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Amalaki (*Emblica officinalis* Gaertn.): A review on its therapeutic properties

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ABSTRACT

Amalaki (*Emblica officinalis*) has a prime position in *Ayurveda*- an Indian indigenous system of medicine. *Amalaki* belongs to the family of *Euphorbiaceae* and is also known as *Phyllanthus emblica* or Indian gooseberry. *Amalaki* is one of the most important medicinal plants in Indian traditional systems of medicine (*Ayurveda*, *Unani* and *Siddha*). It is a well-known fact that all parts of *Amalaki* are useful in the treatment of various diseases. Among all, the most important part is fruit. The fruits of *Amalaki* are widely used in the *Ayurvedic* preparation and it increase defense against diseases. It has a beneficial role in degenerative diseases like cancer, diabetes, liver treatment, ulcer, anaemia, eye diseases, and heart trouble and also is an important constituent in hepatoprotective and rejuvenating formulas available. Phytochemical studies on *Amalaki* disclosed major chemical constituents including tannins, alkaloids, polyphenols, vitamins and minerals. Gallic acid, ellagic acid, emblicanin A & B, phyllembein, quercetin and ascorbic acid are found to be biologically effective. It is enormously used as a tonic to restore the lost body's energy and vigor, mentioned under *Triphala* (~combination of three potent fruit) in *Ayurveda*. In this article, we will emphasize on its various therapeutic applications as per modern researches and our classical texts. We will also discuss about the nutritional value, biochemical constituents, medicinal value of *Amalaki* and its use as a household remedy.

Key words: *Ayurveda, Amalaki, Emblica officinalis, Therapeutic, Traditional*

INTRODUCTION

Ayurveda is one of the major and main traditional medicinal systems of India. The word "*Ayurveda*" means "science of life". The basic concept of diagnosis and drug development in *Ayurveda* is based on *Tridosha* (three major components of disorders) theory, which includes *Vayu*, *Pitta* and *Kapha*. *Amalaki* or Indian gooseberry (*Emblica officinalis* Gaertn.) is known for its medicinal and therapeutic properties from the ancient time in India and considered as a

wonder fruit for health conscious population.^[1] "*Amalaki*" is having prime position amongst the Antiageing drugs. It is the best tissue rejuvenating herb. It is a potent herb rich with Anti-oxidant, Vitamin-C, Tannin and Gallic acid. *Amalaki* possesses key properties like properties like *Rasayana* (Adaptogenic), *Ajara* (Anti-ageing), *Ayushprada* (prolonged cell life), *Sandhaniya* (Improves cell migration and cell binding).^[2] It promotes, protects and extends youthful state and thus, curtailing Ageing process. *Amalaki* fruit has a special characteristic features which makes it a nurturing herb that is credited with a number of health benefits. In *Ayurvedic* tradition, the fruit forms an integral part of medicinal preparations that are used to support wellness and healthy Ageing.^[3]

Charaka Samhita mentioned *Amalaki* is one of the most potent and nutritious drugs and also a best rejuvenating herb (*Amalaki Vayasthapnam Sreshtham*).^[4] *Amalaki* has low molecular weight hydrolysable Tanins (Emblicanin A and B) thereby it is considered as one of the stronger antioxidant herb in *Ayurveda*.^[5]

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AIMS AND OBJECTIVES

1. To study the therapeutic applications of drug *Amalaki* as per our classical texts.
2. To study the biochemical constituents and medicinal value of *Amalaki* as per modern researches.

MATERIALS AND METHODS

The basic and conceptual materials were collected from the *Ayurvedic* classics i.e., *Bruhtrayaj*, research paper and journals.

Taxonomical Classification

Emblca officinalis Gaertn.; Syn. *Phyllanthus emblica* Linn.

- Kingdom: Plantae
- Division: Angiospermae
- Class: Eudicots
- Subclass: Archichlamydeae
- Series: Unisexuales
- Order: Malpighiales
- Family: Euphorbiaceae
- Group: *Emblca*
- Species: *officinalis* Gaertn.
- Synonym- *Phyllanthus emblica* Linn.
- Family- Euphorbiaceae.^[6]

Morphology

Amalaki tree is a small to medium sized deciduous tree with an average height of 8-18 m, with thin light grey bark exfoliating in small thin irregular flakes. The average girth of the main stem is 70 cm. The main trunk is divided into 2 to 7 scaffolds very near to the base. Leaves are 10 -13 mm long, 3 mm wide, closely set in pinnate fashion which makes the branches feathery in appearance. Flowers are unisexual, 4 to 5 mm in length, pale green in color, borne in leaf axils in clusters of 6 to 10. Fruits are fleshy, almost depressed to globose shape, 2.1-2.4 cm in diameter, 5.3-5.7 g in weight, 4.5-5.0 mL in volume. It is commercially cultivated in Uttar Pradesh in India. It is also grown in Tamil Nadu, Rajasthan and Madhya Pradesh.^[7]

Amalaki Fruit: The fruit is fleshy, spherical, light greenish yellow, quite smooth and hard on appearance, with 6 vertical stripes or furrows 4 each containing usually two seeds; seeds are 4-5 mm long and 2-3 mm wide, each weighing 572 to 590 mg. *Amalaki* fruit size, shape and weight were found to vary among its different varieties. There are compositional differences in different varieties of *Amalaki*.^[8]

Leaves: *Amalaki* leaves are Subsessile, closely set along the branchlets, distichous, narrowly linear, obtuse, having appearance of pinnate leaves.^[9]

Flowers: Flowers greenish yellow, in axillary fascicles on the leaf-bearing branchlets, often on the naked portion below the leaves, with fimbriate bracts at the base. Male flowers numerous, on short slender pedicels. Sepals 6, oblong, obtuse, 1.2 mm. long. Anthers 3 on a short central column. Female flowers few, subsessile. Ovary 3 celled; styles connate at the base, irregularly twice with acute lobes.^[10]

The fruiting season of Amalaki

The fruiting season of *Amalaki* fruit is lengthy one. *Amalaki* is a deciduous tree and the new shoots emerges in the beginning of April. The fruit can be harvested in December which can be retained on the tree up to March without any significant loss in quality or yield. The picking of fruit is generally in January to March. *Amalaki* tree is a heavy bearer and the fruits also remain free from the attacks of birds and wild animals.^[11]

Distribution

Throughout tropical and subtropical India, chiefly in dry deciduous forests, ascending to 1400 m on the Himalaya, Chhota Nagpur, Bihar, Orissa, West Bengal, North Circars, Deccan, Karnataka and in Western Ghats.^[12]

Chemical constituents^[13]

Table 1: Chemical Composition of Amalaki

Fruits	Phyllemblic acid, gallic acid, emblicol, quercetin, hydroxymethyl furfural, ellagic acid, pectin, putranjivan A, two new hydrolysable tannins called emblicannin A and B, punigluconin and pendunculagin.
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Leaves	Gallic acid, Ellagic acid, Chebulic acid, Chebulagic acid, Chebulinic acid, a Gallotannins called Amlic acid, Alkaloids, Phyllatidine and Phyllantine. Amalaki bark contains Leucodelphinidin, Procyanidine, tannin, ellagesic acid.
Seeds	Saturated fatty acids (7%), linolenic acid (8.78%), linoleic acid (44.0%), oleic acid (28.40%), stearic acid (2.15 %), palmitic acid (2.99%) and myristic acid (0.95%), linoleic acid and oleic acid.
Barks	Leucodelphinidin, tannin and proanthocyanidin
Roots	Lupeol, Oleanolic aldehyde, ellagesic acid, o-acetyl oleanolic acid



Figure 1: Fruits and Leaves of Amalaki

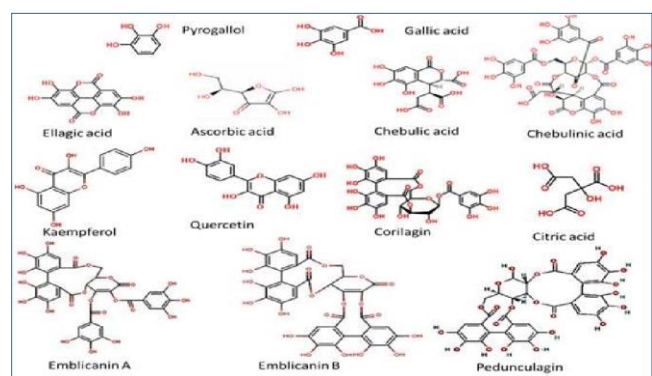


Figure 2: Active principles present in Emblca officinalis

Table 2: Average percentage composition of Amalaki in the fruit pulp.

Chemical Constituents	Percentage (%)
Carbohydrate	14.1
Protein	0.5
Fat	0.1

Fibres	3.4
Mineral matter	0.7
Calcium	0.05
Phosphorus	0.02
Iron	1.2 mg/100 gm
Vitamin C	600 mg/ 100 gm
Nicotinic acid	0.2 mg/100 gm

Amalaki is a good source of Vitamin C; carotene, nicotinic acid, riboflavin, D-glucose, D-fructose, myoinositol and a pectin with D-galacturonic acid, D-arabinosyl, D-xylosyl, L-rhamnosyl, D-glucosyl, D-mannosyl and D-galactosyl residues, embicol, mucic, indole acetic acid and four other auxins- a1, a3, a4 and a5. Two growth inhibitors- R1 & R2; phyllembic acid and phyllembin (fruits) and fatty acids (seed oil); leucodelphinidin, procyanidin, 3-O-gallated prodelfinidin and tannin (bark); ellagic acid, lupeol, oleanolic aldehyde and O-acetyl oleanolic acid (root); tannins, polyphenolic compounds; 1,2,3,6 - trigalloyl glucose, terchebin, corialgin, ellagic acid, alkaloids, phyllantidine and phyllantine (leaves & fruits).^[14]

AYURVEDIC REVIEW OF AMALAKI

Ayurvedic properties (Ras Panchak)

हन्ति वातं तदम्लत्वात्पित्तं माधुर्यशैत्यतः ।

कफं रूक्षकषायत्वात्फलं धान्यास्त्रिदोषजित् ।। भा.प्र.नि.६/४०

Rasa: Amla, Madhura, Kashaya, Tikta, Katu

Guna: Guru, Ruksha, Sheeta

Virya: Sheeta

Vipaka: Madhura

Doshaghната: Tridosha-Shamaka, especially Pitta-Shamaka

Due to its Amla Rasa (Sour) it alleviates Vata

Due to Madhur Vipaka (Sweet) it alleviates Pitta

Due to Kashaya Rasa (Astringent) and Ruksha (Dry) Guna it alleviates Kapha

Useful parts: Root bark, stem bark, leaf, fruit and seed.

Dose: Swaras: 10- 20 ml

Churna: 3- 6 gm^[15]

Synonyms (Paryaya) of Amalaki

Classical names : Amalaki, Vayasya, Vrishya, Dhatriphala, Amritaphala, Amalaka, Tishyaphala.

Table 3: Vernacular names of Amalaki^[16]

SN	Language	Vernacular Names
1.	English	Emblc myrobalan, Indian gooseberry
2.	Gujarati	Amala, Ambala
3.	Hindi	Amalaki, Amalak, Amvala, Aonla, Amla
4.	Bengali	Amla, Amlaki, Ambolati, Amulati
5.	Assam	Amluki, Sohmyrlain
6.	Oriya	Gondhona, Amlaki, Ohalu
7.	Kannada	Nellka, Nelli, Nilika
8.	Malayalam	Nellimaram, Nellikka, Boa-malacca
9.	Marathi	Avala
10.	Punjabi	Ambal, Ambli, Amla
11.	Tamil	Nelli, Nelli-kai, Toppi
12.	Telugu	Usirikaya, Amalakamu, Usereki, Wusheriko, Osirka, Usri, Usirika
13.	Arab	Amlaj
14.	N.W.P.	Amla, Aoula
15.	Pers.	Amuleh, Amelah
16.	Santhal	Meral

Groups (Gana): Kushthaghna, Virechanopaga, Kasahar, Jwarhara, Vayahstapana (Charaka)^[17]

Important formulations and preparations (medicinal uses)

Chyawanprash, Brahmyarasyana, Dhatri Lauha, Dhatri Rasayana

Sansthanik Karma (Organ system wise action)

Bahya (Local action): Daha Prashamana, Chakshushya, Keshya

Abhyantara (Action on visceral organs)

- **Nadi Sansthana (Nervous system):** Medhya, Balya, Indriyashakti Vardhaka
- **Pachana Sansthana (Digestive system):** Rochana, Deepana, Anulomana, Amlatanashaka, Yakrit Uttejaka
- **Raktavaha Sansthana (Blood vascular system):** Hridya and Shonitasthanapana
- **Shwasana Sansthana (Respiratory system):** Kaphaghna
- **Prajnana Sansthana (Reproductive system):** Vrishya and Garbhasthapana
- **Mutravaha Sansthana (Urinary system):** Mutrala and Pramehaghna

Twacha (Skin): Kushthaghna

Tapkrama: Jwaraghna and Dahaprashmana

Saatmikarana: Rasayana

Doshaprayoga (Uses in Doshas): Used specially in diseases caused by Pitta Dasha

Sansthanik Prayoga (System wise uses)

Bahya: Lepa used in Daha, Paittika Shirah Shoola and Mutraawrodha. Swaras is used in Netraroga. Washing head with Swaras in Khalitya and Palitya.

Abhyantara (Internal uses):

- **Nadisansthana:** Used in Mastishka Daurbalya, Drishtimandya
- **Pachanasansthana:** Aruchi, Agnimandya, Vibandha, Yakritavikara, Amlapitta, Parinama Shoola, Udavarta, Udararoga and Arsha.
- **Raktavahasanthana:** Hridaroga, Raktapitta, Raktavikara
- **Swashanasansthana:** Kasa, Shwasa, Yakshma
- **Prajnanasansthana:** Shukrameha, Pradara and Garbhashaya Daurbalya

- **Mutravahasanthana:** Swaras of fresh fruit is used in *Mutrakrichha* and *Paittika Prameh*.

Twacha: *Kushtha*, *Visarpa*

Tapkrama: *Jeerna Jwara*, *Trishna*, *Daha*

Satmikarana: *Daurbalya*, *Kshaya*, *Shotha*^[18]

Therapeutic applications of *Emblca officinalis*^[19]

Anti-ageing: *Amalaki* is one of the strongest antioxidant herbs in *Ayurveda* because it contains low molecular weight hydrolysable Tanins (Emblcanin A and B). enhanced with emmalicanin-A and -B from fruit juice that has just been squeezed. We naturally produce free radicals as byproducts of our own metabolism. *Amalaki*'s high concentration of vitamin C and flavonoids prevents harmful free radicals that accelerate cell aging in addition to enhancing nutrition.

Cardio protective: Fresh *E. officinalis* fruit juice, which is high in Embalicanin-A and -B, is useful in reducing the oxidative stress brought on by ischemia-reperfusion in rat cardiac tissue. Fruits are cardioprotective in nature. In addition to reducing oxidative stress, *Emblca officinalis* also stops the onset and progression of hypertension. It alters levels of serum NO, active eNOS, endogenous antioxidants, and electrolytes.

Hepato protective: A wide range of hepatotoxic substances, including heavy metals, ethanol, paracetamol, carbon tetrachloride, ochratoxins, hexachlorocyclohexane, and antitubercular medications, have been proven to be resistant to *Amalaki*. The herb *Amalaki* and its phytochemicals gallic acid, ellagic acid, quercetin, and corillagin have hepatoprotective properties against a variety of xenobiotic substances.

Against carcinogenesis: Phenolic compounds from *Phyllanthus emblica* extract identified by HPLC having anticancer properties like Ellagic acid (tannin) in Colon, prostate cell lines, and breast and prostate xenografts, Corilagin (tannin) in Ovarian cancer cells, liver cancer cells, and hepatocarcinoma xenografts, Pyrogallol (tannin) in lung cancer cells, gastric cancer cells, and lung adenocarcinoma xenografts, Chebulagic acid (tannin) in retinoblastoma colon cancer, breast cancer,

prostate cancer, and leukemia cancer cell lines, Gallic acid (tannin) in breast and lung cancer cell lines, some activity against lung cancer xenograft, Quercetin (flavonoid) in numerous cancer cell lines from multiple tissue types, transgenic murine model of breast cancer, leukemia xenograft, and phase I clinical trial.

Immunomodulator: It has been proven that *E. officinalis* fruit extracts have a substantial immunomodulatory effect. *Amalaki* has mild cytoprotective and immunostimulant properties. But one must triturate *Amalaki Churna* and *Amalaki Swaras* in order to obtain the desired pharmacological effect.

Cytoprotective: *Amalaki* fruit extracts exhibit cytoprotective qualities against oxidative damage brought on by chromium (VI). It is because they can prevent the generation of free radicals and keep cell antioxidant levels high even when under oxidative stress.

Eye diseases: According to *Ayurveda*, *Amalaki* is referred to as *Chakshyushya*. Conjunctivitis, glaucoma, Retinopathy, and other diabetic eye problems can all be effectively treated with it. Because of its purgative effects, it lowers intraocular pressure. Patients suffering from a variety of ophthalmic conditions, such as rubor (inflammatory conditions), mucosa xerosis (dry eye), chronic conditions (pterygium or pinguecula), surgical cataract patients, age-related degeneration such as ARMD, other retinal degenerative diseases, etc., can benefit from *Amalaki*.

In gastric ulcer: The effectiveness of the *E. officinalis* methanolic extract was dose dependent; it greatly decreased the offensive factors (acid, pepsin) and raised the defensive elements (musin secretion, cellular mucous).

Intestinal disorders: The primary constituent of *E. officinalis* fruit is tannins, which have a significant potential for treating intestinal diseases including diarrhea and dysentery. Tannins are also astringent in nature.

Anti-inflammatory and antipyretic: It has been demonstrated that substances with antipyretic effects

include tannins, alkaloids, phenolic compounds, amino acids, and carbohydrates. Fruit extracts from *Emblca officinalis* have strong antipyretic and analgesic properties.

Hypolipidemic agent: Fruit juice made from *E. officinalis* works well to lower cholesterol. It reduces aortic plaques. It reduces cholesterol levels and low-density lipoprotein oxidation, reducing atherosclerotic changes.

Antidiabetic: Blood sugar levels are lowered by the fruit of *Amalaki's* high vitamin C content. It activates the Langerhans islets, a small collection of cells that release the hormone insulin.

Antibacterial activity: *Amalaki* has antibacterial properties as well. *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *K. ozaenae*, *S. paratyphi A*, *S. paratyphi B*, and *Serratia marcescens* have all been reported to be sensitive to the plant's powerful antibacterial properties.

Anti hyperthyroid: Fruit ethanolic extract has been demonstrated to have antihyperthyroid effect in animal (mice) tests.

Anticancer: Cancers of the stomach, liver, uterus, breast, pancreatic, malignant ascites, and other organs are among those that *Amalaki* inhibits from growing and spreading. It also reduces the negative effects caused by radiotherapy and chemotherapy, which are typically used to treat cancer. Additionally, *Amalaki* has anticancer and immunological stimulant properties.

Antioxidant: Vitamin C and low molecular weight hydrolysable tannins are abundant in *Amalaki* fruit. *Amalaki* becomes a good source of antioxidants as a result of these contents. Tannins like punigluconin, pedunculagin, embelicanin-A, and emblicanin-b protect rat peripheral blood erythrocytes from hemolysis caused by oxygen radicals.

Nephroprotective and Neuroprotective: By blocking NF-B activation, *Amalaki* reduces the levels of iNOS and COX-2 expression, which in turn lowers the high expression of the proapoptotic protein Bax.

Amalaki the Rasayana

Amalaki is the best rejuvenative herb, and specifically observed that *Amalaki* is a great *Rasayana* that helps to protect from disease and reduce the possibilities of premature ageing. *Acharya Charak* and *Vaghbatta* have admired *Amalaki* as the drug of choice for *Vayasthapana Karma* (mentioned as *Agryadravya*). *Charak* has also mentioned it as *Ayushya*, *Deepaniya* an appetizer and *Pachaniya*, a digestant. It is also well known for its *Keshya* and *Chakshushya* properties. *Bhavaprakash* and *Dhanwantri Nighantu* mentioned the *Rasayana* properties of *Amalaki*. *Rasayana* drugs acts as antioxidants. Oxidative damage to cells is important phenomenon in ageing process. *Amalaki* has low molecular weight hydrolysable tannins (Emblcanin A and Emblcanin B, punigluconin) thereby it is considered as one of the more strong antioxidant herb in *Ayurveda*. Antioxidants are the substances that reduce oxidative damage such as that caused by free radicals. Well known antioxidants include a number of enzyme and other substances such as Vit C, Vit E, and Beta carotene are capable of counteracting the damaging effect of oxidant. Main constitute of *Amalaki* are Vit C, Carotene and Riboflavin. They also play a role in collagen fibrin formation, helps in production of fibrin, and iron absorption. *Amalaki*, the *Rasayana* is designed beautifully by nature and discovered by our *Acharyas* as it can be used in almost every disease which are found on the earth.^[20]

DISCUSSION

Present article has been a focused on the utilization of *Amalaki* fruit for their therapeutic properties based on both *Ayurvedic* and modern texts. *Amalaki* is stated as a *Rasayana* drug in *Ayurveda* which is having a rejuvenating effect on body tissues. *Amalaki* is one of the three fruits that are the ingredient in *Triphala* and it is the main ingredient in the *Rasayana* formulation *Chyavanprash*. *Amalaki* is having highest source of vitamin C. It is a highly nutritious fruit and is one of the richest sources of vitamin-C, amino acids and minerals. It contains several chemical constituents like tannins, alkaloids and phenols. *Amalaki* improves healthy metabolism, digestion and elimination. It possesses

anti-inflammatory properties, nourishes body tissue and organs. *Amalaki* fruit is rejuvenative and protective for the heart and respiratory system. *Amalaki* is a natural antioxidant which promotes healthy eyes, growth of hairs, nails, and skin. It balances *Jatharagni* (digestive fire). *Amalaki* builds *Ojas* (bodily strength, vigour, energy, ability) to support a healthy immune response.

CONCLUSION

Emblca officinalis (Amalaki) has an important position in Ayurveda- an Indian indigenous system of medicine. In general, *Amalaki* is a powerful herb which is having medicinal properties for many systems of the body. It is known to promote energy, reproductive health, and healthy state of the body. *Amalaki* is termed as *Chakshyushya* (beneficial for eyes) by many ancient *Acharyas* and this property needs more elaboration in context of eye diseases. Also, *Amalaki* due to its strong antioxidant and biological properties prevent innumerable health disorders as it contains essential nutrients and highest amount of vitamin C. In this review, we have tried to make a summary of the traditional and scientifically proven uses of *Amalaki*. It has various *Sansthanik Karmas* (organs system wise actions). Even though, *Amalaki* has various medicinal properties since ages, there is a colossal necessity to scientifically explore and evident its medicinal values at molecular level with help of various latest biotechnological tools and techniques.

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