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A Review Article on Haritaki (Terminalia Chebula Retz.)

Dr Sonali Kad[1], Dr D.B.More[2] , Dr S.R.Walunj[3]
[1]*PG Scholar, Dravyaguna Department, GAC Osmanabad.*
[2]*Assistant professor, Dravyaguna Department, GAC Osmanabad.*
[3]*PG Scholar, Anatomy Department, R.A.PodarAyurved Medical College, Mumbai.*

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ABSTRACT
Haritaki is most widely used herb in Ayurveda. Botanical source of Haritakiis Terminalia chebula which is commonly Known as Chebulic Myrobalan. Ancient text like BruhAtroyee [Charak Samhita, Sushruta Samhita and Ashtanghridya] and Nighantus have mentioned various uses of Haritaki in Atisar (Diaarhoea), Prameha (Diabetes), Netraroga (Eye disease) Amlapitta (Dyspepsia), Pandu (Anaemia), Arsha (Piles), Ajeerna (Indigestion),Kamala (Jaundice). Research conducted on Terminalia chebula also proves its pharmacological action like anti-inflammatory, anti-viral, antihyperlipidemic, antioxidant, anti-HIV, anti-ulcerative etc. The review aims to compile all information regarding its various traditional uses, pharmacognosy, phytochemical constituent & pharmacological activities to enrich our knowledge about Terminalia chebula.
Keywords: Haritaki, pharmacology, Terminalia chebula

I. INTRODUCTION

Ayurveda is traditional system of Indian medicine used over thousands of years for healing and wellbeing of the body, treatment in Ayurveda is given to cure the body and also maintain homeostasis. This are achieved with numerous medicinal plant mentioned in ancient Samhitas. Terminalia chebula Linn, commonly known as Haritakiis one of the medicinal plant with tremendous effect on various disease. It belongs to family Combrataceae , number of species found in world. In India it is found in sub-himalaya region from raw eastwood to west Bengal and Assam ascending upto the altitude of 1500m in Himalayas. Leaves, fruits are administered in the treatment of many diseases like inflammation, constipation, ulcers, diabetes, wound and also work as hepatoprotective.

Ayurvedic Classification :
Classification of Haritaki in Ayurveda Samhitas

Charak Samhita – Classified under Prajasthapana, Jwaragna,
Kasaghna, Arshoghna
Sushrut Samhita – Triphla, Amlakyadi, Parushakadi
AshtangHriday – HaritakyadiVarga, TriphlaVarga
AshtangSangraha – Arshoghna, Kushtghna, HidhmaNigrahana,
Kasaghna, Garbhasthapan, Vayasthapan, Varnadi Gana
In Nighantus :
Bhavprakash Nighantu – HaritakyadiVarga
Adarsh Nighantu – HaritakyadiVarga
Raj Nighantu – AmradiVarga
KayvadevNighanti – AushadhiVarga
Dhanvantari Nighantu – GuduchyadiVarga

Types of Haritaki
Type of Haritaki -As per Bhavprakash
1) Vijaya – Used for Sarvarogahar
2) Rohini - Used for Varan
3)Putana– used for pralep
4) Amruta - Used for Shodhan
5) Abhaya -Used for Netrarog
6) Jeevanti - Used for Sarvayoga
7) Chetaki – Used for ChurnaYog

Different varieties along with morphological characters and users according to Indian Materia Medica given below: -
1] Survarnaharitaki – Large, dense and heavy size about 2^11 long, yellowish to brownish in color, when it contains pulp of yellowish to brownish tinge.
2] Rangariharitaki- These are smaller in size, less wrinkled,and less furrowed than suvarnhirde and its length is about 1 inch.
These are alternative, stomatic, laxative and toxic, it is generally used in fever, cough asthma, urinary diseases.
3] Balaharitaki – This variety is smaller than suvariharade,rangariharde. Its color is homogenous and pulp is deep brown.

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This is mild and safe aperients.Ripe fruits are considered as purgative removingbills and phlegm and to adjust bile.
Useful in chronic diarrhoea and dysentery,flatulence, vomiting , hiccups,colic and enlarge spleen and Liver.

4]Java Haritaki-These are smallest than all above the varieties and rest characteristics are similar as balahirdas.

Along with that cold infusion of its used as gargles in sole mouth and stomatitis, spongy and Ulcered gum.

Used to increase appetite, digestive and liver stimulant as stomachic, as gastrointestinal prokinetic agent, and mild laxative, it is used for sore throat, blood purifier, and muscular rheumatism for skin itching and oedema.

Different species:
1. Terminalia chebula
2. Terminalia citrin

Taxonomy of Terminalia chebula Retz.
Latin Name – Terminalia chebula
Kingdom – Plantae-plants
Subkingdom – Tracheobionata- Vascular plant
Super division – Spermatophyta – seed plant
Division – Magnoliophyta – flowering plant
Class – Mangoliopsidadicotyledons
Subclass – Rosidae
Order – Myrtales
Family – Combretaceae
Genus – Terminalia
Species – T.chebula

Nirukti:
Abhaya – Na bhayenvyadhinamsevnadasya
Pathya – Pathi sadhu itipathyahithaithyrtha
Kayastha – Kaya tishthatianayaiti
Chetki – Chetyatiiti
Shiva – Shivamkarotiiti
Haimavati – Himavatijataiti
Shreyasi – Atiprashstaiti

Synonyms of Haritaki –

	D.N.	A.N.	R.N.	B.P.	K.N.
Haritaki	+	+	+	+	+
Vijaya	+	+	+	+	+
Rohini	+	+	+	+	+
Amrita	+	+	+	+	+
Shaklasreshta	-	-	-	-	-
Abhaya	+	+	+	+	+
Airytha	-	-	-	-	-
Pramatha	-	-	-	-	-
Amogh	-		-	-	-
Kayastha	+	+	+	+	+
Prapathya	-	-	+	-	+
Divya	-	-	+	-	-
Pranada	+	-	+	+	+
Jiva	-	-	+	-	-
Putana	+	+	+	+	+
Shreyasi	+	+	+	+	+
Chetki	+	+	-	+	+
Balyi	-	-	-	-	+
Pathya	+	+	+	+	+
Jivya Priya	-	+	+	-	-
Bhisak Priya	-	+	+	-	-
Pachani	-	+	-	-	-

Vernacular Names

Sanskrit	Abhaya, Kayastha, Shiva, Pathya
Asamese	Shilikha
Bengali	Haritaki
English	Myrobalan

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Gujrati	Hirdo, Himaja, Pulo-harada
Kannada	Alalekai
Kashmiri	Halela
Malayalam	Katukka
Marathi	Hirda, Haritaki, Harda, Hireda
Oriya	Harida
Punjabi	Halela, Harar
Tamil	Kadukkai
Telugu	Karakkai
Hindi	Harre, Harad, Harar

Properties

Raspanchak

Samhita/Nighantu	Ras	Veerya	Vipak	Guna
Charak	Kashaypradhanpanchras	Ushna	Madhur	Laghu, ruksha
Sushrut	Kashaypradhanpanchras	Ushna	Madhur	Laghuruksha
AshtangHriday	Kashaypradhanpanchras	ushna	Madhur	Laghu,ruksha
Adarsh Nighantu	Kashaypradhanpanchras	Ushna	Madhur	Laghu,ruksha
Bhavprakash Nighantu	Kashaypradhanpanchras	ushna	Madhur	ushna
Rajnighantu	Lavanrahitpanchras	-	-	-
Kaiyadev Nighantu	Kashaypradhanpanchras	ushna	Madhur	Rukshalaghu
Madanpal Nighantu	Lavanrahitpanchras	-	Madhur	Ushna,ruksha
DhanvantariNighantu	Lavanrahitpanchras	-	-	Ruksha

Panchbhautiksanghatan :

Ras/Vipak	Prithvi	Jal	Tej	Vayu	Akash
Kashay	+	-	-	+	-
Madhur	+	+	-	-	-
Amla		+	-		
Tikta	-	-	-	+	+
Katu	-	-	+	+	-

In panchbhautiksanghathan : due to kashayras(Prithvi+Vayu), Madhur(Prithvi +Jal) and tiktaras (Vayu+AkasHaritaki is Pittashamak Due to amla ras (Prithvi+Tej) haritaki is Vatshamak ,Due to katu(Tej+Vayu), tikt and kashayHaritaki is Kaphshamak hence Haritaki is tridoshshamak

Karmas of Haritaki-

Karma	Ch.S	Su.S	A.Hriday	KN	RN	BPN	DN
Vatahar	+	+	+	+	+	+	+
Vayasthapan	+	+	+	+	-	-	-
Sangrahini	+	+	+	-	-	-	-
Hriday	-	-	+	-	-	+	+
Balya	-	+	+	-	-	-	+
Netrahitkar	+	+	+	+	+	+	+
Pittahar	+	+	+	+	+	+	+
Ayushya	+	+	+	+	-	+	-
Medhya	+	+	+	+	-	+	+
Medohara	+		-	+	-	-	-
Vatapittahar	-	+	+	+	+	+	+
Dipaneeya	+	+	+	+	-	+	-

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Rasayani	+	+	+	+	+	+	-
Tridoshar	+	+	-	+	+	+	+
Anuloman	+	+	+	-	-	+	+
Pachan	-	+	+	+	-	+	-

(Reference ch.Su.25, Su.su;D.Nshlok no 204,205,206;K.N shlok no 133,134,RN shlok no 216;BP.N.shlok no 19,20,21,22)

Rogaghnata :
Charak[17] – Jwaraghna(decreases fever),Kushtaghna(useful in skin disease),
Kasaghna (reduces cough),Arshoghna (Useful in piles)
chardighna (useful in vomiting)
Sushrut[38]- kushtagna(useful in skin disease),netrahitkar (useful in eye disease)
vishamjwarhar(decreases fever)
Bhavprakash[20]shwasagna(useful in asthama),
kasaghna(reduced cough),
pramehgna(control diabetes),
arshoghna(useful in piles),
kushtgna(useful in skin disease),
shothagna(anti-inflammatory),
Krumigna(useful in worms)
KaiyadeSv Nighantu[234] – jwaragna(decreases in fever),
netrahitkar(useful in eye-disease),
pramegna(control diabetes),
krumigna(useful in worms),
Rajnighantu[216]– netravikar(useful in eye disease),
DhanvantariNighantu[205]– pramehagna(control diabetes),
Kushtagna(useful in skin disease),
netrahitkar(useful in eye disease),
Ashtanghriday[155] – pramehghna(control diabetes),
pandughna(use in anaemia)

Parts of Haritaki Fruit	**Rasa**
Phalamajja	Madhura
Snyayu	Amla
Vrunta	Tikta
Twacha	Katu
Asthi	Kashay

Morphology of Terminalia chebula[1] [2]
Terminalia chebula is a medium sized deciduous tree with height of up to 30m wide spreading branches and a broad roundish crown. It grows in altitude of 1500-2000 m in mostly clay as well as shady soils.
Stem- is dark brown
Leaves- Leaves are sub-opposites ovate or oblong-ovate 8-20cm long and deciduous during cold season. The species is identified by dark brown bark exfoliating in irregular woody scales and by presence of pair of large gland present at the end of petioles.

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Fruit - Fruit is yellow, elliptical with five longitudinal ridges, and about 2-4 cm long and 1-2.5cm wide. Very large fruit is valuable. Mature fruit is of an ovoid form, from 25 to 38mm long. The unripe fruits are shriveled, black, ovoid, brittle bodies.

Flower

Flowers are somewhat yellowish white and fragrant, borne in large in compound inflorescence. They occur in spike arising from upper axils or in small panicles.

Fruit

Seed-

Seed is globose and 2-6 cm long, sometimes tapering towards the lower extremity, obscurely 5 or 6 sided, more or less furrowed longitudinally, covered with a smooth yellowish-brown epidermis, within which is an astringent pulp, enclosing a large rough bony one celled endocarp.

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Habitat[3]

Terminalia chebula is found throughoutSouth East Asia like India, Sri Lanka, Bhutan, Nepal, Bangladesh & Pakistan, Myanmar, Cambodia, Laos, Vietnam, Indonesia, Malaysia, Egypt, Turkey & Thailand. In India it is found in the Sub Himalayan tracks from Ravi eastwards to West Bengal & Assam ascending up to the altitude of 1500 meter in the Himalayas. This tree is wild inforests of Northern India, Mysore and in the southern part of Bombay presidency. Flowers appear from April to August and fruits ripen from October to January.

Propagation, planting and harvesting[4]

Trees are generally grown from seeds. The fallen fruits are collected and dried thoroughly first. Later the hardened flesh is removed. Fermentation of the stones gives the best germinative results, but clipping the broad end of stones without damaging the embryo, followed by the soaking in cold water for 36 hours gives good results too. In India, seeds are usually sown in boxes or nursery beds in springs or before the rainy season, covered with soil, and watered regularly. Clay and sandy soils are ideal for growing them. They required full sunlight and ample amount of water for growing properly. A mere 20% success rate is reported. Transporting from the nursery into the field can be done in the first or second rainy season. Shading is desirable in early stages in in the nursery and after transplanting. Propagation by cutting is possible, but less successful than transplanting nursery raised seedlings. In the forest, regeneration is facilitated by creating small gaps in the canopy, and this may be supplemented by sowing seeds in the clearings. These deciduous trees remain leafless from February to early April. The flowers bloom between April & August. The trees bear fruits between November and February. The fruits are harvested while they are ripened. Harvesting is done by handpicking the fruits.

Part used - Fruit

Chemical composition :

A number of glycosides have been isolated from Terminalia chebula, including the triterpenes, arjunglucoside I, arjungenin& the chebulosides I &II. Other constituents include a coumarin conjugated with gallic acid called Chebulin as well as other phenolic compound including ellagic acid, chebulinic acid, gallic acid, ethyl gallate, punicalagin, terflavin A, terchebin, luteolin and tannic acid.[5] [6] Chebulic acid is a phenolic acid compound isolated from the ripe fruits.[7] [8]Luteic acid can be isolated from the bark.[9] T. chebula also contain terflavin B, a type of tannin, while chebulinic acid is found in the fruits.[10]

The major bio-active constituent of the fruits are tannins, anthraquinones, chebulinic acids, chebulagic acid, chebulic acid, ellagic acid and gallic acid. The other minor compounds include corilegin, glucose & sorbitol. Polyphenolic compounds, triterpene glycosides. A flavonoids, reducing sugars & starch are other constituent of the fruits.

Doses :3 – 6 gm of the drug in powder form

Important Formulation - Triphalachurna, TriphaladiTaila, Abhayarista, Agastya HaritakiRasayana, ChitrakaHaritaki, DantiHaritaki, DashamulaHaritaki, DantiHaritali, Brahma Rasayana, AbhayaLavanaa, Pathyadilepa.

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Concept of RutuHaritaki[11]

Sr.No	Rutu	Dosha Avastha	Anupana	Guna, Karma of Anupanadravya
1	Varsha (Rainy season)	VataPrakopa, Pitta Sanchay	Saindhav	Vrushya, Tridoshhara
2	Sharada (Autumn)	Pitta Prakopa, VataPrasham	Sharkara	Vrushya, Vata pitta shamaka
3	Hemanta (winter)	Pitta Prasham	Shunthi	Vrushya, VataKapha shamak
4	Shirisha (winter)	KaphaSanchay	Pippali	Vrushya, Kapha pitta shamak
5	Vasanta (spring)	Kaphaprakopa	Madhu	Vrushya, Tridosha shamak
6	Grishma (Summer)	VataSanchay, Kaphaprasham	Guda	Vrushya, Tridosha shamaka

Traditional use of Haritaki

1)Haritaki fruit is extensively used in Thai traditional medicine for laxative, carminative, astringer and tonic effect.

2) Routinely used in traditional medicine by tribes of Tamilnadu to cure severe disease such as fever, cough, diarrhoea, gastroenteritis, skin diseases candidiasis urinary tract infection, wound infections

3) Used commonly in many ayurvedic preparations diuretics and cardiotonic.

4)It is Used to prevent aging and impact long immunity.

5)It is reported to cure blindness and it is believed to growth malignant tumours.

Pharmacological Action

1) Antioxidant & free radical scavenging activity

i) Six extract and four compound of Terminalia chebula fruit exhibited antioxidant activity & phenolic compound were found to be responsible for this activity.[12]

ii] The leaves, bark & fruit of Terminalia chebula possessed high antioxidant activity and phenolic were found to be responsible for this activity.[13]

iii] Terminalia chebula in polyherbal formulation (Aller-7/NR-A2) inhibited free radical induced haemolysis and also significantly inhibited nitric oxide release from lipopolysaccharide stimulated murine macrophages.[14]

iv] Strong antioxidant activity of aqueous extract of Terminalia chebula was observed by studying the inhibition of radiation induced lipid peroxidation in rat liver microsomesat different doses.[15] Methanolic extract was also found to inhibit lipid peroxide formation and to scavenge hydroxyl and superoxide radicals in vitro.[16] Acetone extract has stronger antioxidant activity than alpha-tocopherol and HPLC analysis with diode array detection indicated the presence of hydroxybenzoic acid derivatives, hydroxycinnamic acid derivatives, flavonol aglycones and their glycosides, as main phenolic compound.[17]

v]An evaluation of extracts of five traditional medicinal plants viz, Quercus infectoria Olive., Terminalia chebula Retz, Lavendulastoechas L., Mentha longifolia L., Rheum palmatum L from Iran on the inhibition of mushroom tyrosinase activity and scavenging of free radicals. In general Q. infectoria and T. chebula significantly inhibited tyrosinase activity and DPPH radical. Both activities were concentration-dependant but not in a linear manner. It is needed to study the cytotoxicity of these plant extracts in pigment cell culture before further evaluation and moving to in vivo conditions.[18]

2) Cardioprotective activity

Terminalia chebula extract pretreatment was found to ameliorate the effect of isoproterenol on lipid peroxide formation and retained the activities of the diagnostic marker enzymes in isoproterenol induced myocardial damage in rats.[8]Its pericarp has also been reported to have cardioprotective activity in isolated frog heart model.[19]

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3] Antidiabetic and retinoprotective activity

i] Water extract of dry fruits of Terminalia chebula at a dose of 200 mg/kg body weight improved the glucose tolerance as indicated by 44% of reduction in the peak blood glucose at 2nd hour in glucose tolerance test in diabetic. (Streptozotocin induced) rats.[20] The fruit extract of Terminalia chebula exerts a significant and dose dependant glucose lowering effect in glucose lowering effect in the rat model of metabolic syndrome.[21]

ii] Terminalia chebula fruit and exhibited dose dependent reduction in blood glucose of streptozotocin induced diabetic rats both in short term and long term study and also radioprotective activity.[22] [23]

4] Cytoprotective activity

i] Gallic acid (GA) & CA were isolated from the extract of the herbal medicine Kashi (Myrobalan, the fruit of Terminalia chebula) as active principal that blocked the cytotoxic T-lymphocytes-mediated cytotoxicity. Granule exocytosis in response to anti-CD3 stimulation was also blocked by GA & CA at equivalent concentrations.[24]

ii] The ethanolic extract of Terminalia chebula fruit exhibited a notable cytoprotective effect on the HEK-N/F cells. In addition its extract exhibited significant cytoprotective effect against UV-induced oxidative damage. These observations were attributed to the inhibitory effect of Terminalia chebula extract on the age dependant shortening of telomere length as shown by the Southern Blots of the terminal restriction fragments of DNA extracted from sub-culture passage.[25] It exhibited the development of duodenal ulcers and appeared to exert a cytoprotective effect on gastric mucosa in vivo[26]

iii] Cytoprotective effect on oxidative stress and inhibitory effect on cellular aging of its fruits have also been documented.[27]

5] Antiviral activity

i] Terminalia chebula fruits afforded four immunodeficiency virus type 1 (HIV-1) integrase inhibitors, GA (I) and three galloyl glucoses (II-IV). Their galloyl moiety plays a major role for inhibition against the 3'-processing of HIV-1 integrase of the compound.[28]

ii] Terminalia chebula has also retroviral reverse transcriptase inhibitory activity.[29]

iii] It protects epithelial cells against influenza A virus, supporting its traditional use for aiding in recovery from acute respiratory infections.[30]

iv] It also demonstrated the therapeutic activity against herps simplex virus both in vivo and in vitro tests.[31]

v] These finding prompted a team of Japanese researchers to investigates T. chebula's effect on human cytomegalovirus (CMV). They found that T. chebula was effective in inhibiting the replication of cytomegalovirus in vitro and in an AIDS model with immunosuppressed mice and concluded that it may be beneficial for prevention of CMV disease and immunocompromised patient.[32]

vi] It is also helpful in sexually transmitted diseases and AIDS[33]

vii] Tannins from T. chebula are effective against potato virus x[34]

6] Antiprotozoal activity

i] A combination of T. chebula and four other botanicals (Boerhaviadiffusa,Berberis aristata, Tinospora cordifolia and Zingiber officinale) had a maximum cure rate of 73% in experimental amoebic liver cure in hamsters[35] and 89% in experimental caecal amoebiasis in rats showing its antiamoebic activity against Entamoeba histolytica[36]

ii] The acetone extract of T.chebulaseeds showed anti plasmodium activity against plasmodium falciparum.[37]

7] Anti-inflammatory & anti-arthritic activity

i] Aqueous extract of dried fruit of T. chebula showed anti-inflammatory activity by inhibiting inducible nitric oxide synthesis.[38]

ii] Chebulic acid from immature seeds of T. chebula significantly suppressed the onset and progression of collagen induced mice.[39]

iii]Terminalia chebula in polyherbal formulation (Aller-7) exhibited a dose dependant anti-inflammatory effect against Freund's adjuvant induced arthritis in rats.[40]

8] Anti-allergic activity

Aller -7, a polyherbal formulation of seven medicinal plants including Terminalia chebula exhibited potent in vitro antiallergic activity isolated guineapig ileum substrate.[41]

9] Anticarcinogenic activity

i]Ethanol extract of Terminalia chebula fruit inhibited cell proliferation and induced cell death in does dependant manner in several malignant cell lines including human (MCF-7) & mouse (S115) breast cancer cell line, human osteosarcoma cell

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(PC-3) and a non-tumorigenic immortalized human prostrate cell line (PNT1A). Besides, acetone extract of bark & fruit powder of Terminalia chebula harbours constituents with promising anticarcinogenic activity Chebulagic acid, a COX-LOX dual inhibitor isolated from the fruits of Terminalia chebula Retz., induced apoptosis in COLO-205 cell line.[42]

ii] A group of researchers have reported the inhibitory action on cell growth by phenolics of Terminalia chebula Retz fruit and found that chebulinic acid, tannic acid and ellagic acid were the most growth inhibitory phenolics of T. chebula.[43]

10] Antispasmodic activity

One of the numerous studies of Terminalia chebula demonstrated its 'anti-vata' or antispasmodic properties by the reduction of abnormal blood pressure as well as intestinal spasms. This confirms its traditional usefulness for spastic colon and other intestinal disorders.[44]

11] Wound healing activity

Topical administration of an alcoholic extract of Terminalia chebula leaves on the healing of rat dermal wounds showed that Terminalia chebula treated wound healed faster as salivary bacterial for upto 90 min post rinsing[45]

12] Purgative property

Purgative action of an oil fraction from Terminalia chebula has been documented[46]

13]Immunomodulatory activity

Crude extract of Terminalia chebula stimulated cell-mediated immune response in experimental amoebic liver abscess in golden hamsters,[47] aqueous extract of Terminalia chebula produced an increase in humoral antibody titre and delayed type of hypersensitivity in mice[48]

14]Adaptogenic&antianaphylactic activity

i] Water soluble fractions of Terminalia chebula had a significant increasing effect on anti-dinitrophenyl IgE-induced tumor necrosis factor-alpha production from rat peritoneal mast cells indicating its strong antianaphylactic action.[49]

ii]Besides,animal studies showed that when extract of T. chebula was administered following induction of anaphylactic shock, the serum histamine levels were reduced, indicating its strong antianaphylactic action.[50]

iii] T. chebulafruit was one of the six Ayurvedic herbs administered to animals to test their adaptogenicpotencial. All six traditional rasayana plants were able to aid the animals against a variety of different stressors working in different ways.

15]Antifungal activity

i] An aqueous extract of Terminalia chebula exhibited antifungal against a number of dermatophytes and yeasts.[51] [52]

ii] It is effective against the pathogenic yeast Candida albicans and dermatophytes Epidermophyton, Floccosum,Microsporumgypseum and Trichophyton rubrum.[53]

iii] Its inhibitory effects on three dermatophytes (Trichophyton spp.) and three yeast (Candida spp.) has also been documented.[54]

16]Hypolipidemic/Hypocholesterolemicactivity

Hypolipidemic activity of Terminaliachebula extract against experimentally induced atherosclerosis have been documented.[55]

17]Gastrointestinal motility improving and anti-ulcerogenic activity

Although its traditional use as laxative is well established Terminalia chebula fruit has been shown to increase gastric-emptying time.[56] This action is appeared to be balanced with protective effect on gastrointestinal mucosa, with the improvement in the secretory status of Brunner's gland involved in the protection against duodenal ulcer.[57]

18]Antiamoebic activity

A combination of Terminalia chebula and four other botanicals (Boerhaviadiffusa, Berberis aristate, Tinospora cordifolia, and Zingiber officinale) had a maximum rate of 73% in experimental amoebic liver abscess in hamsters[58]and 89% in experimental caecal in humoral antibody (HA) titre and delayed type hypersensitivity (DTH) in mice[59]

19]Chemopreventive activity

Terminalia chebula showed chemopreventive effect on nickel chloride-induced renal oxidative stress, toxicity and cell proliferation response in male Wistar rats[60]

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20]Skin Disorders

It is useful in skin disorder with discharges like allergies, urticaria and other erythematous disorders.[61]

21]Radioprotective activity

The administration of Terminalia chebula extract prior to whole body irradiation of mice resulted in the reduction of perioxidation of membrane lipids in the mice liver as well as decrease in the radiation induced damage to DNA. It also protected the human lymphocytes from undergoing the gamma radiation induced damage to DNA exposed to vitro[62]

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