

## Pharmacological Review on *Terminalia Chebula*

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### ABSTRACT

Herbal drug product has a special place in the world of pharmaceuticals. *Terminalia chebula* is a deciduous tree, used in traditional medicines. It is reported to contain various bio chemical compounds such as tannins, chebulinic acid, ellagic acid, gallic acid, punicalagin, flavonoids etc. It has been reported as antioxidant, antidiabetic, antibacterial, antiviral, antifungal, anticancerous, antiulcer, antimutagenic, wound healing activities etc. The present review attempts to encompass the up to date comprehensive literature analysis on *Terminalia chebula* with respect to its phytochemistry, pharmacognostic characters and its various pharmacological activities.

**Key Words:** Antimutagenic, Chebulinic acid, Ellagic acid, Punicalagin, *Terminalia chebula*.

### INTRODUCTION

*Terminalia chebula* is a moderate tree used in traditional medicines. It belongs to the family Combretaceae. It is commonly called as Black Myrobalan, Ink tree (or) Chebulic myrobalan. It is extensively used in unani, ayurveda and homeopathic medicine. *Terminalia chebula* is a popular traditional medicine not only used in India but also in other countries of Asia and Africa. This is used in traditional medicine due to the wide spectrum of pharmacological activities associated with the biologically active chemicals present in this plant. It is used for the treatment of number of diseases like cancer, paralysis, cardio vascular diseases, ulcers, leprosy, arthritis, gout, epilepsy etc. It has been reported as antioxidant (Suchalata S et al., 2009), antidiabetic (Rao N.K et al., 2006), antibacterial (Kannan P et al., 2009), antiviral (Kim TG et al., 2001), antifungal, anticancerous, antiulcer, antimutagenic, wound healing activities etc.

It is used extensively in the preparation of many Ayurvedic formulations for infectious diseases such as chronic ulcers, leucorrhoea, pyorrhoea and fungal infections of the skin. It increases the frequency of stools and has got the property of evacuating the bowel completely. It is used to prevent aging and impart longevity, immunity (Vaibhav Aher et al., 2011) and body resistance against disease. It has beneficial effect on all the tissues.



*Terminalia chebula*

### Habitat

It grows in India, Myanmar, Bangladesh, Iran, Egypt, Turkey, China etc. In India Haritaki tree is grown in deciduous forests and found in North India and Southwards to the Deccan table lands at 1000 to 3000 ft. In Myanmar country grows up to 5000 ft.

It consists of pericarp of mature fruit of *Terminalia chebula*, a moderate sized (or) large tree found throughout India chiefly in deciduous forests and areas of light rain fall but occasionally also in slightly moist forests up to about 1500 meter elevation throughout India, flowers appear from April – August and fruits ripen from October – January.

*Terminalia chebula* is also called as Haritaki, Harad, Hirada, Alalekaayi, Kadukkai, Horitoky, Hilikha, Karakkaya in India, Aralu in Srilanka, Zhang-Qin-Ge, Hezi in China, Harra, Harro in Tibet, Myrobalane in Germany, Myrobalan in France.

**Macroscopic characteristics****Tree**

It is a deciduous tree, younger stems glabrescent, woody.

**Leaves**

These are 10 – 20 cm long, sub – opposite, simple; exstipulate; petiolate; laminae broadly elliptic to elliptic – oblong, rarely ovate, the bases obtuse, the margins entire, the tips acute, glabrescent.

**Dry fruits****Leaves****Flowers****Inflorescence**

Its paniculate spikes, terminal and axillary; peduncles tomentose; bracts subulate, small, caducous.

**Flowers**

These are 2 mm long, 3-4 mm in diameter; bracts nearly glabrous, 1.5-2.0 mm long; calyx outside glabrous, inside densely villous, calyx-segments triangular; stamens 3-4 mm long; ovary glabrous, ovoid, 1 mm long; style glabrous, 2.5- 3.0 mm long.

**Fruit**

It is a drupe, glabrous, sub globose to ellipsoid, 2.5 – 5.0 cm by 1.5-2.5 cm, usually smooth or frequently 5-angulate, ridged, wrinkled, turning blackish when dry. Fruits contain astringent substances - tannic acid, Chebulinic acid (Lee HS et al., 2010), gallic acid etc. Resin and a purgative principle of the nature of anthraquinone and sennoside are also present.

**Seed**

one, rough, ellipsoid, 1.0-2.0 cm by 0.2 -0.7 cm and without ridges.

**Microscopic characteristics**

Transverse section of the fruit shows epicarp composed of a layer of epidermal cells, the outer tangential wall and upper portion of the thick radial walls. Mesocarp, 2 or 3 layers of collenchymas followed by a broad zone of parenchyma with fibres and sclereids in groups and vascular bundles, scattered; fibres, simple pitted walls; porous parenchyma; sclereids, various shapes and sizes, mostly elongated; tannins and aggregate crystals of calcium oxalate in parenchyma; starch grains simple rounded or oval in shape, measuring 2-7  $\mu\text{m}$  in diameter. Endocarp consists of thick walled sclereids of various shapes and sizes, mostly elongated. Fibres, sclereids and vessels lignified. Testa, one layer of large cubical cells, followed by a zone of reticulates parenchyma and vessel; tegmen consists of collapsed parenchyma. Cotyledon folded and containing aleurone grains, oil globules and some rosette aggregate crystals.

**Powder**

Brownish in color, under microscope shows a few fibers, vessels with simple pits and groups of sclereids.

**Phytochemistry**

*Terminalia chebula* contains the triterpenes arjun glucoside 1, arjungenin and the chebulosides 1&2. Other constituents contains tannins up to 30%, chebulic acid 3-5%, chebulinic acid 30%, tannic acid 20-40%, ellagic acid, 2,4-chebulyl- $\beta$ -D-glucopyranose, gallic acid, ethyl gallate, punicalagin terflavin A, terchebin, some purgative of the nature of anthraquinone, flavonoids like luteolin, rutins, and quercetin etc.

**Uses of Terminalia chebula**

It is given as adjuvant herb in chronic fever. On long term use it is helpful in gaining weight in the emaciated persons and in losing weight in obese persons. When it is taken with meals it sharpens the intellect, increase strength, stimulates the senses, and expels the urine, stool and waste materials from the body. It reduces the ill effects of fat rich, creamy and oil food. It is used for curing swellings, skin and eye diseases. It can be used as home remedy against fever, cough, asthma and urinary disease. This herb has the ability to stop bleeding and prevent a medical condition called Hemorrhage. Its powder used as toothpaste, it will make your teeth stronger and healthy. The paste of dried fruit is used for chronic ulcers, wounds and scalds.

**Medicinal uses**

It is good to increase the appetite, as digestive aid liver stimulant, as stomachic, as gastrointestinal prokinetic agent and mild laxative. It stimulates

the liver and protects it further by expelling the waste excretory products from the intestines. It is indicated in Protracted diarrhea with hematochezia and prolapse of rectum. It is a good nervine, used in nervous weakness, nervous irritability. It promotes the receiving power of the five senses. It is helpful in renal calculi, dysurea, and retention of urine and used for treating parasitic infection. It is used as a blood purifier, gargle for sore throat, ulcerated gums, and muscular rheumatism. With sugar water it is used to treat ophthalmia, skin itching and edema. It is used as an antioxidant, neuroprotective drug and treatment for heart disease, inflammation, brain dysfunction. It is used as an anti-aging agent and it is found to improve

the mental faculties. The plant also has adrenergic function and helps to recover from stress. One compound Chebulagic acid (Bharat Reddy D et al 2010) from Haritaki has shown antispasmodic action like papaverine.

#### Pharmacological studies

Several pharmacological investigations for different biological activities of *Terminalia chebula* in various in vivo and in vitro test models have been carried out based on the presence of chemical ingredients. A summary of the findings of some of these pharmacological studies is presented below.

Pharmacological activity	Type of extract	Laboratory Organism/ Animal Used	References
Antioxidant	a) 95% of ethanol extract b) water, methanol & 95% of ethanol extract	Adult male albino rats  Fermented products	Suchalata S et al., 2009 Chia-lin chang et al., 2010
Antibacterial	a) Ethanol extract b) Ether, alcoholic, water extract	<i>Salmonella typhi</i> , <i>Staphylococcus aureus</i> , <i>Bacillus subtilis</i> etc. <i>Helicobacter pylori</i>	Kannan P et al., 2009 Malekzadeh F et al., 2001
Antifungal	a) Aqueous, alcoholic, ethyl acetate extract b) 70% of methanol, ethylacetate, hexane, chloroform extract	<i>Aspergillus niger</i> , <i>Aspergillus flavus</i> , <i>Alternaria alternata</i> etc. <i>Fusarium oxysporum</i> , <i>Phytophthora capsici</i> , <i>Fusarium solani</i> etc.	Dr.Saheb L Shinde et al., 2011  Vivek K et al., 2010
Anticancer	70% of methanol	Human(MCF-7), mouse (S115) breast cancer cell lines etc.	Saleem A et al., 2002
Antiviral	a) Acetone extract b) Aqueous extract	Swine influenza A virus  Hepatitis B virus	Hongbo Ma et al., 2010 Kim TG et al., 2001
Antiulcer	Methanolic extract	Wistar albino male rats	Raju D et al., 2009
Antidiabetic	a) Ethanol extract b) chloroform extract	Adult albino male rats  Streptozotocin induced diabetic rats	Gandhipuram Periyasamy et al., 2006 Rao N.K et al., 2006
Wound healing	a) Hydroalcoholic extract b) 90% of ethanol extract	Induced diabetic rats  Wistar albino rats	Manish PalSingh et al., 2009 Choudhary GP 2011
Anticonvulsant	Ethanol, chloroform, Petroleum ether aqueous extract	Rats	Hogade Maheswar G et al., 2010
Antimutagenic	a) Chloroform, aqueous extract b) Acetone, aqueous chloroform extract	<i>Salmonella typhimurium</i>  <i>Salmonella typhimurium</i>	Grover IS et al., 1992 Kaur S et al., 2002
Anticaries	Aqueous extract	<i>Streptococcus mutans</i>	Jagtap AG et al., 1999
Cardio protective effect	95% of ethanol extract	Adult albino male rats	Suchalata S et al., 2005
Radiation protective effect	Aqueous extract	Rats	Jagetia GC et al., 2002
Cytotoxic effect	Acetone extract	Cancer cell lines	Kaur S et al., 2005
Immunodulatory effect	Alcohol extract	Male wistar rats	Vaibhav Aher et al., 2011

#### CONCLUSION

*Terminalia chebula* has long been used because a number of phytochemical constituents have been found to be associated with the plant extract that include mainly the different types of chebulic acid, gallic acid, ellagic acid, tannic acid, amino acids, flavonoids like luteolin, rutins and quercetin etc. These compounds found to be responsible for many of pharmacological activities. From the times immemorial, plants have been widely used as curative agents for variety of ailments.

Concentrated leaves, fruits, seed extracts can be found in various herbal preparations are available in market today. It is believed that detailed information as presented in this review on its phytochemistry, various pharmacognostic and pharmacological properties of the plant and the constituents might provide incentive for proper evaluation of the use of this plant in medicine.

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