

Review Article

A Descriptive Review on Traditional Herbal Drug-Terminalia Chebula

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A B S T R A C T

Terminalia chebula is an important medicinal plant in pharmaceutics and used in Unani System of Medicine (USM) from ancient time to combat various diseases and infections due to its potential medicinal use. This herb has been considered the valuable and cheap source of unique phyto-constituents (tannins, alkaloids, phytochemicals) which are used widely in the development of drugs with higher safety margins and lesser side effects against different types of diseases. It is commonly called Haritaki and belongs to the family Combretaceae. It is known as black myroban, Harad and Halaila in English, Hindi and Persian respectively. In Tibet, it is known as "king of the medicines". This herb has a unique mention in various traditional medicine systems due to its amazing power of healing. Unani physicians have been using this drug as a brain tonic, eye tonic, cardiogenic, stomach tonic, kidney tonic, blood purifier, astringent, purgative (bile), cholagogue, melanogogue, carminative, digestive anthelmintic, anti-inflammatory and antidiarrheal agent. Hence this drug having a momentous position in Unani system of medicine and text.

The previous pharmacological studies showed that T. chebula possesses antibacterial, antifungal, antiviral, antidiabetic, antimutagenic, antioxidant, antiulcer and wound healing properties. It also prevents cardiac damage and is used for the treatment of kidney disease. T. chebula and its phytoconstituents have a therapeutic effect with no toxicity. This review was designed to lime light the T. chebula by describing its traditional, therapeutic and others uses.

Keywords: Anti-bacterial, Halaila, Medicinal Application, Phytoconstituents, Terminalia Chebula

Introduction

Terminalia chebula (Halaila) is an important medicinal plant used in Unani System of Medicine (USM) from the dawn of civilization to combat various diseases and have been considered the precious and economical source of unique phytoconstituents which are utilized widely

in the development of drugs against different diseases.¹ It is a flowering evergreen tree, belonging to the family Combretaceae. It has several common names such as Black myrobalan, ink tree or chebolic myrobalan and also known as "King of medicine" in Tibet. It is extensively exercised herb of USM not only used in India but also in



many other regions of Asia and Africa². It is beneficial in cancer, paralysis, cardiovascular disease, leprosy, gout, epilepsy, ulcer, rheumatoid arthritis, piles, gastric disorders etc.^{2,3,4} The pharmacological studies showed that *T. chebula* possesses antibacterial, antifungal, antiviral, antidiabetic, antimutagenic, antioxidant, antiulcer and wound healing properties etc. it is used widely in the formation of many extremely valuable Unani formulations to treat the many infectious diseases like bleeding and ulceration of gums, conjunctivitis, diarrhea, dysentery, fungal infection of skin.^{2,5,6,7} The fruit and bark are the main parts used for medicinal purpose in USM.^{2,6} It strengthens the brain, eye, gums, prevent ageing and also increase body resistance against disease.^{2,5,6}

Botanical Description⁸

Taxonomy

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Myrtales

Family: Combretaceae

Genus: Terminalia

Species: chebula

Habit and Habitat

The tree of *T. chebula* is a highly branched deciduous with 24-30 m height.⁸ Leaves are 7 to 20 cm long, not clustered, distant, alternate, elliptic-oblong, acute, rounded. Flowers are short-stalked, hermaphrodites, yellowish white with a strong unpleasant odour and are found in terminal spikes. Drupes ellipsoidal, ovoid, yellow to orange-brown, sometimes tinged with red or black and hard when ripe, 3 to 5 cm long, ribbed on drying. Seeds are hard, pale yellow.⁹ It is found throughout the greater parts of India from Ravi eastwards to West Bengal and Assam, ascending to an altitude of 1500 m in the Himalayas. It is also found in Bihar orissa, Madhya Pradesh, Maharashtra, Deccan and south India.^{10,11} It grows in deciduous forests of Himachal Pradesh, Tamil Nadu, Kerala, Karnataka, Uttar Pradesh andhra Pradesh and West Bengal.⁸

Varieties

According to Basri Terminalia chebula is of 4 types; halela-e-zard, halela-e-hindi (smaller and black coloured), halela-e-siyah (large size) and hashaf waqaq also known as halaila chini.¹² However, some Unani Physicians described the following three varieties of halela-

Halail-e-siyah (choti har): The fruit falls off from tree before seed formation and turns black within a few days.

Halaila-e-zard: The fruit doesn't fall off from the tree but is semi-ripe, having a seed within it.

Halaila-e-kabuli (kabuli har): The fruit is fully developed, completely ripe and attain full growth.¹³

Plant Profile

Botanical Name: Terminalia chebula^{5,14,15,16,17}

Common Name: Harada⁶

Family: Combretaceae^{6,17}

Vernacular Names

Arabic: Ahleelalj, Ahilaj asfar^{5,18}

Persian: Halela^{5,18,19}

Hindi: Har, Hara, Harar^{5,6,19}

English: Chebulic Myrobalan^{5, 16,17}

Part Used

Bark^{14,20}

Fruit²

Temperament

Cold in first degree and dry in second degree^{14,21}

Traditional Uses

Unani physicians extensively described this herb as a medicinal plant to treat the different diseases since ancient time. It is widely used drug in Ayurveda, Siddha, Unani and Homeopathic system of medicine in India. it is a top listed herb in Unani Materia medica for treatment of asthma, hemorrhoids, sore throat, gastric disorders (vomiting, anorexia, flatulence), diarrhea, dysentery, splenomegaly, epilepsy, leprosy, skin disorders, melancholia, gout and joints pain.^{6,9,22,23}

Ibn Hubal, renowned Unani physician, in his famous book "Kitab Al-Mukhtarat Fi-Al-tib" mentioned that *T. chebula* acts as an excellent brain tonic, eye tonic, cardiogenic and blood purifier. Hence, the Unani physicians used this herb for the treatment of dementia, conjunctivitis, cataract, zoaf-e-basarat, palpitation.²⁴ It is used in Thai traditional medicine as a craminative, astringent and expectorant.²⁵ The "Triphala", a herbal preparation of "three fruits" from plants *T. chebula*, *T. bellerica*, *Emblica officinalis*, is used as an excellent laxative in chronic constipation, rejuvenator of the body, poor digestion and detoxifying agent of colon also²⁶. Recent studies have shown that "Triphala" improve appetite and useful in treating cancer and detoxification²⁷.

The fruits of halaila are used by Unani physicians both externally as well as internally for treatment purpose. Externally, the ointment (marham) of halaila (prepared from roghan gul, halaila powder and mom) was used by Unani physicians to cure the piles.⁵ The gargle with its

decoction gives excellent results in stomatitis, bleeding and ulceration of gums and sore throat. The powder of Triphala can be used externally for hair wash and prevent hair falling and whitening. A fine powder of halaila is used as a tooth powder to strengthen the gums.^{5,21,22,24} The paste of fruit with honey also beneficial in conjunctivitis due to its anti-inflammatory property.⁵ The paste of fruits effectively decrease swelling, accelerate the healing and unsoiled the wounds. Halaila also prevents the collection of pus in skin disorders. The oil (roghan) of halaila is extremely helpful in healing of wound especially in burns.⁸

Internally, halaila is applied to cure a vast variety of diseases. The murabbah of halaila is used as an excellent brain tonic, cardiogenic, stomach tonic and in problem of constipation. According to Rhaze's (Rhazi), when halaila powder consumed regularly, it promotes memory, thinking and reasoning power, boosts the nervous system due to beneficial effects on the nerves of brain and also cure the ascites, splenomegaly, leprosy, colitis and headache. Gastric disorders (anorexia, vomiting, indigestion, flatulence etc.), piles, enlargement of liver and liver, worms, colitis, epilepsy, diarrhea, dysentery can be treated well with halaila. All the verities of halaila are beneficial in chronic fever^{5,21,24}. The decoction of haritaki or triphala is given along with honey in hepatitis. Haritaki powder with honey and ghee is also effective remedy for anemia. In obesity, its decoction with honey reduces the excessive body fats.⁸

Phytochemical Properties

Although several phytoconstituents like tannins, flavinoids, sterols, amino acids, fructose, resin, fixed oil etc. are present in *T. chebula*, however it is fairly rich in different tannins (about 32 percent tannin content). The tannin content of *T. chebula* mainly depends on its geographical distribution.²⁸ The principal components of tannin are chebulinic acid, chebulic acid, gallic acid, ellagic acid and corilagin.

The tannins of *T. chebula* (Halaila) are of hydrolysable type and there are approximately fourteen hydrolysable tannins such as chebulic acid, gallic acid, punicalagin, chebulanin, corilagin, neochenulinic acid, ellagic acid, chebulegic acid, chebulinic acid, 1,2,3,4,6 penta-O-galloyl-b-D-glucose, casuarinin, 3,4,6 tri-O-galloyl-D-glucose and terchebulin. All of these tannins are isolate from fruits of *T. chebula*.²⁹ Some important phytochemicals like anthraquinones, ethaedioic acid, sennoside, 4,2,4-chebulyl-d-glucopyranose, terpinenes and terpinenols have also been reported to be present. Triterpenoids and their glycosides have been isolated from stem bark of *T. chebula*.^{30,31} Current research proved that *T. chebula* contains a lot of phenolics than any other plant.⁸

Precautions

The halaila should be carefully used by lean peoples, fast, in severe weakness, mental depression and in pregnancy.⁸

Pharmacological actions/ Pharmacological Studies

Anti-bacterial activity: Various extracts of *T. chebula* exhibits ant-bacterial property against different bacterial species.³² Kannan et al have investigated two imported antibacterial compounds, Gallic acid and ethyl ester against methicillin-resistant *Staphylococcus*, have been isolated from ethyl alcohol extract of the fruit of *T. chebula*. The *T. chebula* is well effective against *Helicobacter pylori*, bacterium blame to gastritis, ulcer and sometimes stomach cancer.³³ The ether, alcoholic and aqueous extracts of *T. chebula* were tested against *H. pylori*, but the aqueous extract of the plant, at a concentration of 1-2.5 mg/ ml, inhibited the urease activity of *H. pylori*.³⁴ Numerous biologically active components were isolated from butanol fraction of fruit extract of *T. chebula* and tested against 6 intestinal bacteria. Ethanedioic acid proved strong and moderate inhibitory action against *Clostridium perfringens* and *Escherichia coli*, respectively, with no undesirable effects on the growth of the four tested lactic acid-producing bacteria. Ellagic acid exerted an effective inhibitory effect against *C. perfringens* and *E. coli*, but little or no inhibition was observed for behenic acid, β -caryophyllene, eugenol, isoquercitrin, oleic acid, α -phellandrene, β -sitosterol, stearic acid, α -terpinene, terpinen-4-ol, terpinolene or triacontanoic acid.³⁵ The ethanolic extract of *T. chebula* fruit was found effective against both gram-positive and gram-negative bacteria such as *Salmonella typhi* SSFP 4S, *Staphylococcus epidermidis* MTCC 3615, *Staphylococcus aureus* ATCC 25923, *Bacillus subtilis* MTCC 441 and *Pseudomonas aeruginosa* ATCC 27853 suggesting its broad-spectrum antimicrobial activity.³³

Anti-fungal activity: Aqueous extract of *T. chebula* has been reported to exhibit antifungal activity against different varieties of dermatophytes such as *Epidermophyton*, *Floccosum*, *Microsporum gypseum*, *Tricophyton rubrum* and yeasts e.g. *Candida albicans*.^{36,37} Aqueous, alcoholic and ethyl acetate extracts of leaves of *T. chebula* were also tested against five pathogenic fungi (*Aspergillus flavus*, *A. niger*, *Alternaria brassicicola*, *A. alternate* and *Helminthosporium tetramera*) using paper disc method and were found effective compared to that of the reference standard Carbendazim.³⁸

Antiamoebic and immunomodulatory activities: In a study, *T. chebula* was evaluated in an experimental amoebic liver abscess in golden hamsters and in immunomodulation studies. The formulation had a maximum cure rate of 73% at 800 mg/ kg body weight in hepatic amoebiasis. In immunomodulation studies, humoral immunity was improved where T-cell counts remained unchanged in the animals, but the cell-mediated immune response was stimulated.³⁹

Antiplasmodial activity

T. chebula, water extract revealed antiplasmodial activity

in vitro because it inhibits the uptake of [3H] hypoxanthine into the Plasmodium falciparum K1 multidrug-resistant strain and in vivo.⁴⁰

Molluscicidal Activity

The ethanolic extract of *T. chebula* fruit powder exhibits molluscicidal activity against vector snail *Lymnaea acuminata*. Liquid chromatography analyses demonstrated that the active molluscicidal component in *T. chebula* was tannic acid. Therefore, *T. chebula* could be an effective source of molluscicides against the snail *L. acuminata*.⁴¹

Anti-helminthes Activity

The ovicidal and larvicidal activities of ethyl acetate, acetone and methanol extracts of dried leaves and seeds of *T. chebula* were examined in vitro on *Haemonchus contortus* based on egg hatch and larval development assays at 50, 25, 12.5, 6.25 and 3.13 mg/ml. The extracts of leaves and seeds of *T. chebula* showed complete inhibition at 50 mg/ml.⁴²

Anti-viral activity: The extract of the fruit of *T. chebula* showed inhibitory effects on HIV-1 reverse transcriptase.⁴³ In a study, Hot water extract of *T. chebula* showed anti-herpes simplex virus (HSV) activity in vivo and anti-cytomegalovirus (CMV) activity both in vitro and in vivo.⁴⁴ A study proved that *T. chebula* fruits contain 4 human HIV-type-1 integrase inhibitors, for example gallic acid and three galloyl glucoses and suggested that galloyl moiety had a key role for inhibition of the 3'-processing of HIV-1 integrase by these compounds.⁴⁵ *T. chebula* can also be used in sexually transmitted diseases (STDs) and AIDS.⁴⁶ Recently, acetone extract of *T. chebula* has emerged as a new substitute to treat pandemic swine influenza- An infection due to its low price, easy preparation and potential effect.⁴⁷

Antimutagenic and Anti-carcinogenic Activities

Ponnusankar et al have performed by the effect of 70% methanolic fruit extract of *T. chebula* was examined on the growth of numerous malignant cell lines. One of the fractionated compounds from ethanolic fruit extract of *T. chebula*, chebulagic acid, showed potent dual inhibition against COX and 5-LOX. It also showed anti-proliferative activity against HCT-15, COLO-205, MDA-MB-231, DU-145 and K562 cell lines. A recent study has shown the ability of triphala to inhibit cytochrome P450.⁴⁸

Anti-oxidant Activity

Chen et al have done the study on the *T. chebula* and found that it is an excellent anti-oxidant. In a study, 6 extracts and 4 pure compounds of *T. chebula* showed anti-lipid peroxidation, anti-superoxide radical formation and free radical scavenging properties at different concentration. The outcome established that tri-ethyl-chebulate was a powerful antioxidant as well as free-radical scavenger, which might donate to the anti-oxidative ability of *T. chebula*.⁴⁹

Anti-diabetic Activity

The blood sugar level in normal and alloxan diabetic rats reduces significantly within 4 h by Oral administration of 75% methanolic extract of *T. chebula* (100 mg/kg body weight) and constant every-day administration of the medicine produced a sustained result.⁵⁰ The chloroform extract of *T. chebula* seeds (100, 200 and 300 mg/kg body weight) produced a dose-dependent decline in blood sugar level of diabetic rats equally in short term and long term study (300 mg/kg body weight for 8 weeks). Additional, notable renoprotective action was also detected in *T. chebula* treated rats.⁵¹

Anti-anaphylactic Activity

Shin et al have examined on the *T. chebula* along with numerous new medicinal plants help to resist against many stressors in different ways. *T. chebula* diminish the serum histamine levels and showing a strong anti-anaphylactic property when it administered following anaphylactic shock.⁵²

<https://pdfs.semanticscholar.org/582d/1ce689d0092c76d2e08c0dffa479ed32fab4.pdf>

Anti-nociceptive Activity

The petroleum ether, chloroform, ethanol and water extracts of *T. chebula* fruits were evaluated for their analgesic activity using the tail immersion model in mice. The ethanolic extract of the plant exhibited analgesic response at 200- 400 and 800mg/kg body weight in acute pain and in chronic pain studied for 15 days with a maximum analgesic response on 14th day.⁵³

Anti-ulcerogenic Activity

Sharma et al. have examined on the animals pre-treated at 200 and 500 mg/kg body weight with hydro alcoholic extract of *T. chebula* showed a reduction in lesion index, total affected area and percentage of lesion in comparison with control groups in the aspirin, ethanol and cold restraint stress-induced ulcer models.⁵⁴

Anti-arthritis Activity

The hydroalcoholic extract of *T. chebula* produced a significant inhibition of joint swelling as compared to control in both formaldehyde-induced and CFA-induced arthritis. *T. chebula* treatment also reduced serum TNF- α level and synovial expression of TNF-R1, IL-6 and IL-1 β . The authors believed that *T. chebula* could be used as a disease-modifying agent in the treatment of rheumatoid arthritis.⁵⁵

Wound Healing Activity

Choudhary et al have done on the alcoholic extract of the leaves of *T. chebula* caused much faster healing of rat dermal wounds in-vivo due to improved rates of contraction and a decreased period of epithelialization for the topical

administration. Biochemical studies revealed an increase in total protein, DNA and collagen contents in the granulation tissues of treated wounds.⁵⁶

Cyto-protective Activity

Manosroi et al. have performed on the different concentrations of gallic acid and chebulagic acid, isolated from fruit extract of *T. chebula*, blocked cyto-toxic T lymphocyte (CTL)-mediated cyto-toxicity. Granule exocytosis in response to anti-CD3 stimulation was also blocked by the above phyto-chemicals at the equivalent concentrations.⁵⁷

Radio-protective Activity

Gandhi et al. have estimates on the aqueous extract of the fruit of *T. chebula* (50 µg) was able to neutralize 1, 1-diphenyl-2picrylhydrazyl, a stable free radical by 92.9% and protected the plasmid DNA pBR322 from undergoing the radiation-induced strand breaks.⁵⁸

Cardio-protective Activity

Cardioprotective effect of ethanolic extract of *T. chebula* fruits (500 mg/kg body weight) was investigated in isoproterenol-induced myocardial damage in rats. It was reported that the pretreatment with *T. chebula* extract had a cardioprotective effect due to the lysosomal membrane stabilization preventing myocardial necrosis and inhibition of alterations in the heart mitochondrial ultrastructure and function in the experimental rats.⁵⁹

Hepato-protective Activity

The 95% ethanolic extract of *T. chebula* fruit showed hepatoprotective activity against anti-tuberculosis (anti-TB) drug-induced toxicity which could be attributed to its prominent anti-oxidative and membrane stabilizing activities.⁶⁰

Anti-spermatogenic Activity

Gupta et al. have performed on the oral administration (300 mg/kg body weight for 28 days) of the bark of *T. chebula* extracted in acetone, methanol, 50% ethanol and in aqueous solvents caused histological alterations in seminiferous tubules in testes of treated mice.⁶¹

Chemopreventive Activity

In an investigation, *T. chebula* extract treatment prevented nickel chloride induced renal oxidative stress, toxicity and cell proliferation response in male Wistar rats. The authors suggested that *T. chebula* extract could be used as a therapeutic agent for cancer prevention as it blocked or suppressed the events associated with chemical carcinogenesis.⁶²

Hypolipidemic and Hypocholesterolemic Activity

T. chebula extract administration showed hypolipidaemic activity against experimentally induced atherosclerosis and

hypocholesterolemic activity against cholesterol-induced hypercholesterolemia and atherosclerosis.⁶³ Triphala formulation was found to have hypolipidaemic effects on the experimentally induced hypercholesteremic rats.⁶⁴

Therapeutic Uses

- As Halela cause purgation of bile (safra), it is used in bilious and melancholic disorders.^{5,19}
- It is beneficial in piles, epilepsy, diarrhea, dysentery, bleeding and ulceration of gums, leprosy and melancholia.^{6,22,23}
- It strengthens the brain, eye, gums.^{5,6,7}
- It is useful in Zof-e-meda and various diseases of eyes like Zof-e-Basarat (dim-vision), Dhalk and Conjunctivitis.^{5,6,18,19}
- It is useful in gastric disorders such as anorexia, vomiting, indigestion, flatulence and constipation.³
- It is beneficial in Gout and Joints Pain (Wajaul Mafasil).^{3,20}

Dose

7gm-10.5gm²¹, 7gm-17gm²⁰, 5gm-7gm¹⁸

Substitute (Badal)

Post-e-Anar (Epicarp of pomegranate) and Mazu²⁰.

Halela Kabuli⁶.

Toxicology

Harmful (Muzir)

It is harmful to intestine, anus, liver.⁶

Corrective (Musleh)

Unnab (*Zizyphus vulgaris*).⁶

Sapistan (*Cordia latifolia* Roxb).⁶

Almond oil (*Prunus amygdalus* Batsch).²⁶¹

Popular Unani Preparations (Murakkabat).^{5,6}

Habb-e-muqil, Itrifal Saghir, Itrifal Kabir, Itrifal Kishneezi, Itrifal Zamani, Safoof-e-halela.

Conclusion

In spite of the overwhelming influences and our addiction on modern medicines and synthetic drugs, a large section of the world population still likes drugs of plants origin for treatment of the 2,50,000 higher plant species on earth, more than 80,000 are medicinal. However, only 7000-7500 species are used for their medicinal values by traditional communities. *T. chebula* (haritaki) is an essential herb used by renowned Unani Physicians since ancient time to cure various disorders because of having a number of medicinal property. The main action of *T. chebula* are stomachic, blood purifier, diuretic, antidysentric, purgative (safra), sedative, astringent as well as it is a good eye tonic, cardio-tonic and brain tonic. Hence, it is widely used in

Unani Medicine to treat gout, joints pain, conjunctivitis, low vision, piles, epilepsy, melancholia and leprosy, to strengthen the brain, eye, gums and stimulates digestive capacity. It is a good source of a variety of biologically active phytoconstituents such as chebulic acid, chebulinic acid, chebulagic acid, gallic acid, corilagin ellagic acid and other related compounds which are responsible for antimicrobial, antioxidant, antihyperglycemic, anticancer and protective effects on different human vital organs such as nerves, heart, kidney and liver. Traditionally, Terminalia chebula is used to treat a vast variety of health problems. Consequently, there is an urgent need to investigate the biological activity of its phytoconstituents for development of a new more effective, cheap, reliable herbal drug with better efficacy and higher safety margin.

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Conflict of Interest: None

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