



A Review On *Terminalia Chebula* To Check The Antibacterial Activity Of Gallic Acid And Ethyl Ester.

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ABSTRACT

Natural medication items has an exceptional spot in the realm of drug. *Terminalia chebula* is a deciduous tree utilized in conventional medication. It is accounted for to contain different biochemical compound like a tannin, chebulic corrosive, ellagic corrosive, gallic acid, flavonoids and so on. It has been accounted for as cell reinforcement, antidiabetic, antibacterial, antiviral, antifungal, antiulcer, antimutagenic, wound recuperating exercises and so on. or. The organic product has incredible restorative importance and expectedly applied for the administration of different sickness conditions, for example, sore throat, high hack, asthma, ulcer, heart consume, vommiting, diarrhea illness. It is additionally used as gentle purgative, antispasmodic, and stomachic.

Terminalia chebula (Combretaceae) is known as the "Ruler of Drugs" in the Tibet and is constantly recorded first in the Ayurvedic material medica in light of its unprecedented powers of recuperating with a wide range of natural action. The product of *Terminalia chebula*. . is being utilized for the treatment of various sorts of sicknesses and problems since vestige. During the most recent fifty years, aside from the science of *Terminalia chebula* compounds, significant advancement has been accomplish dregarding the natural movement and restorative utilizations of *Terminalia chebula*.

Keyword

Terminalia chebula Ayurveda, phytoconstituent, biological and pharmacological activity, clinical study.

INTRODUCTION:-

Restorative plants has been a significant wellspring of remedial specialist since old times it is well established reality that mankind rely upon plant as a circuitous wellspring of energy and haven It has been viewed that as close around 80% of all settled normal items begin from plant (philipson 1990).the recovery of interest in regular medication began in last ten years mostly as a result of the far and wide conviction that green medication is more grounded than manufactured product ¹

Terminalia chebula is a moderate tree utilized in conventional medication. It is having a place with the family combretaceae. It is commanly called dark myrobalan, chebulic myrobalan. It is broadly utilized in unani, ayurveda, homeopathic medication. *Terminalia chebula* is well known customary medication not just utilized in India. yet additionally different nations of Asia and Africa. This is utilized in conventional medication because of the wide range of pharmacological exercises partner with naturally dynamic compound present in

this plant. It is utilized for the therapy of number of infection like malignant growth, loss of motion, cardiovascular sickness ulcer, uncleanliness, joint inflammation, gout, epilepsy and so on. It has been antibacterial, antimicrobial, antiviral, antifungal, antimutagenic, wound recuperating activities.³ It is utilized widely in the planning of numerous ayurvedic details irresistible illnesses. Like persistent ulcer, leucorrhoea and contagious disease of the skin it increment the recurrence of stool and has the got the property of evacuating the gut totally. It is a blossoming evergreen tree brought in English the dark myrobalan. It is otherwise called Haritaki (Sanskrit and Bengali), Harad (Hindi), Karkchettu (Telugu), Kadukkaya (Tamil) and Harada (Marathi and Gujrati).²



Fig no :-1 *Terminilia chebula* ⁴.

PLANT PROFILE:-

'Haritaki' is ayurvedic name commonly known as chebulic myrobalan is one of the most useful herbs in medicine field. The name 'haritaki' itself means that the plant is very auspicious and can cure all disease. Haritaki have the vast therapeutic action is most used herb in ayurvedic treatment. In India is the marathi name of the harada.

Biological Source

It consist of dride fruit, root, bark of plant known as *Terminilia chebula*.⁵

Geographical source

Dhaka⁵.

Common Name

Haritaki, harada, hirada⁵.



Fig no:2 fresh fruit of *Terminilia chebula*



Fig no:-3 dried fruit of *Terminilia chebula*

TAXONOMY CLASSIFICATION:-

Kingdom	Plantae-plant
Subkingdom	Tracheobionata-vascular plant
Super division	Spermatophyta-seed plant
Division	Magnoliophyte-flowering plant
Class	Magnoliopsida-dicotyledon
Sub class	Rosidae
Family	Combretaceae
Genus	<i>Terminilia</i>
Species	<i>Chebula</i>

Table1.classification of *Terminilia chebula*⁶.**SYNONYMS**

<i>Terminilia argyrophylla</i> king of prain
<i>Terminilia gangetica</i> Roxb
<i>Terminilia parviflora</i> Thwaites
<i>Terminilia reticulata</i> Roth

Table:2 synonyms of *Terminilia chebula*⁷.**VERNACULAR NAME**

Marathi	Hirda, haritaki, harda
Hindi	Harre, harad
Malayam	Katukka
Tamil	Ammai
Urdu	Halela
Bengali	Haritaki
Kashmiri	Halela
Punjabi	Hakeka, harar

Table no :-3 vernacular name of *Terminilia chebula*⁸.

VARIETIES

Seven varieties

- (i) **Vijaya** :is a gourd-shaped character that can be used in any clue.
- (ii) **Rohini**: has a rounder form and is more beneficial for therapeutic
- (iii)**putana**:is a tiny, stiff seeded plant that is helpful for external plasters.
- (iv)**Amrita** :is fleshier and more effective for cleaning.
- (v)**Abhaya**:is more effective for usage in ophthalmology since it contains five lobes (external).
- (vi)**Jivanti**: is a yellow substance that can be used for any indication.
- (vii) **Chetaki**: This three-lobed churna is utilised as an alternative to the others and has a stronger laxative effect.

Chetaki is available in two colours: white and black

Now, *T. chebula* and the seven varieties are interchangeable. Two varieties of the medication, known as kattukka, are used in Kerala.kerala has two multiplicities two variety of the medication, known as kattukka also, karuvilla khattukaa, are acknowledged as haritaki.⁹

MACROSCOPIC CHARACTER

Various macroscopic character as follows

Tree:

It is a deciduous tree, younger stem glabrescent and woody¹⁰.

Leaves:-These are 10-20 long, sub-opposite, simple,petiolate;laminae broadly to elliptic oblong rarely ovate the bases obtuse, the margin entire, the tips acute glabrescent¹⁰.

Seeds:-

These see single rough, ellipsoid, 1.0-2.0cm by 0.2-0.7cm and without ridge¹⁰.

Flowers:-

The flowers are short-stemmed, monoecious, dark white to yellow, with a strong, unpleasant odour, and simple terminal spike or short panicles¹⁰.

Fresh fruit:-

A glabrous, shining ellipsoidal, or broadly ovoid or obovoid ;obscurely or faintly five angled and shallowly furrowed;greenish -yellow drupe from 25-about 25mm or less wide¹¹.



fig no :-4 *Terminilia chebula* leaves and fruit and flowers

Dry fruit: The surface of the dry fruit is some what wrinkled and shows five slightly thick but well-defined longitudinal ridges that are 2–3 mm wide and 2 mm thick. The surface color varies from light yellowish-brown to a nearly uniform brown with yellowish markings or patches. In some fruits the basal portion is narrower and somewhat elongated or tapering¹¹.

Taste :-There are seven types of taste except for salt, outer skin tastes pungent, ridge tastes sour, seed has astringent taste and stem has bitter taste and endosperm has sweet taste¹¹.

MICROSCOPIC CHARACTERISTICS

The fruit's epicarp is visible in transverse section and is made up of a layer of epidermal cells, the outer tangential wall, and the upper part of the thick radial walls. Two or three layers of collenchymas make up the mesocarp, which is then followed by a broad zone of porous parenchyma with fibres and sclereids in groups and scattered vascular bundles. The parenchyma also contains tannins and aggregate calcium oxalate crystals, and the starch grains are simple rounded or oval in shape and are 2–7 m in diameter. The endocarp is made up of thick-walled sclereids in a variety of sizes and shapes, most of which are elongated. Veins, fibres, and sclereids all look to be lignified. One layer of large cubical cells makes up the testa, which is followed by a region of reticulate parenchyma and a vessel. The tegmen is made up of collapsed parenchyma¹².

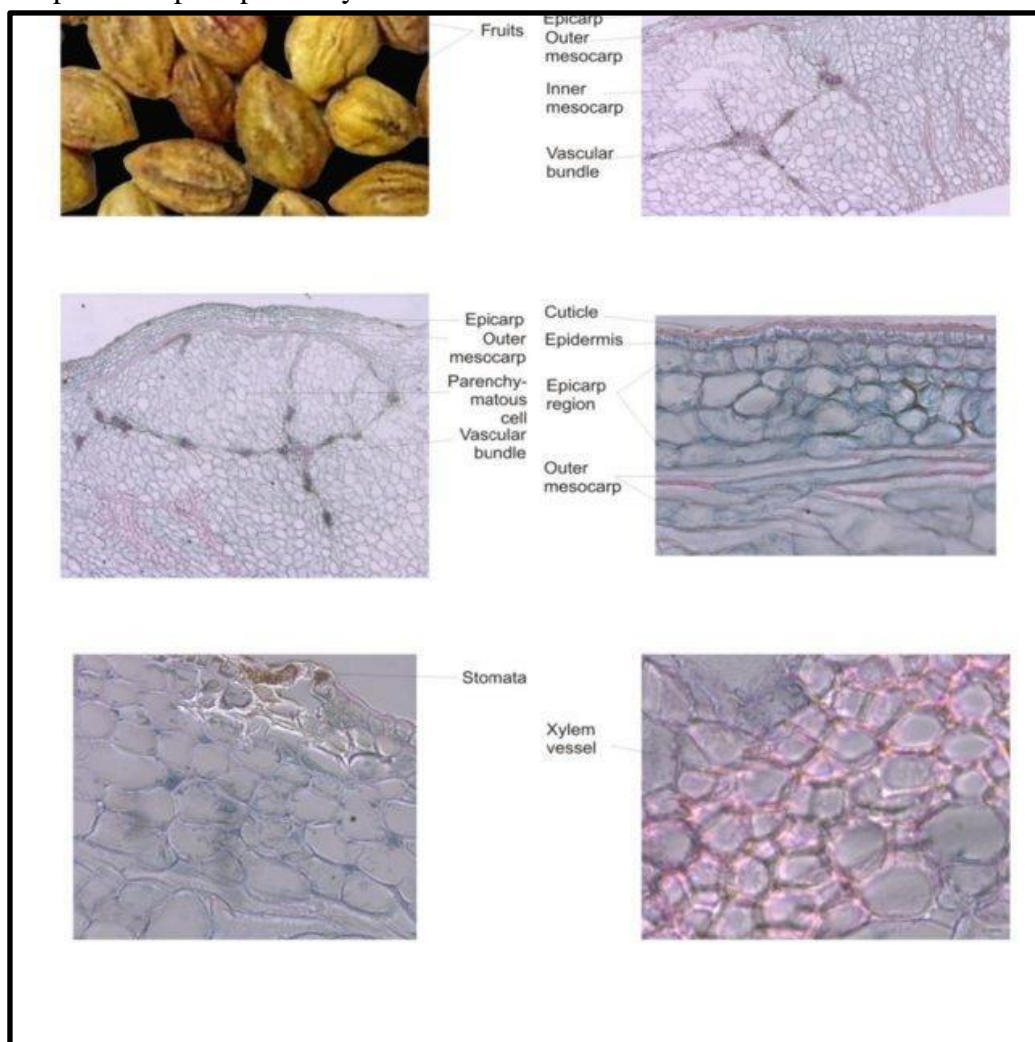


Fig no.5 T. S OF *Terminilia chebula* Fruit¹³.

CHEMICAL CONSTITUENT

Terminilia chebula fruit is rich in tannic acid the chief constituent tannic acid are chebulic acid, chebulagic acid, corilagin and gallic acid tannic acid of *terminilia chebula* is of pyrogallol type A group of researcher found in 14 components of hydrolyzable of tannins

(gallic acid, chebulinic acid, chebulagic acid , punicalagin, chebulanin, corilagin, neochebulinic acid, ellagic acid 1,2,3,4,6–penta-O-galloyl-H-D glucose, 1-6-di-O-galloyl-D-glucose,casuarinin 3,4,6-tri-O-galloyl-D-glucose.)

Terminilia chebula fruits one source lists *terminilia chebula* as having 32% tannic acid content the tannic acid content of *terminilia chebula* varies with geographical various beside fructose, amino acid, succinic acid beta sitosterol, resin and purgative principle anthroquinine and sennoside nature is also present flavonol glycoside triterpenoid coumarin conjugated with gallic acid called chebulin as well as other phenolic compound were also isolated it also exhibit the ability to scavenge the 1,1-diphenyl-2-picrylhydrazyl radical¹⁴.

PHYTOCHEMICALS TEST

S. No	Secondary metabolites	Methanol	Ethyl acetate	Dichloro Methane	Aqueous
1	Alkaloids	+	-	+	-
2	Terpenes	+	+	+	-
3	Saponins	-	-	+	++
4	Steroids	+	+	+	+
5	Carbohydrates	-	-	+	-
6	Flavonoids	+	+	++	+
7	Tannins	+	+	+	+
8	Glycosides	-	-	+	-
9	Polyphenols	+	+	++	+
10	Fixed oil	+	-	+	-

Table no :-4 Phytochemicals test of *Terminilia chebula*¹⁵.

USES

Terminilia chebula is one of the most commonly used plant in traditional system of medicine in India. sub continent is called "king of medicine". The dried ripe fruit of *Terminilia chebula* is an important Indian herb, used extensively in the indigenous system of medicine for its homeostatic, antitussive, laxative, diuretic, and cardiotoxic activities. The herb is used as tonic, in hepatic and spleen enlargement and in skin disease. Fruit of *Terminilia* are astringent and used in cardiac tone, dentifrices for strengthening of gums. The powder is used to treat various condition like jaundice, colic, asthma, hoarse voice, hiccup, vomiting, diarrhea, tuberculosis. It is used as a blood purifier, gargle for sore throat, gum, muscular rheumatism. *Terminilia* is used in Ayurveda and siddha for constipation, chronic diarrhoea, ulcer, gastroenteritis, asthma, cough, dyspepsia, hemorrhoids, candidiasis, skin disease, epilepsy diabetes etc. Pharmacological and biological uses such as antibacterial, antifungal, antiviral, antimutagenic, adaptogenic and anti-anaphylactic, antidiabetic, wound healing, purgative, immunomodulatory, and chemopreventive¹⁶.

Extraction of *Terminilia chebula*

Alcoholic extraction

The dried products of *T. chebula* are powdered independently and 100 g of powder is taken out twice in 500 ml of 75% methanol by mixing for the time being and centrifuging at room temperature. The supernatant is then gathered and dissipated to dryness under diminished strain in a rotational evaporator. The concentrates are solubilized in water and utilized in vivo and in vitro experiment¹⁷.

Watery extraction

The finely powdered (network size 20#) dried products of *T. chebula* are mixed with eight piece of refined water at around 70 to 80°C for 2 h. The fluid concentrate is then sifted through sifter (network size 200#). Then, the filtrate is focused up to two sections on a turning vacuum evaporator. At long last, the concentrated fluid is shower dried to get the dry powder of the concentrate. The focus is communicated as µg/ml¹⁷.

PHARMACOLOGICAL AND BIOLOGICAL ACTIVITY

1. Antibacterial Activity

Antibacterial activity Two antibacterial compounds, gallic acid and ethyl ester against methicillin-resistant Staphylococcus, have been isolated from ethyl alcohol extract of fruits of *T. chebula*. Various extracts of *T. chebula* exhibit antibacterial activity against a number of bacterial species. *T. chebula* is well effective against *Helicobacter pylori*, a bacterium responsible for gastritis, ulcer and stomach cancers. The ether alcoholic and aqueous extracts of *T. chebula* were tested against *Helicobacter pylori*, but aqueous extract of the plant, at a concentration of 1-2.5 mg/ml, inhibited urease activity of *H. pylori*. Several biologically active components were isolated from butanol fraction of fruit extract of *T. chebula* and tested against six intestinal bacteria¹⁸.

Table 1. Antibacterial activity of *Terminalia chebula* fruit ethanol extract.

Organisms	Streptomycin (10 µg/disc)	Zone of inhibition(mm diameter)	
		1 mg/disc	0.5 mg/disc
<i>Bacillus subtilis</i> MTCC 441	13	11	15
<i>Staphylococcus aureus</i> ATCC 25923	12	10	13
<i>Staphylococcus epidermidis</i> MTCC 3615	-	12	16
<i>Escherichia coli</i> ATCC 25922	13	8	9
<i>Salmonella typhi</i> SSFP 4S	9	10	12
<i>Pseudomonas aeruginosa</i> ATCC 27853	13	9	13
<i>Klebsiella pneumonia</i> ATCC 14380	11	8	9
- no activity.			

Table no :-5 Antibacterial activity of *Terminilia chebula*¹⁹

2. Antiviral Activity

A study proved that *Terminalia chebula* fruits contain 4 human HIV type I integrase inhibitors such as gallic acid and 3 galloyl glucose. The aqueous extract of *Terminalia chebula* exhibited the most prominent anti HBV activity by decreasing the level of extracellular HBV virion DNA at concentration ranging from 64-128µg. The extracts of fruit of *Terminalia chebula* showed inhibitory effect on human immunodeficiency virus reverse transcriptase. Acetone extract of *Terminalia chebula* shows antiviral activity against swine influenza A virus and aqueous extract of *Terminalia chebula* showed antiviral extract against hepatitis B virus.²⁰

3. Antifungal Activity

Aqueous *Terminalia chebula* extract shown antifungal efficacy against several yeasts and dermatophytes. The alcoholic ethyle acetate extract shows the activity against *Aspergillus niger*, *aspergillus flavus*, alternate. 70% of methanol ethylacetate, hexane, chloroform extract shows activity against *Fusarium oxysporum*, *Phytophthora capsici*, *Fusarium solanietc*. It is effective against the Dermatophytes *Epidermophyton floccosum*, *Microsporum gypseum*, and *Trichophyton rubrum* as well as the pathogenic yeast *Candida albicans*. Additionally, its inhibition of three yeasts and three dermatophytes. Three yeast and three dermatophytes were inhibited by an aqueous preparation of *T. chebula* galls. *T. chebula* methanol extract demonstrated in vitro anti-candidal action against *Candida albicans* that were resistant to clotrimazole. A seed extract was effective against the fungus *Trichophyton glabrata*²¹.

4. Antidiabetic Activity

Although intestinal sucrase or isomaltase activity was unaffected by *Terminalia chebula* fruit extract's potent intestinal maltase inhibitory activity in rats, its inhibitory effect on glucosidase suggests that it may be useful for treating type 2 diabetes. *T. chebula* fruit and seeds decreased blood glucose levels in streptozotocin-induced diabetic rats over the course of both short-term and long-term experiments. Additionally, they exhibited reno-protective behaviour²².

5. Antioxidant Activity

The presence of phenolic compounds in the fruit of *Terminalia* extract was confirmed by high performance liquid chromatography (HPLC) analysis. The ability of the extract to deactivate free radicals such as 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals has been examined because these chemicals are effective free radical scavengers. The highest absorption of the stable free radical DPPH occurs at 517 nm. As a result, there is a reduction in absorption at 517 nm when chemicals that may scavenge hydrogen (H) atoms or electrons are present. It has been observed that the absorbance due to DPPH reduces constantly up to a concentration of 23 mg/ml even when there are various concentrations of the extract present (3.5 to g/ml)²³.

6. Antimutagenic Activity

Antimutagenic activity of hydrolyzable tannins from *Terminalia chebula* in *Salmonella typhimurium* has been documented. A group of researchers have reported the inhibitory action on cancer cell growth by the phenolics of *Terminalia chebula* Retz fruit and found that chebulinic acid, tannic acid and ellagic acid were the most growth inhibitory phenolics of *Terminalia chebula*. Besides, acetone extract of bark and fruit powder of *Terminalia chebula* harbors constituents with promising antimutagenic activity²⁴.

7. Wound Healing Activity

Using the excision and dead space wound models, the hydroalcoholic extract of *T. chebula* fruit was tested for its wound healing activity in alloxan-induced diabetic rats. The results revealed a significantly higher level of wound healing activity in the fruit extract treated rats. When applied topically to alloxan-induced diabetic rats, the *T. chebula* extract was found to accelerate the rate and extent of wound closure, promoting wound contraction healing. The ethanolic extract of *Terminalia chebula* fruit was tested as an ointment on albino rats using an excision and incision paradigm to assess its ability to heal wounds²⁵.

CONCLUSION

Restorative plants which structure the foundation of conventional medication, have over the most recent couple of many years been the subject for exceptionally serious pharmacological examinations. This has been achieved by the affirmation of the worth of restorative plants as expected well springs of new mixtures of helpful worth. *Terminalia chebula* has been widely utilized in Ayurveda, Unani and Homeopathic medication and has turned into a cynosure of current medication. *Terminalia chebula* is a profoundly esteemed plant, conveyed in numerous nations of the jungles and subtropics. It has an amazing scope of restorative purposes with high healthy benefit. This is a work to smooth out the pharmacological properties of the plant. Keeping in view the reports of its possible viability against diabetes, it is expected that the botanicals play a significant part to play in the administration of diabetes which needs further investigation for vital improvement of medications and nutraceuticals from normal assets. In any case, the information was basically thought to be as elective science and a home grown cure. *Terminalia chebula* is a genuine wonder of nature, clearly on the grounds that it has such countless advantages. Current clinical science has just barely started to acknowledge

their long held information. One can trust that later on, fair will win and the genuine capability of this tree and its numerous items will be understood.

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