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A Critical Review of Pharmacological Actions of *Haritaki* (*Terminalia chebula* Retz) In Classical Texts

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ABSTRACT

The drug *Haritaki* (*Terminalia chebula* Retz.) belongs to family Combretaceae is used since ancient time for therapeutic purposes. It has been widely used in the traditional Indian medical system of 'Ayurveda' for the treatment of a variety of ailments. Ayurvedic scholar *Acharya Bhavprakash* described the *Haritaki as* first drug in *Bhavprakash Nighantu.* It is called the "King of Medicines" in the Tibet and is always listed first in the Ayurvedic materia medica because of its extraordinary powers of healing with a wide spectrum of biological activity. *Haritaki* has five *Rasa* (taste) except *Lavana* (salt), its *Vipaka* (taste after digestion) is *Madhura* (sweet) and *Veerya* (potency) is *Ushna* (hot). Due to these virtues the plant performs various pharmacological actions such as *Rasayana* (rejuvenating), *Medhya* (brain tonic), *Deepana* (appetizer), *Aampachana* (digest Aama or toxins) and *Srotas-Shodhana* (cleaning the channels by detoxifying the metabolic waste). It helps to improve physical and mental health, prevents degeneration, extends youth and delays aging or rather reverse the aging process. Nowadays different modern researches have revealed its chemical components and pharmacological activities. Main phyto-chemicals of *Haritaki* are chebulic acid, gallic acid, corilagin, chebulagic acid, ellagic acid, chebulinic acid, triterpenoids and anthraquinones. It performs various therapeutical actions like; antimicrobial, anti-inflammatory, antioxidant, anti-diabetic, hepato-protective, anti-mutagenic, anti-proliferative, radio-protective, cardio-protective etc. This paper presented a comprehensive review of *T. chebula* especially its pharmacological actions on the basis of ancient texts as well as modern literatures.

Key words: *Haritaki, Terminalia Chebula Retz, Ayurveda, Pharmacological Activity.*

INTRODUCTION

Haritaki (*Terminalia chebula* Retz) is held a supreme position in Ayurveda. It is one of the important as well as commonest herbs used by folk, house hold and traditional medicine. *Acharya Bhavamishra* a renounced scholar of Ayurveda in 16th centuary, described the *Haritaki* firstly in his *Nighantu*. He told the story about the arisen of *Haritaki* that once upon a time *Indra* was drinking *Amrita* (nectar) one drop of it fell on the earth and *Haritaki* grown from that divine drop.[1] *Acharya Charaka* stated *Haritaki* as best among the herbs to be used regularly. *Haritaki* is the best among *Pathya* (wholesome) *Dravya.*[2] According to *Achraya Sharangdhar*, it is the best among *Anulomana* (mild laxative) *Dravyas.*[3]

It is found throughout India up to an altitude of 1500.[4] It's fruit rind is used for medicine. Hundreds of formulations of *Haritaki* are described in Ayurveda texts. It is one of the ingredients in most common and famous formulation of Ayurveda i.e. *Triphala* (three *myrobalans*). *Bhavamishra* describes seven

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varieties of *Haritaki* viz; *Vijaya*, *Rohini*, *Putana*, *Amrita*, *Abhaya*, *Jivanti* and *Chetaki*.[5]

Vernacular names

Sanskrit: Abhaya, Kayastha, Pathya, Vijaya; **Assamese:** Shilikha; **Bengali:** Haritaki; **English:** Myrobalan; **Gujrati:** Hirdo, Himaja, Pulo-harda; **Hindi:** Harre, Harad, Harar; **Kannada:** Alalekai; **Kashmiri:** Halela; **Malayalam:** Katukka; **Marathi:** Hirda, Haritaki, Harda, Hireda; **Oriya:** Harida; **Punjabi:** Halela, Harar; **Tamil:** Kadukkai; **Telugu:** Karaka, Karakkaya; **Urdu:** Halela.

Picture 1: *Haritaki* fruits with plant

Picture 2: Dry *Haritaki* fruits

Interpretation and etymology of synonyms[6]

- *Haritaki*- It provides a good complexion or colour.
- *Abhaya*- It relieves fear against all diseases.
- *Avyatha*- Its usage provides relief from many diseases.
- *Pathya*- It cleanses the channels hence beneficial to the body.
- *Kayastha*- Once used internally it always remains useful(fruitful)in eliminating diseases.
- *Putana*- Cleanses the body by purgation.
- *Amrita*- It has a rasayana property and rejuvenates the body and removes the diseases.
- *Hemvati*- Grows (everywhere and)in Himalayas.
- *Chetaki*- itcleanses the channels in the head and improves mental function.
- *Shreyasi*- It is highly beneficial due to its good properties.
- *Shiva*- It brings good fortunes.
- *Vijaya*- It specifically conquers diseases.
- *Jivanti*- It provides *Rasayana* (Rejuvenative) effect for a long time and thus increases longevity.
- *Rohini*- It is useful for healing of wounds.

Table 1: Synonyms of *Haritaki*

Synonyms	*D.N.*[7]	*S.N.*[8]	*M.P.N.*[9]	*K.N.*[10]	*Bh.N.*[11]	*R.N.*[12]
Abhaya	+	+	+	+	+	+
Amogha	-	-	+	-	-	-
Amrita	+	+	+	-	+	+
Avyatha	+	+	-	-	+	+
Bhishagvara	-	-	-	-	-	+
Chetaki	+	+	+	-	+	-

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Chetanika	-	-	-	-	-	+
Devi	-	-	-	-	-	+
Divyaa	-	-	-	-	-	+
Haritaki	+	+	+	+	+	+
Haimavati	+	+	+	+	+	+
Himaja	-	+	-	-	-	-
Jaya	+	+	+	-	-	+
Jeevaniya	-	-	+	-	-	-
Jivanti	-	+	-	-	+	+
Jeevpriya	-	-	-	-	-	+
Jeevya	-	-	-	-	-	+
Kalika	-	+	-	-	-	-
Kayastha	-	+	+	+	+	+
Nandini	+	+	+	-	-	-
Pathya	+	+	+	+	+	+
Pranada	+	+	+	+	-	+
Prapathya	+	+	+	+	-	+
Putana	+	+	+	-	+	+
Ramturyaka	-	+	-	-	-	-
Rohini	+	+	+	-	+	+
Ropani	-	+	-	-	-	-
Shiva	+	+	+	+	+	+
Shreyasi	-	+	+	+	+	+
Surabhi	-	+	-	-	-	-
Vayastha	+	+	+	-	+	-
Vijaya	+	+	+	+	+	+

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Vratna	-	-	+	-	-	-
Prathama	-	-	+	-	-	-
Jivanika	-	-	-	-		+

D.N. - Dhanvantari Nighantu, S.N. - Shodhala Nighantu, K.N. - Kaiydeva Nighantu, M.P.N. - Madanpala Nighantu, Bh.N. - Bhavprakasha Nighantu, R.N. - Raj Nighantu

Morphology

It is a moderate sized deciduous tree, attaining height 25-30m. Leaf-buds, branchlets and youngest leaves are soft,shining, and generally with rust-coloured hairs. **Bark** is usually 6mm. thick, and dark brown with many shallow vertical cracks. **Leaves** are 7-20 cm. long and 4-8 cm. breadth, elliptic-oblong, rounded or cordate at base, glabrous, alternate or sub-opposite, secondary nerves 6-8 pairs, arching, prominent; petioles 2-5 cm. long, pubescent, usually with 2 glands near the top. **Flowers** are hermaphrodite, 4mm. across, sessile, dull white or yellowish, with an offensive smell. **Fruit** is ellipsoidal or ovoid, more or less distinctly 5-angled.

Chemical composition

Haritaki consisted of several phyto-constituents like tannin, flavonoids, sterols, amino acid, fructose, resin, fixed oil etc.[13] It contains 33% of hydrolysable tannin which is responsible for pharmacological action. The chief components of tannin are chebulic acid, chebulinic acid, chebulagic acid, gallic acid, corilagin and ellagic acid. Tannins of *Haritaki* are of pyrogallol (hydrolysable) type. Phytochemicals like anthraquinones, ethaedioic acid, sennoside, 4,2,4 chebulyl-d-glucopyranose, terpinenes and terpinenols have also been reported to be present.[14,15] Triterpenoids and their glycoside have been isolated from the stem bark of *Haritaki*.[16]

Materials and Methods

Brihattrayi

- *Charaka Samhita*
- *Sushruta Samhita*
- *Vagbhatta*

Nighantus

- *Dhanvantari Nighantu* (10th Century A.D.) iscomposed by *Mahendra Bhougika*.
- *Shodhala Nighantu* (12th Century A.D.) is written by *Acharya Shodhala*.
- *Madanapala Nighantu*(14th century A.D.) is also known as *Madan Vinoda* written by *Madan Pal*.
- *Kaiyadeva Nighantu* (14th Century A.D.) is written by *Kaiyadeva*
- *Bhavaprakasha Nighantu* (16th Cent. A. D.) is written by *Acharya Bhava Mishra*.
- *Raj Nighantu* (17th Century A.D.) is also known as *Abhidana Chudamani* or *Nighanturaja*, written by *Narhari Pandita*.
- Modern medical databases (PubMed, Scirus, Science Direct and Scopus)

Discussion

In *Charaka Samhita, Haritaki* was mentioned with six synonyms i.e. *Abhaya, Amrita, Pathya, Vijaya, Shiva* and *Haritaki*. It is described as best *Pathya Dravya* and classified under the eight groups i.e. *Arshoghna,*[17] *Kushthaghna,*[18] *Virechanopaga,*[19] *Hikka-nigrahana,*[20] *Kasahar,*[21] *Jwarahar,*[22] *Prajasthapana,*[23] *Vayah-Sthapana*[24] *Mahakashaya. Charaka* indicated *Haritaki* in *Jwara* (fever), *Prameha* (diabetes), *Kushtha* (leprosy), *Unmada* (mental disorder), *Apasmara* (epilepsy), *Krimi Roga* (worm infestation), *Pandu* (anaemia), *Grahani* (small intestine disease), *Visha* (poisoning) and *Madatyaya* (alchoholism) etc.[25] *Acharya* used it in various formulations, some are very common and used

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frequently such as *Agastya Haritaki, Abhayarishta, Phalarishta, Kansa Haritaki* and *Chitraka-Haritaki* etc.

In *Sushruta Samhita, Haritaki* was mentioned with same synonyms as *Charak Samhita* except one i.e. *Shiva* is replaced by *Vijaya. Acharya Sushruta* classified *Haritaki* under *Vachadi,*[26] *Mushkakadi,*[27] *Parushakadi,*[28] *Mustadi,*[29] *Triphaladi*[30] and *Amlakyadi Gana.*[31] It is indicated in various diseases like *Kushtha* (leprosy), *Kandu* (*pruritis*), *Apasmara* (epilepsy), *Unmada* (mental disorder), *Pandu* (anaemia), *Bhagandara* (fistula), *Pliha Roga* (spleen disorder), *Urustambha* (paraplegia), *Netra Roga* (eye disease), *Raktapitta* (bleeding-disorder), *Prameha* (diabetes).

Acharya Vagbhatta classified it in *Vachadi Gana.*[32],[33] In *Ashtanga Hridaya*, a new synonym is mentioned as *Pranada*. *Acharya* indicated it in *Raktagulma* (tumor arising from the blood), *Kshata* (injury), *Timira* (eye disease), *Visha* (poisoning), *Vrana* (wound), *Ajirna* (indigestion), *Kushtha* (leprosy), *Twakdosha* (skin diseases) and *Udararoga* (gastro-intestinal disorder) etc.

Table 2: Formulations and *Rogaadhikara* (Drug of choice) of *Haritaki* in *Charaka Samhita.*

Adhyaya* & *Shloka	**Formulations**	***Rogaadhikara***
Sutrasthana		
4-11/12	*Arshoghna Mahakashaya*	Piles
4-11/13	*Kushthaghna Mahakashaya*	Leprosy
4-15/30	*Hikkanigrahan Mahakashaya*	Hiccup
4-16/36	*Kasahara Mahakashaya*	Cough
Vimanasthana		
7-21	*Kriminashaka Pooplika*	Worm infestation
Chikitsasthana		
3-201	*Anyedyushak Jwarahara Kashaya*	Fever
3-204	*Vatsakadi Kashaya*	Fever
3-206	*Mdhukadi Sheeta Kashaya*	Fever
3-208	*Triphaladi Kwatha*	Fever with constipation
3-222	*Vasadi Ghrita*	Chronic Fever
3-231	*Virechana Dravya*	Fever
3-307	*Dhoopa*	Intermittent Fever
5-79	*Hingwadi Choorna*	Anorexia, cough, hiccup.
5-106	*Nilinyadi Ghrita*	Leprosy, fever, anaemia.
5-115	*Rohinyadya Ghrita*	Thirst, anorexia.
5-123,124	*Drakshadya Ghrita*	Paittika vikara. Blood disorders.
5-154	*Danti Haritaki*	Intermittent Fever, jaundice.
9-45	*Mahapaishachika Ghrita*	Epilepsy, seizures.
9-49	*Lashunadya Ghrita*	Epilepsy
10-48	*Mustadi Varti Anjan*	Epilepsy, lucoderma.
12-53	*Patolmooladi Kwatha*	Fever
14-138	*Abhayarishta*	Jaundice, worm infestation,
14-148	*Phalarishta*	Cough, spleenomegaly.
15-88	*Panchmooladya Ghrita*	Cough and Asthma.

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15-168	*Pippalimooladi Churna*	Anorexia
18-58	*Agastya Haritaki*	Piles and heart diseases.
18-126	*Kantakari Ghrita*	Cough and dyspnoea.
Kalpasthana		
7-46	*Vyoshadi Modaka*	Poisoning and urinary disorders.
Siddhisthana		
3-54	*Drakshadi Niruha Basti*	Burning sensation

Table 3: Formulations and *Rogaadhikara* (Drug of choice) of *Haritaki* in *Sushruta Samhita.*

Adhyaya* & *Shloka	**Formulations**	***Rogaadhikara***
Sutrasthana		
38-26	*Vachadi Gana*	Lactation disorders and degenerative disorders
38-57	*Triphala*	Intermittent Fever
38-60	*Amlakyadi Gana*	Fever
46-518	*Haritaki Churna*	Heart disease
Chikitsasthana		
9-10	*Kushthahar Lepa*	Leprosy
25-28	*Nili taila*	Greying Hair
25-43	*Lakshadi Ghrita*	Leprosy
Kalpasthana		
7-16	*Kwatha*	Rat Bite
Uttaratantra		
17-19	*Anjan*	Night blindness
39-216	*Kwatha Visham Jwara*	Intermittent Fever
42-48	*Vrischivadi Arishta*	*Gulma,* Anorexia
51-28	*Talishadi Ghrita*	Dyspnoea
58-66	*Mahabala Ghrita*	Menstural disorders, urinary disorders.

Haritaki in *Nighantus* (Lexicons)

Word *Nighantu* is derived from the word *Nirukta* i.e. which helps to point out concealed meaning of *Vedas.* Similarly, *Nighantus* contain documented list of medicinal plants and throw light on their general and therapeutic properties in the form of different synonyms. Thus we can say *Nighantus* are Ayurvedic materia medica. *Haritaki* is described in *Nighantus* as *Rasayana* (rejuvenating),[34],[35] *Vrinaropana* (wound healing),[36],[37] *Shulahara* (antispasmodic),[38],[39] *Hrudya* (cardioprotective)[36],[37] and *Pramehanashaka* (antidiabetic).[38],[39] It is indicated in *Vishamjwara* (malaria),[34],[37] *Udararoga* (gastro-intestinal disorders),[37],[38] *Shiroroga* (disease of the head)[34],[38] and *Krimiroga* (worm Infestation).[38], [39]

There are seven types of *Haritaki* have been explored in *Bhavaprakash Nighantu,* which are enlisted below:

Table 4: Showing Species, origin place and indications of seven types of *Haritaki.*[40]

Species	**Origin place**	**Indications**
Vijaya	Vindhya	used in all diseases.
Rohini	Pratishtanaka	used for woundhealing.
Putana	Sindh	used for externalplastering
Amrita	Champa	used as detoxification & body purifier.
Abhaya	Champa, Bangladesh	used in ophthalmic diseases

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Jivanti	Saurastra	used in all diseases.
Chetaki	Himachal Pradesh	Laxative

Acharya Kaiyadeva quoted three varieties of *Haritaki* viz., *Niraja*, *Vanaja* and *Parvatiya*.[41]

Ritu Haritaki[42]

Aacharya Bhavprakash mentioned *Ritu Haritaki* for the purpose of *Rasayana* (rejuvenation, anti-aging and imunity promoter). *Haritaki* is taken along with different *Anupaan* (vehicle) in different *Ritu* (seasons). This regimen is called as *Ritu Haritaki*.

- *Varsha Ritu* - *Haritaki* is given along with *Saindhava* (rock salt).
- *Sharad Ritu* - It is given along with *Sharkara* (sugar).
- *Hemanta Ritu* - It is given along with *Shunti (Zingiber officinale* roxb*).*
- *Shishir Ritu* - It is given along with *Pippali* (Piper longum linn).
- *Vasant Ritu* - It is given along with *Madhu* (honey).
- *Greeshma Ritu* - It is given along with *Guda* (jaggery).

Rasapanchaka of *Haritaki*[43]

- *Rasa* (Taste) - *Pancharasatmaka* i.e. having five taste viz. *Madhura* (Sweet), *Amla* (Sour*), Katu* (Pungent)*, Tikta* (Bitter) and *Kashaya* (Astringent).
- *Guna* (Quality) - *Laghu* (Light), *Ruksha* (Dry).
- *Veerya* (Potency) - *Ushna* (Hot)
- *Vipaka* (Taste conversion after digestion) - *Madhura* (Sweet).

Karma (pharmacological action)

Haritaki performs various pharmacological actions which are described as following;

Table 5: Showing the *Karma* of *Haritaki* according to different *Nighantus.*

***Karma* (pharmacological actions)**	***D.N.*[34]**	***S.N.*[35]**	***M.P.N.*[36]**	***K.N.*[37]**	***Bh.N.*[38]**	***R.N.*[39]**
Deepana (appetizer)	-	+	-	+	-	-
Arshanashaka (anti- haemorrhoids)	-	+	+	+	+	-
Atisarnashaka (anti-diarrheal)	-	+	-	+	-	-
Chakshushya (benefecial to eyes)	+	-	+	+	+	+
Chhardinashaka (anti- emetic)	+	+	+	+	+	-
Hridyorognashaka (heart disease)	-	+	+	+	+	-
Hridya (beneficial for heart)	+	-	-	-	-	-
Kamlanashaka (hepatoprotective)	-	+	+	+	+	-
Kasahar (anti-cough)	-	+	+	+	+	-
Kushthahar (anti-leprosy)	+	+	+	+	+	+
Medhya (brain tonic)	+	+	+	+	+	-
Mehanashaka (anti diabetic)	+	+	+	+	+	-

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Shophahar (anti-inflammatory)	+	+	+	+	-	-
Swashara (anti-asthamatic)	-	+	+	+	+	-
Vayasthapani (anti-aging)	-	+	+	-	-	-
Visham Jwarahara (anti-pyretic)	-	+	+	+	+	-
Vranaropana (wound healing)	+	-	+	+	-	-
Rasayana (rejuvenation)	-	-	+	-	-	+
Ayushya (beneficial for life)	-	+	-	+	+	-

D.N. - Dhanvantari Nighantu, S.N. - Shodhala Nighantu, K.N. - Kaiydeva Nighantu, M.P.N. - Madanpala Nighantu, Bh.N. - Bhavprakasha Nighantu, R.N. - Raj Nighantu

A comparative review of Pharmacological actions of *Haritaki* in Ayurveda and as per modern researches

Nowadays, pharmaceuticals are being interested towards the herbal medicine, and many researches are being to reveal the pharmacological actions of different phyto-chemicals found in plants. As we have discussed previously that *T. Chebula* is one of the most common used drug in Ayurveda and ethno medicine. Different modern researches have proved its various pharmacological actions as well.

Immunomodulatory Activity and Anti-oxidantactivity

In Ayurveda*, Hartaki* is cosidered the best *Pathya Dravya* (substances that clean the channels) and a good *Rasayan* (immunomodulator). Vaibhav Aher and Arun Kumar Wahi[44] have seen the Immunomodulatory Activity of *Terminalia chebula* Retz. They have assessd the immunomodulatory potential of the alcohol extract of the dry ripe fruit of this plant at the cellular and molecular levels using Wistar male rats. These studies showed that there was distinct increase in the levels of glutathione, superoxide dismutase and catalase following treatment with *T. chebula* as alcohol extract compared to treatment with SRBC and cyclophosphamide. Glutathione is the major endogenous antioxidant produced by cells and Catalase is an antioxidant enzyme while Superoxide dismutase induces the activation of endogenous system of antioxidant defences. Therefore, the extract has both antioxidant as well and immunomodulatory activities, and is thus capable of protecting cells from oxidative damage. Chen X. et.al.evaluated the antioxidant capacity of tri-ethylchebulate, an aglyconer from Terminalia chebula Retz fruit in vitro.[45]

Antitussive activity

Haritaki in *Nighantus* described as *Kasahara* i.e. to alleviate the cough. Gabriela Nosalova et.al. has evaluated the anti-tussive activity of water-extracted carbohydrate polymer from the fruits of *Terminalia chebula retz*.[46] in guinea pigs. Their results showed that the number of citric acid-induced cough efforts decreased significantly after the oral application of polysaccharide fraction in a dose of 50mg/kg body weight. Its antitussive efficacy was higher than cough suppressive effect of standard drug codeine. Therefore, traditional aqueous extraction method provides a major polysaccharide, which induces a pharmacological effect.

Anti-diabetic activity

In classic texts, *Hartaki* is indicated frequently in the treatment of *Prameha* (diabetes). Various animal experiments show that *Haritaki* fruit is effective to decrease blood sugar levels and useful in diabetes. Murali *et.al.* has observed that 75% methanolic extract of *Terminalia chebula* (100 mg/kg body

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weight) reduced the blood sugar level in normal and alloxan diabetic rats significantly.[47] Ethanolic extracts of *T. chebula* exhibited dose dependent reduction in blood glucose of Alloxan induced diabetic rats.[48]

Cardio-protective activity

Haritaki is considered as *Hridya* i.e. beneficial for heart and indicated in heart disease. Suchalatha *et.al.* has investigated the cardio-protective effect of ethanolic extract of *T. chebula*fruits (500 mg/kg body weight) in rats and it was found that pre-treatment with *T. chebula* extract is cardio-protective.[49] Its pericap has been reported to have cardio-protective activity in isolated frog heart model.[50]

Hepato-protective activity

Haritaki is drug of choice for gastro-intestinal and liver-disorders, it is traditionally used for indigestion. Tasduq *et.al.* has reported the hepato-protective activity of ethanolic extract of *T. chebula* fruits against anti-tuberculosis drugs.[51] During the experimental study on caecal amoebiasis in rats Sohni YR found its anti-amoebic activity against *Entamoeba histolytica*.[52] Sharma P. *et.al.* revealed anti-ulcerogenic activity of *Terminalia chebula* fruit in experimentally induced ulcer in rats.[53]

Skin Diseases

In *Ayurvedic* text, *Haritaki* is stated as *Kushthaghna* i.e. to alleviate the skin diseases including leprosy, various modern researches have proved its activities against a number of dermatophytes and yeasts and it is found that aqueous extract of *T. chebula* exhibited antifungal activity.[54]

Anti-ulcerogenic & wound healing activity

Sharma *et.al.* has examined on the animals pre-treated at 200 and 500 mg/kg body weight with hydro alcoholic extract of *Terminalia chebula* showed reduction in lesion index, total affected area and percentage of lesion in comparison with control groups in the aspirin, ethanol and cold restraint stress induced ulcer models.[55]

Anti-arthritic activity

Nair et.al. has investigated on the hydro-alcoholic extract of *Terminalia chebula*, it produced a significant inhibition of joint swelling as compared to control in both formaldehyde-induced and CFA-induced arthritis and it also reduced serum TNF-α level and synovial expression of TNF-R1, IL-6 and IL-1β.[56]

Anti-mutagenic and anti-carcinogenic activities

Ponnusankar *et.al.* has performed by the effect of 70% methanolic fruit extract of Terminalia chebula was studied on growth of several malignant cell lines. One of the fractionated compounds from ethanolic fruit extract of Terminalia chebula, chebulagic acid, showed potent dual inhibition against COX and 5-LOX. It also showed anti-proliferative activity against HCT-15, COLO-205, MDA-MB-231, DU-145 and K562 cell lines. A recent study has shown the ability of triphala to inhibit cytochrome P450.[57]

Anti-viral activity

Lin *et.al.* the extract of fruits of *Terminalia chebula* showed inhibitory effects on human immunod eficiency virus-1 reverse transcriptase. Hot water extract of *Terminalia chebula* showed anti-herpes simplex virus (HSV) activity in-vivo and anti-cytomegalovirus (CMV) activity both in-vitro and in vivo in a study. *Terminalia chebula* inhibited HSV-1 entry at non-cytotoxic doses in A549 human lung cells by preventing binding, penetration, and cell to cell spread, as well as secondary infection.[58]

Radio-protective activity

Radio-protective activity Gandhi *et.al.* has estimates on the aqueous extract of the fruit of *Terminalia chebula* (50µg) was able to neutralize 1, 1-diphenyl-2picrylhydrazyl, a stable free radical by 92.9% and protected the plasmid DNA pBR322 from undergoing the radiation-induced strand breaks.[59]

Antihelmintic activity

In Ayurveda *Haritaki* is described as *Krimihara* i.e. to alleviate Parasites or microbes. S. Dwivedi *et.al.* evaluated the anti-helmintic activity of alcoholic and aqueous extracts of the fruits of *Terminalia chebula* and it was found that the alcoholic extract activity is higher than aqueous extract and the standard drug of albendazole.[60]

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Antiplasmodial activity

In Ayurveda *Haritaki* is described as *Krimihara* i.e. to alleviate Parasites or microbes. A study has been done by Khosit Pinmai *et.al.* to evaluate the anti-plasmodial activity of *Phyllanthus emblica*, *Terminalia chebula,* and *Terminalia bellerica* extracts. This study revealed that the three plants had the antiplasmodial activity in vitro and in vivo both.[61]

Table 6: A comparison of pharmacological action of *Terminalia Chebula* mentioned in modern research and Ayurvedic texts as well.

Modern	Ayurvedic
Wound healing[55]	*Vrinaropana*[36],[37]
Cardioprotective[49],[50]	*Hridya*[36],[37]
Antidiabetic[47],[48]	*Pramehanashaka*[38],[39]
Malaria[61]	*Vishamjwara*[34],[37]
Gastro-intestinal disorders[52]	*Udararoga*[37],[38]
Antiheminthic activity[60]	*Krimiroga*[38],[39]
Antitussive activity[46]	*Kasahara*[21]
Hepato-protective activity[51]	*Kamlanashaka*[35],[36],[37],[38]
Immunomodulatory Activity[44]	*Rasayana*[36,39]

Conclusion

From the detailed review, it can be inferred that *Haritaki* is an important plant used in Ayurveda as well as in other indigenous systems of medicine. The mythological origin of the plant represents the immortal nature of therapeutic attributes in the human body. This review attempts to summarize the various facts about *Haritaki* (*Terminalia chebula)* including its pharmacological actions. Flavonoids, hydrolysable tannins, terpenes and gallic acid are the main constituents which are responsible for its pharmacological activities. It is a frequently used Ayurvedic medicine to treat many diseases such as skin diseases, anemia, jaundice, constipation, piles, asthma, cough, fever, chronic ulcers etc. It is a *Rasayana* i.e. promote health, immunity and longevity. This review gives a wide knowledge about the herb and their importance as medicine.

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