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Traditional Uses, Phytochemistry, Potential Health Benefit Profiling of Terminalia Chebula Retz. (HARAD)

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ABSTRACT

Terminalia chebula Retz, known as Haritaki, is revered as the "King of Medicines" in Ayurveda. Its extensive healing properties and potential health benefits have earned it a prominent place in traditional medicine. For centuries, Haritaki has been utilized in Unani, Ayurveda, and Siddha practices to treat various ailments, including digestive issues, skin disorders, and infections. Research has validated the pharmacological activities of T. chebula through in vitro and in vivo studies, revealing its potential applications and phytochemical properties.

KEYWORDS: Terminalia chebula, Human diseases, Medicinal value, Bioactive constituents, Safety evaluation

INTRODUCTION

Medicinal plants, including Terminalia chebula, have significantly impacted human civilization. For centuries, various cultures have relied on these plants for therapeutic purposes. Terminalia chebula, also known as Haritaki, is a versatile tree species with numerous applications. Its fruits, bark, leaves, and roots are used in Ayurvedic medications to treat digestive issues, respiratory problems, and liver disorders. The species is also a crucial component of the herbal formulation "Triphala."However, the genus Terminalia faces genetic diversity loss and depletion, threatening ecological balance. To address this, conservation efforts require a comprehensive understanding of the genetic diversity and distribution of Terminalia species. Terminalia, a genus of largely deciduous trees, is renowned for its medicinal properties. In the Indian subcontinent, natural Terminalia forests are found in various states, including West Bengal, Madhya Pradesh, Uttar Pradesh, Maharashtra, Assam, Tamil Nadu, Rajasthan, Karnataka, Kerala, and Punjab.

Fig. Terminalia chebula

- **Species identity:**

− Taxonomy Current Name: Terminalia chebula Authority: Retz. Family: Combretaceae Kingdom: Plantae Species: chebula	**− Botanic Description** Terminalia chebula is a medium to large deciduous tree Attaining a height of up to 30 m, with widely spreading Branches and a broad roundish crown
Type of Haritaki -As per Bhavprakash 1) Vijaya – Used for Sarvarogahar 2) Rohini - Used for Varan 3) Amruta - Used for Shodhan 4) Abhaya -Used for Netrarog 5) Jeevanti - Used for Sarvayoga	**− Common Names** 1. Haritaki (Sanskrit) 2. Chebulic Myrobalan (English) 3. Ink Tree (English) 4. Yellow Myrobalan (English) 5. Kadukkai (Tamil)
− Natural Habitat Different Varieties Terminalia chebula occurs scattered in teak forest, mixed Deciduous Forest extending into forests of comparatively dry Types.	- **Different Varieties** • Green • Black • Kabuli

Fig. T. chebula tree

PHYTOCONSTITUENTS OF T. chebula Retz:

T. chebula Retz is rich in phytoconstituents, including:

1. Tannins (32-34%): pyrogallol type, with 14 identified components.

2. Phenolics: chebulinic acid, ellagic acid, and anthraquinones.

3. Polyphenols: corilagin, galloyl glucose, terflavin A, and maslinic acid.

4. Other constituents: fructose, amino acids, succinic acid, beta-sitosterol, resin, and anthraquinone.

5. Flavonoids: flavanol, glycosides, and triterpenoids.

6. Fatty acids: palmitic acid, linoleic acid, oleic acid, and nine others.

7. Triterpenoid glycosides: chebulosides I and II, arjunin, and arjun glucoside.

8. Leaf polyphenols: punicalin, punicalagin, terflavins B, C, and D.

9. Other compounds: phloroglucinol, pyrogallol, ferulic acid, p-coumaric acid, caffeic acid, and vanillic acid

Fig. T. chebula seeds

T. chebula contains various bioactive compounds, including:

- Monosaccharides: D-fructose and D-glucose

- Triterpenoid glycosides: chebulosides I and II

- Phenolic acids: vanillic, caffeic, p-coumaric, ferulic, shikimic, and quince acids

- Other compounds: 2α-hydroxycoumarin acid and 2α-hydroxyursolic acids

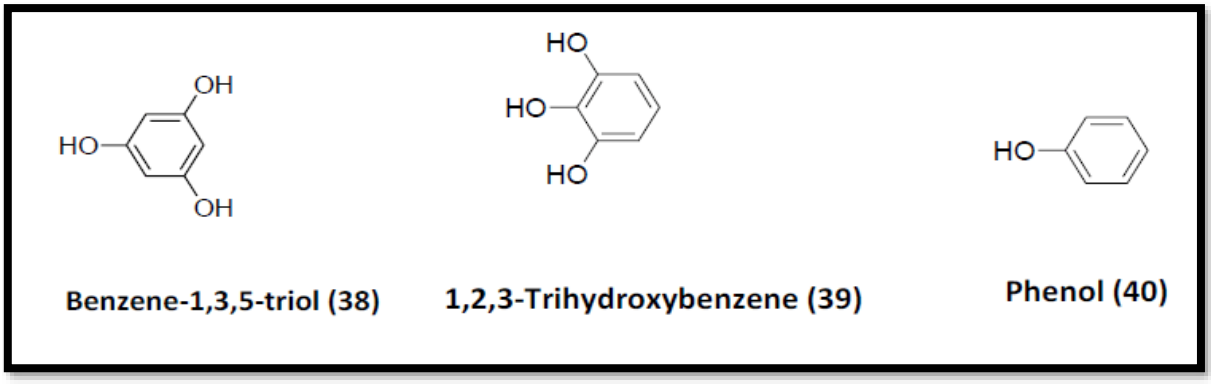

Fig. Structure of Phenol

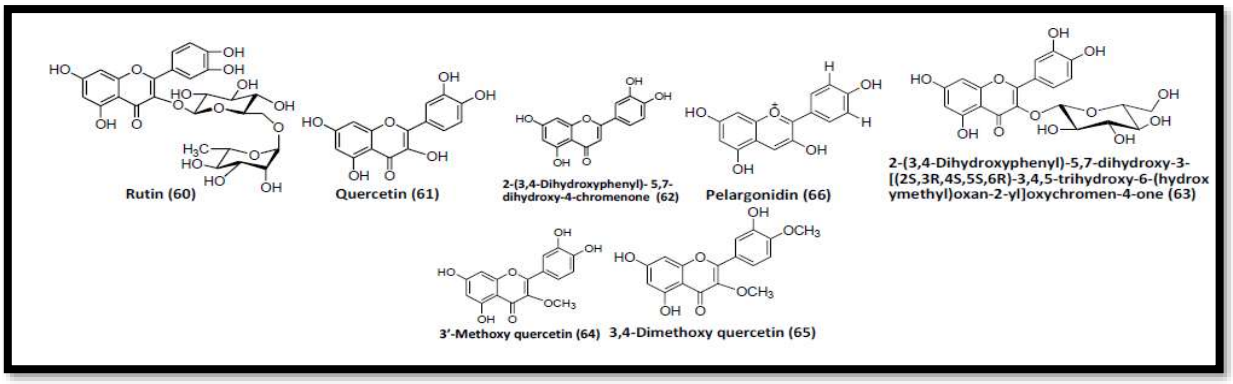

Fig. Structure of Flavonoids

• TRADITIONAL USES:

T. chebula (Haritaki/Halaila) has various medicinal applications:

- In traditional Ayurvedic medicine, Terminalia chebula is considered a "rasayana" herb, believed to promote overall health and longevity.

1.Haritaki powder with honey and ghee is also effective remedy for anemia. In obesity, its decoction with honey reduces the excessive body fats.

2. Halaila also prevents the collection of pus in skin disorders. The oil (Roghan) of halaila is extremely helpful in the healing of wound, especially in burns.

3. The Murabaha of halaila is used as an excellent brain tonic, cardiotonic, stomach tonic and in problems of constipation.

4. It is a widely used drug in Ayurveda, Siddha, Unani and the Homeopathic systems of medicine in India.

5. It is a top listed herb in Unani Matrice Medica for the treatment of asthma, hemorrhoids, sore throat, gastric disorders (vomiting, anorexia, flatulence), diarrhoea, dysentery, splenomegaly, epilepsy, leprosy, skin disorders, melancholia, gout and joints pain.

6. Gastric disorders (anorexia, vomiting, indigestion, flatulence etc.), piles, enlargement of liver and liver, worms, colitis, epilepsy, diarrhoea, dysentery can be treated well with halaila.

7. “Triphala” is useful in treating cancer.

8. ointment (Marham) of halaila (prepared from Roghan gul, halaila powder and mom) was used by Unani physicians to cure the piles.

9. gargle with its decoction gives excellent results in stomatitis, bleeding and ulceration of gums and sore throat.

Here are the traditional uses of Terminalia chebula:

1. Digestive issues: Treats constipation, diarrhea, indigestion, and bloating.

2. Respiratory problems: Relieves cough, asthma, and bronchitis.

3. Skin disorders: Treats acne, eczema, and other skin conditions.

4. Oral health: Used as a mouthwash for gum inflammation and mouth ulcers.

5. Wound healing: Applied topically to accelerate wound healing.

6. Antibacterial and antifungal: Used to treat infections and prevent their spread.

7. Anti-inflammatory: Relieves arthritis, gout, and other inflammatory conditions.

8. Cardiovascular health: Supports heart health and reduces cholesterol levels.

9. Immune system: Boosts immunity and prevents illnesses.

10. Antioxidant: Protects against oxidative stress and cell damage.

PHARMACEUTICAL APPLICATION OF TERMINALIA Chebula:

Terminalia chebula is considered as “King of Plants” in Ayurveda, because it is a major ingredient of several ayurvedic medicines and is used for the treatment of various ailments due to its detoxifying and regenerating properties.

1.Anti-inflammatory potential of T. chebula:

T. chebula exhibits anti-inflammatory potential by blocking pathways that cause inflammation, reducing signs of inflammation such as redness, swelling, and pain. Studies have demonstrated its effectiveness:

- A 70% ethanol extract of T. chebula fruit reduced carrageenan-induced inflammation (rat paw edema) by 69.96%.

- T. chebula also protected human red blood cell membrane stability.

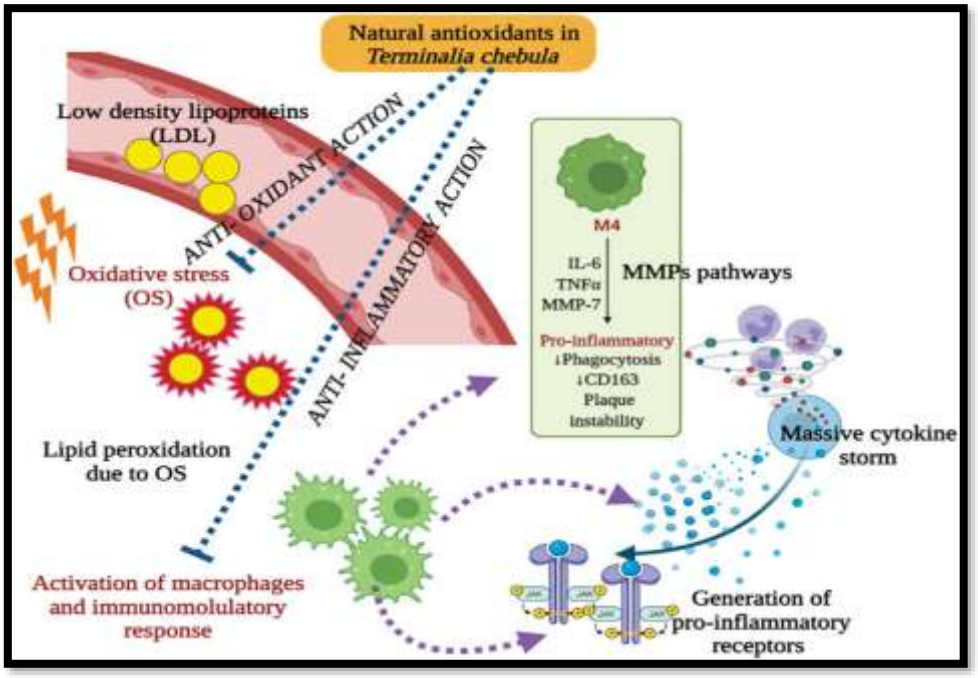

Fig. Anti-inflammation activity in T. chebula

The free acetone extract of T. chebula exhibits stronger antioxidant activity than alphatocopherol. HPLC analysis revealed the presence of various phenolic compounds, including:

- Hydroxybenzoic acid derivatives

- Hydroxycinnamic acid derivatives

- Flavanol aglycones

- Glycosides of flavanol aglycones

2. Anti-diabetic activity:

Diabetes Mellitus is a global health issue, with increasing cases daily. Poor blood glucose regulation is a key factor. T. chebula has been traditionally used to support gastrointestinal health, which is linked to diabetes management.

- ✓ **Research has shown that:**

- Ethanol extracts of T. chebula, Morus alba, Poria cocos, and Zea mays inhibit α-glucosidase activity.

- This inhibition favors glucose-stimulated insulin secretion.

- Foods rich in dietary fiber, like T. chebula, can improve gastrointestinal function and potentially manage diabetes.

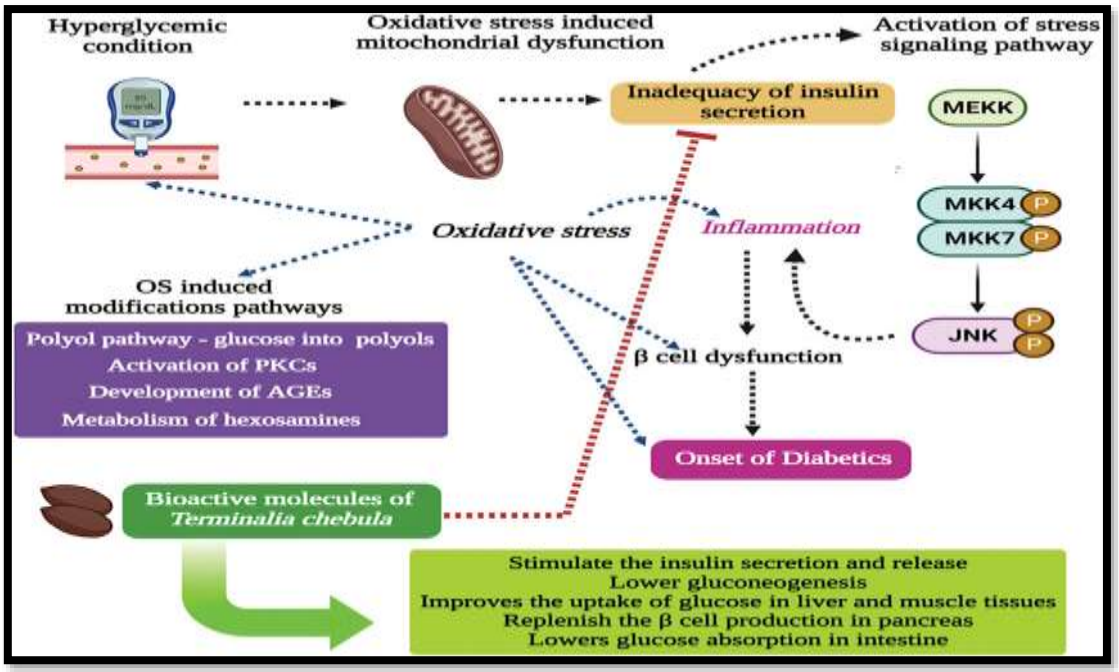

Fig. Anti-diabetics activity

3. Anti-microbial activity:

The rise of antibiotic-resistant pathogens has intensified the search for natural antimicrobial agents. Traditional medicinal plants, including T. chebula, have gained attention. Research highlights T. chebula's effectiveness against harmful microorganisms, demonstrating antibacterial activity against both Gram-positive and Gram-negative pathogens.

- ✓ **Studies have shown that:**

- T. chebula extracts exhibit antibacterial activity against gastroenteritis-causing Gram-negative microbes.

- The plant's aqueous and methanol concentrates reduce gastroenteritis.

- T. chebula shows extensive antibacterial activity against Salmonella epidermis.

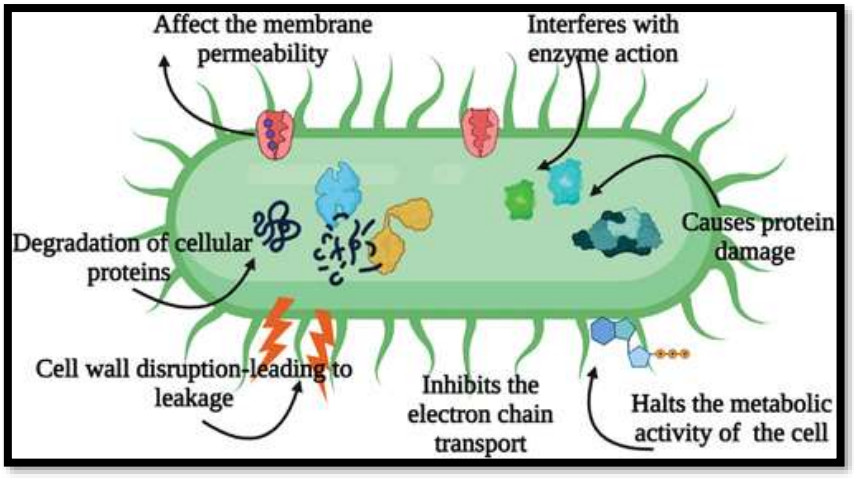

Fig. Anti-microbial activity

4. Wound healing activity:

T. chebula's wound-healing potential was demonstrated in a study where an alcoholic extract of its leaves was topically applied to rat dermal wounds. Results showed that T. chebula-treated wounds healed faster, with:

- Improved contraction rates

- Shortened epithelialization period

5. Neuroprotective protective activity:

T. chebula may support brain health due to its antioxidant properties, potentially benefiting aging populations. Research suggests:

- Stress recovery: T. chebula reduces nitric oxide levels and increases arginase-1 expression.

- Anti-inflammatory: Protects the CNS system.

- Neuroprotection: Water and methanolic extracts, along with ellagic acid, safeguard PC12 cells against beta-amyloid-induced toxicity.

- Mechanism: Inhibits ROS production and decreases calcium ion influx.

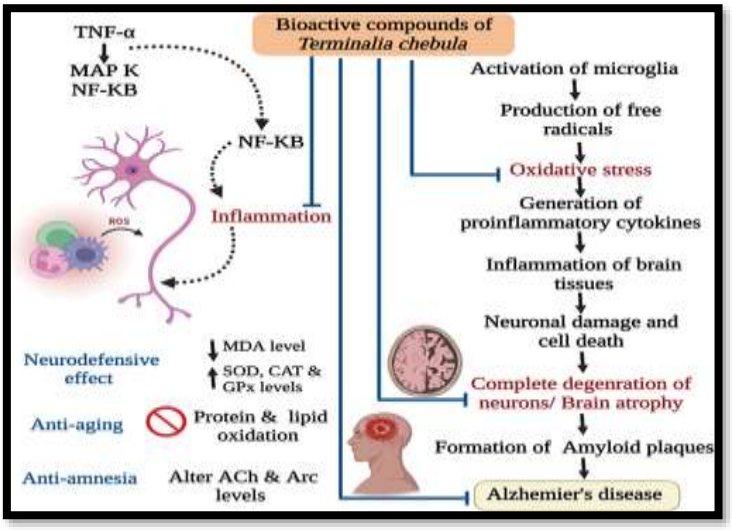

Fig. Spectrum of Anti- neurodegenerative effect of T. chebula

CONCLUSION:

In conclusion, T. chebula is a versatile plant with a wide range of pharmacological and medicinal properties. This versatile medicinal plant is the unique source of various types of compounds having diverse chemical structure. Despite its potential, further research is needed to explore its therapeutic applications, particularly against multidrug-resistant bacterial pathogens. There is a growing interest in using non-toxic, plant-based products, and T. chebula could be a valuable source for developing modern drugs. However, this requires extensive investigation, standardization, and clinical trials to ensure safety and efficacy.

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