifungal, anthelmintic and insecticidal effects: The antibacterial effect of aqueous and ethanolic extracts of different coriander parts was studied against nine different pathogenic bacteria isolated from urine, blood, stool and cerebraspinal fluid of different patients (*Burkhellacapacia*, *Escherichia coli*, *Enterobacter cloacae*, *Gamellamorbillorum*, *α-Haemolytic streptococci*, *Klebsiella pneumonia*, *Proteus mirabilis*, *Streptococcus pneumonia*, and *Salmonella typhi*). Cold aqueous extract of coriander seeds had inhibitory effect against some tested bacteria. On the other hand, ethanolic extracts of seeds, leaves and stems showed wide range of antibacterial activity and the highest values for inhibition zone was recorded against *Klebsiella pneumoniae* and *Proteus mirabilis.*

Antioxidant effect: *Coriandrum sativum* has a very effective antioxidant profile showing 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, lipoxygenase inhibition, phospholipid peroxidation inhibition, iron chelating activity, hydroxyl radical scavenging activity, superoxide dismutation, glutathione reduction and antilipid peroxidation due to its high total phenolic content. The fresh juice exhibited high antioxidant activities, evidenced by its ability to scavenge hydroxyl- and superoxide-radicals, high reducing power, and protection against biological macromolecular oxidative damage and by increasing the level of glutathione. Among the leaf essential oil and leaf petroleum ether, chloroform, ethyl acetate and methanol extracts of *Coriandrum sativum* studied, methanol extract and leaf essential oil showed potent scavenging activity on 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical [86].

The *in vitro* antioxidant potential of aqueous leaf extracts of *Coriandrum sativum* leaves was determined qualitatively. Enzymatic antioxidant analysis in the extract of *Coriandrum sativum*: Catalase (μ/moles of H2O2 decomposed/min/g protein, 1 unit = μ/moles of H2O2 decomposed/min/g protein) = 3.135; peroxidase (Unit/mg protein, 1 unit = mg of GSH utilized / min)= 2.508×103; ascorbate oxidase (μ mole/ml, 1 unit = 0.01 O.D change/min)= 100.262.

Hypolipidemic effect: The antilipidemic activity of fresh leaves of *Coriandrum sativum* was studied against salbutamol induced cardiac injury in rabbits. Salbutamol administered rabbits (50mg/kg) showed elevated level of serum lipids (LDL-cholesterol, triglyceride) and decreased level of HDL-cholesterol and antioxidant enzymes (SOD, CAT). Both the pre- and post treatment of plant extract (100mg/kg) for three weeks exerted significant antilipidemic effect against salbutamol-induced myocardial infarction by lowering the level of serum LDL-cholesterol, triglycerides and peroxidase and increasing the level of HDL-cholesterol and antioxidant enzymes.

Anti-inflammatory and analgesic effects: The anti-inflammatory and anti-granuloma activities of *Coriandrum sativum* hydroalcoholic extract (CSHE) was studied in experimental models. The anti-inflammatory activity of CSHE was evaluated using carrageenan-induced paw edema model and the anti-granuloma activity of CSHE was evaluated using the subcutaneous cotton pellet implantation-induced granuloma formation and stimulation of peritoneal macrophages with complete Freund's adjuvant. Serum tumor necrosis factor-α (TNF-α), IL-6, IL-1 β levels, and peritoneal macrophage expression of TNF-R1 were evaluated as markers of global inflammation. CSHE at the highest dose (32 mg/kg) produced a significant reduction ($p<0.05$) in paw edema after carrageenan administration. CSHE treatment also reduced dry granuloma weight in all treated animals. Serum IL-6 and IL-1 β levels were significantly ($p<0.05$) lower in the CSHE (32 mg/kg)-treated group as compared to control. Although there was an increase in serum TNF-α level in the CSHE-treated group as compared to control, but TNF-R1 expression on peritoneal macrophages was reduced.

Anticancer effect: Brine shrimp lethality bioassay revealed that coriander LC50 was 2.25 mg/ml [92]. The anticancer activities of *Coriandrum sativum* root, leaf and stem, as well as its effect on cancer cell migration, and its protection against DNA damage, with special focus on the roots was evaluated. The ethyl acetate extract of *Coriandrum sativum* roots showed the highest antiproliferative activity on MCF-7 cells (IC50 = 200.0 ± 2.6 μg/ml), had the highest

phenolic content and FRAP and DPPH scavenging activities among the extracts. Ethyl acetate extract of *Coriandrum sativum* root inhibited DNA damage and prevented MCF-7 cell migration induced by H2O2, suggesting its potential in cancer prevention and metastasis inhibition. The extract exhibited anticancer activity in MCF-7 cells by affecting antioxidant enzymes possibly leading to H2O2 accumulation, cell cycle arrest at the G2/M phase and apoptotic cell death by the death receptor and mitochondrial apoptotic pathways.

Cardiovascular effects: Coriander crude extract (1-30 mg/ml) caused fall in arterial blood pressure of anesthetized animals which partially blocked by atropine. Coriander crude extract produced vasodilatation against phenylephrine and K+ (80 mM)-induced contractions in rabbit aorta and caused cardio-depressant effect in guinea-pig atria. Bioassay-directed fractionation revealed the separation of spasmogenic and spasmolytic components in the aqueous and organic fractions respectively. Furthermore, Coriander crude extract produced diuresis in rats at 1-10mg/kg. Aqueous extracts of coriander seeds inhibited the electrically-evoked contractions of spiral strips and tubular segments of isolated central ear artery of rabbit. The water extract of coriander seed had hypotensive effects in rats. The preventive effect of *Coriandrum sativum* (CS) on cardiac damage was evaluated by isoproterenol induced cardiotoxicity model in male rats. Rats were pretreated with methanolic extract of CS seeds at a dose of 100, 200 or 300 mg/kg orally for 30 days and they were subsequently administered (sc) with isoproterenol (85 mg/kg body weight) for the last two days. Isoproterenol treated rats showed increased LPO, decreased levels of endogenous antioxidants and ATPases in the cardiac tissue together with increased plasma lipids and markers of cardiac damage. TTC staining showed increased infarct areas while HXE staining showed myofibrillar hypertrophy and disruption. CS (200 and 300 mg/kg body weight) pretreatment significantly prevented or resisted all these changes. The results showed that methanolic extract of CS is able to prevent myocardial infarction by inhibiting myofibrillar damage. It is also postulated that, the rich polyphenolic content of CS extract was responsible for preventing oxidative damage by effectively scavenging the isoproterenol generated ROS.

Gastrointestinal effects: In a randomized, double-blinded clinical trial, performed in Isfahan dental school in 2012, a new herbal medicament containing combined extracts from *Q. brantii*and *Coriandrum sativum* was formulated in the gel form for subgingival application. Following scaling and root planing (SRP), both herbal and placebo gels were delivered at the experimental and control sites, respectively. Periodontal pocket depth, clinical attachment level, papilla bleeding index, and plaque index were measured at baseline, 1 month and 3

months later. Both groups indicated statistically significant improvements in the periodontal indices ($p<0.05$) [154]. The effect of coriander pretreatment on gastric mucosal injuries caused by NaCl, NaOH, ethanol, indomethacin and pylorus ligation accumulated gastric acid secretions was investigated in rats. Pretreatment at oral doses of 250 and 500mg/kg, was found to provide a dose-dependent protection against the (i) ulcerogenic effects of different necrotizing agents; (ii) ethanol-induced histopathological lesions; (iii) pylorus ligated accumulation of gastric acid secretions and ethanol related decrease of nonprotein sulfhydryl groups (NP-SH). Results of gastric mucus and indomethacin-induced ulcers demonstrated that the gastro protective activity of Coriander might not be mediated by gastric mucus and/or endogenous stimulation of prostaglandins. The authors suggested that the protective effect against ethanol-induced damage of the gastric tissue might be related to the free-radical scavenging property of different antioxidant constituents (linanool, flavonoids, coumarins, catechins, terpenes and polyphenolic compounds) present in coriander. The inhibition of ulcers might be due to formation of a protective layer of either one or more of these compounds by hydrophobic interactions.

Hepatoprotective effect: The radio protective ability of *Coriandrum sativum* seeds against whole body gamma irradiation was studied in rats. Coriander aqueous extract group (CE) rats received the aqueous extract 300 mg/ kg bw/ day for 42 days. Irradiated group: rats were subjected to whole body gamma irradiation at dose of 4 Gy delivered as a single exposure dose. In combined treatment group, rats received orally CE (300 mg/ kg bw/ day) for 42 days, at day 35 of CE treatment, the rats were irradiated at dose level of 4 Gy. The animals exposed to gamma radiation showed a significant increase in serum aspartate transaminase, alanine transaminase, alkaline phosphatase, lactate dehydrogenase, urea, creatinine, total cholesterol, triglycerides, low density lipoprotein cholesterol and tissue thiobarbituric acid reactive substance. Gamma irradiation caused significant decrease in serum total protein, albumin and high density lipoprotein cholesterol. A decrease of liver and kidney reduced glutathione content, superoxides dismutase and catalase activities were reported.

Deodorizing effect The leaves of *Coriandrum sativum* exhibited a strong deodorizing effect against porcine internal organs (large intestine). The effective deodorizing compounds of coriander were identified by separating the volatile component of coriander, testing the effectiveness of each fraction against the offensive odor of porcine large intestine, and then identifying the compounds by GC-MS. The volatile component of coriander was first separated into six fractions (A-F) by preparative gas chromatography, and the deodorizing

activity of each of these fractions against the offensive odor was measured. Fraction D, which showed the strongest deodorizing effect, was then separated into 12 subfractions by preparative GC. The deodorant activity of each subfraction was evaluated, and the deodorant compounds were identified by GC-MS. (E,E)-2,4-undecadienal was the most effective deodorizing compound. The deodorizing activity of (E,E)-2,4-undecadienal on the porcine large intestine increased with concentration, reaching almost complete deodorizing ability at 10 ppb.

Diuretic effect: The acute diuretic activity of aqueous extract of the seed of *Coriandrum sativum* was evaluated in rats. The aqueous extract of coriander seed was administered by continuous intravenous infusion (120 min) at two doses (40 and 100mg/kg) to anesthetized Wistar rats. Furosemide (10mg/kg), a standard diuretic was used as the reference drug. Excretion of water and electrolytes (sodium, potassium and chloride) in urine, and glomerular filtration rate (equal to creatinine clearance) were determined. The crude aqueous extract of coriander seeds increased diuresis, excretion of electrolytes, and glomerular filtration rate in a dose-dependent way. Furosemide was more potent as a diuretic and saluretic. The authors concluded that the mechanism of action of the plant extract appears to be similar to that of furosemide.

Dermatological effect: *Coriandrum sativum* ethanol extract (CSE) showed a protective effects against UVB-induced skin photoaging in normal human dermal fibroblasts (NHDF) *in vitro* and in the skin of hairless mice *in vivo*.

Effect on fertility: Effect of the aqueous extract of fresh coriander (*Coriandrum sativum*) seeds has been studied on female fertility in rats including the effects on oestrus cycle, implantation, foetal loss, abortion, teratogenicity and serum progesterone levels on days 5, 12 and 20 of the pregnancy. The extract at doses of 250 and 500 mg/kg orally produced a dose-dependent significant anti-implantation effect, but did not produce complete infertility. Treatment of animals during day-8 to day-12 and day-12 to day-20 of the pregnancy did not produce any significant abortifacient activity. There was no significant change in the weight and length of the foetuses delivered by rats treated with the extract and no abnormalities were seen in the organs of the offsprings. Theextracts produced a significant decrease in serum progesterone levels on day-5 of pregnancy which may be responsible for its anti-implantation effect.

Mizaj (Temperment): Cold 2^0 and Dry 2^0

Musleh (Correction): Honey

Badal (Proximal substitute): Tukhmekahu, Khashkhash.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 6 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1.5 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 10 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 19 per cent, Appendix 2.2.7
Fixed Oil	: Not less than 0.3 per cent, Appendix 2.2.8

Aa'mal-e-Advia (Pharmacological action) : Musakkin, Mohallil-e-Waram, Muqawwi-e-Qalb, Muqawwie-e-Dimagh, Muqawwi- e-Meda, Kasir-e-Riyah, Qabiz.

Mahall-e-Istemalat (Therapeutic uses): Suda, Dawar, Zof-e-Qalb, Zof-e-Meda, Nafkh-e-Shikam, Zof-e-Dimagh

Meqdar-e-khorak (Dose): 5 to 7 gm

Side-effects: Coriander is likely safe in food amounts and possibly safe for most people when taken by mouth in appropriate medicinal amounts. It can cause some side effects, including allergic reaction and increased sensitivity to the sun. Increased sensitivity to the sun might put you at greater risk for sunburns and skin cancer. Avoid sunlight. Wear sunblock and protective clothing outside, especially if you are light-skinned.

There is one report of severe diarrhea, stomach pain, darkened skin, depression, lapse of menstruation, and dehydration in a woman who took 200 mL of a 10% coriander extract for 7 days.

When coriander comes in contact with the skin, it can cause skin irritation and inflammation.

Important formulations: Khamira Gaozaban Sada, Khamira Gaozaban Ambari Zawaharwala, Jawarish e Shahi, Iteifal e Kishneezi, Dawaul Misk Motadil Sada, Qurs-e-Ziabetus Sada, Arq-e-Musaffi-e-Khoon Qawi.

KUTKI

(Rhizome)

The drug Kutki consists of the dried rhizome with root of *Picrorhiza kurroa* a perennial, more or less hairy herb common on the north western Himalayas from Kashmir to Sikkim, Rhizome is cut into small pieces.

Other names :

Botanical name **:** *Picrorhiza kurroa*

Family **:** Scrophulariaceae

Bengali name **:** Kutki

English name **:** Hellebore

Description:

General: This plant Katuki has very large family, over 200 genera and 3000 species. It is known as *Picrorhiza kurroa* in the scientific language. This is a perennial herb which has a long rhizome. It is 2.5 to 12 cm long and 0.3 to 1 cm thick with somewhat curvy straight features.

Macroscopic:

Rhizome : 2.5 cm long and 4-8 mm thick, sub-cylindrical, straight or slightly curved externally grayish-brown, surface rurface rough due to longitudinal wrinkles, circular scars of roots and bud scales and sometimes roots attached, tip ends in a growing bud surrounded by tufted crown of leaves, at places cork exfoliates exposing dark cortex; fracture, short, odour pleasant; taste bitter.

Root: Thin, cylindrical, 5-10 cm long, 0.05-0.1 cm in diameter, straight or slightly curved with a few longitudinal wrinkles and dotted scars, mostly attached with rhizomes, dusty grey, fracture short, inner surface black with whitish xylem; odour pleasant; taste bitter.

Microscopic:

Rhizome: Shows 20-25 layers of cork consisting of tangentially elongated, suberised cells; cork cambium 1-2 layered; cortex single layered or absent, primary cortex persists in some cases, one or two small vascular bundles present in cortex; vascular bundles surrounded by single layered endodermis of thick-walled cells; secondary phloem composed of phloem parenchyma and a few scattered fibers; cambium 2-4 layered; secondary xylem consists of vessels, tracheids, xylem fibers and xylem parenchyma, vessels vary in shape and size having transverse oblique articulation. Tracheids ling, thick-walled, lignified, more or less cylindrical with blunt tapering ends; xylem parenchyma thin-walled and polygonal in shape; center occupied by a small pith consisting of thin-walled cells; simple round to oval starch grains, measuring 25-104µ in diameter, abundantly found in all cells.

Root : Young root shows single layered epidermis, some epidermal cells elongate forming unicellular hairs; hypodermis single layered; cortex 8-14 layered; consisting of oval to polygonal, thick-walled, parenchymatous cells; primary stele tetrarch to hexarch, enclosed by single layered pericycle and single layered, thick-walled cells of endodermis; mature root shows 4-15 layers of cork, 1-2 layers of cork cambium; secondary phloem poorly developed; secondary xylem consisting of vessels, tracheids, parenchyma and fibres; vessels have varying ahape and size, some cylindrical with tail-like tapering ands, some drum shaped with perforation on end walls or lateral walls; trachids cylindrical with tapering pointed ends; fibres aseptate, thick-walled lignified with tapering blunt chisel-like pointed ends.

Powder: Dusty gray; shows groups of fragments of cork cells, thick-walled parenchyma, pitted vessels and aseptate fibres, simple round to oval, starch grains, measuring 25-104 µ in diameter.

Parts used: Rhizome

Habitat: It is found in the Himalayan region from Kashmir to Sikkim at an elevation of 2700-4500meter and in Nepal, found abundantly between 3500 and 4800meter. It is found far away from the community and takes from hours to days to walk to its growing habitat. It has been reported that Picrorhiza has been harvested to near extinction.

Phyto constituents: Chemical composition of Picrorhiza kurroa include Kutkin, a bitter glycoside which contains two C-9 iridoid glycosides-Picroside I and Kutakoside.

Af'aal-e-Advia (Pharmacological activities):

Antioxidant activity: Antioxidant agents work as radical scavengers that prvent the human body from various diseases (Kalaivani and Mathew, 2010). Deshpande et al.(2015) reported that activities of liver enzymes are reduced among the livercirrhosis patients following the treatment with the *P. Kurrooa*plant extract.The antioxidant effectiveness of plant extracts were reported by Rajkumaret al. (2011) employing radical scavenging assays, ferric reducing antioxidantproperty and thiobarbituric acid assay for analyzing inhibition of lipidperoxidation. The rhizome ethanol extract of *P. kurroa*at the dose of 20 mg/kg body weight, healed rapidly the stomach wall of indomethacin inducedgastric ulcerated rats by an *in vivo* free radical scavenging action (Ray et al.,2002). Kant et al. (2013) used diverse antioxidant testing methods tocorroborate the antioxidant efficacy of the leaf fractions of *P. kurroa*. The

extract showed DPPH radical scavenging and metal chelating activities withIC50 of 75.16±3.2 and 55.5±4.8 ìg/mL and exhibited potent reducing powerwith antioxidant activities (Krupashree et al., 2014). Antioxidant and radicalscavengingactivity of *P. kurroa*extract indicate its active role toward differentoxidative stress related diseases, as a food supplement and source of naturalantioxidants.

Immunomodulatory activity: An immunomodulatory agent is a type of drug that may act as animmunostimulator or an immunosuppressant based on its effect on theimmune system. Gupta et al. (2006) reported the immunostimulatory activityof biopolymeric fraction RLJ-NE-205 from *P. kurroa*. Biopolymeric fractioninduced both the humoral and cellular parts of the immune system. Ethanolicextract of *P. kurroa*leaves was able to stimulate humoral as well as cellmediatedcomponents of the immune system and also phagocytosis ininvestigational animals (Sharma et al., 1994). Two powerful anticomplementarypolymeric fractions were isolated that plays an importantrole in the antigen non-specific defense. The analysis supports the assumptionthat therapeutical preparations made from *P. kurroa*roots may influence onimmune mechanisms (Simons et al., 1989). Further, Hussain et al (2013)
reported that the alcoholic extract of the root is more potent than aqueousextract in producing delayed type hypersensitivity response.

Anti-inflammatory activities: Inflammation is a restricted defensive response of tissue to irritation orinfection, characterized by redness, swelling, pain and at times loss offunction. Apocynin, an active phyto-constituent of root extracts has beenevidenced to possess anti-inflammatory properties. The inhibition of oedemaat the rate of 29.8% reveals that *P. kurrooa*is an active anti inflammatorydrug (Kantibiswas et al., 1996). Application of *P. kurroa*rhizome extractsignificantly inhibited joint inflammation (Kumar et al., 2016). It also exhibitspotent anti-inflammatory activity against chemically induced inflammation
and may be regard as a high-quality naturally occurring analgesic.

Antimicrobial activity: Antifungal activity of root extract of *P. kurroa*was examined against *Candidatropicalis, C. albicans, Penecilliummarneffi and Trichophyton rubrum*. Alcoholic solventof the root extract at 10% were effective in the inhibition of these clinical fungalisolates (Shubha et al., 2016). Moreover, acetone and methanol extracts of driedstolons of *P. kurroa*exhibited broad range of antimicrobial activity against majorityof the pathogenic microbes such as *Gloeocercosporasorghi, Erwinia chrysanthemi,Rhizoctonia solani,*

*Fusarium oxysporum*and *Sporisoriumscitamineum*(Laxmi and Preeti,2015). Also, 0.1% stock solution of chloroform, methanol and water extract wasfound to illustrate antimicrobial activity (Sharma and Kumar, 2012).

Antidiabetic activity: Diabetes mellitus corresponds to a common group of metabolic disordersthat show the phenotype of hyperglycemia. It is distinguished by high bloodglucose level caused due to insulin deficiency and often associated with insulinresistance. *P. kurroa*root extract treatment influenced significant (p<0.001)reduction in fasting blood glucose level in streptozotocin-nicotinamideinduced type-2 diabetic rats, illustrating antidiabetic activity (Husain et al.2009).

Antiasthmatic activity: The ethanolic extract of *P. kurroa*roots has been investigated for antiasthmatic activity by using *in vivo* and *in vitro* experimental model inguinea pigs by inducing histamine stimulated broncho-constriction. The extractshowed a significant protection (52.16%) which was comparable to that ofsalbutamol (65.83%). The influence of the plant extract on isolated guineapig ileum was analyzed to recognize the pathway by which the extractexhibited muscle relaxant activity. The analysis showed that the extract is effective at a concentration of 100 mg/ml against acetylcholine and histamineinduced contraction. The result revealed antiasthmatic activity of the extractdue to presence of saponins and favonoids (Sehgal et al. 2013).

Nephroprotective activity: Siddiqi et al. (2015) investigated the effectiveness of *P. kurroa*against nimesulide induced toxicity. The *in vitro* study was performed on mice whichwere divided into 4 groups at National Institute of Health. One group wasgiven only the plant extract while the other three groups were given a potentialnephrotoxic drug, nimesulide at a dose of 750 mg/kg body weight for 3days to induce nephrotoxicity. Biochemical analysis of kidney was done bymeasuring serum urea and creatinine and further histology was also takenplace. The outcome of the study deduced that out of 20 mice, 19 mice survived.Only 1 mouse of nimesulide group died. Mean serum urea of nimesulidegroup was 60 mg/dl and was decreased to 23 mg/dl and 25 mg/dl by twodoses of the plant extract. Mean creatinine in the other group was 0.55 mg/dl and was decreased to 0.21 and 0.19 mg/dl by two doses of plant extract.

Hepatoprotective activity: A hepatocyte is a cell of the main parenchymal tissue of the liver and makeup 70-85% of the liver's mass. Hepatocytes death leading to hepatic injurywhen there is an elevation in the level of normal serum transaminase enzymes(Navarro and Senior, 2006). *P. kurroa*has noteworthy hepatoprotective actionagainst carbon tetrachloride intoxicated rats (Kaur et al., 2012) and *Amanita*poisoning (Dwivedi et al., 1992). The herbal extract supplies advancedneutraceutical activity for superior hepato-protection by improving intestinalabsorption (Jia et al., 2015).

Analgesic activity: Analgesic activity of the plant was assessed by the treatment of alcoholic root extract. The analgesic activity was assessed by employing the Hot plateand Acetic acid induced-writhing technique in albino mice of either sex. The500 mg/kg extract dose of *P. Kurroa*had shown comparable effect incomparison to the standard drug pentazocin when kept for ½ hr (Rupali etal. 2013).

Cardioprotective effect: Normal rat pre-treated with *P. kurroa*(200 mg/kg) alone did not shownoteworthy change; however, application of isoproterenol leads tohemodynamic and left ventricular dysfunction, lipid peroxidation andoxidative stress. Such type of cardiac dysfunction was considerably prohibitedby the plant's root extract. Pre-treatment with root extract significantlychecked the isoproterenol-induced oxidative stress by renovating various enzymes like myocardial superoxide dismutase, catalase and glutathione inlipid peroxidation, which prevent the outflow of myocyte creatine kinase-MB and lactate dehydrogenase enzymes. The outcome suggests that the rootextract possesses effective cardioprotective properties that may be attributedto its future use (Nandave et al. 2013).

Anticancer activity: Malfunctioning in the mechanism of apoptosis may lead to infinite growthand cell division. The dichloromethane fraction of *P. kurroa*showed efficientanticancer activity and may be recommended to explore for cancer therapy(Mallick et al., 2015).

Mizaj (Temperament) : Unknown

Musleh (Correction) : Unknown

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter : Not more than 2 per cent, Appendix 2.2.2

Total ash : Not more than 7 per cent, Appendix 2.2.3

Acid-insoluble ash	: Not more than 1per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 10 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 20 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of alcoholic extract of the drug on silica gel 'G' plate using Chloroform : Methanol (95 : 5) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.05 (blue), 0.30 (blue) and 0.35 (green). On spraying with nine spots appear 5% Methanolic Sulphuric acid reagent and heating the plate at 105^0 for ten minutes seven spots appear at Rf. 0.05, 0.10, 0.17, 0.21, 0.30, 0.41 and 0.84 (all brownish grey). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action) : Muqawwi-e-Meda, Kasir-e-Riyah, Mulayin-e-Taba, Daf-e-Humma, Mukohrij-e-Deedan-e-Ama.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Meda, Zof-e-Hazm, Nafakh-e-Shikam, Humma-e-Safravi, Istisqa.

Meqdar-e-khorak (Dose): 500 mg-1 gm

Side-effects : Picrorhiza is possibly safe for most people, when taken by mouth for up to one year. But in some cases it may cause vomiting, rash, anorexia, diarrhea, and itching.

Important formulations: Majoon-e-Jograj Gogul

MADAR

(Stem bark)

The drug Madar consists of dried stem bark of *Calotropis procera* an erect shrub exuding milky white latex from cut parts, found wild more or less throughout the country

Other names :

Botanical name **:***Calotropis procera*

Family **:**Asclepiadaceae

Bengali name **:**Akando

English name **:** Maddar

Description:

General: It is a large shrub growing to 4 meter (13 ft) tall. It has clusters of waxy flowers that are either white or lavender in colour. Each flower consists of five pointed petals and a small "crown" rising from the center which holds the stamens. The aestivation found in calotropis is valvate i.e. sepals or petals in a whorl just touch one another at the margin, without overlapping. The plant has oval, light green leaves and milky stem. The latex of *Calotropis procera*contains cardiac glycosides, fatty acids, and calcium oxalate.

Macroscopic: Drug occurs in channeled, quailed and fibrous pieces, up to 0.1-0.5cm thick, external surface yellowish brown having longitudinal cracks, internal surface greenish, smooth, with an occasional wood tissue attached; fracture fibrous; odors and taste not distinct.

Microscopic: Stem bark shows exfoliated cork, consisting of 6-8 layers of tangentially elongated, thick-walled cells; where cork has not developed, epidermis present consisting of a single layered rectangular cells coveded externally with striated cuticle; secondary cortex composed of tangentially elongated, oval, rounded or rectangular thin-walled parechymatous cells having intercellular spaces, some cells contain rosette crystals of calcium oxalate, a number of rounded , oval to elongated, single or groups of stone cells and latex cells also found scattered in this region; pericyclic fibres numerous, lignified; secondary phloem composed of sieve elements, phloem parenchyma, phloem fibres and phloem rays; phloem parenchyma rectangular to polygomnal in shape having rosette crystals of calcium oxalate, latex cells and stone cells similar to those found in secondary cortex; phloem fibres aseptate with bordered pits; phloem rays mostly uniseriate and straight.

Powder: Light yellowish; Shows fibres stone cells, rosette crystals of calcium oxalate and latex cells.

Parts used: Leaves, stems, root

Habitat: Akando is a species of *Calotropis* native to Cambodia, Indonesia, Malaysia, the Philippines, Thailand, Sri Lanka, India, Bangladesh, China, Pakistan, Nepal, *BoocBooc* in Somalia and tropical Africa.

Phyto constituents: α and β Calotropeols, β Amyrin, Ginanteol, a Colourless wax, small amount of Tetra cyclic Terpenes and Traces of Sterols.

Af'aal-e-Advia (Pharmacological activities):

Antimicrobial effects: The antimicrobial activity of aqueous and ethanolic extract of roots and leaves of *Calotropis procera* against Staphylococcus aureus, Streptococcus pyogen, Escherichia coli and Pseudomonas aeruginosa was studied on disc method. Both ethanolic and aqueous extracts of Calotropis procera had inhibitory effect on the growth of isolates. The effect exhibited by ethanolic extract of leaves and roots was significantly greater than that of the aqueous extract of leaves and roots.

Antiinflammatory, analgesic and antipyretic effects: The anti-inflammatory effect of the chloroform (CH) and hydroalcoholic extract (HE) of the stem bark of Calotropis procera against carrageenan-induced paw oedema has been studied by using two acute models, aspirin (100 mg/kg, po) and ethanol (96%) in albino rats. CH and HE extracts showed significant anti-inflammatory activity at 200 and 400 mg/kg. As part of investigations to obtain compounds with anti-inflammatory effects, a bioassay was carried out with fractions obtained from the CH extract with n-hexane (NF1), 1-butanol (BF1), ethyl acetate (EF1) and chloroform (CF1). The HE extract of the stem bark was fractionated with n-hexane (NF2), 1butanol (BF2), ethyl acetate (EF2), chloroform (CF2) and water (WF2). The fractions were evaluated for their antiinflammatory effects. Fractions NF1, CF1, BF2 and EF2 (20 mg/kg) showed significant anti-inflammatory activity. The latex of Calotropis procera, ethanol extract of its flowers and the chloroform soluble fraction of its roots possessed significant anti-inflammatory activity.

Anticancer effects: The Allium cepa root tip meristem model was used to evaluate the cytotoxic and anti-mitotic activities of latex of *Calotropis procera*(DL). Both DL and cyclophosphamide arrested the root growth. The mitotic cells were counted in the root

meristems in at 0, 48 and 96h of incubation. The mitotic index ranged between 60.7±0.7 and 63.0±2.3 in the control group over a period of 96h. DL produced a significant decrease in mitotic index that was dose and time dependent. The mitotic index at 10 mg/ml concentration of DL was 32.7±0.8 at 48h as compared to 57.6±0.4 at 0h, while at 96h, the cellular morphology was lost. The cytotoxic activity of methanolic extract of Calotropis procera flowers was studied by MTT assay using Hep2 and Vero cell lines. The extract showed maximum activity on Hep 2 cells than Vero cells at higher concentration, and it exhibited toxicity only on Hep 2 cells at lower concentration.

Anti-angiogenic activity: Angiogenesis is controlled by number of growth factors, including vascularendothelial growth factor (VEGF). The methanolic (CM), n-hexane (CH), ethylacetate (CE) and water (CW) extracts of the roots of *Calotropis procera* were tested for anti-angiogenic activity in the chicken egg chorioallantoic membrane (CAM) assay. CM, CH and CE but not CW inhibited vascular endothelial growth factor (VEGF)-induced neovascularization in a dose-dependent manner. Of all the tested extracts, CM at the dose of 10, 5 and 2.5 ng most effectively inhibited over 83, 71 and 64%, of neovascularization induced by 10ng of VEGF, respectively. Sponge implantation assay in mice further showed that at the dose of 100ng, CM, CH and CE but not CW significantly inhibited neovascularization induced by VEGF (100 ng).

Immunological effects: The immunological potential of the latex of *Calotropis procera* against sheep red blood cells (SRBC) as antigen was investigated in Wistar albino rats by studying cell-mediated, delayed type hypersensitivity reaction (DTH), humoral immune response, macrophage phagocytosis and E. coli induced bacteremia sepsis. The latex was fractionated according to water solubility and molecular size of its components. The fractions were named as non-dialyzable latex (NDL) which corresponding to the major latex proteins, dialyzable latex (DL) corresponding to low molecular size substances and rubber latex (RL) which was highly insoluble in water. The HA titer levels were quantified by primary and secondary humoral immune response in rats. The fractions induced production of antibodies titer level significantly ($p<0.05$) in response to SRBC. In addition immunostimulation was counteracted by up regulating macrophage phagocytosis in response to carbon particles. Rats received NDL fractions by oral route displayed considerable immunological response.

Antidiabetic effects: The root extracts of *Calotropis procera* were investigated for its anti-hyperglycemic effect in Male Wister Albino rats. Glibenclamide 500 µg/kg, petrolium ether, methanol and aqueous extracts of roots of *C. procera* were administered to streptozotocin induced diabetic rats at a dose of 250 mg/kg bw as a single dose per day for 15 days. It appeared that methanol and aqueous extracts were the most effective hypoglycemic extracts.

Cardiovascular and hypolipidemic effects: Latex of *Calotropis procera* was evaluated for protection against isoproterenol (20 mg/100g) induced myocardial infarction in albino rats. The pretreatment with an ethanolic latex extract of *Calotropis procera* at a dose of 300 mg/kg body weight orally three times a day for 30 days, reduced significantly ($p<0.01$) the elevated markers enzyme levels in serum and heart homogenates in isoproterenol induced myocardial infarction.

Gastroprotective effects: The protective effect of methanolic extract of *Calotropis procera* latex was investigated on experimentally induced gastric ulcers in rats. The methanolic extract was found to inhibit mucosal damage in both ethanol (85-95%) and aspirin (70- 80%) model, with maintaining the tissue integrity and significant reduction in gastric hemorrhage. Oxidative stress markers (glutathione, thiobarbituric acid reactive substance and superoxide dismutase) were found to be regulated.

Antidiarrheal effects: The dry latex (DL) of *Calotropis procera* was evaluated for its anti-diarrhoeal activity. Like atropine, a single oral dose of DL (500 mg/kg) produced a significant decrease in the frequency of defecation and the severity of diarrhea as well as protecting from diarrhoea in 80 % of rats treated with castor oil. The effects of DL on intestinal transit, castor oil-induced intestinal fluid accumulation (enteropooling) and electrolyte concentration in intestinal fluid were also evaluated. Dry latex produced a decrease in intestinal transit (27%–37%) compared with both normal and castor oil-treated animals. Unlike atropine, dry latex significantly inhibited castor oil induced enteropooling. However, it did not alter the electrolyte concentration in the intestinal fluid compared with castor oil-treated rats.

Antioxidant effects: Total phenol and flavonoid contents in extract were 15.67 ± 1.52 mg propyl gallate equivalent/g and 1.62±0.05 mg quercetin equivalent/g, respectively. UVvisual spectroscopic scanning of the extract indicated the presence of glycoside-linked tannins or

flavonoids. The extract exhibited appreciable reducing power signifying hydrogen donating potential. DPPH radical scavenging assay revealed substantial free radical scavenging activity (42-90%) in the extracts. Concentration dependent response was observed in the metal ion chelating activity (16-95%). Extracts also provided protection against iron induced lipid peroxidation in rat tissue (liver, brain, and kidney) homogenates. Comparatively better protective efficacy against peroxidative damage was observed in liver (71%) followed by kidney (65%) and brain (60%) tissues. Positive correlation (r (2) = 0.756) was observed between DPPH free radical scavenging activity and reducing power of extract. Similarly strong positive correlation (r (2) ≈ 0.756) was observed between metal ion chelating ability and percentage lipid peroxidation inhibition in different tissues.

Effects on Reproductive systems: The effects of ethanolic and aqueous extracts of *Calotropis procera* roots were studied on the oestrous cycle regularity. Both extracts were found to interrupt the normal oestrous cycle in 60 % and 80 % of female rats respectively. The extracts had no oestrogenic activity when tested in immature female bilaterally ovariectomized rats. The antifertility effect of the ethanolic extract of roots of *Calotropis procera* was investigated in female rats. A strong antiimplantation (inhibition 100%) and uterotropic activity was observed at the dose level of 250 mg/kg (1/4 of LD50). Calotropis procera was uterotonic drug, its aqueous extracts induced significant sustained increases in human myometrial smooth muscle cell contractility, with varying efficiencies, depending upon time of exposure and dose.

Anticonvulsant effects: The anticonvulsant activity of different root extracts of *Calotropis procera* was studied in rats using seizures induced by maximal electroshock seizures (MES), pentylenetetrazol (PTZ), lithium-pilocarpine and electrical kindling seizures. In the MES test, the chloroform extract of Calotropis procera roots showed the most significant ($P<0.01$) anticonvulsant effect, it decreased the duration of hind limb extension (extensor phase), clonus and also the duration of the stupor phase compared with the controls. In the PTZ test, the chloroform extract exhibited a highly significant ($P<0.001$) effect, and the aqueous extract had a significant ($P<0.01$) effect compared with the controls by delaying the onset of convulsions. The extracts also inhibited convulsions induced by lithium-pilocarpine and electrical kindling.

Hepatic and renal protective effects: An aqueous ethanolic extract of*Calotropis procera* flowers was tested for its hepatoprotective effect against paracetamol-induced hepatitis in rats. Paracetamol (2000 mg/kg) has been reported to enhance SGPT, SGOT, ALP, bilirubin and cholesterol levels and reduce serum levels of HDL and the tissue level of GSH while treatment with an aqueous ethanolic extract of *C. procera* flowers (200 mg/kg and 400 mg/kg) restored the altered levels of biochemical markers to almost normal levels in a dosedependent manner. The possible hepatoprotective and nephroprotective activities of the ethanolic extract of *C. procera* root were investigated in female rats. Carbon tetrachloride (CCl 4) was used for induction of hepatotoxicity and nephrotoxicity with significant ($P<0.05$) increase in the level of serum enzyme markers of hepatotoxicity and nonenzyme markers of nephrotoxicity.

Mizaj (Temperament) : Hot 3^0 and dry 3^0

Musleh (Correction) : Filfil Siyah, Rowghan-e-Zard(Ghee)

Badal (Proximal substitute) : Another part of same plant, if available.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 12 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1.5 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 7 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 15 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract of the drug on silica gel 'G' plate using Chloroform : Methanol (1 : 1) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.63, 0.71, 0.81, 0.87 (all blue). On spraying Dragendroff reagent followed by 5% Methanolic Sulphuric acid reagent and one spots appear at Rf. 0.08 (orange). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action) : Muhallil, Musakkin, Munnaffis, Hazim, Mukhrij-e-Balgham, Daf-e-Zaheer.

Mahall-e-Istemalat (Therapeutic uses): Aatshak, Juzam, Haiza, Tap-e-Larza, Zeeq-un-Nafs, Sual, Zof-e-Hazm, Zaheer.

Meqdar-e-khorak (Dose):250- 500mg

Side-effects: Calotropis is unsafe, especially in high doses. It contains chemicals that can interfere with heart function, particularly at high doses. It can cause serious side effects including vomiting, diarrhea, slow heartbeat, convulsions, and death.It’s not known whether it’s safe to inhale calotropis smoke.

Important formulations **:** Habb-e-Gul-e-Aak

MAKO

(Whole plant)

The drug Mako consists of the dried whole plant of *Solanum Nigrum* Linn. (Fam. Solanaceae); a herbaceous annual weed, 30-45 cm high, found throughout the country in dry parts, quite common in cultivated lands, road sides and gardens.

Other names :

Botanical name **:** *Solanum nigrum* Linn

Family **:** Solanaceae

Bengali name **:** Gudakamai

English name **:** Black nightshade

Description:

General: The flowers have petals greenish to whitish, recurved when aged and surround prominent bright yellow anthers. The berry is mostly 6 to 8 mm (0.24 to 0.31 in) in diameter, dull black or purple-black.In India, another strain is found with berries that turn red when ripe.

Macroscopic:

Root: Tap root with a few branches and numerous small roots, externally smooth, pale brown; bark thin, easily peeled off exposing pale yellow wood.

Stem: Erect glabrous or pubescent, green, rounded at the basal region and angular at the apical region, slightly woody and branched.

Leaf: Simple, 2.5-8.5 cm long and 25 cm wide, ovate or oblong sinuate, toothed or, lobed, narrowed at both ends; petiolate thin.

Flower: Small, extra-axillary, sub-umbellate, 3-8 flowered cymes, peduncles 6-20 mm long, slender; pedicels 6-10 mm long, very slender; calyx 2-3 mm long, glabrous, five lobed, oblong, obtuse, 1.25 mm long; corolla 4.8 mm long, divided more than half way down into 5 oblong sub-acute lobes, white or pale violet; filaments short, flattened, hairy at base; another 1.2-2.5 mm long, yellowish, oblong, obtuse notched at apex; ovary globose, glabrous; style cylindric, hairy in lower part.

Fruit: - A berry, 6 mm in diameter, obtuse usually purplish-black but sometimes red, yellow or black; smooth shining.

Seed: - Discoid, 1.5 mm in diameter, smooth, minutely pitted, yellow.

Microscopic:

Root: Shows cork consisting of 2-4 rows of tangentially elongated cells; cortex of large, slightly elongated, thin-walled cells having patches of lignified sclerenchyma fibres, most of the cortical cells contain oval to round starch grains, measuring 2.5-22µ in diameter, single or with two or rarely 3 components; a few parenchyma cells contain microsphenoidsal crystals of calcium oxalate; phloem consists of thin-walled, polygonal cells, phloem rays uniseriate, filled with starch grains; xylem composed of vessels and parenchyma; vessels arranged in groups of 2-4 in radial rows; parenchyma thick-walled containing microsphenoidal crystals of calcium oxalate; rays composed of thin-walled, radially elongated cells.

Stem: Shows single layered, epidermis of cubical to barrel-shaped cells, covered with thick, slightly striated cuticle, trichomes multicelylar, uniseriate; secondary cortex composed of 2-4 layered collenchyma but 4-10 layered in angular parts; tangentially elongated, oval parenchymatous cells, some containing numerous microsphenoidal crystals of calcium oxalate and simple, oval to round starch grains measuring 2.5-8.25 in diameter, endodermis single layered; pericycle consists of intermittent ring of patches of fibres either isolated or in groups of 2-4; vascular bundles-collateral, conjoint and open; cambium 2-4 layered; xylem vessels arranged radially smaller being towards enctre, showing spiral thickenting and somple perforations; tracheids pointed tipped and with pitted walls; xylem rays homogenous, uniseriate; internal phloem; in small or large patches, usually accompanied by fibres, embedded in perimedullary zones; pith large, composed of thin-walled parenchymatous cells with small intercellular spaces, a few cells containing microspenoidal crustals of calcium oxalate.

Petiole: Shows single layered epidermis of oval or tangentially elongated cells, covered with striated cuticle; covering trichomes uniseriate, 3-5 celled having pointed tips and warty walls; glandular hairs with 1-2 celled stalk and 2-7 celled head; epidermis single layered; chlorenchyma 2-3 layered, compactly arranged; 5-8 layered parenchyma consisting of roung, thin-walled cells with smaller intercellular arc-shaped, bicollateral; two smaller bundles present laterally on either side of main vascular bundles one in each latelal wing of th petiole.

Leaf:

Midrib: Shows upper and lower epidermis of round to oval cells, covered with striated cuticle, trichomes similar to those found on petiole; collenchyma 2-3 layered on both surfaces; parenchyma 6 layered, thin-walled with small intercellular spaces; arc-shaped bicollateral vascular bundle placed centrally.

Lamina: Dorsiventral, both upper and lower epidermis single layered, composed of oval to tangentially elongated cells covered with thick cuticle; palisade single layered; spongy parenchyma 4-6 layered containing chloroplasts with intercellular spaces; a few vessels with spiral thickenings, present beneath palisade parenchyma; in surface preparation a large number of multicellular, waty hairs with pointed tips and glandular hairs are present; epidermis with irregular outline,stomata anisoytic, scared on both surfaces but more abundant in loerr surface; palisade raito 2-4; vein islet number 7-10; stomatal index 15-17 on upper epidermis and 22-23 on lower epidermis.

Fruit: Shows thin, papery epicarp, pulpy mesocarp and axile placentation; seeds at first remain attached to the placenta but afterwards separate from it and lie free in pulp of fruit.

Powder: Creamish-green; shows fragments of vessels with spiral thickening; a few broken pieces of pointed, unicellular haira; single, oval to round and compound with three components of starch grains, measuring 2.5-11µ in diameter.

Parts used: Whole plant

Habitat: Black nightshade is a common herb or short-lived perennial shrub, found in many wooded areas, as well as disturbed habitats. It reaches a height of 30 to 120 cm (12 to 47 in).

Phyto constituents: Alkaloids and Saponins

Af'aal-e-Advia (Pharmacological activities):

Anti-Cancer Activity: Sepide Miraj et al., 2016 has evaluated on the suppression of EMT in MCF-7 breast cancer cells treated with AESN was evaluated. The results suggested that AESN could inhibit EMT of MCF-7 breast cancer cells mediated by attenuation of mitochondrial function.

Anti-fungal effect: Sepide Miraj et al., 2016 The anti-fungal effect of *Solanum nigrum* L. was investigated and result showed that the production of solamargine by a cultivable fungal endophyte at a significant yield is a new observation. Further experiments such as media optimization, OSMAC (One Strain Many Compounds) or epigenetic modifiers could be applied to enhance the fungal solamargine production.

Anti-larvicidal effect: Sepide Miraj et al., 2016 has performed by the biocontrol potentiality of active ingredient isolated from ethyl acetate extract of mature leaves of Solanum nigrum L. (Solanaceae) was investigated. The findings indicated that there is a clear dose-dependent mortality, as the rate of mortality (Y) was positively correlated with the concentrations of the compound (X); having regression coefficient value close to 1.

Anti-Stress effect: Sepide Miraj et al., 2016 The prophylactic or curative anti-oxidant efficacy of crude extract and the active constituent of Solanum nigrum leaves were evaluated .result suggested that Brain is vulnerable to stress induced prooxidant insult due to high levels of fat content. Thus, as a safe herbal medication the Solanum nigrum leaves extract or its isolated constituents can be used as nutritional supplement for scavenging free radicals generated in the brain due to physical or psychological stress or any neuronal diseases per se.

Anti-oxidative effect: Sepide Miraj et al., 2016 has investigated on effects of endophytic bacterium inoculation on plant growth were evaluated. The beneficial effect was more obvious at relatively low Cd concentration (10 μM). Based on the alteration of nutrient uptake and activated oxygen metabolism in infected plants, the possible mechanisms of endophytic bacterium in Cd phytotoxicity reduction can be concluded as uptake enhancement of essential mineral nutrition and improvement in the anti-oxidative enzymes activities in infected plant.

Anti-allergic effect: Sepide Miraj et al., 2016 Potential of the plant berries in the treatment of asthma was evaluated. The petroleum ether extract of Solanum nigrum berries can inhibits parameters linked to the asthma disease.

Estrogenic activity: Sepide Miraj et al., 2016 has done on the estrogenic potential ofSolanum nigrum fruits by in vitro and in vivo assays was evaluated. Result demonstrates the hormone like activity of Solanum glycosides both in vitro and in vivo in mouse, which needs to be further explored to evaluate the possible mechanism and clinical implications.

Hepato-protective activity: Vishwanath Jannu et al., 2012 has evaluated on the herbal based therapeutics for liver disorders has been in use in India for a long time and has been

popularized world over by leading pharmaceuticals. Lack of standardization of the herbal drugs. (i) Lack of identification of active ingredient(s)/principle(s). (ii) Lack of randomized controlled clinical trials (RCTs). (iii) Lack of toxicological evaluation.

Anti-convulsant activity: Km. Ruby et al., 2012 has performed on the central nervous system depressant action of Sn was ascertained by measuring the effects of intraperitoneal injection of Sn on various neuropharmacological parameters. Isotonic contraction of the isolated toad rectus abdominis. Negative chronotropic and inotropic action on the isolated toad heart.Isotonic contraction of the isolated guinea pigs ileum. Isotonic contraction of the rat's isolated jejunum. Decrease on the cat's arterial blood pressure. Secretory effects on the rat's submaxillary gland.

Anti-diabetic activity: Km. Ruby et al., 2012 The aqueous and hydro-alcoholic extracts of different parts of Solanumnigrum plant, viz leaf, fruit and stem for hypoglycemic activity in Sprague Dawley rats. Thus it can be concluded that Solanumnigrumhas the anti- diabetic property.[19] Protective effect Km. Ruby et al., 2012 has done on Protective effect of an aqueous leaf extract of Solanum nigrum extract was examined against lead acetate Swiss albino mice. The results of the present study provide clear evidence of defence provided by Solanum.nigrum extract against lead acetate induced toxicity in brains of albino mice.

Immuno-stimulant activity: Km. Ruby et al., 2012 has investigation found immunostimulant potential plants being an alternative for preventing fish diseases. Plants extracts have great potential as immunostimulant against microorganisms and that they can be used in the treatment of infectious diseases caused by microorganisms.

Anti-microbial activity: Km. Ruby et al., 2012 has investigated on theanti-bacterial activity of methanol and water extracts of Solanum nigrum leaves was evaluated and phytochemical screening was carried out to know the compounds responsible for these activities. On the basis of the results obtained, it could be concluded that methanol could be used for extracting antimicrobial compounds from leaves.

Anti-ulcer activity: Km. Ruby et al., 2012 has performed on the anti-ulcerogenic effects of the methanolic extract of Solanum nigrum berries on aspirin induced ulceration in rats with respect to antioxidant status in the gastric mucosa have been investigated. The results indicate that Solanum nigrum berries may exert its gastroprotective effect by a free radical scavenging

action. Solanum nigrum berries may have considerable therapeutic potential in the treatment of gastric diseases.

Cardio-protective activity: Km. Ruby et al., 2012 has done on the cardio-protective activity of methanolic extract of berries of the plant Solanum nigrum was evaluated byusing global in vitro ischemiareperfusion injury carried out using doses of 2.5 and 5.0 mg/kg for 6 days per week for 30 days. The methanolic extract of berries of the plant Solanum nigrumpossessed cardioprotective activity.

Analgesic activity: Km. Ruby et al., 2012 has investigated on the ethanolic extracts of Solanum nigrum for analgesic activity was evaluated. analgesic activity of the extract was evaluated for its central and peripheral pharmacological actions by using Eddy's hot plate and acetic acid induced writhing respectively.

Anti-diarrhoreal activity: Km. Ruby et al., 2012 has performed on the ethanolic extract of the dried fruit of Solanum nigrum Linn. Was assessed for anti-diarrhoeal activity. The fruit extract showed a significant ($P<0.01$ and $P<0.001$) anti-diarrhoeal activity against castor oil induce diarrhoea in mice in which it decreased the frequency of defecation and increased the mean latent period at the dose of 250mg/kg and 500mg/kg body weight.

Cytzotoxic activity: Km. Ruby et al., 2012 has done on the ethanolic extract of the dried fruit of Solanum nigrum Linn. cytotoxic activity. In the brine shrimp lethality test, the extract showed cytotoxicity significantly with LC50= 63.10µg/ml and LC90= 160µg/ml.

Anti-inflammatory activity: Km. Ruby et al., 2012 has investigated on the methanolic extract of whole plants of Solanum nigrum L. was investigated for anti-inflammatory activity on the experimental animal models. The methanolic extract decreased the edema induced in hind paw. The methanolic extract of Solanum nigrum (375 mg/kg b.w.) has showed significant anti-inflammatory.

Anti-seizure activity: Km. Ruby et al., 2012 has performed on the aqueous extract of the leaves of Solanum nigrum was evaluated for anti-seizure activity in chicks, mice and rats by intraperitoneal administration of the extract. The anti-seizure property of the extract was potentiated by amphetamine.

Mizaj (Temperament) : Cold 2^0 and Dry 2^0

Musleh (Correction) : Honey, Sweet

Badal (Proximal substitute) : Kaknaj(*Physalisalkekengi*).

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 16 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 7 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 4 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 15 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract of the drug on silica gel 'G' plate using Toluene : Ethylacetate (90 : 10) shows two spots at Rf. 0.06 & 0.34 (both brown)in visible light. Under U.V. light (366 nm) two fluorescent zones are visible at Rf. 0.06 & 0.34 (both pink). On exposure to Iodine vapour three spots appear at Rf. 0.06, 0.34 and 0.97 (all yellow). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action): Qabiz, Rade, Mujaffif, Mulattif, Musakkin-e-Hararat,Mohallil-e-Auram.

Mahall-e-Istemalat (Therapeutic uses): Warm-e-Jigar wa Meda, Dard-e-Gosh.

Meqdar-e-khorak (Dosez: 5-7 gm

Side-effects: Madar(Black nightshade) is unsafe to take by mouth. It contains a toxic chemical called solanin. At lower doses, it can cause nausea, vomiting, headache and other side effects. At higher doses, it can cause severe poisoning. Signs of poisoning include irregular heartbeat, trouble breathing, dizziness, drowsiness, twitching of the arms and legs, cramps, diarrhea, paralysis, coma, and death.

There isn't enough information to know whether it is safe to apply black nightshade directly to the skin.

Important formulations : Qairooti Mako wali, Arq-e-Mako, Zimad-e-Kabid, Zimad-e-Mohallil.

NARMUSK

(Stamens)

The drug Narmushk consists of dried stamens of *Mesua ferrea*Linn. (Fam. Clusiaceae); an evergreen tree, about 15-18 meter high with short trunk, often buttressed at the base, occurring in the Himalayas from Nepal eastwards, Bengal, assam, evergreen rain forests of north kanara, konkan, forests of western Ghats and Andhra Pradesh and also in Bangladesh.

Other names :

Botanical name **:***Mesua ferrea* Linn

Family **:** Clusiaceae

Bengali name **:** Nagesvara, Nagesar

English name **:** Cobras Saffron

Description:

General: *Mesua ferrea* is a medium-sized or fairly large evergreen tree up to 36 meter tall. Bole cylindrical to poorly shaped, up to 95 cm in diameter, often fluted at base. Bark surface is smooth to adherent scaly, sometimes somewhat dippled, ochrous-brown revealing a bright orange layer below.

Macroscopic: Stamen consists of anther, connective and filament; copper colour or golden brown; filament united at base forming a fleshy ring; each stamen 0.9-1.9 cm long; anther about 0.5 cm long linear, basifixed, containing pollen grains; filament 0.8-1.0 cm long; slender, filiform, more or less twisted, soft to touch, quite brittle; connective not visible with naked eye; odour fragrant; taste astringent.

Microscopic: Anther ahows golden-brown, longitudinally dehiscent anther wall, consisting of thin-walled parenchmatous cells, pollen grains numerous in groups or in single, yellowish and thin-walled many pollen grains having 1-3 minute, distinct protuberances on walls, thick-walled exine and intine distinct.

Powder: Brown; shows elongated cells offilament, connective and numerous golden yellow pollen grains having 1-3 protuberances.

Parts used: Stamens of Narmushk

Habitat: It grows in the Himalayas from Nepal eastwards, in north-eastern India, the Deccan Peninsula and the Andaman Islands, ascending to an altitude of 1,500 meter.

Phyto constituents: Essential oil and Oleo-resin.

Af'aal-e-Advia (Pharmacological activities):

Antioxidant and hepatoprotective activity: The methanolic extract of dried flowers of *M. ferrea* (100 and 200 mg/kg) was screened for in vivo antioxidant and hepatoprotective activity in experimental female Wistar mice. An artificial infection was induced by administration of S. aureus in drinking water for 24 h at the onset of experiment, sampling was done once a day and after one week. The biochemical parameters Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Creatinine phosphorkinase (CPK), Alkaline phosphatase (ALKP), Creatinine, Urea, Super oxide dismutase (SOD), Catalase (CAT), Glutathione peroxidise (GPX), Glutathione reductase (GR) were measured. There was significant increase in liver SOD and AST in treated groups. There was significant reduction in catalase (CAT), GPX, GR, and ALT activity. No significant difference was observed in CPK and creatinine activity (Garg et al., 2009). The ethanolic extract of flowers showed potent inhibitory activity (96.03%) at 100 µg/ml against nitric oxide (NO) assay (Makchuchit et al., 2010). The water-ethanol (1:1) leaf extract showed potent inhibition on lipid peroxidation (Yadav, 2010). The ayurvedic formulations Brahma rasayana (Ramnath et al., 2009) and Maharishi AK-4 (Cullen et al., 1997) containing M. ferrea have reported to exhibit significant antioxidant activity in cold stressed chicken and isolated rat heart, respectively. The 2,2-diphenyl-1-picrylhydrazyl (DPPH) (56.67 mmol/100 g DW), 2,2'-azino-bis (ABTS) (35.22 mmol/100 g DW), ferric reducing/antioxidant power (FRAP) (8.99 µmol/g DW) assay and determination of total phenolic content (4.18 g/100 g DW) in M. ferrea seeds and pericarp showed antioxidant activity (Surveswaran et al., 2007). Phomopsis sp. GJJM07 (an endophyte) was isolated from M. ferrea and examined for the in vitro antioxidant activity by DPPH radical scavenging assay. It showed potent antioxidant activity with the half maximal inhibitory concentration (IC50) value of 31.25 µg/ml compared to the IC50 value of standard ascorbic acid, 11.11 µg/ml (Jayanthi et al., 2011).

Analgesic activity: n-Hexane, ethyl acetate and methanol extracts of *M. ferrea* leaves (125 and 250 mg/kg) exhibited significant analgesic activity in acetic acid induced writhing response in mouse. The reduction in writhing response for lower dose of above extracts was 36.08, 16.33 and 10.21%, respectively and for higher dose it was 42.21, 19.63 and 17.06%, respectively (Hassan et al., 2006).

Antispasmodic activity: The petroleum extract of M. ferrea seed oil was evaluated for antispasmodic activity on isolated rat ileum in vitro. The contraction of rat ileum was measured on kymograph. Acetycholine and Carbachol caused contraction of 2.61 and 3.20 cm, respectively. The crude oil at concentration, which is 1:5 and 1:10, and the normal

contraction of acetylcholine was reduced to 70 and 86%, respectively. Normal response of acetylcholine in presence of atropine was reduced to 55% (Prasad et al., 1999).

Anti-venom activity: The aqueous extract of *M. ferrea* leaves was screened for its activity against fibroblast cell lysis after Heterometrus laoticus scorpion venom treatment. The extract was evaluated against viability of fibroblast cells after 30 min treatment with mock control or with 0.706 mg/ml plant extracts preincubated with H. laoticus venom. Viability of fibroblast cells after 30 min treatment with mock control or with 0.706 and 0.406 mg/ml showed efficiency in protecting against venom induced lysis (Uawonggul et al., 2006).

Immunomodulatory activity: A poly herbal formulation, ACII containing *M. ferrea* flower buds was evaluated for immunomodulation effect on radiation induced immunosuppresion. There was a significant increase in the amount of circulating antibody in animals treated with ACCII (250 mg and 1 g/kg). There was no significant change in body weight in treated as well as irradiated animals. The lowered total white blood cells (WBC) count was significantly increased. There was no significant change in the hemoglobin content of irradiated animals when compared with drug treated or normal animals. ACII also did not produce any change on differential count especially in lymphocyte-neutrophil ratio. The bone marrow cellularity was improved significantly and α-esterase positive cells were found to be improved. The weight of thymus was found to increase in ACII treated animals compared to irradiated animals (Tharakan et al., 2006). Moreover, ACII was found to have an immunomodulatory effect in normal (Tharakan et al., 2004) as well as in cyclophosphamide treated animals (Tharakan et al., 2003). Mesuol isolated from *M. ferrea* seed oil was evaluated for immunomodulatory activity in experimental animals by using specific and non-specific immune response models. In humoral immune response model, mesuol evoked a significant dose dependent increase in antibody titer values in cyclophosphamide (50 mg/kg, i.p, 9th and 16th day) induced immunosuppression which was sensitized with sheep red blood cells (SRBC) on the 7th and 14th day of experiment. In cellular immune response model, an increase in paw volume was recorded on the 23rd day in cyclophosphamide-induced immune-suppressed rats treated with SRBC (0.03 ml 2% v/v, s.c.) on the 21st day. Mesuol restored the hematological profile in cyclophosphamide inducedmyelosuppression model. Chahar et al. 215 Mesuol potentiated percentage of neutrophil adhesion in neutrophil adhesion test in rats and phagocytosis in carbon clearance assay. The study indicated immunomodulatory activity of mesuol (Chahar et al., 2012).

Anti-neoplastic activity: The crude ethanolic extract of *M. ferrea* was evaluated against human cholangio carcinoma (CL-6), human laryngeal (Hep-2), and human hepatocarcinoma (HepG2) cell lines in vitro. The extract showed promising activity against cholangio carcinoma (CL-6), with survival of less than 50% at the concentration of 50 µg/ml. There was potent cytotoxic activity against Hep-2 and HepG2 also (Mahavorasirikul et al., 2010). The methanolic extract was evaluated against Ehrlich Ascites carcinoma in mice. There was significant inhibition in tumour growth inhibition (Rana et al., 2004). Muthu Marunthu, a poly herbal formulation containing M. ferrea flowers (100 mg) was evaluated for antitumour effect on experimental fibrosarcoma in rats. Significant reduction in the levels of DNA and RNA were noticed after Muthu Marunthu treatment. A significant reduction in the levels of vitamins A, C and E were observed in fibrosarcoma rats. Muthu Marunthu treatment was able to enhance the levels of vitamins A, C and E. An elevated level of copper and decreased levels of zinc and selenium were noticed in fibrosarcoma rats. Treatment with Muthu Marunthu for 20 days brought back the altered levels of these trace elements to near normal levels. When compared between normal and Muthu Marunthu treated control rats, there was no significant changes in the blood levels of glucose, urea, plasma protein and cholesterol, and activities of serum enzymes such as Lactate dehydrogenase (LDH), Glutamate oxaloacetate transaminase (GOT) and Glutamic-pyruvic transaminase (GPT), alkaline and acid phosphatase (Palani et al., 1999).

Anti-convulsant activity: The ethanolic extract of *M. ferrea* flowers was evaluated for anticonvulsant activity at 3 different dose levels (200, 400 and 600 mg/kg p.o.) by Maximum electroshock seizure (MES) test using albino mice. The extract reduced the duration of Hind limb tonic extension (HLTE) in a dose dependent manner against MES model. The ethanolic extract of M. ferrea inhibited MES-induced convulsions. The percentage inhibition achieved at the doses 200, 400, and 600 mg/kg were 100% ($p < 0.01$), 60% ($p < 0.01$) and 100% ($p < 0.001$), respectively. Data from this study showed that *M. ferrea* flowers significantly increased the onset time and decreased the duration of seizures by electroconvulsive shock (Tiwari et al., 2012).

Anti-inflamatory activity: Mesuaxanthone A and mesuaxanthone B (MXA and MXB) from M. ferrea were evaluated using albino rats by carrageenan induced hind paw oedema, cotton pellet implantation and granuloma pouch tests. In all the methods, xanthones were administered at the dose level of 50 mg/kg. *M. ferrea* xanthones upon oral administration in carrageenan induced hind paw oedema test showed MXA (37%) and MXB (49%) reduction

when compared to normal control group. The xanthones produced significant anti-inflammatory activity in normal, as well as in adrenalectomised rats, as the inflammation reduced significantly by MXA (38%) and MXB (22%) when compared to normal control group. In granuloma pouch tests, these xanthones showed MXA (46%) and MXB (49%) reduction in inflammation, and 47% reduction was observed in cotton pellets granuloma tests. The xanthones used in the present study have been found to produce significant anti-inflammatory activity (Gopalakrishnan et al., 1980).

Anti-ulcer activity: Xanthones from *M. ferrea* were screened for antiulcer activity by pyloric ligation method in albino rats. The ulcer scoring for the gum acacia treated rats was found to be 3.50 ± 0.27 which was significantly lesser than that of standards. The control animals showed extensive ulceration, haemorrhage and perforation, while the xanthones pre-treated animals exhibited only scattered areas of hyperemia and occasional haemorrhagic spots (Gopalakrishnan et al., 1980).

Anti-arthritic activity: M. ferrea seed extracts (petroleum ether, ethyl acetate and alcohol) were evaluated in the formaldehyde and Complete Freund's Adjuvant (CFA)-induced arthritis in rats. The results indicate that *M. ferrea* protects rats against formaldehyde and CFA induced arthritis. The body weight changes and the CFA-induced haematological perturbations, such as an increase in the WBC count, a decreased RBC count, a decreased haemoglobin (Hb) count and an increased erythrocyte sedimentation rate (ESR) which were significantly altered by *M. ferrea* treatment. The overall results indicated that *M. ferrea* extract has a potent protective effect against formaldehyde and adjuvant-induced arthritis in rats (Jalalpure et al., 2011).

Anti-microbial activity: In an in vivo experiment, the methanol extract of *M. ferrea* flowers protected mice challenged with S. typhimurium ATCC 6539.2 and 4 mg/mouse of the extract reduced the mice mortality. There was a significant reduction in the viable bacteria of blood, liver and spleen in the animals treated with the extract. In in vitro experiment, the extract inhibited 30 strains of Staphylococcus aureus, and all the tested strains of Bacilllus spp., Salmonella spp., Pseudomonas spp., Streptococcus pneumonia, Sarcina lutea, Proteus mirabilis, Lactobacillus arabinosus at 50 µg/ml concentration. One and two strains of Staphylococcus were inhibited by 100 and 200 µg/ml whereas 8 strains were resistant, strains of Klebsiella, Vibrio cholera, Escherichia coli, Shigella spp. were less sensitive (Mazumder et al., 2004). Dichloromethane and methanol (1:1 v/v) extract of *M. ferrea* flowers showed

complete inhibition against all tested bacteria at 500 and 1000 µg/ml. The screening was carried by agar dilution-streak method against B. cereus varmycoides, B. pumilus, B. subtilis, Bordetella bronchiseptica, Micrococcus luteus, Sta. aureus, Sta. epidermidis, E. coli, K. pneumoniae, P. aeruginosa, Str. faecalis, Candida albicans, Aspergillus niger and Saccharomyces cerevisiae (Prashanth et al., 2006). The light petroleum ether, chloroform and ethanol extracts of M. ferrea seeds, leaves and stem bark were evaluated against antibacterial and antifungal study by disk diffusion method at 400 µg disk-1 against 14 pathogenic bacteria including 5 gram positive like B. subtilis, B. megaterium, Str. β-haemolyticus, Str. aureus, Sarcina lutea and 9 gram negative as Shigella sonnei, E. coli, Klebsiella species, Shigella shiga, S. boydii, S. flexneriae, S. dysenteriae, Salmonella typhi and Pseudomonas aeruginosa and 6 pathogenic fungi Penicillum notatum, A. niger, Trichoderma viride, A. flavus, C. albican and Hensinela californica. Chloroform extract of *M. ferrea* stem bark displayed strong activity against gram-positive Str. aureus (16 mm) and gramnegative E. coli (19 mm). The extracts of *M. ferrea* leaves were found to be mild to moderate active against most of the bacteria strains.

Mizaj (Temperament) : Hot 3^0 and dry 3^0

Musleh (Correction) : Honey, Cold and moist temperament product.

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 6 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 3 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 15 per cent, Appendix 2.2.6
Water- soluble extractive	: Not more than 12 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action): Qabiz, Mujaffif, Mufarreh, Muqawwi-e-Qalb wa Jigar, Meda wa Ama, Moharrik-e-Bah.

Mahall-e-Istemalat (Therapeutic uses): Amraz-e-Qalb wa Dimagh, Malikhooliya, Junoon, Bawasser, Zof-e-Bah.

Meqdar-e-khorak (Dose): 5-7 gm

Side-effects: The current evidence suggests that sterol supplements are relatively safe and well-tolerated. Side effects, if any, tend to be mild and may include constipation, nausea,

upset stomach, heartburn, flatulence, and the discoloration of stools. Many of these symptoms will resolve on their own once the body adapts to the supplement.

Important formulations **:** Mufarreh Yaqooti, Halwa-e-Supari pak, Habb-e-Jarayan, Arq-Ma-ul-Laham.

NEELOFAR

(Flowers)

The drug Neelofar Consists of dried flowers of *Nymphaea nouchali* Burn, an aquatic herb, generally found in tanks and ponds throughout the warmer parts of the country.

Other names :

Botanical name **:** *Nymphaea nouchali Burn*

Family **:** Nymphaeaceae

Bengali name **:** Kumud, Sundi

English name **:** Water Lily

Description:

General: *Nymphaea nouchali*, often known by its synonym Nymphaea stellata, or by common names blue lotus, star lotus, red and blue water lily, blue star water lily or manel flower is a water lily of genus Nymphaea. It is native to southern and eastern parts of Asia, and is the national flower of Sri Lanka and Bangladesh.

Macroscopic: Drug occurs mostly in broken form of varying sizes of dired pieces of flowers and buds, dark brown, attached with a pedicel of 0.5-1.0 cm long when present; sepals 5-6 cm long, 1.5 - 2.0 cm wide, oblong, lanceolate, tip acute or subacute, free, adnate to base of disc; petals–3.5–4.5 cm long, 2.0-2.5 cm wide, linear-oblong or lanceolate, yellowish-brown;

stamens 6 to indefinite, free, adnate to fleshy thalamus; filaments dilated at base; anther with lingual appendages, introrse, bithecous; gynecium indefinite, enclosed by thalamus; style short carples.

Microscopic: Sepal single layered epidermis on either side, unicellular hairs present on upper epidermis; both epidermis followed by 4-6 layers of elongated, thin-walled, spongy parenchymatous cells; large stellate air cavities and vascular tissues present in this region; tanniniferous content present in collenchymatous cells.

Patal: Epidermis on either side, followed by 2-3 layers of collenchymatous cells, central region composed of 3-4 layers, elongated spongy parenchyma; stellate air cavities present in this region;tanniniferous contents also found scattered in pewtals.
Powder: Brown shows groups of parenchymatous cells, stellate air canals, uniseriate hairs, yellowish-brown rounded pollen grains, measuring 22–27 µ in diameter having thick, somooth, exine and thin intine.

Stamen: Single layered upper and lower epidermis, followed by 2-3 layers, rounded to oval large parenchymatous cells; 3-4 layers elongated parenchymatous cells present in centre; stellate air cavities present in this region; anther shows 4 spliting pollen chambers attached with parenchymatous connective tissues vascular tissues and stellate idioblasts present in this region, endothecium consisting of single layered columnar cells, stromium in both the chambers and a few rounded 22-27 µ in diameter, pollen grains having thick smooth, exine and thin intine.
Parts used: Flowers

Habitat:*Nymphaea nouchali* occurs in tropical to southern Africa where it is common (although not as common as it used to be) in pools, dams, vleis and swamps, seasonal ponds, lake edges and slow-flowing streams and rivers, mostly in water 30 to 90 cm deep.

Phyto constituents: Tannins

Af'aal-e-Advia (Pharmacological activities):

Antimicrobial activities: Flowers of *N. nouchali* were effective against Pseudomonas aeruginosa, Bacillus cereus, and Staphylococcus aureus (Vasu and Singaracharya 2008;

Mohan et al. 2008). The zone of inhibition was extremely great for P. aeruginosa, S. aureus, K. pneumoniae, S. dysenteriae and E. coli and for fungi: C. albicans and T. mentagrophytes (Parimala et al. 2014). The results therefore clearly indicates that the crude extract from N. nouchali seeds could be used as a potential source of natural antimicrobial agent owing to the presence of the phytoconstituent catechin in abundance along with other active compounds and supports the traditional use of the plant in the treatment of infections (Dash et al. 2013; Parimala et al. 2014).

Anxiety disorder: It is increasingly recognized as a highly prevalent and chronic disorder in all ages. Pharmacotherapeutic approaches for the management of anxiety disorders include psychotropic drugs, but these agents are limited by their side-effect profile, the need for dietary precautions, and drug interactions. Recently interest of many researchers to evaluate new compounds from plant origin in the hope to identifying other anxiolytic drugs with fewer unwanted side effects has grown. N. alba has potential clinical applications in the management of anxiety and muscle tension disorders (Thippeswamy et al., 2011). Thippeswamy et al., (2011) suggested that the ethanolic extract of N. alba possesses anxiolytic and muscle relaxant properties. Khan and Sultana (2005) reported anticarcinogenic effect of Nymphaea alba against oxidative damage, hyperproliferative response and renal carcinogenesis in Wistar rats.

The anti-infectious activities:*N. Nouchali* have already been assessed to clarify its traditional use as a medicine. Park et al., (2016) reported for the first time protection on skin aging due to the mitochondria-mediated antiapoptosis effects of WL rhizome extract (WLRE) on human epidermal keratinocytes.

Liver disease: Liver diseases are mainly caused by toxic chemicals, excess consumption of alcohol, infections and autoimmune disorders. Liver produces large amounts of oxygen free radicals (reactive oxygen species (ROS) in the course of detoxifying xenobiotic and toxic substances, and oxidative stress caused by ROS has been shown to be linked to liver diseases, such as hepatotoxicity and other liver pathological conditions (Mehendale et al 1994; Stohs 1995). The immunological hepatotoxicity of primary cultured rat hepatocytes can be induced by Bacille Calmette-Guerin (BCG) combined lipopolysaccharide (LPS) treatment in vitro and this model has implicated the involvement of release of various cytokines and active free radicals (Zheng et al 2002). Thus, immunological mechanisms and oxidative stress play

important role in liver injury induced by BCG plus LPS (Wang et al., 2004). At present, this model has frequently been used as useful experimental means for testing and developing new drugs (Zou et al., 2006). Nymphaea candida Presl (or snow-white waterlily) is a herbaceous hydrophyte native to the southern Xinjiang province in China and the flowers of N. candida has been used as a folk medicine for head pains, common cold, cough, hepatitis and hypertension (Liu 1999).

Miscellenious activities: Young seed paste is used externally as a cooling medicine for skin diseases. The seed kernels are also used as a source of starch or eaten dry (Usher, 1984). Young flower paste is prescribed as cardiac tonic and also in fever and liver ailments. Paste of young leaf, along with fruits of Emblica myrobalan is applied on forehead to get relief from headache. Powdered root is taken for expelling ring worms. Root paste in lemon juice is taken for the treatment of piles (Panda and Misra, 2011).

Mizaj (Temperament) : Cold 2^0 and Dry 2^0

Musleh (Correction) : Honey

Badal (Proximal substitute) : Banafsha*(Viola odorata)*

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 8 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 0.5 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 5 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 22 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract of the drug on silica gel 'G' plate using Crhloroform : Ethylacetate : Formic acid (5:4:1) shows in visible light three spots at Rf. 0.59, 0.68 and 0.81 (all bluish grey). On spraying with 10% ferric Chloride solution (aqueous) two spots appear at Rf. 0.68 and 0.81 (both blue and correspond to that of Tannic acid). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action): Muqawwi Qalb, Muqawwi digmah, Musakkin, Hiddat-e-Khoon, Muhallil-e-Waram.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Qalb, Khafqan, Warm-e-Halaq, Khunaq, Bars, Bahaq,Namash.

Meqdar-e-khorak (Dose): 5-7 gm

Side-effects: No significant side-effect hve been observed.

Important formulations: Sharabat Nilofar, Muffarreh Azam,Qurs Kafoori, Musaffikhoon.

NEEM

(Stem bark)

The drug Neem Consists of stem bark of *Azadirachta indica*A. Juss Syn. *Melia azadirachta* Lina. (Fam. Meliaceae); a moderate sized to fairly large evergreen tree, attaining a height of 12-15 meter with stout trunk and spreading branches, occurring throughout the country up to an elevation of 900 meter.

Other names :

Botanical name **:***Azadirachta indica*

Family **:** Meliaceae

Bengali name **:** Nim, Nimgach

English name **:** Margosa tree

Description:

General: Neem is a fast-growing tree that can reach a height of 15–20 metres (49–66 ft), and rarely 35–40 metres (115–131 ft). It is evergreen, but in severe drought it may shed most or nearly all of its leaves. The branches are wide and spreading. The fairly dense crown is roundish and may reach a diameter of 20–25 metres (66–82 ft). The neem tree is very similar in appearance to its relative, the Chinaberry (*Melia azedarach*).

Macroscopic: Bark varies much in thickness according to age and parts of tree from where it is taken; external surface rough fissured and rusty-grey; laminated inner surface yellowish fracture, fibrous; odour characteristic; taste bitter.

Microscopic: Stem bark shows outer exfoliating pieces hard, woody, considerably thick in older barks; almost entirely dead elements of secondary phloem, alternating with discontinuous tangential bands of compressed cork tissue, former composed of several layers of stone cells occurring in regularly arranged groups together with collapsed phloem elements filled with brown contents; in between the successive zones of cork tissue 3-5 layers of fibre groups with intervening thin-walled and often collapsed phloem elements present; each zone of cork tissue consists of several layers of regular, thin-walled cells occasionally with a few a compressed rows of thick-walled cells towards outer surface; within exfoliating portion a number of layers of newly formed cork composed of thin-walled, rectangular cells and one or two layers of cork cambium, below which a wide zone of secondary phloem present; secondary cortex absent in most cases; secondary phloem commonly composed of well developed fiber bundles traversed by 2-4 seriate phloem rays and transversely by bands of parenchymayous tissue of phloem; phloem elements of outer bark mostly collapsed; a few fairly large secretory cavities also occur in phloem; most of phloem parenchyma contain starch grain and prismatic crystals of calcium oxalate; starch grains, simple, round with central hilum, measuring 2.75-5 µ; structure of bark varies considerably according to gradual formation of secondary cork bands.

Powder: Reddish-brown; shows numerous prismatic crystals of calcium oxalate; phloem fibres with narrow lumen and pointed ends; cork cells, stone cells mostly in groups, lignified

rectangular to polygonal, having wide lumen and distinct striations, simple starch grains, measuring 2.75-5 µ on diameter.

Parts used: The bark, leaves, and seeds are used to make medicine. Less frequently, the root, flower, and fruit are also used.

Habitat: Azadirachta indica, commonly known as neem, nimtree or Indian lilac, is a tree in the mahogany family Meliaceae. It is one of two species in the genus Azadirachta, and is native to the Indian subcontinent, i.e. India, Nepal, Pakistan, Bangladesh, Sri Lanka, and Maldives. It is typically grown in tropical and semi-tropical regions. Neem trees also grow in islands located in the southern part of Iran.

Phyto constituents: Bitter principles Nimbin and Nimboil.

Af'aal-e-Advia (Pharmacological activities):

Analgesic effect: In a Study done by Kumar et al., (2012) by using albino rats, it was found that Neem seed oil (NSO) of 2ml/kg body weight is comparable to morphine with a dose of 1mg/kg body weight, NSO produces a better analgesic effect than morphine with 45 minute of interval and in another similar study done by Srinivasa et al., (2014) it were stated that neem resembles indomethacine.

Antipyretic effects: Methanol extract of Neem leaves shows antipyretic effects when administrated orally in rabbits and rats (Parveen, 2013).

Antifungal effects: In a study done by Mondali et al. (2009) shows that the ethanolic extract of A.indica leaves is more effective against Rhizopus and Aspergillus compared to aqueous leaf extract. Aqueous and ethanolic extract of neem leaves were found effective against Candida albicans by which these organism shows sensitivity at the concentration of 15% and 7.5% on aqueous extract and the Minimum Inhibitory Concentration (MIC) was 7.5%. In the ethanolic extraction Candida albicans were found to be susceptible at the concentration of 15%, 7.5% and 3.75%, besides that; the MIC were 3.75% (Aarati et al., 2011).

Antibacterial: The methanol extract of of A.indica leaves shows antibacterial activity against Bacillus subtilis, Staphylococcus aureus, Proteus vulgaris, Salmonella typhi, and showed low activity on Pseudomonas aeruginosa but it is inffective against Escherichia coli. The

petroleum ether and methanol extract of A.Indica leaves were highly effective against Candida albicans (Grover et al., 2011). Futhermore the hexane extract from A.indica bark shows antimicrobial activity against Escherichia coli (Abalaka et al., 2012). In another study done by Vashist and Jindal, (2012) the Azadirachta indica seeds poses an antibacterial activity against the bacteria that causes eye infection (Ophthalmic infection) such as Staphylococcus aureus, Staphylococcus pyogenes, Escherichia coli and Pseudomonas aeruginosa. Aqueous extract and hexane extract were used and it was found that hexane extract was much more effective than aqueous extract by producing larger zone of inhibition with smaller MIC (1.59 to 25 mg/ml) and MBC (3.17 to 50 mg/ml).

Antiviral: Neem leaves is found to be effective against Dengue virus type -2 in which it halts the replication of the virus itself in an invitro environment and in the laboratory animals (Rao et al., 1969). The aqueous extract of Neem bark were found to be effective against Herpes simplex virus type 1 by blocking its entry into natural target cell (Tiwari et al., 2010), even though Neem does not cure but it shows the abilitiy to prevent smallpox, chickenpox and fowl pox (Bhowmik et al., 2010).

Contraceptive: According to Bansal et al., (2010) the addition of sodium nimbidinate salt in aqueous form to semen of rat and human results in death of sperm in different percentage. Neem oil claimed spermicidal activity against rhesus monkey human spermatozoa in invitro condition, and when the oil is used in intra vaginally it prevents pregnancy in rats with concentration of 20 microlitre and in rhesus monkey and women were about 10 mililitre (ml) and the oral dose as low as 25 micro litre prevents implantation in rats and does not show any side effects upon repeated application. Similarly, Neem extract (Nim-76) is found to be effective than raw neem oil which act as spermicidal with no alteration in hormonal values. According to Khillare and Shrivastav (2003), aqueous extract of old and tender leaves shows 100% of mortality of the sperms without altering its morphology (head, midpiece and tail).

Hepatoprotective: Young stem bark extract of Azadirachta indica were used to analyse the hepatoprotective activity by inducing carbon tetrachloride as acute hepatotoxic agent in rats and uses Silymarin as a standard hepatoprotective agent. A dose of 200mg/kg and 500mg/kg were choosen for the studies. Upon administration of Azadirachta indica, it stabilize the levels of Serum glutamate oxaloacetate transaminase (SGOT), Serum Glutamate Pyruvate Transaminase (SGPT), Alkaline Phosphatase (ALP) , Serum bilirubin and elevates total

protein amount. Thus, this plant clearly notify the improvement of the functional status of liver cells (Gomase et al., 2011).

Antihyperglycemic agent: In a dose of 800 mg/kg Neem root bark extract shows anti hyperglycemic effects upon tested with overnight fasted wistar albino rats of either sex and in alloxan induced diabetic rats but it is not significant as glibenclamide (Patil et al., 2013). A dose of 250 mg/kg of aqueous extract of fresh leaves of Neem was administrated orally onto streptozotocin induced and its associated retinopathy in rats for 16 weeks and resulted in significant fall in blood glucose level and serum lipids and there were slight increase in HDL level. The slight increase indicates the extract as positive effect in lipid metabolism of diabetic rats. Futhermore the plant completely reversed the unusual changes in the retina of the rats (Hussain, 2002). Aqueous neem fruit extract were found to be effective as blood glucose lowering agent at the dose of 500mg/kg in normoglycemic albino rabbits upon oral administration (Rao et al., 2012).

Mizaj (Temperament) : Hot 2^0 and dry 2^0

Musleh (Correction) : Unknown

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 7 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1.5 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 6 per cent, Appendix 2.2.6
Water- soluble extractive	: Not more than 5 per cent, Appendix 2.2.7

TLC behavior of Chloroform extract:

TLC of the alcoholic extract of the drug on silica gel ‘G’ plate using Chloroform : Ethylacetate: Formic Acid (5 : 4 : 1) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.72 (blue), 0.86 (blue) and 0.90 (Green). On spraying with 5% Methanolic – Phosphomolybdic acid reagent and heating the plate at 105^0 for ten minutes four spots appear a t Rf. 0.20, 0.45, 0.63 and 0.90 (all blue). Appendix 2.2.10

Aa'mal-e-Advia (Pharmacological action): Mohallil, Muskkin, Mulaiyin, Munzij, Musaffi, Daf-e-Bukhar, Daf-e-Taaffun, Qatil-e-Jaraseem, Qatil-e-Kirm-e-Shikam.

Mahall-e-Istemalat (Therapeutic uses): Fasad-e-Dam, Amraz-e-Jildiya, Deedan-e-Ama.
Meqdar-e-khorak (Dose): 6 - 10 gm (Decoction)
Side-effects: Neem is possibly safefor most adults when taken by mouth for up to 10 weeks, when applied inside the mouth for up to 6 weeks, or when applied to the skin for up to 2 weeks. When neem is taken in large doses or for long periods of time, it is possibly unsafe. It might harm the kidneys and liver.
Taking neem seeds or oil by mouth is likely safe for children. Serious side effects in infants and small children can happen within hours after taking neem oil. These serious side effects include vomiting, diarrhea, drowsiness, blood disorders, seizures, loss of consciousness, coma, brain disorders, and death.

Important formulations: Habb-e- Surkh Badah, Habb-e-Musaffi-e-Khoon,Habb-e-Bawasir, Majoon Musaffi-e-Khoon, Marham Jadwar.

NEEM

(Leaf)

The drug Neem Consists of dried leaf of *Azadirachta indica*A. Juss Syn. Melia azadirachtaLinn. (Fam. Meliaceae); a moderate sized to fairly large evergreen tree, attaining a height of 12-15 m with stout trunk and spreading branches, occurring throughout the country up to an elevation of 900 meter.

Other names :

Botanical name **:** *Azadirachta indica*

Family **:** Meliaceae

Bengali name **:** Nim, Nimgach

English name **:** Margosa tree

Description:

General: Neem is a fast-growing tree that can reach a height of 15–20 metres (49–66 ft), and rarely 35–40 metres (115–131 ft). It is evergreen, but in severe drought it may shed most or nearly all of its leaves. The branches are wide and spreading. The fairly dense crown is roundish and may reach a diameter of 20–25 metres (66–82 ft). The neem tree is very similar in appearance to its relative, the Chinaberry (*Melia azedarach*).

Macroscopic: Leaves compound, alternate, rachis 15-25 cm long 0.1 cm thick; leaflet with oblique base, opposite, exstipulate, lanceolate, acute serrate, 7-8.5 cm long and 1.0-1.7 cm wide, slightly yellowish-green; with characteristic odour taste bitter.

Microscopic:

Leaf

Midrib: Leaflet through midrib shows a biconvex outline; epidermis on either side covered externally with thick cuticle; below epidermis 4-5 layers of collenchyma present; stele composed of one crescent shaped vascular bundle towards lower and two to three smaller bundle towards upper surface; rest of tissues composed of thin-walled, parenchymatous cells having secretory cells and rosette crystals of calcium oxalate; phloem surrounded by non-lignified fibre strand; crystals also present in phloem region.

Lamina: Shows dorsiventral structure; epidermis on either surface, composed of thin-walled, tangentially elongated cells, covered externally with thick cuticle; anomocytic stomata present on lower surface only; palisade single layered; spongy parenchyma composed of 5-6 layered, thin-walled cells, traversed by a number of veins; rosette crystals of calcium oxalate present in a few cells; palisade ratio 3.0-4.5 on lower surface and 8.0-11.5 on upper surface.

Powder: Green, shows vessels, fibres, rosette crystals of calcium oxalate, fragments or spongy and palisade parenchyma.

Parts used: The bark, leaves, and seeds are used to make medicine. Less frequently, the root, flower, and fruit are also used.

Habitat: Azadirachta indica, commonly known as neem, nimtree or Indian lilac, is a tree in the mahogany family Meliaceae. It is one of two species in the genus Azadirachta, and is native to the Indian subcontinent, i.e. India, Nepal, Pakistan, Bangladesh, Sri Lanka, and Maldives. It is typically grown in tropical and semi-tropical regions. Neem trees also grow in islands located in the southern part of Iran.

Phyto constituents: Triterpenoids and Sterols.

Af'aal-e-Advia (Pharmacological activities) :

Antipyretic effects: Methanol extract of Neem leaves shows antipyretic effects when administrated orally in rabbits and rats (Parveen, 2013).

Antifungal effects: In a study done by Mondali et al.,(2009) shows that the ethanolic extract of A.indica leaves is more effective against Rhizopus and Aspergillus compared to aqueous leaf extract. Aqueous and ethanolic extract of neem leaves were found effective against Candida albicans by which these organism shows sensitivity at the concentration of 15% and 7.5% on aqueous extract and the Minimum Inhibitory Concentration (MIC) was 7.5%. In the ethanolic extraction Candida albicans were found to be susceptible at the concentration of 15%, 7.5% and 3.75%, besides that; the MIC were 3.75% (Aarati et al., 2011).

Antibacterial: The methanol extract of of A.indica leaves shows antibacterial activity against Bacillus subtilis, Staphylococcus aureus, Proteus vulgaris, Salmonella typhi, and showed low activity on Pseudomonas aeruginosa but it is inffective against Escherichia coli. The petroleum ether and methanol extract of A.Indica leaves were highly effective against Candida albicans (Grover et al., 2011). Futhermore the hexane extract from A.indica bark shows antimicrobial activity against Escherichia coli (Abalaka et al., 2012). In another study done by Vashist and Jindal, (2012) the Azadirachta indica seeds poses an antibacterial activity against the bacteria that causes eye infection (Ophthalmic infection) such as Staphylococcus aureus, Staphylococcus pyogenes, Escherichia coli and Pseudomonas aeruginosa. Aqueous extract and hexane extract were used and it was found that hexane extract was much more

effective than aqueous extract by producing larger zone of inhibition with smaller MIC (1.59 to 25 mg/ml) and MBC (3.17 to 50 mg/ml).

Antiviral: Neem leaves is found to be effective against Dengue virus type -2 in which it halts the replication of the virus itself in an invitro environment and in the laboratory animals (Rao et al., 1969). The aqueous extract of Neem bark were found to be effective against Herpes simplex virus type 1 by blocking its entry into natural target cell (Tiwari et al., 2010), even though Neem does not cure but it shows the abilitiy to prevent smallpox, chickenpox and fowl pox (Bhowmik et al., 2010).

Mizaj (Temperament) : Hot 2^0 and dry 2^0

Musleh (Correction) : Unknown

Badal (Proximal substitute) : No proximal substitute is identified.

Identity, purity and strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 10 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 13 per cent, Appendix 2.2.6
Water- soluble extractive	: Not more than 19 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Mohallil, Musakkin, Mulaiyun, Munzij, Musafi-e-khoon, Daf-e-Bukhar, Daf-e-Taaffun, Qatil-e-Jaraseem, Qatil-e-Kirm-e-Shikam.

Mahall-e-Istemalat (Therapeutic uses): Fasad-e-Khoon, Amraz-e-Jildiya, Deedan-e-Ama.
Meqdar-e-khorak (Dose): 6 - 10 gm (Decoction)
Side-effects: It is harmful in Pregnancy and breast-feeding when taken by mouth. During pregnancy it can cause a miscarriage.
Important formulations: Habb-e-Surkh Badah, Habb-e-Musaffi-e-Khoon, Habb-e-Bawaseer, Majoon Musaffi-e-Khoon, Marham Jadwar.

SANA

(Leaves)

The drug Sana consists of dried leaves of *Cassia angustifolia* of Leguminaceae family. Drug yielding plant is a small shrub, 60-70 cm high found throughout the year, cultivated largely in Southern India and some parts of Bangladesh.

Other names :

Botanical :*Cassia angustifolia*

Family : Leguminaceae

Bengali : Svaranamukhi, Sonpat, Sannamakki

English name : Indian Senna, Trnnevelly Senna

Description:

General: Senna is a herb. The leaves and the fruit of the plant are used to make medicine.Cassia angustifolia (senna), a native plant of Yemen, Somalia and Arabia and now cultivated in other parts of the world, has a variety of medicinal uses in Unani as well as other traditional systems of medicine. The plant is mainly valued for its cathartic properties and is specially useful in habitual constipation. The laxative principles sennoside A and sennoside B, isolated from leaves and pods of senna, constitute important ingredients in purgative medicines. The plant has been investigated for its various Phyto Constituents and pharmacological properties. Being a hardy species, it can be grown even in saline and rainfed conditions. Cultivation of senna does not require much expense on irrigation, manuring, pesticides, protection and other pre- and post-harvesting care.

Macroscopic: Leaflets, 2.5-6 cm long 7-15 mm wide at centre, pale yellowish-green. Elongated lanceolate, slightly asymmetric at base; margins entire, flat, apex acute with sharp spine, both surfaces smooth with sparce trichomes; odour; faint but distinctive; taste mucilaginous and disagreeable but not distinctly bitter.

Microscopic: Transverse section of leaflat through midrib shows an isobilateral structure, epidermal cells, straight walled, containing mucilage; both surfaces bear scattered, unicellular hair, often conical, curved near base, thick-walled, non-lignified; warty cuticle, stomata, paracytic numerous on both surfaces; mesophyll consists of upper cuticle, stomata, paracytic,

numerous on both surfaces; mesophyll consists of upper and lower palisade layers with spongy layer in between,; palisade cells of upper surface longer than those of lower surface, the latter having wavy anticlinal walls, prismatic walls, prismatic crystals of calcium oxalate present on larger veins, and clusters of calcium oxalate crystals distributed throughout the palisade and spongy tissues, midrib biconvex; bundles of midrib and larger veins, incompletely surrounded by a zone of pericyclic fibres and a crystal sheath of parenchymatous cells, containing prismatic crystals of calcium oxalate.

Parts Used: Dried leaves

Habitat: Cassia angustifolia (senna), a native plant of Yemen, Somalia and Arabia and now cultivated in other parts of the world, has a variety of medicinal uses in Unani as well as other traditional systems of medicine.

Phyto Constituents: Anthraquinone, Glucoside, Flavonoids, Streoids and Resin.

Af'aal-e-Advia (Pharmacological activities):

Effect on Constipation: Taking senna orally is effective for shorttermtreatment of constipation. Senna is anFDA-approved nonprescription drug foradults and children ages 2 years and older.However, in children ages 3-15 years,mineral oil and a medication called lactulosemight be more effective. In elderly people,senna plus psyllium is more effective thanlactulose for treating ongoing constipation.Children over the age of two years andadults can orally take senna to treatconstipation, but only on a short-term basis,which is about two weeks. If you take it anylonger than that, you could cause yourbowels to become dependent on it, and theymight stop functioning properly. Overuse ofsenna can also cause an electrolyteimbalance that could worsen heart disease.Another use for senna is to cleanse thebowels before a colonoscopy.

Effect on Hemorrhoids: The herb of senna is quite popular as chieingredient in many teas and colon cleansingproducts prescribed to heal hemorrhoids.Senna contains special components knownas sennosides that act on the lining of thebowel causing a laxative effect. Constipationor hard stools is one of the triggering factorsfor causing and worsening hemorrhoids.Other folk medicine uses are for skindiseases, gonorrhea, fever and upsetstomach.

Digestive Effect: Senna contains natural enzymes that help inregulating the bowel movements and alsorestoring the gastric juice secretion instomach. It is therefore, the herb is foundeffective in treating dyspeptic syndrome.Senna supplements, if used in proper dosagefor certain period, have shown potential rolein reducing the irritability in intestines byimproving overall digestion.

Anti-Obesity Effect: In most of the dieter's tea, the herb of sennais found as primary ingredient. Due to thecombination of acting as laxative andstimulant, regular intake of senna tea isfound to reduce the appetite withoutdisturbing other body systems. It is alsorevealed that its quick gastric and intestinalemptying property augments overall therapyof weight loss as food moves through thesystems quite earlier than many calories getabsorbed. However, this may lead to evendangerous weight loss and hence, beforetaking senna supplement it is important tofix the dosage and period.To lose weight using senna typically meanstaking the product for longer than therecommended two weeks and possiblytaking more than the recommended dosageof 17.2 milligrams daily. Overuse of thisherb is considered senna abuse and cancause serious problems. Drugs.com reporteda case of an anorexia nervosa patient whotook up to 100 tablets of senna daily. Whenyou take more than the dosagerecommended on the package, you run therisk, as this patient did, of developingnephrocalcinosis, or too much calcium in thekidneys; finger clubbing, a deformity of thefingers; and osteoarthropathy, a bone andjoint disease.

Anti-inflammatory Effect: Senna possesses natural anti-inflammatoryproperties due to its compound calledresveratrol and hence is used in variousgastrointestinal conditions whereinflammation is one of the symptoms.Furthermore, component found in sennacalled barakol is used for counteractingaconitine poisoning in the gastrointestinaltract.Senna, in some cases, has been used toempty the stomach and intestines so as torelieve from acidity and constipation.

Mizaj (Temperment): Hot 1^0 and dry 1^0

Musleh (Correction): Gul-e-Surkh, Anisun

Badal (Proximal substitute): Amaltas.

Identity, purity & strength:

Foreign matter : Not more than 1 per cent, Appendix 2.2.2

Total ash	: Not more than 14 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 2 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not more than 3 per cent, Appendix 2.2.6
Water- soluble extractive	: Not more than 25 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Mushim, Munaqqi-e-Dimagh, Jali, Mufatteh Sudad, Mukhrij-e-Deedan-e-Ama, Musaffi-e-Dam, Daf-e-Qai.
Mahall-e-Istemalat (Therapeutic uses): Waj-ul-Mafsil, Waj-ul-Qntn, Wajul-Warik, Irq-un-Nisa, Niqras, Zeeq-un-Nafas, Jarab, Busoor, Qulanj
Meqdar-e-khorak (Dose):5 to 10 gm

Side-effects: Senna is likely safe for most adults and children over age 2 when taken by mouth, short-term. Senna is an FDA-approved nonprescription medicine. Senna can cause some side effects including stomach discomfort, cramps, and diarrhea.
Senna is possibly unsafe when taken by mouth long-term or in high doses. Don't use senna for more than two weeks. Longer use can cause the bowels to stop functioning normally and might cause dependence on laxatives. Long-term use can also change the amount or balance of some chemicals in the blood (electrolytes) that can cause heart function disorders, muscle weakness, liver damage, and other harmful effects.

Important formulations: Habb-e-Shabyar, Majoon-e-Musaffi-e-Khoon, Majoon-e-Ushba, Sufoof-e-Chobchini, Sufoof-e-Lajward, Itrifal Ghudadi, Itrifal-e-Shahatra, Sufoof-e-Mulaiyin, Sufoof-e-Mus-hil.

SAZAJ HINDI

(Leaves)

The drug Sazaj Hindi consists of dried mature leaves of *Cinnamomum tamala* Nees of Lauraceae family. Drug yielding plant is a small evergreen tree up to 7.5 meter high and occurs in tropical, sub-tropical Himalayas between 900-2300 meter often raised from seeds.

Other names :

Botanical **:***Cinnamomum tamala* Nees

Family **:** Lauraceae Bengali

Bengali **:**Tejpatra, Tejpata

English name : Indian Cinnamon, Cassia Cinnamon

Description:

General: Cinnamomum tamala is a tree. It grows in parts of the Himalayas and in northern parts of India. The leaf and bark are used as medicine.

Macroscopic:

Leaves: 12.5-20 cm long, 5-7.5 cm wide at the centre, 3 converging nerves form base to apex young leaves pink; petiole 7.5-13 mm long; margin entire, apex acute or accunminate, taste slightly sweet, mucilaginous and aromatic.

Macroscopic:

Petiole and Midrib: Transverse section of petiole and midrib shows epidermis externally covered with cuticle, uniseriate, multicellular (1 to 3 cells), trichomes present, oil cells single or in group, isolated large stone cells, much lignified showing strations found scattered, most of the parenchymatous cells of cortex with reddish-brown contents; pericyle represented by a few layers of sclerenchymatous cells, stele more or less planoconvex as in the midrib of leaf; xylem on upper and phloem on lower side consisiting of usual elements, present.

Lamina: Transverse sections of lamina show dorsiventral structure, represented by palisade tissue on upper and spongy parenchyma on lower side; epidermis same as in midrib, externally covered with cuticle; below upper epidermis single row of closely packed palisade layer followed by multilayered, irregular, thin-walled cells of spongy parenchyma without intercellular spaces; idioblasts containing oil globules present in mesophyll and also in palisade; lower epidermis covered with thick-walled fibres on both sides.

Parts Used: Leaves and barks

Habitat:*Cinnamomum tamala* known as tejpat or bay leaves in trade, found in Himalayan region, is a promising medicinal plant species. They are evergreen trees and shrubs and most species are aromatic and many are economically important. About 20 species occur in this sub-continent.

Phyto Constituents: Essential Oil (Phellandrene and eugenol)

Af'aal-e-Advia (Pharmacological activities):

Antidiarrhoeal Activity: *C. tamala*leaves extract (25, 50 and 100 mg/kg, orally) produced a dosedependentreduction in the total amount of faecal matter in castor oil-induceddiarrhoea. The mean distance travelled by charcoal meal at 50 and 100 mg/kgof extract showed a significant reduction in the secretion of gastrointestinalfluid accumulation by 32.5-65.0%. The Na(+) and K(+) concentrations oncastor oil-induced fluid accumulation showed a greater inhibitory effect onNa(+) levels than on K(+) concentrations. *C. tamala*significantly

reducedthe lipid peroxidation and increased the catalase activity in comparison to thecastor oil-induced groups.

Antihyperlipidemic Activity: The aqueous and ethanolic extracts of leaves of *C. tamala*Nees. at a dose of400mg/kg /day p.o. for 10 days showed hypolipidemic effect in high cholesteroldiet induced hyperlipidemia. The simultaneous administration of *C.tamala*Nees. leaves extracts significantly prevented the rise in serum levelsof total cholesterol, triglyceride, LDL-C, VLDL-C and atherogenic indexwhereas significant increases in the level of HDL-C was observed.

Anti-inflammatory activity: The anti-inflammatory effect of the aqueous extract of *C. tamala*leaves atdose of 100, 200 and 400 mg/kg showed anti-inflammatory effect by various*in vivo* and *in vitro* screening methods. The acute inflammation was evaluatedby carrageenan induced paw edema in rats and acetic acid-induced vascularpermeability in mice. In vitro anti-inflammatory activity of extract (concentrations0.2 – 1 mg/ml) was evaluated by membrane stabilizing activity i.e.red blood cells (RBC's) exposed to hypotonic solution in triplicate. Theplant extract inhibited significantly and dose dependently edema induced bycarrageenan in rats also reduced significantly acetic acid-induced vascularpermeability in mice. The extract exhibited significant membrane-stabilizingproperty in concentration dependent manner up to 1mg/ml *in vitro* modelswhen compared with Indomethacin.

Antioxygenic activity: The tejpat showed the pro- or antioxygenic activity in refined sunflower oilat 370C. Tejpat and its fractions containing chlorophyll showed pro-oxygenicactivity and the catalytic action increased with increase in concentrationof chlorophyll in the fractions. However fractions which did not containchlorophyll were devoid of pro-oxygenic activity.

Acaricidal activity: The aqueous extracts from leaf and barks of tree species of *C. tamala*(Lauraceae) showed acaricidal properties against two-spotted spider mite,*Tetranychusurticae*and *Neoseiuluslongispinosus*Evans (phytoseiid mite),a common potential predator often found associated with *T. urticae*.

Hepatoprotective activity: The methanolic extract of *Cinnamomumtamala*leaves showedhepatoprotective activity against paracetamol induced hepatic damage inSwiss albino mice at two different doses 100 and 200 mg/kg body weight.The liver marker enzymes SGOT, SGPT, ALKP, serum bilirubin and othermetabolic parameters total cholesterol, HDL

were evaluated in all the experimentalgroups. The changes in liver function parameters were significantcomparing with disease control and efficacy was comparable with standarddrug silymarin. The efficacy of the extract was found to be dose dependentmanner. The histopathology study of liver also evidenced for hepatoprotectiveactivity of *C. tamala*by showing improved architecture of liver cells in thetreatment groups.

Gastroprotective effects: The *C. tamala*leaves at 50, 100 and 200 mg/kg body weight for 5 daysshowed gastroprotective effects against ethanol, cold-restraint stress andpylorus ligation induced ulcers. A significant reduction in lesion index wasobserved in ulcer-induced animals treated with plant at different doses whencompared with ulcerated rats. A significant decrease occurred in the level ofH+K+ATPase, volume of gastric juice, and acid output. Simultaneously thelevel of gastric wall mucus and pH were increased significantly. The antioxidantenzyme levels of LPO and SOD were decreased while administeringplant at different doses compared with their control values. Thegastroprotective activity of *C. tamala*was probably due to its free radicalscavenging activity.

Antioxidant activity: A methanolic extract of bay leaf showed antioxidant activity in vitro assays.A significant increase in the levels of lipids and lipid peroxidation productsand a decline in antioxidant potential were observed in diabetic rat brainsynaptosomes. The extract displayed scavenging activity against superoxideand hydroxyl radicals in a concentration-dependent manner. Further, theextract showed inhibition of Fe (2+)-ascorbate induced lipid peroxidation inboth control and diabetic rat brain synaptosomes. Maximum inhibition oflipid peroxidation, radical scavenging action and reducing power of extractwere observed at a concentration of 220 microgram. These effects of extractin vitro were comparable with that of butylated hydroxyl toluene (BHT), asynthetic antioxidant. The synaptosomes from diabetic rats are susceptibleto oxidative damage and the positive effects of bay leaf in vitro, could beattributed to the presence of antioxidant phytochemicals.

Antibacterial activity: The aqueous and alcoholic extracts of *Cinnamomumtamala*demonstratedpotential antibacterial activity against six bacterial strains belonging to Enterobacteriaceae,viz., *Enterobacter aerogenes* ATCC13048, *Escherichia coli*ATCC25922, *Klebsiella pneumoniae* NCIM2719, *Proteus mirabilis* NCIM2241, *Proteus vulgaris* NCTC8313, and *Salmonella typhimurium*ATCC23564. The alcoholic extract was found more active than aqueousextract. The most susceptible bacterium was *K. pneumoniae*, while the mostresistant bacteria were *S. typhimurium* and *E. coli*.

A-amylase inhibitory activity: The methanol and successive water extract of bark of *C. tamala*showed a-amylase inhibition for antidiabetic activity. The percentage inhibition valuesof methanol and successive water extract of bark were found to be 97.49%and 93.78% respectively. Similarly, IC50 values of methanol and successivewater extract of the *C. tamala*were found to be 1.80 and 5.53. The methanolextract of *C. tamala*showed high potent activity than successive waterextracts.

Immunomodulatory activity: The hexane and solvent free extract (CTH) of dried powder of *C. tamala*leaves showed immunomodulatory activity when given orally to rats for10 days, in various doses. Its effect was studied on peritoneal macrophagefunctions, and was compared with ascorbic acid (1,000 mg/kg, immune-stimulant)and cyclophosphamide (10 mg/kg, immune-suppressant). CTH significantlysuppressed phagocytosis activity (EC50 2,355 ± 52.45 mg/kg), reducedproduction of superoxide (EC50 275.91 ± 10.21 ìg/ml) and cellularNADPH (EC50 384.959 ± 4.85 ìg/ml) content in concentration dependentmanner. It also inhibited LPS induced production of nitric oxide (EC50 143.75 ± 3.40 ìg/ml) and iNOS protein expression (EC50 183.132 ìg/ml). Thenon-polar hexane fraction of leaves of *C. tamala*possesses immunosuppressiveproperty, which may be mediated through modulation of innate immunity.

Antibacterial activity: Several investigations have been performed on the antimicrobial activity of different species of *Cinnamomum*essential oils and crude extracts against several pathogenic microorganisms [4,18-22]. Singh et al., [19] analysed the antibacterial potential of several essential oils and acetone extract of various spices along with *C. tamala*against *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Bacillus cereus*, *Bacillus subtilis* and *Staphylococcus aureus*. The analysis revealed that the essential oils showed excellent activity against tested organism as compared to the acetone extract. In the same way, Kapoor et al., [18] investigated the antimicrobial activity of essential oil and oleoresins of *C. tamala*against bacteria and fungi and reported that both oil and oleoresins revealed effective antimicrobial activity against tested organisms.

Antioxidant activity: Previously antioxidant activity of *C. tamala*has been evaluated by different methods. Some authors evaluated the activity of extracts of nine plants selected from the family Euphorbiaceae, Lauraceae, Malvaceae and Balsaminaceae using petroleum ether, chloroform, ethyl acetate and methanol/n-butanol in order of increasing polarity using Soxhlet

apparatus. Methanolic extracts of *C. zeylanicum*and *C. tamala*showed highest antiradical (96.8%) and phosphomolybdate (1.131) activity, respectively, while ethyl acetate extract of *R. communis*exhibited maximum lipid per-oxidation (FTC) activity (79.3%). IC50 value of chloroform extract of *C. tamala*(2.2 g/ml). These correlations have suggested that polyphenols are mainly responsible for the antioxidant activity displayed by these extracts.

Antidiabetic activity: The blood glucose lowering effect of 95% ethanolic extract of *C. tamala*leaves as investigated at a single oral dose of 250 mg/kg body weight in normal fasted, fed, glucose loaded and streptozotaocin-induced diabetic male albino rats. Authors demonstrated the significant reduction in blood glucose levels observed in fasted, fed and diabetic rats. Extract also suppressed the peak value significantly in the glucose loaded rats. Marked degranulation in pancreatic β-cells of extract treated rats associated with corresponding blood glucose lowering suggests insulin secretogogue effect of extract that promote the peripheral utilization of glucose and also increase the muscle glycogen store in fed model, resulting in hypoglycaemic response.

Hypolipidemic activity: Authors have studied the hypolipidemic effect of *C. tamala*leaf extracts in high cholesterol diet induced hyperlipidemia. Aqueous and ethanolic extracts of leaves of *C. tamala*were administered in doses of 400 mg/kg/day p.o. each for 10 days. Simultaneous administration of *C. tamala*leaves extracts significantly ($p<0.001$) prevent the rise in serum levels of total cholesterol, triglyceride, LDL-C, VLDL-C and Atherogenic index whereas significant ($p<0.01$) increases in the level of HDL-C.

Hepatoprotective activity: Some authors evaluated the hepatoprotective activity of *C. tamala* and reported the extract was administered p.o to the albino mice at two different doses 100 and 200 mg/kg body weight. The healthy control, disease control and standard drug silymarin treated groups were also maintained for the comparison. The liver marker enzymes SGOT, SGPT, ALKP, serum bilirubin and other metabolic parameters total cholesterol, HDL were evaluated in all the experimental groups. The changes in liver function parameters were significant comparing with disease control and efficacy was comparable with standard drug silymarin. The efficacy of the extract was found to be dose dependent manner. The histopathology study of liver also evidenced for hepatoprotective activity of *C. tamala*by showing improved architecture of liver cells in the treatment groups. Further research on isolation and characterization of functional molecules from the extract has to be focused.

Gastroprotective activity: Some authors demonstrated the antidiarrhoeal potential of 50% ethanolic extract of *C. tamala*on experimentally induced castor oil diarrhoea, gastric emptying of phenol red meal, gastrointestinal transit of charcoal meal and in vitro mast cell degranulation activity. *C. tamala*extract (25, 50 and 100 mg/kg, orally) produced a dose-dependent reduction in the total amount of faecal matter in castor oil-induced diarrhoea. The mean distance travelled by charcoal meal at 50 and 100 mg/kg of extract showed a significant reduction in the secretion of gastrointestinal fluid accumulation by 32.5–65.0%. The Na+ and K+ concentrations on castor oil-induced fluid accumulation showed a greater inhibitory effect on Na+ levels than on K+ concentrations. *C. tamala*significantly reduced the lipid peroxidation (P<0.001) and increased the catalase (P<0.01) activity in comparison to the castor oil-induced groups. *C. tamala*leaf extract did not show any significant effect at a higher dose (15 mg/ml) on mast cell degranulation. However, the extract in the dose of 5 and 10 mg/ml conferred significant mast cell protective action (P<0.001). The percentage of eugenol in extract is 3.8% w/w, and total tannin is 247.5 mg/g. The result indicates the Indian spice *C. tamala*is useful for diarrhea.

Immunomodulatory activity: The leaves of *C. tamala*component of Indian spices are associated with hypoglycemic property in Ayurveda; authors were demonstrated the dried powder of CT leaves was extracted with hexane and solvent free extract (CTH) was given orally to rats for 10 days, in various doses. Its effect was studied on peritoneal macrophage functions, and was compared with ascorbic acid (1,000 mg/kg, immune-stimulant) and cyclophosphamide (10 mg/kg, immune-suppressant). CTH significantly suppressed phagocytosis activity (EC50 2,355 ± 52.45 mg/ kg), reduced production of superoxide (EC50 275.91 ± 10.21 µg/ml) and cellular NADPH (EC50 384.959 ± 4.85 µg/ml) content in concentration dependent manner. It also inhibited LPS induced production of nitric oxide (EC50 143.75 ± 3.40 µg/ml) and iNOS protein expression (EC50 183.132 µg/ml). Thus, it could be suggested that non-polar hexane fraction of leaves of *C. tamala*possesses immunosuppressive property, which is mediated through modulation of innate immunity.

Anti-inflammatory activity: The anti-inflammatory effect of the aqueous extract of *C. tamala*leaves at dose of 100, 200 and 400 mg/kg showed anti-inflammatory effect by various *in vivo* and *in vitro* screening methods. The acute inflammation was evaluated by carrageenan induced paw edema in rats and acetic acid-induced vascular permeability in mice. *In vitro* anti-inflammatory activity of extract (concentrations 0.2-1.0 mg/ml) was evaluated by membrane stabilizing activity i.e. red blood cells (RBC's) exposed to hypotonic solution in

triplicate. The plant extract inhibited significantly and dose dependently edema induced by carrageenan in rats also reduced significantly acetic acid-induced vascular permeability in mice. The extract exhibited significant membrane-stabilizing property in concentration dependent manner up to 1 mg/ml *in vitro* models when compared with Indomethacin.

Mizaj (Temperment): Hot 3^0 and dry 2^0

Musleh (Correction): Moatagi Rumi

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 5 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 6 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 9 per cent, Appendix 2.2.7
Volatile Oil	: Not less than 1 per cent, v/w

Aa'mal-e-Advia (Pharmacological action) : Muqawwi-e-aam, Kasir-e-Riyah, Qabiz, Mudirr-e-Haiz,Munaffis-e-Balgham, Mohallil-e-Waram.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Meda, Bakhrulfam, Zof-e-Kabid, Ishal, Sual, Nazla, Zukam.

Meqdar-e-khorak (Dose): 1 to 3 gm

Side-effects: Cinnamomum tamala oil can be irritating to the skin and mucous membranes, including the stomach, intestine, and urinary tract. It can cause side effects such as diarrhea, vomiting, dizziness, drowsiness, and others.

Important formulations: Jawarish-e-Shahreyaran, Jawarish-e-Zarishk, Jawarish-e-Tamar Hindi, Khamira-e-Abresham Arshadwaqa, Kohal-e-Roshnai, Jawarish-e-Narmushk, Majon-e-Muqil, Majoon-e-Kalkalanaj, Majoon-e-Khadar, Majoon-e-Sohag Sonth, Arq-e-Ambar, Arq-e-Juzam, Sufoof-e-Ziabetus Qawi.

SHEETRAJ (Hindi)

(Root)

The drug Sheetraj consists of dried mature root of *Plumbago zeylanica* Linn of Plumbaginaceae family. Drug yielding plant is a large perennial sub-scandent shrub, found throughout the country and occasionally cultivated in gardens.

Other names :

Botanical :*Plumbago zeylanica* Linn

Family : Plumbaginaceae

Bengali : Chita, Sufaid, Chitruke, Chitrak, Chitra

English name : Lead wort, Ceylon lead wort, white flowered lead wort, white lead wort

Description:

General: Plumbago zeylanica is a herbaceous plant with glabrous stems that are climbing, prostrate, or erect. The leaves are petiolate or sessile and have ovate, lance-elliptic, or spatulate to oblanceolate blades that measure 5-9 × 2.5–4 cm in length. Bases are attenuate while apexes are acute, acuminate, or obtuse. Inflorescences are 3–15 cm in length and have glandular, viscid rachises. Bracts are lanceolate and 3-7 × 1–2 mm long. The heterostylous flowers have white corollas 17–33 mm in diameter and tubes 12.5–28 mm in length. Capsules are 7.5–8 mm long and contain are reddish brown to dark brown seeds.

Macroscopic: Roots 30 cm more in length 6 mm or more in diameter as also as short stout pieces, including root stocks reddish to deep brown, scars, of rootles present; bark thin and brown; internal structure striated; odour, disagreeable; taste, acrid.

Microscopic: Transverse section of root shows outer most tissue of cork consisting of 5-7 rows of cubical to rectangular dark brown cells; secondary cortex consists of 2-3 rows of thin-walled, rectangular, light brown cells, most of the cortex cell contain starch grains; secondary cortex followed by a wide zone of cortex, composed of large polygonal to tangentially elongated parenchymatous cells, varying in size and shape, containing starch grains and some cells with yellow contents; fibres scattered singly or in groups of 2-6; phloem a narrow zone of polygonal, thin-walled cells, consisting of usual elements and phloem fibre; similar ot cortical zone, phloem fibres usually in groups of 2-5 or more but occasionally occurring singly, lignified with pointed ends and narrow lumen, similar in shape and size to those of secondary cortex; cambium indistinct; xylem light yellow to whitish ;vessels radially arranged with pitted thickenings; medullary rays straight, 1-6 seriate, cells redially elongated and filled with starch grains; stone cells absent.

Parts Used: Dried mature root

Habitat: Plumbago zeylanica grows throughout the tropical and sub-tropical climates of the world, including Australia and India. In Australia, it grows in the understory of monsoon forests and vine thickets from sea level to 900 m. In Dhofar, Oman, this species is often found growing on Olea trunks.It is also available in Bangladesh.

Phyto Constituents: Plumbagin

Af'aal-e-Advia (Pharmacological activities):

Anti-inflammatoty activity: *Plumbago species* are one of the most importantmedicinal plants which are used for anti-inflammatorydiseases. The root of *P. zeylanica*extracted with methanolwas used for determining the anti inflammatory effects.The methanolic extracts at 300 and 500 mg/kg produced31.03 and 60.3% inhibition of acute inflammation,respectively, in Carrageenin induced raw paw oedemaconfirming that *P. zeylanica*roots are effective againstacute inflammation.

Lipid metabolism activity: Plumbagin (2-methyl-5-hydroxy, 1:4naphthoquinone)isolated from the roots of *P. zeylanica*when administeredto hyperlipidaemic rabbits, reduced

serumcholesteroland. Plumbagin was reported to reduce serumcholesterol and LDL-cholesterol by 53% - 86% and 61%-91% respectively; lower cholesterol/ phospholipid ratio by45.8%; elevates decreased HDL-cholesterol significantly inrabbits.

Wound healing activity: The wound healing activity of *Plumbago zeylanica*wasinvestigated by Devender Rao Kodati*et al*and Reddy *etal*in rat. Significant wound healing activity of methanolicroot extract of *Plumbago zeylanica*was observed.

Antidiabetic activity: Olagunju*et al.*investigate antihyperglycemic effect of *P.zeylanica*on induced diabetic animals.Zarmouh*et al.*shows that oral administration ofethanolic root extract of ***P. zeylanica***(100 mg, 200mg/kg/p.o), tolbutamide (250 mg/kg/p.o) increased theactivity of hexokinase and decreased the activity ofglucose-6-phosphatase ($P < 0.001$) in streptozotocintreated diabetic rats.Christudas Sunil and *et al.*also evaluated theantidiabetic effects of plumbagin isolated from *P.zeylanica*root and its effect on GLUT4 translocation inSTZ-induced diabetic rats.

Memory-inducing activity: Mittal *et al*reported the effect of *P. zeylanica*roots onscopolamine induced amnesia for learning and memoryof mice. The chloroform extract of plant at dose 200mg/kg has shown promising memory enhancing effect inmice. The extract significantly reversed the amnesiainduced by scopolamine (0.4 mg/kg i.p.).

Blood coagulation activity: The structure of *Plumbago zeylanica*active principlecompound is similar to that of vitamin K. The *P. zeylanica*extract (2 mg/kg body weight) and napthoquinone (2mg/kg body weight) given to individual groups werescreened for its effect on bleeding time (BT), clotting time(CT), prothrombin time (PT), platelet count and plateletadhesion in albino rats after 1-day, 15-day and 31-daytreatment. There was no change observed in treatedgroups and control group but the platelet adhesion wassignificantly decreased in *Plumbago zeylanica*andnapthaquinone-treated animals.

Anti-malarial activity: Malaria is normally transmitted to people by mosquitoesinfected with the malaria parasite.Avoiding the bites of *Anopheles* mosquitoes is the bestway to prevent malaria. Plants are traditionally used inIndia for the treatment of malarial fever since timeimmemoral. *Plumbago* spp have been tested formosquito larvicidal activity. The crude extracts whichbeen show highest larvicidal activity against *Anophelesgambiae* were hexane (LC50 = 6.4 μg/mL) andchloroform(LC50 = 6.7 μg/mL) extracts.Patil *et al.*tested extracts of *P. zeylanica*and *C. nocturnum*forlarvicidal activity against second, third, and fourth instarlarvae of *Aedes aegypti*. The LC (50) values of all theextracts in different solvents of

both the plants were lessthan 50 ppm (15.40 to 38.50 ppm) against all tested larvalinstars. Plant extracts also affected the life cycle of *A.aegypti* by inhibition of pupal development and adultemergence with increasing concentrations.Simonsen *et al*.carried out *in vitro* screening of Indianmedicinal plants for anti-plasmodial properties against*Plasmodium falciparum*. Out of 80 analyzed ethanolextracts, from 47 species, significant effects were foundfor 31 of the extracts and only 5 plant extract showspecial interest for further study, one of that was *P.zeylanica*.Plumbagin shows anti-malarial effects on *Plasmodiumfalciparum* enzyme, the succinate dehydrogenase (SDH).It also inhibited the in vitro growth of the parasite with a50% inhibitory concentration of 0.27mM.

Allergic and modulatory effects: Plumbagin, derived from *P. zeylanica*modulates cellular proliferation, carcinogenesis and radio resistance. Allthese reactions should be regulated by the activation ofthe transcription factor NF-kappa B activation pathway.Plumbagin inhibits NF-kappa B activation induced by TNF,other carcinogens and inflammatory stimuli like phorbolmyristate acetate.

Antifertility activity: Some worker reported that *Plumbago zeylanica*treatment during first 7 days of pregnancy abolisheduterine proteins of 13, 000, 19, 000 and 26, 000 and 75,000 Da molecular weights resulting in preimplantationaryloss. Proteins having molecular weights 55,000 and 65,000 Da were absent in aborted rats, that were given *P.zeylanica*root powder since day 6 to day 17 ofpregnancy.

Microbiological activity: Infectious diseases account for a high proportion of thehealth problems in developing countries. Claims ofeffective therapy for the treatment of these diseases haveprompted the interest in scientific investigation. Extractsfrom roots of *Plumbago zeylanica*showed microbiologicalproperties.

Anti-bacterial activity: 82 plants were evaluated for antibacterial activity, amongthem only alcoholic extract of *Plumbago zeylanica,Emblica officinalis, Terminalia chebula, TerminaliaBelerica*howed potential antibacterial activity**.** Thealcoholic extract from roots of *Plumbago zeylanica*wastested against multi-drug resistant of clinical origin(*Salmonella paratyphi, Staphylococcus aureus, Escherichiacoli* and *Shigella dysenteriae*). The extract exhibitedstrong antibacterial activity against all tested bacteria.The chloroform extract of *Plumbago zeylanica*L. Rootshowed antibacterial activity against *Escherichia coli*(16.7 }0.14 mm), *Salmonella typhi*(14.3 }0.04 mm) and*Staphylococcus aureus* (12.0 }0.54 mm). Moderateinhibition is shown against *Klebsiella pneumonia* (9.2}0.73mm), *Serratia*

marcescens (8.6}0.07 mm) and *Bacillussubtilis*(8.0 }0.61 mm), and lowest against *Proteusvulgaris* (5.9}0.55mm) and *Pseudomonas aeruginosa*(4.8}0.87mm). The methanolic extract exhibitedmoderate activity while aqueous extract has been foundweak against the bacterial strains.The synergisticactivity of antimycobacterial constituents from *Plumbagozeylanica*was evaluated in combination with isonicotinicacid hydrazide (INH) against four atypical organisms,namely, *Mycobacterium intracellulare, M. smegmatis, M.xenopei*and *M. chelonei.* The potency of INH wasincreased four-fold, The MIC values of plumbagin (from*Plumbago zeylanica*) were thus lowered from 1.25-2.5 to0.15-0.3 μg/ml due to synergism with INH.

Anti-viral activity: Chenexamined the antiviral activities of the 80%methanolic extracts of *Plumbago zeylanica*againstcoxsackievirus B3 (CVB3), influenza A virus and herpessimplex virus type1 Kupka (HSV-1) using cytopathic effect(CPE) inhibitory assays in HeLa, MDCK, and GMK cells,respectively. The antiviral activity of the most activecompound was confirmed with plaque reduction assays.*Plumbago zeylanica*L had marked inhibition effects onHBeAg and HBsAg which is expressed by cells. In addition,CVB3 was inhibited by the extracts of *Plumbagozeylanica*.

Anti-oxidant activity: Antioxidant effects of the aqueous/alcoholic extracts ofroot, corresponding to medicinal preparations, and theactive ingredient, plumbagin, were studied by Tilak *et al*. Methods used included: ferric reducing/antioxidantpower (FRAP), radical scavenging of 1,1-diphenyl- 2-picrylhydrazyl (DPPH) and 2,2'-azobis-3- ethylbenzthiazoline-6-sulfonic acid (ABTS), lipid peroxidation in rat livermitochondria induced by different agents, and estimatingphenolic and flavonoid content. In FRAP/DPPH assays,boiled ethanolic extracts was the most effective, while inthe ABTS assay boiled aqueous extracts was the mostefficient. These extracts also significantly inhibited lipidperoxidation induced by cumene hydroperoxide,ascorbate-Fe2+ and peroxynitrite and contained highamounts of polyphenols and flavonoids. In conclusion,various studies reveal that extracts of *P. zeylanica*and itsactive ingredient plumbagin have significant antioxidantabilities that may possibly explain some of the reportedtherapeutic effects.

Anti cancer activity: It was observed that the plant *Plumbago zeylanica*showanti cancer activity agains various cancer cell lines. Thereare so many report that show the anti cancer activity ofthe plant *Plumbago zeylanica.*

Mizaj (Temperment): Hot 3^0 and dry 3^0

Musleh (Correction): Cold temperament medicinal plants

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 3 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 12 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 12 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Moharrik-e-Asab, Mohallil-e-Waram.

Mahall-e-Istemalat (Therapeutic uses): Waj-ul-Mafasil, Falij, Laqwa, Zof-e-Asab.

Meqdar-e-khorak (Dose): 1.5 to 3 gm

Side-effects: Sheetraj is concerned about the possible hepato and nephrotoxicity potential of the drug arising due to the long-term administration in the management of chronic disorders. It should not be used during pregnancy.

Important formulations: Majoon-e-Flasifa, Itrifal-e-Kabir, Majoon-e-Jograj Gugal, Raughan-e-Baladur, Jawarish-e-Narmushk, Jawarish-e-Fanjnosh.

SIBR

(Leaves)

The drug Sibr consists of gel and latex, which are used for medicines. Aloegel is the clear, jelly-like substance found in the inner part of the aloe plant leaf. Aloelatex comes from just under the plant's skin and is yellow in color. Drug yielding plant is a shrub planted in many gardens throughout the country.

Other names :

Botanical :*Aloe barbadensis* Mill

Family : Lilliaceae

Bengali : Ghritakalmi, Ghrit-kumari, Musabhar, Kanya

English name : Indian Aloe

Description :

General : Aloe is a cactus-like plant that grows in hot, dry climates. In the United States, aloe is grown in Florida, Texas, and Arizona.

Macroscopic: Dark chocolate brown, to black, compact, irregular masses; surface dull, opaque with slightly vitreous appearance; odour, characteristic; taste, nauseous and bitter.

Microscopic: Powder when mounted in glycerin or lactophenol and examined under the microscope show innumerable crystalline, yellowish-brown to chocolate coloured particles of varying size and shape.

Parts Used **:**Gel and latex of leaves

Habitat **:** The aloe grows wild in tropical and subtropical territories. The plant thrives in arid sandy conditions, dry earth which contains clay and lime and can easily be cultivated.

Phyto Constituents: Anthraquinone, Glycoside.

Af'aal-e-Advia (Pharmacological activities):

Laxative effects: The leaf lining (latex, resin or sap) contained anthraquinone glycosides (aloin, aloe-emodin and barbaloin) which are potent stimulant laxatives. These water soluble glycosides are split by intestinal bacteria into aglycones which have laxative action stronger than senna, cascara or rhubarb root. The anthraquinones found in the latex stimulate chloride and water secretion into the large intestine, inhibit their reabsorption and stimulate peristalsis. The onset of action is 6 –12 hours after a single oral dose. On the other hand, it has severe side effects including diarrhea, nausea, and cramping. For medicinal use, the leaf lining is dried and the residue is used as herbal laxative. The products are taken at bedtime which are poorly absorbed after oral administration. These products excreted in urine, bile, feces and breast milk. The products usually avoided during pregnancy due to the risk of stimulating uterine contractions and during lactation due to the risk of excretion in breast milk.

Wound healing: *Aloe vera*gel enhanced wound healing. It reduced wound diameter (induced on both sides of the vertebral column) by 62.5% in mice receiving 100 mg/kg/day orally and 50.80% in animals receiving topically 25% *Aloe vera*. Many studies showed that aloe hasten wound healing cause by burns, frostbite, electrical injuries, caustic chemicals and surgery. It stimulated the activity of macrophages and fibroblasts which increase both collagen and proteoglycan synthesis and promote tissue repair**.** It also enhanced collagen deposition and cross-linking in granulation tissue in wounds and improved scar strength compared with topical antibiotic medication [26-29]. Acemannan also accelerated wound healing and reduce radiation induced skin reactions.

Anti-inflammatory and Analgesic effects: *Aloe vera*inhibited the production of prostaglandin E2 by 30% at 1 in 50 dilution (P=0.03), but had no effect on thromboxane B2 production. The release of interleukin-8 by CaCo2 cells declined by 20% (P<0.05) with *Aloe vera*diluted at 1 in 100.

Aqueous extract of *Aloe vera*gel showed significant analgesia compared to control. The results were significant (p<0.001) in radiant heat method and also in hot plate method (p<0.05) at the dose of 300 mg/kg. Writhing test showed maximum inhibition (51.17%) at the dose of 300 mg/kg. No adverse effects on renal and hepatic functions were found with *Aloe vera*. Histopathological study of gastrointestinal mucosa showed preservation of normal architecture with *Aloe vera*. The aqueous extract of *Aloe vera*gel has been reported to reduce anti-inflammatory and analgesic effects via inhibition of prostaglandin production from arachidonic acid. It has been utilized for reducing pain during dental treatments, mouth ulcers, sores, blisters, hemorrhoids and for wound healing.

Antimicrobial effects: Aloe gel exerted antibacterial activity against *Staphylococcus aureus, Streptococcus pyogenes, Serratia marcescens, Klebsiella pneumoniae, Pseudomonas aeruginosa, E. coli, Salmonella typhi* and *Mycobacterium tuberculosis*. Aloe-emodin also inhibited the growth of *Helicobacter pylori* [36-38]**.** The activity of leaf pulp and liquid fraction of *Aloe vera*was evaluated against plant pathogenic fungi, Rhizoctonia *solani*, *Fusarium oxysporum,* and *Colletotrichum coccodes,* They possessed an inhibitory effect on *F. oxysporum*at 104 µl/l and the liquid fraction reduced the rate of colony growth at a concentration of 105 µl/1 in *R. solani*, *F. oxysporum, and C. coccodes***.**

Immunomodulatory antioxidant and cytotoxic activity: When *Aloe vera*extract (150 mg/ kg and 300 mg/kg) administered to mice for 5 days, it significantly increased the total count of white blood cell and macrophages [45]. Acemannan increased monocyte and macrophage activity and cytotoxicity, stimulated killer T-cells, enhanced macrophage release of interleukin–1 (IL-1), interleukin-6 (IL-6), tumor necrosis factor alpha (TNF-α), and interferon gamma (INF-□)[46-52]. Treatment with *Aloe vera*appeared effective in reducing genotoxicity of the direct-acting mutagen.

Anti ulcerogenic effect: Aloe-emodin inhibited growth of *Helicobacter pylori* in a dose-dependent fashion. *Aleovera*inhibited gastric acid secretion in mice and rats and has protective effects against gastric mucosal damage in rats. Pretreatment with *Aloe vera*extract reduced aspirin-induced gastric mucosal injury by 70% in experimental rats. *Aloe vera*extracts also

suppressed the ulcerogenic effects of stress in experimental rats. Intraperitoneal injection of ethanol extract exerted a gastroprotective effect in acute gastric mucosal lesions induced by 0.6 M HCl in rats. A clinical study showed that *Aloe vera*gel might be helpful in treating patients with duodenal ulcers.

Cardiovascular effects: *Aloe vera*gel lowered triacylglyceride levels in liver and plasma. Histological examinations of periepididymal fat pad showed that *Aloe vera*gel reduced the average size of adipocytes.

Five thousand patients of atheromatous heart disease, presented as angina pectoris, were studied over a period of five years. After adding the (Husk of Isabgol) and *(Aloe vera*) to the diet, a marked reduction in total serum cholesterol, serum triglycerides, increased HDL, decreased fasting and postprandial blood sugar level in diabetic patients were noted. Simultaneously the clinical profile of these patients showed reduction in the frequency of anginal attacks.

Endocrine effects: Aloe gel decreased blood sugar in diabetic and normal mice. It also decreased insulin resistance in mice [64, 66-68]. In clinical trials, it appeared that orally administered *Aloe gel* (1-2 tablespoons twice daily) enhanced the hypoglycemic effect of glibenclamide.

Toxicity and contraindications: The gel stings a bit when it is first applied. It also causes contact dermatitis. Acute toxicity associated with the leaf lining is mostly gastrointestinal including severe cramping, diarrhea, and nausea. Overdoses have also been associated with nephritis, gastrointestinal hemorrhage, dyspnea, palpitations and fluid depletion. Due to side effects, aloe latex has been replaced by other safer laxatives. Long-term ingestion of aloe leaf lining lead to potassium deficiency, muscle weakness and cardiac arrhythmias. Long-term use of anthraquinones is also associated with development of Pseudomelanosis coli. The treatment should be avoided during pregnancy and lactation. 100-150 mg / Kg of *Aloe vera*extract induced abortion in pregnant female rats.

Mizaj (Temperment): Hot 2^0 and dry 2^0

Musleh (Correction): Katira, Gul-e-Surkh, Honey

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Identification: Mix 0.5 gm with 50 ml of water, boil until nearly dissolved, cool and 0.5 gm of Kieselguhr and filter, to the filtrate apply the following tests.

- Heat 5 ml of filtrate with 0.2 gm of Borax until dissolve, add a few drops of this solution to a test-tube nearly filled with water, a green gluorescence is produced.
- Mix 2 ml of filtrate with 2 ml of a freshly prepared solution of Bromine, a pale yellow precipitate is produced.

Foreign matter : Not more than 2 per cent, Appendix 2.2.2
Total ash : Not more than 5 per cent, Appendix 2.2.3
Acid-insoluble ash : Not more than 2 per cent, Appendix 2.2.4
Alcohol-soluble extractive : Not less than 80 per cent, Appendix 2.2.6
Water- soluble extractive : Not less than 60 per cent, Appendix 2.2.7
Moisture Content : Not more than 10 per cent of its weight when dried to constant wight at 105^0

Aa'mal-e-Advia (Pharmacological action) : Mushil, Mudirr-e-Haiz, Mohallil-e-Waram, Moharrik-e-Kabid

Mahall-e-Istemalat (Therapeutic uses): Qabz, Deedan-e-Ama, Warm-e-Kabid, Waja-ul – Mafasil, Izm-e-Tehal, Ihtebasut Tims.

Meqdar-e-khorak (Dose):1-4 gm

Other uses: For constipation: 100-200 mg of aloe or 50 mg of aloe extract taken in the evening has been used. Also, a 500 mg capsule containing aloe, starting at a dose of one capsule daily and increasing to three capsules daily as required, has been used.

For diabetes: The most effective dose and form of aloe for diabetes is unclear. Multiple doses and forms of aloe have been used for 4-14 weeks, including powder, extract, and juice. Doses of powder range from 100-1000 mg daily. Doses of juice range from 15-150 mL daily.

For a mouth condition called oral submucous fibrosis: Pure aloe vera juice 30 mL twice daily along with applying pure aloe vera gel to lesions three times daily for 3 months has been used.

For weight loss: A specific aloe gel product containing 147 mg of aloe twice daily for 8 weeks has been used.

Side-effects: Aloe gel is likely safe when applied to the skin appropriately as a medicine or as a cosmetic.

Aloe is Possibly safe when taken by mouth appropriately, short-term. Aloe gel has been used safely in a dose of 15 mL daily for up to 42 days. Also, a solution containing 50% aloe gel has been safely used twice daily for 4 weeks. A specific gel complex (Aloe QDM complex Univera Inc., Seoul, South Korea) has been used safely at a dose of about 600 mg daily for up to 8 weeks.

Taking aloe latex by mouth is possibly unsafe at any dose, but likely unsafe when taken in high doses. Aloe latex can cause some side effects such as stomach pain and cramps. Long-term use of large amounts of aloe latex might cause diarrhea, kidney problems, blood in the urine, low potassium, muscle weakness, weight loss, and heart disturbances. Taking aloe latex 1 gram daily for several days can be fatal.

There have been a few reports of liver problems in some people who have taken an aloe leaf extract; however, this is uncommon. It is thought to only occur in people who are extra sensitive (hypersensitive) to aloe.

Important formulations : Zimad-e-Jalinoos, Majoon-e-Antaki, Kohal-e-Bayaz, Habb-e-Muntin Akbar, Habb-e-Mudirr, Habb-e-Ghafis, Iyarji-e- Loghaziya.

ZANJABEEL

(Rhizome)

The drug Zanjabeel consists of dried rhizome of *Zingiber officinale* Rosc. of Zingiberaceae family. Drug yielding plant is widely cultivated throughout the country.

Other names :

Botanical :*Zingiber officinale* Rosc.

Family : Zingiberaceae

Bengali : Ada, Saunth

English name : Ginger

Description :

General : Ginger is a plant with leafy stems and yellowish green flowers. The ginger spice comes from the roots of the plant.

Macroscopic: Rhizome, laterally compressed bearing shor, flattish, ovate, oblique, branches on upper side each having at its apex a depressed scar, pieces about 5-15 cm long, 1.5-6.5 cm wide (usually 3-4 cm) and 1-1.5 cm thick; extrtnally buff coloured showing longitudinal striations and occasional loose fibres; fracture short, smooth, transverse surface exhibiting narrow cortex (about one-third of radius); a well marked endodermis and wide stele showing numerous scattered fibro-vascular bundles and yellow secreting cells; odour; agreeable and aromatic; taste; agreeable and pungent.

Microscopic: Transverse section of rhizome shows cortex of isodiamatric thin-walled parenchyma with scattered vascular strands and numerous isodiametric idioblasts, about 40-80 µ in diameter containing a yellowish to reddish-brown oleo-resin; endodermis slightly thick walled, free from starch; immediately inside endodermis a row of nearly continuous collateral bundles usually without fibers stele of thin walled, parenchyma cells, arranged radially around numerous scattered, collateral vascular bundles, each consisting of a few unlignified, reticulate or spiral vessels upto about 70 µ in diameter; a group of phloem cells, unlignified, thin-walled septtate fibers upto about 30 µ wide and 600 µ long with small oblique, slit like pits, present numerous scattered idioblasts about 8-20 m wide and upto 130 m long with dark reddish-brown contents; in single or in axial rows, adjacent to vessels, present; parenchyma of cortex and stele packed with flattened, rectangular, ovate; ovate; starch grains, mostly 5-15 m , 30-60 m long about 25 m wide and 7 m thick, marked by five transverse striations.

Parts Used : Dried rhizome

Habitat : Ginger is native to warmer parts of Asia, such as China, Japan, and India, but now is grown in parts of South American and Africa. It is also now grown in the Middle East to use as medicine and with food.

Phyto Constituents: Essential Oil, pungent constituents (gingerol and shogal),resinous matter and starch.

Af'aal-e-Advia (Pharmacological activities):

Anti-cancer effects: The anticancer effects of ginger are thought tobe attributed to various constituents includingvallinoids, viz. (6)-gingerol and (6)-paradol,shogaols, zingerone, and Galanals A andB.21,20,27 Galanals A and B have been found tobe potent apoptosis inducers of human Tlymphoma Jurkat cells.

Anticoagulant Effects: Ginger has been shown to inhibit plateletaggregation7,8,13 and to decrease plateletthromboxane production in vitro28,29,13. (8)-Gingerol, (8)-shogaol, (8)-paradol, andgingerol analogues (1 and 5) exhibited antiplateletactivities.13 However, its effects invivo have not been well studied. AlthoughVerma et al. found ginger to decrease plateletaggregation30, Lumb found no effect of gingeron platelet count, bleeding time, or plateletaggregation31. Similarly, Bordia et al. foundginger to have no effect on plateletaggregation, fibrinolytic activity, or fibrinogen levels. Janssen et al. showed no effect oforal ginger on platelet thromboxane B2production, while Srivastava foundthromboxane levels to be decreased by gingeringestion in a small study.

Antiemetic Effects: The mechanism of action of ginger's effect onnausea and vomiting remains uncertain.However, there are several proposedmechanisms. The components in ginger thatare responsible for the antiemetic effect arethought to be the gingerols, shogaols, andgalanolactone, a diterpenoid ofginger.35,36,37 Recent animal models and invitro studies have demonstrated that gingerextract possesses antiserotoninergic and 5-HT3 receptor antagonism effects, which playan important role in the etiology of postoperativenausea and vomiting.38,37,36, In arandomized, placebo-controlled, crossover trialof 16 healthy volunteers, ginger (1g orally) hadno effect on gastric emptying.40 It appearsunlikely that ginger's anti-emetic or antinauseaeffects are mediated throughincreased gastro duodenal motility or throughincreased gastric emptying. Using gastroduodenal manometry, Micklefield et al.demonstrated that oral ginger increases antralmotility during phase III of the migrating motorcomplex (MMC) and increases motorresponse to a test meal in thecorpus.41 However, ginger had no significanteffect in the antrum or corpus during otherphases, except for a significant decrease inthe amplitude of antral

contractions duringphase II of the MMC. Additionally, there wasno effect of ginger on duodenal contractions oron the "motility index."

Anti-Inflammatory Effects: Ginger has a long history of use as an anti-inflammatoryand many of its constituentshave been identified as having anti-inflammatoryproperties.9 Ginger has beenfound to inhibit prostaglandinbiosynthesis19 and interfere with theinflammatory cascade and the vanilloidnociceptor12. Ginger has been shown to sharepharmacological properties with non-steroidalanti-inflammatory drugs (NSAIDs) because itsuppresses prostaglandin synthesis throughthe inhibition of cyclooxygenase-1 andcyclooxygenase-2. However, ginger can bedistinguished from NSAIDs based on its abilityto suppress leukotriene biosynthesis byinhibiting 5-lipoxygenase. This discoverypreceded the observation that dual inhibitorsof cyclooxygenase and 5-lipoxygenase mayhave a better therapeutic profile and havefewer side effects than NSAIDs. It was alsodiscovered that a ginger extract (EV.EXT.77)derived from *Zingiber officinale*(and Alpinagalanga) inhibits the induction of severalgenes involved in the inflammatory response,including genes encoding cytokines,chemokines, and the inducible enzymecyclooxygenase-2. This discovery provided thefirst evidence that ginger modulatesbiochemical pathways activated in chronicinflammation. Identification of the moleculartargets of individual ginger constituentsprovides an opportunity to optimize andstandardize ginger products with respect totheir effects on specific biomarkers ofinflammation.

Antioxidant Effects: In vitro, ginger has been shown to exhibitantioxidant effects.15 (6)-gingerol appears tobe the antioxidant constituent present inginger, as it was shown to protect HL-60 cellsfrom oxidative stress.7 Ginger oil hasdominative protective effects on DNA damageinduced by H2O2. Ginger oil might act as ascavenger of oxygen radical and might beused as an antioxidant.

Cardiovascular Effects: In vitro research indicates that gingerols andthe related shogaols exhibit cardio depressantactivity at low doses and cardiotonic propertiesat higher doses.7 Both (6)-shogaol and (6)gingerol, and the gingerdiones, are reportedlypotent enzymatic inhibitors of prostaglandin,thromboxane,and leukotriene biosynthesis.

Gastrointestinal Effects: There is evidence that ginger rhizome (root)increases stomach acid production. If so, itmay interfere with antacids, sucralfate(Carafate), H2 antagonists, or proton pumpinhibitors. In contrast, other in vitro and animalstudies have revealed gastro protectiveproperties.16, 17 in addition, (6) shogaol,generally more potent than (6)-gingerol,

hasinhibited intestinal motility in intravenouspreparations and facilitated gastrointestinalmotility in oral preparations. Ginger extract hasalso been reported to inhibit the growthof Helicobacter pylori in vitro.5 However, Desaiet al. observed a significant increase in theexfoliation of gastric surface epithelial cellsfollowing the consumption of 6g or more ofginger (after examining gastric aspirates in 10healthy volunteers).23

Weight Loss Effects: Spiced foods or herbal drinks, such as thosethat contain ginger, have the potential toproduce significant effects on metabolictargets, such as satiety, thermogenesis, andfat oxidation.11 A significant clinical outcomessometime may appear straightforwardly butalso depends too strongly on full complianceof subjects. Thermogenic ingredients, such asginger, may be considered as functionalagents that could help restore a "positiveenergy balance" and prevent obesity.

Antiarthritic Effect: A study investigated the antiarthritic effects ofginger and its bioactive constituents. A wellcharacterizedcrude ginger extract wascompared with a fraction containing [6]-gingerol and their derivatives to inhibit jointswelling in an animal model of rheumatoidarthritis, streptococcal cell wall-inducedarthritis. Both extracts demonstrated anti-inflammatoryactivity. The crudedichloromethane extract, containing essentialoils and more polar compounds, was moreefficacious, when normalized to [6]-gingerolcontent, in preventing, both joint inflammationand destruction. Non-gingerol componentsenhance the antiarthritic effects of the morewidely studied [6]-gingerol.

Antimicrobial Activities: Ingenol and [6]–shogaol, isolated from gingerrhizome, demonstrated antiviral activity.32[10]-gingerol has been reported as activeinhibitor of M. avium and M. tuberculosis invitro. Gingerol and related compounds havebeen investigated for antimicrobial activities.[6]- gingerol and [12]-gingerol, isolated fromginger rhizome, demonstrated antibacterialactivity against periodontal bacteria.

Antigenotoxic Activity: Norethandrolone and oxandrolone wereinvestigated for their genotoxic effect onhuman lymphocyte chromosomes usingchromosomal aberrations and sister chromatidexchanges as parameters and subsequentlyGenistein and [6]-gingerol were used asantigenotoxic agents to ameliorate thegenotoxicity induced by the steroids.Norethandrolone and oxandrolone werestudied at 5, 10, 20, 30 and 40 μM,respectively and were found to be significantlygenotoxic at 30 and 40 μM. Genistein and [6]-gingerol proved to be equally effective inreducing genotoxic damage at appropriatedoses.

Mizaj (Temperment): Hot 3^0 and dry 3^0

Musleh (Correction): Honey, Coconut oil

Badal (Proximal substitute): Akarkarah, Filfilsiyah

Identity, purity & strength:

Foreign matter	: Not more than 1 per cent, Appendix 2.2.2
Total ash	: Not more than 6 per cent, Appendix 2.2.3
Water- soluble ash	: Not more than 1.5 per cent, Appendix 2.2.5
Alcohol-soluble extractive	: Not less than 3 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 10 per cent, Appendix 2.2.7

Aa'mal-e-Advia (Pharmacological action) : Kasir-e-Riyah, Hazim Munaffis-e-Blagham, Jali.

Mahall-e-Istemalat (Therapeutic uses): Nafkh-e-Shikham, Waj-ul-Meda, Zof-e-Ishteha, Waj-ul-Mafasil, Waj-ul-Qutn, Sual, Zeequn-Nafas, Sailan-ur-Rahem.

Meqdar-e-khorak (Dose) : 1 to 2 gm

Side-effects : Ginger is likely safe when taken by mouth appropriately. Some people can have mild side effects including heartburn, diarrhea, and general stomach discomfort. Some women have reported extra menstrual bleeding while taking ginger.
Ginger is possibly safe when it is applied to the skin appropriately, short-term. It might cause irritation on the skin for some people.

Important formulations : Habb-e-Ambar Momyaee, Habb-e-Hilteet, Habb-e-Hindi Mohallil, Habb-e-Hindi Zeeql, Habb-e-Pachlona, Habb-e-Kabid Naushardi, Habb-e-Miskeen Nawaz, Habb-e- Mushil-Dimaghi, Habb-e-Papita Desi, Habb-e-Papita Wilayati, Habb-e-Shifa, Habb-e-Tursh Mushtahi, Kohal-ul-Jawhir, Kohal-e-Roshnai, Halwa-e-Gazar, Jawarish-e-Bisbasa, Jawarish-e-Falafali, Jawarish-e-Fanjnosh, Jawarish-e-Jalinoos, Jawarish-e-Kamooni, Jawarish-e-Narmushk, Jawarish-e-Safarjali, Qabiz, Jawarish-e-Shahreyaran, Jawarish-e-Utraj, Jawarish-e-Zanjbeel, Luboob-e-Kabir, Luboob-e-Saghir, Majoon-e-Aqrab,

Majoon-e-Baladur, Majoon-e-Bandkushad, Majoon-e-Flasifa, Majoon-e-Fanjnosh, Majoon-e-Jograj Gugal, Majoon-e-Kallalanaj, Majoon-e-Lana, Majoon-e-muluki, Majoon-e-Mukil, Majoon-e-Nankha, Majoon-e–Piyaz, Majoon-e-Salab, Majoon-e-Seer Alvi Khani, Majoon-e-Suhag Sonth, Majoon-e-Suparipak, Majoon-e-Suranjan, Murabba-e-Zanjabeel, Raughan-e-Ispand, Raughan-e-Jauzmasil, Iyarij-e-Loghazia, Sufoor-e-Hazim Kalan, Sufof-e-Mushil, Suffof-e-Qaranful.

ZARD CHOB

(Rhizome)

The drug Zard Chob consists of dried rhizomes of Curcuma longa Linn of Zingiberaceae family. Drug yielding plant is a perennial herb extensively cultivated in all parts of the country.

Other names :

Botanical :*Curcuma longa* Linn

Family : Zingiberaceae

Bengali : Haldhi, Haldi, Halalda, Pitras

English name : Turmeric

Description :

General : Turmeric is a spice that comes from the turmeric plant. It is commonly used in Asian food. But the root of turmeric is also used widely to make medicine. It contains a yellow-colored chemical called curcumin, which is often used to color foods and cosmetics.

Macroscopic: Rhizomes ovate, oblong or pyrifrom (round turmeric) or cylindreical, often short brached (long turmeric), former about half as broad as long, latter 2-5 cm long and about 1-1.8 cm thick, externally yellowish to yellowish-brown with root scars and annulations of

leaf bases; farcture horny, fractured surface orange to reddish brown; central cylinder twice as broad as coetex; odour and taste characteristic.

Microscopic: Transverse section of rhizome shows epidermis with thick-walled, cubical cells of various dimensions; cortex characterized by the presence of mostly thin-walled, rounded parenchyma cells scattered collatered collateral vascular bundles; a few layers of cork developed under epidermis of 4-6 layers of thin walled, brick-shapped parenchyma; cells of ground tissue contain starch grains of 4-15µin diameter; oil cells with suberised walls containing either orange-yellow globules of volatile oil or amorphous resinous mater, vassels mainly spirally thickened, a few reticulate and annular.

Parts Used : Dried rhizomes

Habitat : The origin of *Curcuma Longa* is Southern Asia, most probably from India. This plant is a sterile triploid, and it grows up continued selection and vegetative propagation of hybrid between the diploid wild Turmeric. *Curcuma Longa* is a tropical plant, and it grows in a humid warm weather with a lot of rainfall.

Phyto Constituents: Essential Oil and colouring matter (curcumin)

Af'aal-e-Advia (Pharmacological activities):

Gastrointestinal disorders: The fresh juice of Haridra isconsidered to be anthelmintic. The Curcumin acts through nuclearfactor (NF)-κB inhibition and it reduces the production of adhesionmolecules and inflammatory cytokines, resulting in the amelioration ofgastric injury in NSAIDs-induced gastropathy in rats. It also improvesgastric mucosal damage and decreases in leukocyte adhesions, andintercellular adhesion molecule 1 and tumor necrosis factor (TNF)-αproduction after curcumin administration. Curcuma longa extracttablet decreased IBS prevalence and abdominal pain/discomfort scoresignificantlybetween baseline and after treatment of eight-week.There were significant improvements in the IBS quality of life (QOL)scales [14]. In liver injury of Male mice Curcumin prevents APAPinducedhepatitis through the improvement of liver histopathology bydecreased oxidative stress, reduced liver inflammation, and restorationof GSH.

Respiratory disorders: The fresh juice of rhizome is given inbronchitis. In rhinitis and cough boil Haridra in milk and mixed withjiggery given internally. In catarrhal cough, sore throat, and throatinfection the decoction of rhizome is used for gargle and also the pieceof rhizome is

slightly burnt and given for chewing [11]. The chemicalconstituents of *Curcuma longa* like Tumerones, curcuminoids,Curcumin and tetrahydrocurcumin has an anti-asthamatic action [16].In asthma and congestion, fumes of Haridradidhumvarti (fumes wick)is given.

Inflammatory disorders: Curcumin has been shown to inhibita number of different molecules involved in inflammation includingphospholipase, lipooxygenase, COX-2, leukotrienes, thromboxane,prostaglandins, nitric oxide, collagenase, elastase, hyaluronidase,MCP-1, interferon-inducible protein, tumor necrosis factor, andinterleukin-12 [18]. Studies has proven bisdemethylcurcumin(BDC) is more potent as an anti-inflammatory agent as indicatedby suppression of TNFinduced NF-κB activation, more potent as ananti-proliferative agent, and more potent in inducing reactive oxygenSpecies(ROS). Hispolon analogues, which lacks one aromatic unit inrelation to curcumin, also exhibited enhanced anti-inflammatory andanti-proliferative activities [19]. The beneficial effect of curcumin(anti-inflammatory compound) in sepsis appears to be mediated by theupregulation of PPAR-γ, leading to the suppression of pro inflammatorycytokine, TNF-α expression and release.

Diabetes mellitus: Turmeric rhizome powder is very useful withAmla juice and Honey in Madhumeha (diabetes mellitus) [21]. Theingestion of 6 g *Curcuma longa* increased postprandial serum insulinlevels, but did not seem to affect plasma glucose levels or GI, in healthysubjects. The results indicate that *Curcuma longa* may have an effect oninsulin secretion. The active principles in the rhizome of Turmericplant viz; curcuminoids lower lipid peroxidation by maintaining theactivities of antioxidant enzymes like superoxidedismutase, catalaseand glutathione peroxidase at higher levels. Antioxidant properties ofcurcuma longa is due to curcumin and its three derivatives (dimethoxy curcumin, bisdemethoxy curcumin and diacetyl curcumin).A scientific and systemic exploration reveals the antidiabetic,hypolipidemic and hepatoprotective effects of *Curcuma longa* freezedried rhizome powder dissolved in milk which could be used as aneffective and safe antidiabetic dietary supplement of high potential. *Curcuma longa* is known to contain curcuminoids, glycosides,terpenoids, and flavonoids. Maximal inhibition of the enzymeHuman Pancreatic Amylase (HPA) was obtained with *Curcuma longa*isopropanol extract and acetone extract. This inhibitory action on HPAcauses reduction in starch hydrolysis leading to lowered glucose levels.

Cardiovascular disorders: The antioxidants in turmeric alsoprevent damage to cholesterol, thereby helping to protect againstatherosclerosis. In fact, the ability of the antioxidants in turmeric todecrease free radicals is similar to that in vitamins C and E. Since theantioxidant

activities of turmeric are not degraded by heat (unlike mostvitamins), even using the spice in cooking provides benefits. Animalstudies show that curcumin lowers cholesterol and triglycerides,another fat that circulates in the blood stream and is a risk factor forcardiovascular disease. In a recent study of atherosclerosis, micewere fed a standard American diet, rich in refined carbohydrates andsaturated fat, but low in fiber. Some of the mice, however, receivedthis diet plus turmeric mixed in with their food. After four months onthese diets, the mice that consumed the turmeric with their food had 20percent less blockage of the arteries than the mice fed the diet withoutthe turmeric. In another study, rabbits were fed turmeric plus a dietdesigned to cause atherosclerosis. Several risk factors for the diseasewere improved, including a decrease in cholesterol, triglycerides, andfree-radical damage.

Hepatoprotective: The powder of the rhizome mixed with amlajuice is used in jaundice. Corriliyum (Anjana) with Haridra, Redochre (Gairika), and Amalaki (*Emblica officinalis*) cures jaundice.Curcumin, the most common antioxidant constituent of *Curcumalonga* rhizome extract, was reported to enhance apoptosis of damagedhepatocytes which might be the protective mechanism wherebycurcumin down-regulated inflammatory effects and fibrogenesis ofthe liver. The ethanolic extract of *Curcuma Longa* rhizomes showeda significant hepatoprotective effect when orally administrated indoses of 250 mg/kg and 500 mg/kg, and the protective effect was dosedependent.The main constituents of *Curcuma longa* rhizome ethanolicextract are the flavonoid curcumin and various volatile oils, includingtumerone, atlantone, andzingiberene. The hepatoprotective effects ofturmeric and curcumin might be due to direct antioxidant andfreeradical scavenging mechanisms, as well as the ability to indirectlyaugment glutathione levels, thereby aiding in hepatic detoxification.The volatile oils and curcumin of Curcuma longa exhibit potent anti-inflammatory effects.

Neuroprotective activity: Curcuma oil significantly reduces theill effect of ischemia by attenuating nitrosative and oxidative stress.Ischemia induces collapse of mitochondrial membrane potential,cytochrome c release, altering the Bax: Bcl-2 ratio and subsequentlycaspases activation led to induction of apoptosis in sequential fashionwas reverse significantly by Curcuma oil. So there is an evidence forthe high efficacy of Curcuma oil as a neuroprotective, with an excellenttherapeutic window for the prevention of ischemic brain injury.

Chemoprotective activity: Curcumin activate the DDR (DNAdamage response), providing an opportunity and rationale for theclinical application of these nutraceuticals in the chemoprevention ofprostate cancer. Chemoprotective effects in esophageal epithelialcells

exposed to bile acids**;** Curcumin reverses bile acid suppression ofgene expression of SOD-1 and also able to inhibit bile acid inductionof COX-2 gene expression. Curcumin has demonstrated thesechemopreventive properties in cell cultures, animal models and humaninvestigations.

Anti-cancer activity: Curcumin has been found to possess anticanceractivities via its effect on a variety of biological pathways involvedin mutagenesis, oncogene expression, cell cycle regulation, apoptosis,tumorigenesis and metastasis. Curcumin has shown anti-proliferativeeffect in multiple cancers, and is an inhibitor of the transcription factorNF-B and downstream gene products (including c-myc, Bcl-2, COX-2, NOS, Cyclin D1, TNF-a, interleukins and MMP-9). In addition,curcumin affects a variety of growth factor receptors and cell adhesionmolecules involved in tumor growth, angiogenesis and metastasis.Curcumin asserts its anti-tumor activity in cancer cells by altering thederegulated cell cycle *via* (a) cyclin-dependent (b) p53-dependent and(c) p53-independent pathways. Such influences of curcumin upon keysignal transduction pathways of cell cycle and effectiveness in animalmodel systems have qualified it as a multiple edged sword in combatingthe deadly disease-cancer. Curcumin as a natural phytochemicalscould communicate with these novel targets and show synergism tochemotherapy. Additionally, curcumin is well tolerated in humans.Therefore, EGFR- miRNA- autophagy and cancer stem cell-basedtherapy in the presence of curcumin might be promising mechanismsand targets in the therapeutic strategy of lung cancer.

Anti-allergic activity: Curcumin suppressed compound48/80-induced rat peritoneal mast cell (RPMC) degranulation andhistamine release from RPMCs. Curcumin inhibited compound48/80-induced systemic anaphylaxis *in vitro* and anti-DNPimmunoglobulin E (IgE) mediated passive cutaneous anaphylactoidresponse *in viv*o. Curcumin has an ability to inhibit nonspecific andspecific mast cell-dependent allergic reactions.

Antidermatophytic activity: Fresh juice of rhizome of Haridra isused as antiparastic in many skin affections [12]. Its rhizome powdermixed with cow's urine is taken internally in itching and dermatitis.*Curcuma longa L.* leaves have good promise as an antifungal agent thatcould be used as a therapeutic remedy against human pathogenic fungion account of its various *in vitro* and *in vivo* antifungal properties,*viz.*, strong fungicidal action, long shelf-life, its tolerability of heavyinoculum density, thermo stability, broad range of antidermatophyticactivity and absence of any adverse effects. Curcumin obtained from theturmeric rhizome (*Curcuma longa*) have shown to possess the ability toprotect the skin from harmful UV-induced effects by displaying

antimutagen,antioxidant, free radical scavenging, anti-inflammatory andanti-carcinogenic properties.

Curcumin prevents drug resistance: The Curcumin is a potentdrug resistance preventer. It exhibits novel ability to prevent the upregulationof P-glycoprotein and its mRNA induced by Adriamycin (ADM). The prevention capacity is also functionally associated withthe elevated intracellular drug accumulation and parallel enhancedADM cytotoxicity.

Mizaj (Temperment): Hot 3^0 and dry 3^0

Musleh (Correction): Lemon juice

Badal (Proximal substitute): No proximal substitute is identified.

Identity, purity & strength:

Identification:

- On the addition of Concentrated Sulphuric acid or a mixture of concentrated sulphuric acid and alcohol to the powdered drug, a deep crimson colour is produced.
- A piece of filter paper is impregnated with an alcoholic extract of the powder, dried and then moistened with solution of Boric acid slightly acidified with Hydrochloric acid, again, the filter paper assumes a pink of brownish red colour which becomes deep blue of greenish-black on the addition of alkali.

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 9 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 8 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 12 per cent, Appendix 2.2.7
Volatile Oil	: Not less than 4 per cent v/w

Aa'mal-e-Advia (Pharmacological action) : Mohallil-e-Waram, Musakkin, Jali, Mujaffif, Daf-e-Tashannuj.

Mahall-e-Istemalat (Therapeutic uses): Qurooh, Waj-ul-Mafasil, Ramad, Zof-e-Basarat, hikka, Zeeq-un-Nafas, Nazla, Zukam, Kharish.

Meqdar-e-khorak (Dose): 5 to 7 gm

Side-effects : Turmeric is likely safe when taken by mouth or applied to the skin appropriately for up to 8 months.

Turmeric is possibly safe when it is used as an enema or a mouthwash in the short-term.

Turmeric usually does not cause significant side effects. But some people can experience stomach upset, nausea, dizziness, or diarrhea.

In one report, a person who took very high amounts of turmeric, over 1500 mg twice daily, experienced a dangerous abnormal heart rhythm. However, it is unclear if turmeric was the actual cause of this side effect. Until more is known, avoid taking excessively large doses of turmeric.

Important formulations: Marham-e-Jadwar, Raughan-e-Sanan, Sufoof-e-Tehal,Sunoon-e-Zard.

ZEERA SIYAH

(Seeds)

The drug Zeera Siyah consists of dried ripe fruits of *Carum carvi* Linn of Umbelliferae family. Drug yielding plant is a biennial herb, 30-90 cm high, cultivated as a cold season crop in plains of Bangladesh and India.

Other names :

Botanical :*Carum carvi* Linn

Family : Umbelliferae

Bengali : Kalajira, Jira

English name : Black Caraway, Caraway, Common Caraway

Description :

General : The aromatic dried seeds of *Carum carvi*, also known as black caraway and cumin seeds are widely used as a spice for culinary purposes and for flavoring confectionaries. In Traditional Unani and Ayurvedic medicine, *Carum carvi* is widely used as medicine for the relief of different diseases.

Macroscopic: Fruit greenish-brown, slightly curved, elongated; mericarps, usually separate, free from the pedical; carbophores upto 7 mm long 2 mm broad almost equally five sided, narraw, tapering to each end, arcuate, glabrous, brown with five very narraw, yellowish primary ridges; endosperm, orthospermous; odour and taste, aromatic and characteristic.

Microscopic: Transverse section of fruit show pericarp with outer epidermis of polygonal tabular cells with a thick outer wall and striated cuticle; trichomes, absent; vittae four dorsal, intercostals and two commissural extending the length of each mericarp, with and epithelium of brown cells and volatile oil in the cavity; mesocarp parenchymatous without reticulate thickening; costae five in each mericarp with vascular strand consisting of an inner group of small vessels and fibres and arched, outer group of pitted sclerenchyma with a small group of phloem on each lateral surface; on the outer margin of each vascular strand a small

schizogenous canal extending into both stylopod and pedicel; inner epidermis of thin-walled, subrevtangular cells, elongated tangentially, each about 8-12 µ wide and 40-100 µ long, arranged paralled with one another; endosperm of thick-walled, celluslosic parenchyma, containing much fixed oil and numerous small aleurone grains upto 10 µ in diameter, each containing one of sometimes two micro-rosette crystals of calcium oxalate; carpohore, when present, passing at the apex to a raphe in rach mericarp, and with a small strand of sclerenchyma, the sclereids of which continue into the stylopod.

Powder: Colour fawn to brown; epidermal cells of pericarp with striated cuticle; fragmants of brown endothelium of vitae, parenchyatous cells of the mesocarp without reticulate thickening rectangular, finely pitted sclerids of mesocarp, thick-walked polygonal parenchymatous cells of endosperm containing much fixed oil; numerous small aleurone grains containing microrosette crystals of calcium oxalate; trchomes; starch and parquetry layer absent; it contains no less than 2.5 per cent of volatile oil.

Parts Used: Dried ripe fruits

Habitat: Caraway is native to Europe, but also to western Asia and North Africa. Its natural habitats are well drained sunny meadows, hills and roadsides but it can also be found naturalized around old crofts and farm houses. It reaches about 60 cm (24 in) tall and 25 cm (9.8 in) wide, bearing frilly leaves and hermaphroditic flowers; it is pollinated by insects and self-fertile.

Phyto Constituents: Essential Oil (Carvone and Carvacrol)

Af'aal-e-Advia (Pharmacological activities):

Adaptogenic (antistress) and nootropic activity: Aqueous extract of *Carumcarvi*was evaluated for antistress activity in normal and stress induced rats. The study showed that the extract provides scientific support as anti-stress (adaptogenic), antioxidant and nootropic activity in stress induced rats (Koppula*et al.*, 2009).

Anti-bacterial: The antibacterial activity of *Carumcarvi*essential oil is apparently due to carvone, limonene, carvacrol, and linalool, which inhibits the growth of *Aspergillus parasiticus*and yeasts and Gram-positive and Gram-negative bacteria. The activity was particularly high against the genera Clavibacter, Curtobacterium, Rhodococcus, Erwinia, Xanthomonas, Ralstonia, and Agrobacterium, which are responsible for plant or cultivated mushroom diseases worldwide (Iacobellis*et al*., 2005). *Caraway* essential oil performs

medium antimicrobial activity. Hence it inhibits growth of many bacteria and fungi: *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Vibrio cholerae*, *Mycobacterium tuberculosis* (Seidler-Lozykowska*et al.*, 2013). The oil showed complete inhibition of the growth of the fungi *Aspergillus aegytiacus*, *Penicillium cyclopium*Westling and *Trichoderma viride*Pers (Anonymous, 1992)

Anti-diabetic: Ethanolic extract of *Caraway (Carumcarvi*L.*)* has hypoglycemic effect in streptozotocin-induced diabetic rats. The hypoglycemic activity of Caraway may be due to inhibition of hepatic glucose production and/or stimulation of glucose utilization by peripheral tissues, especially muscle and adipose tissue (Eidi*et al.*, 2010).

Anti-fertility: Endocrinological and physiological changes in the reproductive system of female albino rats were observed after oral administration of different doses of aqueous and ethanolic extracts of *Carumcarvi.* They also increase the weight of ovary, uterus and body weight. Caraway has estrogenic activity. It inhibits FSH and LH secretion from pituitary and prevents the development of new follicle in ovary resulting inhibition of ovulation and impairment of fertility and thus leads to contraception (Thakur *et al*, 2009).

Anti-hemolytic: Methanolic and acetonic extracts of Caraway seeds were able to neutralize free radicals (can cause hemolysis) and carried antioxidant properties. Caraway seed extracts were able to protect erythrocytes from hemolysis due to the presence of bioactive compounds that perform a radical-scavenging activity (Atrooz, 2013).

Anti-spasmodic: *Carumcarvi* has anti spasmodic activity and their effect is slightly greater than that of usual dose of atropine on acetylcholine-induced contractions of isolated guinea pig ileum (Khalighi*et al.*, 1988).

Anti-asthma: Caraway has relatively potent relaxant (bronchodilator) effect on the tracheal chain of guinea pig. The β-2 adrenergic receptor stimulatory and / or H1 histamine blocking effect might be contributed to functional antagonist of the essential oil of *Carumcarvi*at tracheal muscarinic receptors (Boskabady&Talebi, 1999).

Antioxidant: Caraway has antioxidant activity in streptozotocin induced diabetic rats. It also improved immune functions by increasing total IgE, decreasing inflammatory cytokines (IL-6, IL-1 and TNF) and the decreasing total blood count with increasing neutrophil percent. *CarumCarvi*oil may serve as a natural hypoglycemic antioxidant compound. It may help in

attenuating diabetic complications by reducing oxidative stress and improving immune functions (Moubarz*et al*., 2014).

Anti-obesity: Caraway is helpful in the management of obesity because of its bioactive constituents. Caraway extract with no restriction in food intake, when combined with exercise, is of value in the management of obesity in women wishing to lower their weight, BMI, body fat percentage, and body size, with no clinical side effects (Kazemipoor*et al*., 2013).

Bowel motility: To evaluate effect of the *Carumcarvi*plant, a gas solvent, on resumption of bowel motility after cesarean section. The study proved that according to the principles of Iranian traditional medicine it is effective to promote bowel function in women after caesarean section (Yosefi*et al.*, 2014).

Gastric action: The Aqueous and ethanolic extracts reduced lesions of gastric mucosal injuries when administrated orally or intraperitoneally at doses of 100-500 mg/kg in several *in vivo* models such as rat models of colitis and gastric mucosal injuries.

Caraway oil reduces lesions when administrated orally or intraperitoneally at doses of 100-400 µl/kg or 100-300 mg/kg in *in vivo* models of colitis and gastric mucosal injuries in rats (Anonymous, 2015).

Hypoglycemic*:* *Caraway* has antihyperglycemic activity. Oral administration of *caraway* decreases blood glucose level of treated streptozotocin (STZ) induced diabetic rats (Haidari *et al.*, 2011). *CarumCarvi*essential oil mainly Carvone and limonene exhibits a potent hypoglycemic effect in STZ induced diabetic rats and reduces blood glucose in diabetic and *Staphylococcus aureus* infected diabetic rats. Caraway also increases total leucocyte count and total immunoglobulin E and decreases inflammatory cytokines (interleukin 6, interleukin 1 and tumor necrosis factor) in diabetic and diabetic infected rats (Moubarz*et al*., 2014).

Hypolipidemic: Aqueous extract of *Carumcarvi*has hypolipidemic property in diet induced hyperlipidemic rats. It reduced lipid levels more, effectively than the simvastatin. Its hypolipidemic effect is due to a counteraction of free radicals by its antioxidants i.e. Quercetin (flavonoids) and Carvone (Saghir*et al*., 2012). *Caraway* has hypolipidemic activity in diabetic rats. It caused significant decrease in total cholesterol and low-density lipoprotein cholesterol levels in the treated animals compared with the diabetic control rats, and with no significant change in triglyceride and high density lipoprotein cholesterol levels (Haidari *et al.*, 2011).

Hypothyroidism:*Carumcurvi*has property to increase thyroid stimulating hormone (TSH) in hypothyroid patients. Caraway interferes with levothyroxine effect in hypothyroid patients and increase TSH level, but the exact mechanism of action of *Carumcarvi*is not known (Naghibi*et al.,* 2015).

Nephroprotective effect: *Carumcarvi*essential oil showed nephroprotection against diabetic nephropathy in streptozotocin induced diabetic rats because carvon, γ-terpinene and Limonene are bioactive compounds of caraway, has strong anti-oxidant activity and synergistic action (Abou El-Soud*et al.,* 2014).

Mizaj (Temperment): Hot 2^0 and dry 2^0

Musleh (Correction): Sirka, Katira gum

Badal (Proximal substitute): Shah Jeera

Identity, purity & strength:

Foreign matter	: Not more than 2 per cent, Appendix 2.2.2
Total ash	: Not more than 9 per cent, Appendix 2.2.3
Acid-insoluble ash	: Not more than 1.5 per cent, Appendix 2.2.4
Alcohol-soluble extractive	: Not less than 2 per cent, Appendix 2.2.6
Water- soluble extractive	: Not less than 12 per cent, Appendix 2.2.7
Volatile Oil	: Not less than 3.5 per cent v/w

Aa'mal-e-Advia (Pharmacological action) : Hazim, Kasir-e-Riyah, Muqawwi-e-Meda.

Mahall-e-Istemalat (Therapeutic uses): Zof-e-Meda, Nafkh-e-Shikam, Su-e-Hazm

Meqdar-e-khorak (Dose): 3 to 5 gm

Side-effects : Caraway oil can cause belching, heartburn, and nausea when used with peppermint oil. It can cause skin rashes and itching in sensitive people when applied to the skin.

Important formulations: Jawarish Kamooni, Majoon-e-Kalkatanaj, Majoon-e-Jograj, Gugal, Habb-e-Pachlona, Habb-e-Jund, Sufoof-Muqliyasa, Sufoof-e-Habb-ur-Rumman, Sufoof-e-Moya.

Name of assigned expertsfor compilation of following Monographs

A .Dr. Shariq H. Khan		
MONOGRAPHS OF SINGLE DRUGS		
Sl. No.	Unani Name	Botanical Name
01.	Anisoon (Fruit)	*Pimpinellaanisum*Linn.
02.	Anjeer (Fruit)	*Ficuscarica* Linn.
03.	Aspaghol (Seed)	*Plantagoovata*Forsk.
04.	Azaraqi (Seed)	*Strychnosnux-vomica* Linn.
05.	Dhatura (Seed)	*Daturametel* Linn.
06.	Gul-e-Banafsha (Flower)	*Viola odorata* Linn.
07.	Gul-e-Madar (Flower)	*Calotropisprocera*Ait.
08.	Hanzal (Root)	*Citrulluscolocynthis*Schard.
09.	Hina (Leaf)	*Lawsoniainermis* Linn.
10.	Hulba (Seed)	*Trigonellafoenum-graecum* Linn.
11.	InderjaoShireen (Seed)	*Wrightiatinctoria*Roxb.
12.	Katai (Shoot)	*Solanumsurattense*Burm.
13.	Khulanjan (Rhizome)	*Alpiniagalanga* Linn.
14.	KunjadSiyah (Seed)	*Sesamumindicum* D.C.
15.	Neem (Leaf)	*Azadirachtaindica* A. Juss.
16.	Panwar (Seed)	*Cassia tora* Linn.
17.	Aftimoon (Whole plant)	*Cuscutareflexa*Roxb.
18.	Bakayin (Leaf)	*Meliaazedarach* Linn.
19.	Gul-e-Surkh (Flower)	*Rosa damascena* Mill.
20.	Mulsari (Flower)	*Mimusopselengi* Linn.
21.	Neem (Seed)	*Azadirachtaindica* A. Juss.
22.	Qirfa (Stem bark)	*Cinnamonum cassia*Blume.
23.	Sanvhalu (Fruit)	*Vitexnegundo* Linn.
24.	Sazaj Hindi (Stem bark)	*Cinnamonumtamala*Buch. Ham.
25.	Talmakhana (Seed)	*Asteracanthalongifolia*Nees.

B. Dr. Md. Muslim Uddin		
MONOGRAPHS OF SINGLE DRUGS		
Sl. No.	***Unani Name***	***Botanical Name***
01.	Aam (Stem bark)	*Mangiferaindica*Linn
02.	Aamla(Fruits)	*Phyllanthusemblica*Gaertn
03.	Arjun(Stem bark)	*Terminaliaarjuna*
04.	Asgand(Roots)	*Witheniasomnifera*
05.	Aslussus(Stolon and root)	*Glycirrhizaglabra* Linn
06.	Babchi (Rfuits)	*Psoraleacorylifolia* Linn
07.	Badiyan(Fruits)	*Foeniculumvulgare* Mill
08.	Balela(Fruits)	*Terminaliabellerica* Roxb
09.	Bedanjeer(Seeds)	*Ricinuscommunis* Linn
10.	Belgiri(Fruits)	*Aeglemarmelos*
11.	Bhangra(Whole plant)	*Eclipta alba*Hassk
12.	Chiraita(Whole plant)	*SwertiachirataBuch*
13.	Chirchita(Root)	*Achyranthesaspera* Linn
14.	Doob(Root)	*Cynodondectylon*
15.	FilfilSiyah(Fruit)	*Piper nigrum* Linn
16.	Fufal(Seeds)	*Areca catechu Linn*
17.	Gilo(Leaves)	*Tinosporacordifolia*
18.	HabbusSalatin(Seeds)	*Croton tiglium*
19.	JalBrahmi(Whole plant)	*Bacopomonniera*linn
20.	Jamun(Stem Bark)	*Syzygiumcumini* Linn
21.	Jamun(Seeds)	*Syzygiumcumini* Linn
22.	Karanja(Root)	*Pongamiapinnata* Linn
23.	Karela(Fresh fruit)	*Momordicacharantia* Linn
24.	Katan(Seeds)	*Linumusitatissimum*
25.	Kishneez(Seeds)	*Coriandrumsativum* Linn
26.	Kutki (Rhizome)	Picrorhizakurrooa
27.	Mader(Stem bark)	*Calotropisprocera*
28.	Mako(Whole plant)	*Solanumnigrum* Linn
29.	Narmusk(Stamens)	*Mesuaferrea* Linn
30.	Neelofer(Flowers)	*Nymphaenouchali* Burn
31.	Neem(Stem bark)	*Azadirachtaindica*
32.	Neem(Leaf)	*Azadirachtaindica*
33.	Sana(Leaves)	*Cassia angustifolia*
34.	Sazaj Hindi(Leaves)	*Cinnamomumtamala*Nees
35.	Sheetraj(Root)	*Plumbagozeylanica* Linn
36.	Sibr(Leaves)	*Aloe barbedinsis* Mill
37.	Zanjabeel(Rhizome)	ZingiberofficinaleRosc.
38.	ZardChob(Rhizome)	*Curcuma longa* Linn
39.	ZeeraSiyah(Seeds)	*Carumcarvi* Linn

C . Dr. Mohammad Nazrul Islam		
MONOGRAPHS OF SINGLE DRUGS		
Sl. No.	**Unani Name**	**Botanical Name**
1.	Ajwainkhurasani (Seed)	*Hyoscyamusniger*
2.	Asrol (Root)	*Rauwolfiaserpentina*
3.	Karanjwa (Seed)	*Caesalpiniabonduc*
4.	Khayar(Seed)	*Cucumissativus*
5.	Nana (Leaf)	*Menthaarvensis*
6.	Neem (Bark)	*Azadirachtaindica*,
7.	Neem (Fruit)	*Azadirachtaindica*,
8.	Rehan (Leaf)	*Ocimumtenuiflorum*
9.	Sad kufi (Rhizome)	*Cyperusrotundus*
10.	Sambahalu(Leaf)	*Vitexnegundu* Linn
11.	Sarson(Seed)	*Brassica campestris Linn*
12.	Seer (Bulb)	*Allium sativum*
13.	Sehjana(Leaf)	*Moringaoleifera*
14.	Sembhal (Stem bark)	*Bombaxceiba*
15.	Tukhmekhatmi (Seed)	*Althaeaofficinalis*
16.	Abresham(Silk cocoon)	*Bombyxmori*
17.	Ajwain (Fruit)	*Trachycpermumammi*
18.	Anar (Fresh seed)	*Punicagranatum*
19.	Angoor(Fruit)	*Vitisvinifera*
20.	Arusa (Leaf)	*Adhatodavasica*
21.	Bisbasa(Aril)	*Myristicafragrans*
22.	Jao(Fruit)	*Hordeumvulgare*
23.	Maghzetukhmekaddushireen(Kernel)	*Cucurbitamoschata*
24.	Mayeenkalan(Gall)	*Tamarixgallica*
25.	Oodhindi(Heart wood)	*Aquilariaagallocha*
26.	Palashpapra(Seed)	*Buteamonosperma*
27.	Raal (Resinous exudate)	*Shorearobusta*
28.	Reesh-e-bargad (Aerial root)	*Ficusbangalensis*
29.	Satawar(Tuberous root)	*Asparagus racemosus*
30.	Sahtara(Whole plant)	*Fumariaparviflora*
31.	Tamar hindi (Fruit pulp)	*Tamarindusindica* Linn
32.	Tambol (Leaf)	*Piper betle*
33.	Tukhmegajar (Seed)	*Daucuscarota*
34.	Tukhmekasni (Seed)	*Cichoriumintybus*
35.	Gurmur (Stem and leaf)	*Gymnemasylvestre*
36.	Chobchini(Tuberous root)	*Smilax china*

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