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COSMETIC VALUES OF PLANT TERMINALIA CHEBULA RETZ.(HARITAKI)

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Abstract: Terminalia chebula is one of the most commonly used plant traditional system of medicine in Indian sub- continent Terminalia chebula is called as king of medicine in Tibet. Terminalia chebula is a unique herb having various therapeutic potential as anti-inflammatory, antioxidant, anticancer and digestant. This plant having cosmetic values like anti-aging, skin-whitening, dark circle, pigmentation, skin nourishment, and prevent hair loss. Terminalia chebula is a plant species belongs to the genus Terminalia, family Combretaceae. It is commonly called black or chebulic myrobalan, is a species of terminalia. It is well known as'Haritaki' since it can be used to cure all kind of diseases the, whole plant posses high medicinal value .The Terminal is chebula is known to contain several bioactive constituents such as chebulagic acid, chebulinic acid ,Gallic acid, ellagic acid, tannic acid, corilagin, polyphenolic compounds, triterpinoids and ascorbate. In the present review, an attempt to be made to explain the different cosmetic values of TC. From previous research.

INTRODUCTION

Terminalia chebula is a unique herb that is used from ancient time since charak. It is used in many herbal formulation like Triphala[1]The WHO devices a policy on traditional medicine and issued directives with series of monographs on widely used herbal medicines. In recent years the utilization of herbal medicines increasing worldwide due to their minimal side effects[2]. Terminalia is chebula is a prime medicinal plant known as 'Harard' in Indian sub-continent. In China, ripen fruit of T.chebula is named "Hezi" and unripe fruit of chebula is named "Xiqingguo".The fruit of terminal is chebula consider as the king of medicine by Tibetans and second-to none by ayurvedic apothecaries, and also held in high regard other folk meditionalpratitional. Terminalia chebula is anative tree of India, Bangladesh, Myanmar, Nepal, Pakistan, Vietnam, and south western china. In India, T. chebula is found in the sub Himalayan tracks from Ravi east wards to west Bengal and Assam, ascending up to the altitude of 1500m in the Himalayas. This tree is wild in forests of Northern India, central provinces and Bengal; they are common in Madras, Mysore and in the southern part of the Bombay presidency [3].

Fig 1: Terminal chebulaRetz. Plant

Taxonomy:

Kingdom – Plantae

Subkingdom–Tracheobionta

Super division –Spermatophyta

Division – Magnoliopsida

Subclass – Rosidae

Order – Myrtaceae

Family –Combretaceae

Genus – Termnalia L.

Species – Terminalia chebula Retz. [4]

Category: Purgative, astringent, antiaging, resortative, rasayana.

Usual strength: 15% w/w.

Botanical distribution: The tree is tall about 50 to 80 feet in height. It has round crown along with spreading branches. The bark is of dark brown colour with some longitudinal cracks. Leaves are ovate and elliptical, with two large glands at the top of the petiole. The flowers are monocots, dull white to yellow, with a strong unpleasant odour, borne in terminal spikes or short panicles. The flowers appear from May-June, the fruits July-December. The fruit is drupe is about 1-2 inches in size. It has five lines or five ribs on outer skin. The fruit is green when unripe and yellowish grey when ripe. Fruits were collected from January- April, fruit formation started from November to January. [3]

It has a shine on its external part and has longitudinal ridges. The color varies from yellowish brown to light black. It has an astringent taste and is also slightly bitter.

Plant morphology: Terminalia chebula is a medium sized deciduous tree with a height of up to 30m, wide spreading branches and a broad roundish crown. It grows in the altitude of 1500 to 2000 m in mostly clayey as shady soils the leaves are elliptic rhombus, with an acute tip, cordite at the base, outskirts entire, glabrous above a yellowish pubescence below. The flowers are monoecious, monotonous white to yellow, with a strong unlikable odour, born in terminal prickle or short panicles [5].

Microscopy: Epicure has thick walls covered with cuticle the Monocarp has many stone cells of various sizes and shapes which forms a reticulum. Large quantity of tannin is present in the Mesocarp. Simple starch granules are present in plenty [6].

Sr.No	Macroscopic character	Fruits of Terminalia chebula
1	Colour,odour,and taste	Yellowish brown to blakish brown in Colour externally and darker with dirty white patches internally;characteristicodour and astringent in taste.
2	Surface	Longitudinally wrinkled and shiny.
3	Size and shape	Round to ovoid,upto 4cm in length and 2.5 cm wide;pericarp excluding endocarp upto 4mm in thickness.
4	Texture and fracture	Hard and rough,Fracture granular

Table 1: Terminalia chebula fruit macro-morphology.

Habitat: Terminalia chebula occurs scattered around teak forest, mixed deciduous forest, extending into forests of comparatively dry types in Thailand and Burma, it is found together with teak [7] the tree is a light-demander, but withstands some shade in youth, and may benefit then from protection from sun. It grows in India, Myanmar, Bangladesh, Iran, Egypt, Turkey, China, etc. In India, Haritaki tree grows in deciduous forest and found in north India and south words towards the Deccan table lands at1000 to 3000ft [8].

Ecology and Distribution

History of cultivation: The Terminalia chebula has been introduced to Singapore, where it failed, but it was planted successfully in the botanical garden in Bogor, Java. This plant was also introduced to Peninsular Malaysia.

Propagation and cultivation: Depending on the region, the fruits ripen between November and March and fall shortly after. In India, dried fruits have traditionally been utilized as one of the most significant vegetable tanning resources. Shaking the trees in January and April allows the mature fruits to be harvested. They are then processed for marketing and dried in thin layers, ideally in shade. [9]

The act or action and propagation: by increase in number, by spreading of something abroad or into new regions, by enlargement in any living body [10].

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Fig 2: Propagation and cultivation of Terminalia chebula Retz

Microscopic Characteristics

Fruit: Transverse section of fruit shows epicarp and composed of a layer of epidermal cells, the outer tangential walls and upper portion of the thick radial walls. Mesocarp consist of two or three layers of collenchyma followed by broad zone of parenchyma with fibres and

sclereides in groups or vascular bundles with scattered fibres, simple pitted walls; porous parenchyma, sclerides are mostly elongated, tannins and aggregate crystals of calcium oxalate are found in parenchyma, starch grains simple rounded or oval in shape, measuring 2-7 micrometer in diameter[8]

Fig 3: T.S of Terminalia checula fruit

Leaves: These are sub-opposite, simple, estipulate, petiolate, and 10–20 cm long. The laminae are broadly elliptic to elliptic–oblong, infrequently ovate, with obtuse bases, complete margins, and acute, glabrescent tips [11]

Flowers: Flowers all hermaphrodite, sessile, 4 mm in diameters, dull-white or yellow, with offensives small.

Spikes- sometimessimple, usually in short panecles, terminal and in the axils of the uppermost leaves.

Bracts- exceeding the flowers, sub u late or lanceolate, hairly, conspicuous among the buds but soon deciduous.

Calyx- Company late, 3mm.long, flat at the base expanding a little towards the mouth; glabrousoutside, hairywithin; teeth 5 short, sometimesdiameter.

Bark: 6mm. thick, dark brown with many generally shallow vertical cracks.wood very hard, brownish grey with a greenish or yellowish ringe, withirregular, small dark Purple Heart wood, close-grained. [12]

Seed: The presence of primary and secondary metabolites like starch grains, tannins were observed under microscope. The sections cleared with chloral hydrate to observe various ergastic cell contents like crystals of calcium oxalatecrystals, calcium carbonate and silica. It was observed that tannins, starch grains and lignins were present in section [8]

COSMETIC VALUE

Melanin inhibition: The depigmenting agent like kojic acid has been found to have carcinogenic effect. So, safe agents like plant extract of Terminalia chebula should be developed as a depigmenting ingeredient in cosmetic industry. Extract of chebula have great potential as safe effective depigmenting agent. Methanolic extract of the T.chebula showed a melanin inhibitory effect higher than 90% at astringent.

Anti-inflammatory activity: Gallic acid (3, 4, 5-trihydroxybenzoic acid) is one of the main endogenous phenolic acids found in T.chebula plant, which posses the anti-inflammatory activity.

Cellular aging: The ethanol extract from the fruit of Terminaliachebula exhibited significant inhibitory effect on cellular aging.

Astringent: In allopathy,Terminalia chebula extract is used as an astringent. [13]

BENEFITS OF CHEBULA FOR SKIN

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1.Antioxidant/Anti-Aging Function: It is the antioxidant capacity of the chebula that gives it such powerful anti-aging power.In fact,the chebula extract is stronger than the antioxidants we generally consider the best for our skin,including vitamin C(ascorbic acid),vitamin E(tocopherol),and BHT. Terminalia Chebula is able to scavenge more free radicles,and for a longer duration of time than other antioxidants can.Previous study stated,"The antioxidant activity of the extract is significantly higher than the standard ascorbic acid,and its activity is concentration–dependent.It is concluded that the"polyphenolic–rich fraction of Terminalia chebula fruits is a potential source of natural antioxidants"[14]

2.Deeply moisturizes and brightens Skin: The more hydrated yours skin is the better and more youthful it appears . Well hydrated skin shows lass signs of aging than thirsty skin and also reflectslight more evently , giving you a healthier glow. Chebula was proved to increase the moisture content of skin, with a 2012 study clearly stating that "the skin moisture content increased after the application of formulation through out study period".

Genomewide expression responses to terminalia chebula were the opposite to those observed in cells exposed to oxidative solar- simulated UV radiation and wounding , with increased expression of genes associated with water homeostasis , skin barrier establisment, blood vessel development and circadian rhythms . "These results demonstrate that functionlly important T. chebula extract responses occur in the epidermis and are there fore not restrated to the dermal layer . Our finding thus suggest mechanism by which T. cbebula may strengthen full – thickness skin architecture for treatment of skin aging [15,16]

3.Softens skin: Chebula reduces the inflammation in skin ,as well as softens its texture and brightens its appearance.

Psoriasis is one of the most common inflammatory skin disorder,affecting 3% of general population.Terminalia chebula is a polyphenolic compound that posses antioxidants and antiinflammatory activities.as the effect of T.chebula are not strong enough to completely eliminate skin lesions,T.chebula best products may be used in mild psoriasis cases or perhaps as a combination therapy.Overall,the data provide a novel potential therapeutic option for psoriasis[17]

4.Hyperpigmentation: Hyperpigmentation of skin is a common dermatological condition in which the Colour of the skin generally becomes darker .Melanin is a pigment which is responsible for the Colour of the skin.hyper pigmentation is a situation in which large amount of melanin is synthesized .In reaction to theUV rays in sunbeams,the skin cells called melonocytes initiate to synthesized melanin. Terminalia chebula has the property of deminishing the pigmentation and dark spot on the face. [18,19]

MARKETED COSMETIC FORMULATION:

Table 3: Marketed cosmetic formulation containing Terminalia chebulaRetz.[20-24]

Sr. No.	Marketed formulation	Uses	Images
1.	Powder	1.Good for hair and skin health 2.Prevent hair loss 3.Removes acne 4.Removes dark circles 5.Prevent skin allergies 6.Boost immunity	
2.	Cream	1.Decrease in the melanin content of the skin 2.Skin whitening 3.Decrease erythma 4.Skin moisturizing effect 5.Anti wrinkle effect 6.Anti acne 7.Reduce excessive oil secretion	
3.	Gels	1.Treatment of wounds 2.Softens skin 3.Reduces skin irritation 4.Reduces skin toxicity	
4.	Tablets	1.Anti diabetic 2.Used as a lubricant 3.Laxative 4.Antioxidant 5.Hypolipidemic	
5.	Hair oils	1.Promote hair growth 2.Control excess oil 3.Keep scalp skin 4.Control dandruff 5.May prevent premature hair graying and hair loss.	

HARITAKI EXTRACT

Haritaki extract is obtained by extracting haritaki (Terminalia chebula Retz.,fam Combretaceae) from the dried fruit pericarp with ethanol or any other suitable solvent.Haritaki extract contains not less than 90.0%w/w and not more than 120.0%w/w of the stated amount of chebulinic acid and chebulagic acid.

Identification

A.Determine by thin-layer chromatography,coating the plate with silica gel GF254

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Mobile phase- A mixture of6 volumes of ethyl acetate,2 volumes of formic acid,2 volumes of toluene and1 volume of methanol.

Test solution- Dissolve 0.5g of extract under examination with 100ml methanol and filter.

Reference solution- A. 0.1%w/v solution of chebulagic acid RS and 0.1%w/v solution of chebulinic acid RS in methanol.

Apply to the plate 10microliter of each solution as bands 10mm by 2mm.Allow the mobile phase to rise 8cm.Dry the plate in air and examination in ultra-violet light at 254nm.Spray the plate with ferric chloride reagent.heat the plate at 110° for 10min and examine the plates at 366nm and in day light.The chromatographic profile of the test solution is similar to that of the reference solution.

B. In the assay,the peaks due to chebulinic acid and chebulagic acid in the chromatogram obtained with test solution corresponds to the peak obtained with the reference solution.

Tests

Loss on drying: Not more than 5.0%,determined on 2g by drying in an oven at 105° for 3 hours.

Ash: Not more than 2%,appendix XI J.

Heavy metals: 1g complies with the limit test for heavy metal(method B)20ppm.

Microbial contamination: Complies with the microbial contamination test.

ASSAY

Determine by liquid chromatography

Test solution- Dissolve about 0.5g of the extract or quantity equivalent to 100mg of polyphenols in water,make upto 100ml and filter.

Reference solution- (a)0.01% w/v solution of chebulagic acid RS in water.

Reference solution-(b)0.01% w/v solution of chebulinic acis RS in water.

Chromatographic system-

A stainless steel column 25cm×4.6mm packed with octadecylsilane bonded to porous silica (5micrometer).

2.Mobile phase- A. a buffer solution prepared by dissolving 0.136g of potassium do-hydrogen orthophosphate in 500ml of water,add 0.5ml of orthophosphoric acid and dilute to 1000ml with water.

B.acetonitrilea gradient programme using the conditions given below,flow rate 1.5ml per min,spectrophotometer set at 270nm,injection volume 20 microlitre

Time (in min)	Mobile phase A(%v/v)	Mobile phase B(%v/v)
0	95	5
18	75	25
25	65	35
28	65	35
35	95	5

Inject reference solution (a) and (b).The test is not valid unless the relative standard deviation for the replicate injection is not more than 2%.Inject the reference solution and the test solution. Calculate the content of chebulinic acid and chebulagic acid.

Storage: Store protected from heat and moisture. [25]

Chemical Constituents:

The fruit of T.chebula is rich in tannins (about 32%-34%) and its content varies with geographical distribution[26].A group of researchers found 14 components of hydrolysable tannins such as gallic acid, chebulagic acid, punicalagin, chebulanin, corilagin, neochebulinic acid, ellagic acid, chebulinic acid,1,2,3,4,6 - pen ta – O – galloyl – beta – D - glucose, 1 , 6 – di – o -galloyl-D-glucose, casuarilin, 3,4,6-tri-o-galloyl-D-glucose , terchebulin from T.chebula fruits[27].Twelve fatty acids were isolated from T.chebula of which palmitic acid,linoleic acid and oleic acid were main constituent. The plant is found to contain phloroglucimol and pyrogallol, along with phenolic acid such as ferulic, p-coumaric, caffeic and vanillic acids. Oil extracted from kernels yielded palmitic, steraric, oleic, linoleic, is his nic and arachidic acids. [28].

Other constituents present in Terminalia chebula are flavonoids, steroids, amino acids, fructose, resins, fixed oils, antraquinone, carbohydrates, glucose, sorbitol etc. are the hydrolysable tannin reach in plant. Phytochemical like antraquinone ethadioic acid, sennocides, 4,2,4-chebylyl-d-glycopyranose terpenes and terpinols are have also been reported some other minor chemical constituents were polyphenol such as corilagin,gallolyl glucose, punicalagin, terflavinA, maslimic acid. fructose, amino acid, succinic acid,beta sitosterol, resin and purgative principle of antraquinone also present.[29]

PHARMACOLOGICAL AND THERAPEUTIC ACTIVITY

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Antitumor activity: Cell proliferation,cell cycle distribution and apoptosis in SMMC-7721 cells weredetermined and tumor growth inhibition in H22 tumors was investigated.The results suggest that FOF promotes apoptosis in SMMC-7721 cells and inhibits H22 tumor growth, resulting in a potential antitumor effect on hepatic caner. [30]

Antidiabetic: Diabetes mellitus (DM) is amultifactorial disease caused by a metabolic disorder, characterized by chronic hypoglycemia syndrome, and is associated with co-morbidities such as kidney failure, nerve damage, hyperlipidemia, hypertension, and cardiovascular diseases. The results of the present study clearly indicate that the flavonoids of Malus toringoides (Rehd.) Hughes (ESF) exhibit hypoglycemic activity in experimental diabetic animals. [31]

Anti-fungal activity: TheTerminalia chebula is expected to act against the fungal infection. The study wasconducted on the anti-fungal activity of Terminalia sp. In that study aqeous,ethanolic and alcoholic twig extracts were tested against the fungal strains Alternaria brassicicola, Helminthosporium tetramera, Aspergillus flavus and A.niger. These results showed that aqeous extracts were not mucheffective.[32]

Sr.no	Pharmacological action	Parts used	Responsible compound
1.	Anti-oxidant	Fruits Leaf galls Bark	Ellagic acid, ascorbic acid,gallic acid Phenolics flavonoids[33.34]
2.	Antiparacitic	Leaf,flower,seed	Polyphenols[35]
3	Anti-inflammatory and anti-arthritic	Fruits	Chebulagic acid, chebulinic acid,corilagin, hydrolysable tannins[36]
4	Antiviral	Fruit, bark	Punicalagin, chebulagic acid, galloyl compounds[37]
5	Antifungal	Galls, stem bark, seed	Apigenin,phytol,stigmasterol
6	Anti-diabetic and anti-hyperglycemic	Fruits	Chebulic acid, chebuloyl group Tannin[38]
7	Antibacterial	Fruits	Gallotannin and ellagic acid[40]
8	Hepatoprotective	Fruits	Chebulic acid;ellagitannins[41]
9	Antipsychiatry	Fruits	Chebulinic acid[42]
10	Anti-androgenic	Fruits	Chebulinic acid [43]
11	Antiaging	Leaf galls	Polyphenols, flavonoids[44]

Table 4: Overview of different pharmacological activities of Terminalia chebula.

CONCLUSION: Terminalia chebula is highly regarded as an universal panacea in the Ayurvedic medicine.It is the most versatile plants having a wide spectrum of medicinal activities.These versatile medicinal plant is the unique source of various types of compound having cosmetic value.It has benefits for skin,hair and nails.Due to antibacterial, anti tyrosinase and anti–inflammatory properties of Terminalia it prevents skin related disorders also improves skin tone protects from damaging UV rays.Along with that,the Terminalia chebula is mainly used as antiaging, antiviral, antibacterial, antifungal, antioxidant, anticarcinogenic, anti-inflammatory, anti-diabetic and anti-hypoglycemic activity. Future studies should evaluate T.chebula extract supplementation for acne, seborrheic dermatitis and photoaging.

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