



## Leaves of *Terminalia Chebula*

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### ABSTRACT:

*Terminalia chebula* medicinal plant Commonly referred to as Yellow myrobalan or Chebulic In the Ayurvedic system of medicine, myrobalan or Haritaki is one of the main drugs that is native to South Asia, mostly India. In Tibet, *Terminalia chebula* is named 'the King of Medicine' and is still Due to its extraordinary power of healing, it is listed at the top of the list in Ayurvedic Materia Medica<sup>[30]</sup>. The objective of this research is to collect both the conventional knowledge and the traditional knowledge available in the texts. Reviews on the extracts as written and some of the isolated. In order to illustrate the significance of this significant drug, the compounds of this plant and their toxic effects For use of human medical conditions and in health maintenance<sup>[1]</sup>. In southern Indian markets, the *Terminalia chebula* leaf galls are commonly used as Karkatasringi. Karkatashringi is an entity In various indigenous systems of medicine against many diseases, essential crude drugs are used and the drug has Various medicinal characteristics<sup>[5]</sup>. Leaf extracts have been analyzed in water as well as in various organic solvents (including methanol, ethanol, ethyl acetate and chloroform) to demonstrate their antibacterial activity against four different forms of solvents. Enteric-causing bacteria, viz. In vitro, along with Escherichia coli, Salmonella sp, Shigella sp and Vibrio cholerae, Cerevisiae of Saccharomyces. Although all species were immune to chloroform extract and some to ethyl acetate, the chloroform extract was resistant to ethyl acetate. The possible bactericidal activity was shown by methanol as well as the plant's aqueous extracts, but nothing was Apparent against the yeast applicant<sup>[31]</sup>. *Terminalia chebula* includes many significant phytochemicals, such as Chebulic acid, gallic acid, ellagic acid, tannic acid, amino acids, luteolin, rutin, and flavonoids Quercetin, et cetera. Nutrients such as vitamin C, protein, amino acids and minerals. The review highlights the different traditional uses as well as phytochemical and pharmacological uses. Activities reported so far from *Terminalia chebula* will certainly assist researchers to investigate it at the molecular level The development of a new product by the pharmaceutical industry<sup>[9]</sup>.

KEYWORDS: *Terminalia chebula*, Myrobalan, Karkatashringi, Antibacterial activity.

### INTRODUCTION :

According to world health organization about 80% of world population depend on medicine to satisfy their main need for health care<sup>[1]</sup>. Due to the indiscriminate use of existing antimicrobials, multiple drug resistance has been developed in recent years<sup>[2]</sup>. The name Genus Terminalia derives from Latin. Terminus, Since the leaves appear at the peak of the shoots<sup>[3]</sup>. *Terminalia chebula*, frequently referred in English as black Myrobalans and also popularly used as folk therapy to examine for its antitussive, homeostatic, Diuretic, laxative and cardiotoxic disorders<sup>[4]</sup>. Plants of the genus Terminalia, which consists of 250 Species are mainly distributed in the tropical regions of the world (Fabry et al., 1998<sup>[4]</sup>. *Terminalia chebula* has been reported to possess anti-oxidant (Cheng et al., 2003), anti-diabetic (Sabuand Kuttan, 2002), anti-cancer (Saleem et al., 2002), anti-mutagenic (Kaur et al., 2002), anti-viral (Ahn et al., 2002), anti-bacterial (Kim et al., 2006; Chattopadhyay et al., 2007, Bag et al., 2009) and radioprotective activity (Gandhi and Nayar, 2005)<sup>[5]</sup>. Leaf of *Terminalia chebula* is composed of Chebulic acid, glycosides, tannin, sugar, Steroids, triterpenoids and trace amount of Acid phosphoricity<sup>[6]</sup>.

### PLANT PROFILE :

#### Biological source :

*Terminalia chebula* are the dried leaflet belongs to the family of Combretace<sup>[7]</sup>.

#### Synonyms :

China: Zhang-Qin-Ge, Hezi • Germany: Myrobalane • Bengali: Haritaki • Hindi: Harre, Harad, Harar • Malayalam : Katukka • Marathi : Hirda, Haritaki, Harda, Hireda • Punjabi: Hakeka, Harar • Tamil: Ammai, Amutam, Aritaki, Pethiyam, Varikkai • Telugu: Karakkaya; • Urdu: Halela. • ae<sup>[7]</sup>.



**Fig - Terminalia chebula**

#### **Distribution:**

It is found mainly in deciduous forests and light rainfall areas in the larger parts of India, also in slightly moist forests ascending to an altitude of 150 m in the Himalayas, also in Assam, Bihar, Orissa, Madhya Pradesh, Maharashtra, Deccan and South India<sup>[9]</sup>.

#### **Macroscopical character :**

*Terminalia chebula* is an intermediate to Broad deciduous tree, younger glabrescent stems, woody stems It rises up to 30 m (98 ft) tall, with a 1 m (38 ft) tall trunk. Leaves are arranged as replacement for sub-reverse leaves. *Terminalia chebula* leaves are approximately 7 to 8cm in length, 4.5 to 10cm in width and 1 to 3cm of petiole. Bases are obtuse/cordate. Margin are entire and tip of the leaves are acute<sup>[1]</sup>.

#### **Microscopical character :**

The plant powder shows a few fibers under the microscope, simple pit vessels Sclereids, clusters<sup>[16]</sup> and polygonal epidermal cells, stone cells and parenchyma containing starch grain<sup>[33]</sup>.

#### **Chemical constituent :**

*Terminalia chebula* has a reserve of Tannin. Chebulic acid, chebulagic acid, carilagin and gallic acid are the primary constituents of tannin. A group of researchers that've been discovered Fourteen hydrolyzable tannin components (gallic acid, chebulic acid) Punicalagin, acid, chebulanin, corilagin, acid, neochebulin, Ellagic Acid, Chebulium Acid, Chebulium Acid, 1,2,3,4,6—1,6,-di-O-galloyl-D-glucose, -penta-O-galloyl-β-D-glucose, Casuarinin, 3,4,6-glucose tri-O-galloyl-D, terchebulin<sup>[8]</sup>.

#### **Traditional uses :**

- It is effective for discharges such as allergies and other erythematous disorders in skin conditions<sup>[9]</sup>.
- This helps to minimize the Pile mass and reduce / prevent the bleeding<sup>[10]</sup>.
- It is used for many diseases that are contagious, such as cough, fever, Tuberculosis and pneumonia<sup>[11]</sup>.
- For this vine, a decoction is used for Vaginal infection and testis for normal physiological tasks. It should be Avoided during pregnancy because it can induce fetal abortion<sup>[11]</sup>.
- It is effective for dysurea and urine retention<sup>[9]</sup>.

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#### **PHYTOCHEMISTRY :**

Phytochemical tests were carried out on various terminals Species have shown the existence of many active groups Tannins, pentacyclic triterpenes and their glycoside constituents Flavonoids, and other phenolic compounds<sup>[12]</sup>. Pyrogallol class Tannins of *Terminalia chebula* are phytochemicals such as anthraquinones, Sennoside, 4,2,4 chebulyl-d-glucopyranose, terpinenes, and terpinenols and also ethaedioic acid, Claimed to be attending. Gallic acid, ellagic acid corilagin are the components of *Terminalia chebula* have been documented to have cancer, anti inflammatory and antimicrobial function<sup>[10]</sup>. Research has shown that the plant contains glycosides, sugar, triterpenoids, steroids and small amounts of phosphoric

acid<sup>[13]</sup>. They have been shown to exhibit antibacterial, anti-fungal, anti-viral, anti-carcinogenic, anti-carcinogenic, Adaptogenic and anti-anaphylactic, antioxidants, hypolipidemic, hepato-protective, cardio-protective, anti-diabetic, wound healing, immuno-modulatory<sup>[14]</sup>. The plant was made up of Cytotoxic effects were observed on the cell lines used in the research, that is COLO-205, MDA-MB-231, HCT-15, DU-145 and K-5625<sup>[15]</sup>. A plant study found that tannins play a major role in the healing of wounds by Many of the mechanisms include free radical chelation, wound contracting, Increased development of fibroblasts and capillary blood vessels<sup>[11]</sup>. Carbohydrates, glucose and sorbitol, fructose and sucrose, and traces of arabinose, a smaller quantity of gentiobiose, Also found to be present in *Terminalia chebula* are maltose, rhamnose, and xylose Preliminary studies too have indicated that the plant has no toxicity<sup>[11]</sup>. *Terminalia chebula* has rich component of tannic acid. Ellagitannin, such as ellagitannin, Punacalagin, casuarinin, terchebulin, corilagin and others such as Neochebulinic acid, chebulinic acid, chebulinic acid and chebulinic acid Acid has been confirmed to be connected to the plant<sup>[16]</sup>.

## PHARMACOLOGY :

The plant has been known to have many pharmacological benefits, due to which the plant has been associated with a variety of therapeutic uses. Because of its numerous pharmacological effects, *Terminalia chebula* has been extensively researched<sup>[16]</sup>.

### Antioxidant activity :

*Terminalia chebula* is an outstanding antioxidant. Novel possible sources of natural antioxidants for food and nutraceutical products are *Terminalia chebula*<sup>[9]</sup>. 6 extracts and 4 pure extracts in a sample In-vitro compounds of *Terminalia chebula* were found Antioxidant properties of anti-lipid peroxidation, radical formation of antiperioxides and DPPH activities Distinct concentration<sup>[7]</sup>. High antioxidant capacity of the Aqueous methanolic extract activity of the leaves They were attributed to *Terminalia chebula* and High phenolic levels (72.00-167.20 mg/g)<sup>[17]</sup>. In the pyrogallol-luminol assay, the 95% ethanol extract exhibited potent antioxidant activity. In both CuSo4-Phen-Ve-H2O2 and lumino-H2O2 assays, the water extract tended to have the highest total phenolic and tannin content and demonstrated strong antioxidant activities. In the HRP-luminol-H2O2 assay, the methanol extract of *Terminalia chebula* had the highest total triterpenoid content and had strong antioxidant activity. Thus, due to variations between the mechanism of the four ROS chemiluminescence systems, the three extracts display different levels of ROS scavenging effectiveness<sup>[9]</sup>. *Terminalia chebula's* aqueous extract seems to be Ability to protect cell organelles from damage caused by radiotherapy<sup>[18]</sup>. In a polyherbal formulation, *Terminalia chebula* Inhibited Free Radical Mediated (Aller-7/NR-A2) Hemolysis has also greatly impaired nitric inhibition Stimulated release of oxide from Lipopolysaccharide Mucus macrophages<sup>[19]</sup> There is a better acetone extract, Regulation of antioxidants compared to alpha-tocopherol and HPLC analysis suggested by diode array detection presence of derivatives of hydroxybenzoic acid, Derivatives of Hydroxycinnamic Acid, Flavonol, The key phenolic aglycones and their glycosides Compounds<sup>[20]</sup>. The possible antioxidant activity of *Terminalia chebula* was tested by means of Of its ability to prevent lipid peroxidation caused by gamma-radiation in the Microsomes of the rat liver and superoxide dismutase enzyme damage in rat liver mitochondria have been tested. These experiments confirm that the T. extract has been removed. The antioxidant enzyme was shielded by chebula from the effect of reactive oxygen species that is produced by gamma radiation<sup>[21]</sup>.

### Antidiabetic activity :

The anti-diabetic properties of medicinal plants and their connection with their antioxidant capacity have long been identified<sup>[9]</sup>. The capacity of *Terminalia chebula* is to minimize blood Short-term and short-term glucose in diabetic rats Study for the long term<sup>[22]</sup>. On 75 percent methanolic, Murali et al. investigated *Terminalia chebula* extract (100 mg/kg of body weight) Reduced natural blood sugar and alloxane levels Significant diabetic rats in oral rats within 4 h Administrative<sup>[7]</sup>. The *Terminalia* extracts The anti-hypoglycemic and anti-diabetic activities were carried out against the Endothelial cell dysfunction caused by advanced glycation endproducts (AGEs) It was found that chebulic acid treatment decreased glycer-AGEE induced formation<sup>[21]</sup>. Chebulagic Acid, *Terminalia Chebula* Isolated Type Retz, proved to be a non-competitive and reversible Efficient maltase alpha-glucosidase inhibitor with a K I The 6.6 muM meaning. The inhibiting role of Maltase-glucoamylase chebulagic acid on Complex was more effective than has already been recorded on the sucrose<sup>[23]</sup>. An aqueous extract of *Terminalia chebula* gallstones Three dermatophytes showed inhibitory effects on (*Trichophyton* spp.) and three types of yeast (*Candida* spp). Anti-candidal function of methanol extract in vitro *Terminalia chebula* has been reported against *Candida albicans* clotrimazole-resistant<sup>[24]</sup>.

### Wound healing activity :

Topical administration of alcoholic leaf extract from *Terminalia chebula* on the The acceleration of rat dermal wounds had a positive effect on the acceleration of the Healing process, by increasing the tensile strength of tissues by approximately 40 percent and reducing the epithelialization span. The concentrations of hexosamine and uronic acid rise before day 8 after wounding. This outcome showed that the *Terminalia chebula* extract had a beneficial effect on the healing process<sup>[25]</sup>. Biochemical trials have shown that Increasing the overall content of protein, DNA and collagen in the Tissues with granulation from treated wound<sup>[26]</sup>. Tannins are the responsibility of the *Staphylococcus aureus* and *Klebsiella* inhibitions In vitro and stimulated cutaneous pneumonia Healing of wounds in rats due to the extract's high antibacterial and angiogenic activity<sup>[27]</sup>. The preparation of herbal paste obtained from *Terminalia chebula* showed substantial (p<0.05) improvement in stimulating the role of fibroblast, enhancing glycosaminoglycans synthesis and collagon deposition, thus offering a distinct benefit of wound healing. The preparation of herbal paste obtained from *Terminalia chebula* showed substantial (p<0.05) improvement in stimulating the role of fibroblast, enhancing glycosaminoglycans synthesis and collagon deposition, thus offering a distinct benefit of wound healing<sup>[9]</sup>.

**Antifungal activity :**

*Terminalia chebula* shows Anti-fungal activity Against a variety of yeasts and dermatophytes like Epidermophyton, Floccosum, Microsporum gypseum and Tricophyton rubrum and yeasts like Candida albicans<sup>[28]</sup>. Aqueous alcoholic and ethyl acetate extract of *Terminalia chebula* leaves was also tested against five Pathogenic fungi (Aspergillus flavus, A. niger, Alternaria brassicicola, A. alternate and Helminthosporium tetramera) were also examined using the paper disk process. And compared to that of the reference, they were found to be successful Carbendazim Standard<sup>[7]</sup>.

**Anti-helminthes activity :**

The Ovicidal and Larvicidal Analysis Ethyl acetate, acetone, and methanol extract activity of The dried leaves of *Terminalia chebula* have been examined by Haemonchus contortus in vitro on the basis of 50, 25, 12.5, 6.25 and 3. 13mg/ml egg hatch and larval growth assays. Extracts from mats of leaves At 50mg/ml, Terminalia chebula demonstrated full inhibition<sup>[2]</sup>

**Neuroprotective activity :**

*Terminalia chebula* methanol and water extracts have neuroprotective activity against H<sub>2</sub>O<sub>2</sub>-induced PC12 cell toxicity and are possible candidates for the treatment of H<sub>2</sub>O<sub>2</sub>-induced neurodegenerative diseases. The water extract's effective neuroprotective activity is due to its OH and H<sub>2</sub>O<sub>2</sub> scavenging activities, its highest extraction yield and its overall phenolic and tannin material<sup>[34]</sup>.

**Anti-arthritis activity :**

*Terminalia chebula* hydroalcoholic extract was tested to have the potential to be used as a disease-modifying agent in the treatment of rheumatoid arthritis<sup>[21]</sup>. *Terminalia chebula* extract has provided a considerable amount of Joint swelling inhibition compared to regulation in both Arthritis caused by formaldehyde and CFA-induced. Treatment with *Terminalia chebula* also reduced serum TNF-alpha alpha TNF-R1, IL-6 and IL-1 $\beta$  levels and synovial expression<sup>[32]</sup>.

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