Biological Monograph: Haritaki (*Terminalia chebula*)

India is richly endowed with a wide variety of plants of medicinal value. These plants are widely used by all sections of the society, either as folk remedies or as traditional medicines of the Ayurveda, Siddha, and Unani systems. *Terminalia chebula* (commonly known as Black Myrobalan or Chebulic Myrobalan) is a medium to the large deciduous tree, native to South Asia from India and Nepal east to Southwest China, and South to Sri Lanka, Malaysia, and Vietnam.[1] The tree yields a fruit which has an abrasive seed but a fleshy pulp. The seed, called "Harda" is also used in Indian cooking. The plant is highly regarded in Ayurvedic and Tibetan medicines. *T. chebula* has been extensively used in traditional Indian medicine (Ayurveda, Siddha, and Unani) system.[2] The Sanskrit name for *T. chebula* is "Haritaki" which has multiple meanings of taking away all diseases (harayet), of being green in natural color (harita) and of growing in the abode of Lord Shiva (Hara), the Himalayas.[3] In Sanskrit, "Haritaki" is also known as "Abhaya" which refers to the "fearlessness," as it provides in the face of the disease. It is considered to be a Rasayana (with literal meaning: Path [ayana] of the Juice [rasa], or Elixir vitae) and balances Tridoshas (loosely translated to three energetic forces in the body). Beneficial properties of *T. chebula* comprise Jwaraghna (treats fever), Kashaghna (treats cough and cold symptoms), Virechnopaga (reduces purgation), Vayasthapana (reduces the aging process), Grahi (treats diarrhea), Chakshushya (improves vision), Shulahara (reduces pain), Deepana (enhances stomach fire), Pachana (helps in digestion), Rochana (stimulates appetite), Arshohara (treats piles), Kusthahara (treats skin disease), and Shothahara (reduces inflammation)."The Ayurvedic Pharmacopoeia of India" mentions the following therapeutic uses of fruits of *T. chebula*: Arsa (piles), Aruci (loss of appetite), Gulma (abdominal glands), Hrdroga (heart disease), Jirnajvara (chronic fever), Visamajvara (irregular fever), Kasa (cough), Pandu (anemia), Prameha (diabetes), Sirorgoa (diseases above the neck), Sotha (inflammation), Tamaka Swasa (bronchial asthma), Vibandha (constipation), Udavarta (reverse movement of vata), Udararoga (diseases of the abdomen). In India, fruits are available in the market. They are conventionally used as a mild laxative and as an astringent against wounds and abscesses. In dental care, the dried powder is applied against stomatitis and against ulcers of the gum. The plant is used as an antidote against bites of snakes. Kadukkai is a local name of *T. chebula* used by tribal of Tamil Nadu in India, and they use it to cure several ailments such as fever, cough, diarrhea, gastroenteritis, skin diseases, candidiasis, urinary tract infection, and wound infections. In China, the drug is a remedy against a sore throat, cough, and diarrhea. In Tibet, the dried fruit is used against ulcers and dysentery.

Monograph/Pharmacopoeia details: *M*onograph of *T. chebula* is listed in "The Ayurvedic Pharmacopoeia of India" (Part-I and Volume-I) and also reported in various formulations in

Table 1: Compounds and their derivatives from *Terminalia chebula*

Chemical	Plant part
1,2,3,4,6-pentagalloylglucose	Fruit
1,3,6-Trigalloylglucose	Fruit
2,3-(S)-Hexahydroxydiphenoyl-D-glucose	Leaf
2,3-Di-O-galloyl-β-D-glucose	Leaf
2-α-Hydroxymicromeric acid	Leaf
3,6-Digalloylglucose	Fruit
9-(2-Hydroxyethoxymethyl)guanidine	Plant
Arabinose	Fruit
Arachidic acid	Seed oil
Arginine	Fruit
Arjungenin	Fruit
	Pericarp
Arjunglucoside I	Pericarp
	Stem bark
Arjunolic acid	Fruit
Ascorbic acid	Fruit
Asparagine	Fruit
Behenic acid	Seed oil
Bellericoside	Stem bark
Chebulagic acid	Fruit
	Leaf
Chebulanin	Fruit
Chebulic acid	Fruit
	Leaf
Chebulic acid triethyl ester	Fruit
Chebulinic acid	Fruit
Chebuloside I	Stem bark
Chebuloside II	Stem bark
Chebupentol	Fruit
Colosolic acid	Leaf
Corilagin	Fruit
	Leaf
Daucosterol	Fruit
Dehydroshikimic acid	Fruit
Dihydroshikimic acid	Fruit
Ellagic acid	Fruit
	Leaf
Gallic acid	Fruit
	Leaf
Gallic acid ethyl ester	Fruit
Isoquercitrin	Fruit
Linoleic acid	Seed oil
	Seed
Maslinic acid	Leaf
Neochebulagic acid	Plant
Neochebulic acid	Plant

Contd...

Table 1: Contd...

Chemical	Plant part
Oleic acid	Seed oil
	Seed
Oxalic acid	Bark
p-Coumaric acid	Plant
Palmitic acid	Fruit
	Seed oil
Pentagalloyl-β-d-glucose	Fruit
Punicalagin	Fruit
	Leaf
Punicalin	Leaf
Quercetin	Fruit
Quinic acid	Fruit
Rutin	Fruit
Sennoside A	Fruit
Stearic acid	Seed oil
Succinic acid	Fruit
Terchebin	Fruit
Terchebulin	Fruit
Terflavin A	Fruit
Terflavin-B	Leaf
Terflavin C	Leaf
Terflavin D	Leaf
Terminoic acid	Fruit
Triacontanoic acid	Fruit
Vanillic acid	Plant
β-Glucogallin	Fruit
β-Sitosterol	Bark
	Fruit

"The Unani Pharmacopoeia of India." Fruit of *T. chebula* is part of "The Siddha Pharmacopoeia of India." *T. chebula* fruit extract is also part of The Herbal Medicines Compendium, published by the U. S. Pharmacopeial Convention.[4] The monograph prioritization committee of the American Herbal Pharmacopoeia has included *T. chebula* in their future priorities. EU Novel food catalog states that "according to information available, the use of fruit and bark of *T. chebula* is known in food supplements in the EU before May 15, 1997."[5]

A number of glycosides have been isolated from *T. chebula*, including the triterpenes arjunglucoside I, arjungenin, and chebulosides I and II.[2] *T. chebula* fruit is generally known forits high contents of phenolic compounds, including phenolic acids, flavonoids, and tannins. The fruit is also reported for their high content of Vitamin C (ascorbic acid). The main compounds among tannins (hydrolyzable tannins) are chebulagic acid, chebulinic acid, corilagin, punicalagin, terchebulin, and terflavin A.[3] Several phenolic acids, such as ellagic acid, gallic acid, hydroxycinnamic acids, and their derivatives, are also reported.[2] Flavonoids from the fruits include quercetin and methylated derivatives of quercetin.[6] Table 1 shows the chemical compounds and their derivatives of *T. chebula*.[2,3,6,7]

Acute and rutinchronic toxicity results of *T. chebula* are given in Table 2 and showed its safety. In various clinical trials,

Table 2: Toxicological information

Test	Results
Acute toxicity test	LD50 - ≤5000 mg/kg (mice), LD50 - ≤5000 mg/kg (rat)
Sub-acute toxicity test	LD50 - ≥2754.436 mg/kg (mice)
Chronic toxicity test	LD50* - ≤1200 mg/kg/day (Rat)

*1200 mg was max dose tested up to 270 days

T. chebula was found safe as well. In a clinical study at the Center for Applied Health Sciences (Stow, OH), a standardized aqueous extract of *T. chebula* fruit was tested with 105 healthy overweight men and women. Results suggested that *T. chebula* supplementation improved knee and overall joint health. All biomarkers of safety remained within normative limits during the study.[8] In another study, a mechanical pain model was used to evaluate analgesic efficacy and safety of single dose (1000 mg) of *T. chebula*. Twelve healthy volunteers were randomized to take either a single dose of two capsules of *T. chebula* 500 mg each or identical placebo capsules in a double-blinded manner. Results revealed *T. chebula* considerably increased pain threshold and pain tolerance compared to placebo. Both the study medications were well tolerated.[9] Efficacy and tolerability of aqueous extracts of *T. chebula* and *Terminalia bellerica* versus febuxostat and placebo on reduction in serum uric acid levels were tested in 110 eligible participants with hyperuricemia for 24 weeks. Of 110 eligible participants, only 88 participants completed 24 weeks of treatment. There was a highly significant reduction in mean serum uric acid levels after 24 weeks of treatment compared to baseline in all the four active treatment groups, i.e., *T. chebula* 500 mg, *T. bellerica* 500 mg, *T. bellerica* 250 mg, and febuxostat 40 mg ($P < 0.001$). All treatments were well tolerated.[10] The wide spectrum of pharmacological, medicinal properties, and safety profile of *T. chebula* makes it one of the most versatile plants.

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Conflicts of interest

There are no conflicts of interest.

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