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A review on *Emblica officinalis* gaertn

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Abstract
One of the most important medicinal plants in Indian traditional systems of medicine is *Phyllanthus emblica Linn.* or *Emblica officinalis* Gaertn., also known as Indian gooseberry or Amla (Ayurveda, Unani and Siddha). It is a well-known fact that all components of Amla are beneficial in the treatment of a variety of illnesses. Fruit is the most vital element of all. The amla fruit is widely used in medical devices all over the world. Amla fruit is widely used in pharmaceuticals all over the world as an antioxidant, hepatoprotective, cardioprotective, stomach ulcer protective, hair energizer, and sickness, either alone or in combination with other herbs. According to various studies, it contains a large number of biochemical components, particularly alkaloids, phenols, tannins, multivitamins, and inorganic compounds. Ellagic acid, Gallic acid, Emblicanin A & B, Phyllembein, Quercetin, and Ascorbic acid are among the organic chemical constituents found in amla that have been shown to be beneficial to health. In this text, we discuss the geographical distribution, nutritional value, biochemical components, pharmacological importance, ethnomedicinal uses of Amla.

Keywords: *Emblica officinalis*, nutrients, phytochemicals, pharmacological action, ethnomedicinal uses

Introduction
Emblica officinalis (EO) is revered in Ayurveda, an Indian indigenous system of medicine. It is the first tree to be created in the universe, according to ancient Indian mythology. It is a member of the Euphorbiaceae family. Amla, *Phyllanthus Emblica*, and Indian gooseberry are other names for it [1]. Mother Nature has provided mankind with incredible medicinal plants to help us live a disease-free and healthy life. There are numerous medicinal plants presented in Indian traditional systems of medicine (such as Ayurveda, Unani, and Siddha), the most commonly used of which is Indian gooseberry or Amla, which is an important medicinal herb in Ayurveda and Unani systems of medicine.
It is widely used as a tonic to replenish the body's energy and vigour [2].

Fig 1: *Emblica officinalis* fruit [3]

It is an excellent nutritional supplement with numerous medicinal benefits. Because of the high concentration of phenolic compounds *Emblica* fruit may be considered a plant source of natural antioxidants, nutraceuticals, and medicinal components [3]. Amla is a well-known tree

that is used in the production of herbal and pharmacological medicines. *E. officinalis* trees contain acids, gallic acid, and phenols. They are mostly small or medium in size (8-18m) and can be found in Pakistan, India, Sri Lanka, China, and Malaysia, among other places. Their leaves are similar to pinnate leaves in that they are simple, dull green, and stalkless; their bark is thin and light grey in colour; their flowers are greenish yellow in colour; and their fruits are pale yellow in colour with six trigonal seeds packed in three hard shelled cocci. Amla has a high nutrient content and is the best source of inorganic content, amino acids, and ascorbic acid (vitamin C). Other important chemical ingredients include alkaloids, tannins, and emblicanin A and B; the elagic part of *E. officinalis* contains medicinal properties; particularly, the fruits are used to treat jaundice, diarrhoea, and inflammation. Amla is also used in medicine, either alone or in combination with other beneficial plants, to treat stomach infections, liver infections, hair loss, and ulcers. The pharmaceutical-based reports or research articles on amla show that it has pain-relieving, anti-mutagenic, cardio-protective, gastro-protective, nephro-protective, neuro-protective, and anticancer properties. It has chemo preventive [4], radio protective, and immunomodulatory properties. All of the above properties make it more effective in curing various diseases such as cancer, diabetes, stomach ulcers, liver infection, cardiovascular disease, and many others. The current discussion is an attempt to understand the significance of Amla from a medical standpoint, as well as its nutritional values, routine uses, and biochemical components [5].

Table 1: Taxonomical classification [6]

Kingdom	Plantae (Plant)
Sub-kingdom	Tracheobionta (Vascular plant)
Super-division	Spermatophyta (Seed containing plant)
Division	Angiospermae (Flowering plant)
Class	Dicotyledonae (Dicotyledons- two cotyledons)
Sub-class	Rosidae
Order	Geraniales
Family	Euphorbiaceae
Genus	*Emblica*
Species	*Officinalis Geartn.*

Table 2: Vernacular name [6]

Sr. No.	Language	Vernacular names
1	Sanskrit	Amla, Amaliki, Dhatriphala, Amalkan
2	Hindi	Amla
3	Punjabi	Aula
4	Gujarati	Amla

Plant morphological description

Amla (*Emblica Officinalis*) is a small to medium-sized tree with greenish-gray or red bark that grows to a height of 8-18 m. Flowering season is from March to May, and fruiting season is from September to November.

Leaves

They are 3 mm wide and 1.25-2 cm long, Alternate, Bifurious, Pinnate, with numerous leaflets that are Alternate, Linear-obtuse, and entire, and Striated, Round petioles.

Fig 2: Leaf [8]

Bark: Thin, light grey bark that exfoliates in small, irregular flakes.

Fig 3: Bark [8]

Flowers
Small, inconspicuous greenish-yellow flowers grow in compact clusters in the lower leaf axils. Male flowers are unisexual and numerous on short, slender pedicels, while females are few, sub sessile, and have a three-celled ovary.

Fruit
Pale yellow, depressed, fleshy, globose, about 2 cm across, with 6 obscure vertical furrows enclosing 6 trigonous seeds in 2 seeded 3 crustaceous cocci [8, 9].

Organoleptic properties
Colour: Yellowish green
Consistency: Hard
Odour: Aromatic
Taste: Sour
Shape: The fruits are globose and depressed.
Size: 1.5 to 2.5 cm in diameter

Phytochemistry
E. officinalis is one of the most thoroughly researched plants, and reports indicate that it contains Tannins, Alkaloids, and Phenolic Compounds. It has been reported that the fruits of *E. officinalis* contain significantly higher concentrations of most minerals, protein, and amino acids such as Glutamic acid, Proline, Aspartic acid, Alanine, Cystine, and Lysine.
It contains more Vitamin C than oranges, tangerines, or lemons.
The fresh pericarp of *E. officinalis* contains more hydrolysable tannins such as emblicanin A and B, punigluconin, and pedunculagin [14].
An activity directed fractionation and purification process was used to identify phytochemicals in *E. officinalis*. They used a chromatographic and spectroscopic method to identify gallic acid, methyl gallate, corilagin, furosin, and geraniin in *E. officinalis.*
Phytochemical studies revealed that *E. officinalis* contains a higher concentration of flavonoids such as quercetin. Fruits were also tested for Alkaloidal content [15].
Chromatography and infrared spectral studies confirmed the presence of alkaloids such as Phyllantine and Phyllantidine.
The fruit also contains gallic acid, ellagic acid, chebulinic acid, chebulagic acid, emblicanin A, emblicanin B, punigluconin, pedunculagin, citric acid, ellagotannin, trigallaylglucose, pectin, 1- O- galloyl- β- D- glucose, 3,6- di- O- galloyl- D- glucose, chebulagic acid, corilagin, 1,6- di- O- galloyl- β- D- glucose, 3 ethylgallic acid (3 ethoxy 4,5 dihydroxy benzoic acid), and isostrictiniin. It also contains flavonoids such as quercetin kaempferol 3 O- α- L (6″ methyl) rhamnopyranoside and kaempferol 3 O- α- L (6″ ethyl) rhamnopyranoside [11].

Source of different phytochemicals from *emblica offcinalis gaertn. syn. phyllanthus emblica linn*
Plant part and Phytochemical Constituents

Bark
β-sitosterol, Leucodelphinidin, Lupeol, Tannin

Fruit
3–6-di-O-galloyl-glucose, Alanine, Ascorbic acid, Aspartic acid, Arginine, β-carotene, Boron, Calcium, Carbohydrates, Chebulagic acid, Chibulinic acid, Chebulaginic acid, Chebulic acid, Chloride, Copper, Corilagic acid, Corilagin, Cystine, d-fructose, d-glucose, Ellagic acid, Emblicanin-A, -B, Emblicol, Ethyl gallate (syn. Phyllemblin), Gallic acid, Gallic acid ethyl ester, Gibberellin A1, Gibberellin A3 (syn. Gibberellic acid), Gibberellin A4, Gibberellin A7, Gibberellin A9, Glucogallin, Glucose, Glutamic acid, Glycine, Histidine, Iron, Isoleucine, Leucine, Lysine, l-malic acid 2-O-gallate, Manganese, Magnesium, Methionine, Myo-inositol, Myristic acid, Niacin, Nitrogen, Pectin, Phenylalanine, Phosphorus, Phyllemblinic acid, Phyllemblic acid, Polysaccharide, Potassium, Proline, Protein, Quercetin, Ribofavin, Rutin, Selenium, Serine, Silica, Sodium, Starch, Sucrose, Sulfur, Tannin, Terchebin, Thiamin, Threonine, Trigalloyl glucose, Tryptophan, Tyrosine Zinc, Zeatin, Zeatin riboside, Zeatin nucleotide, Phyllantidine, Phyllantine.

Leaf
Amlaic acid, Astragalin, Ellagic acid, Gallo-tannin, Kaempferol, Kaempferol-3-O-glucoside, Phyllantidine, Phyllantine, Rutin, Tannin

Root: Ellagic acid, Lupeol

Seed
β-sitosterol, Flavonoid, Linolenic acid, Myristic acid, Oleic acid, Palmitic acid, Stearic acid, Tannin

Shoot
3–6-di-O-galloyl-glucose, β-sitosterol, Chebulagic acid, Chibulinic acid, Ellagic acid, Gallic acid, Glucogallin, Lupeol.

Twig: Tannin

Whole plant: Ascorbic acid, Lupenon [7, 9]

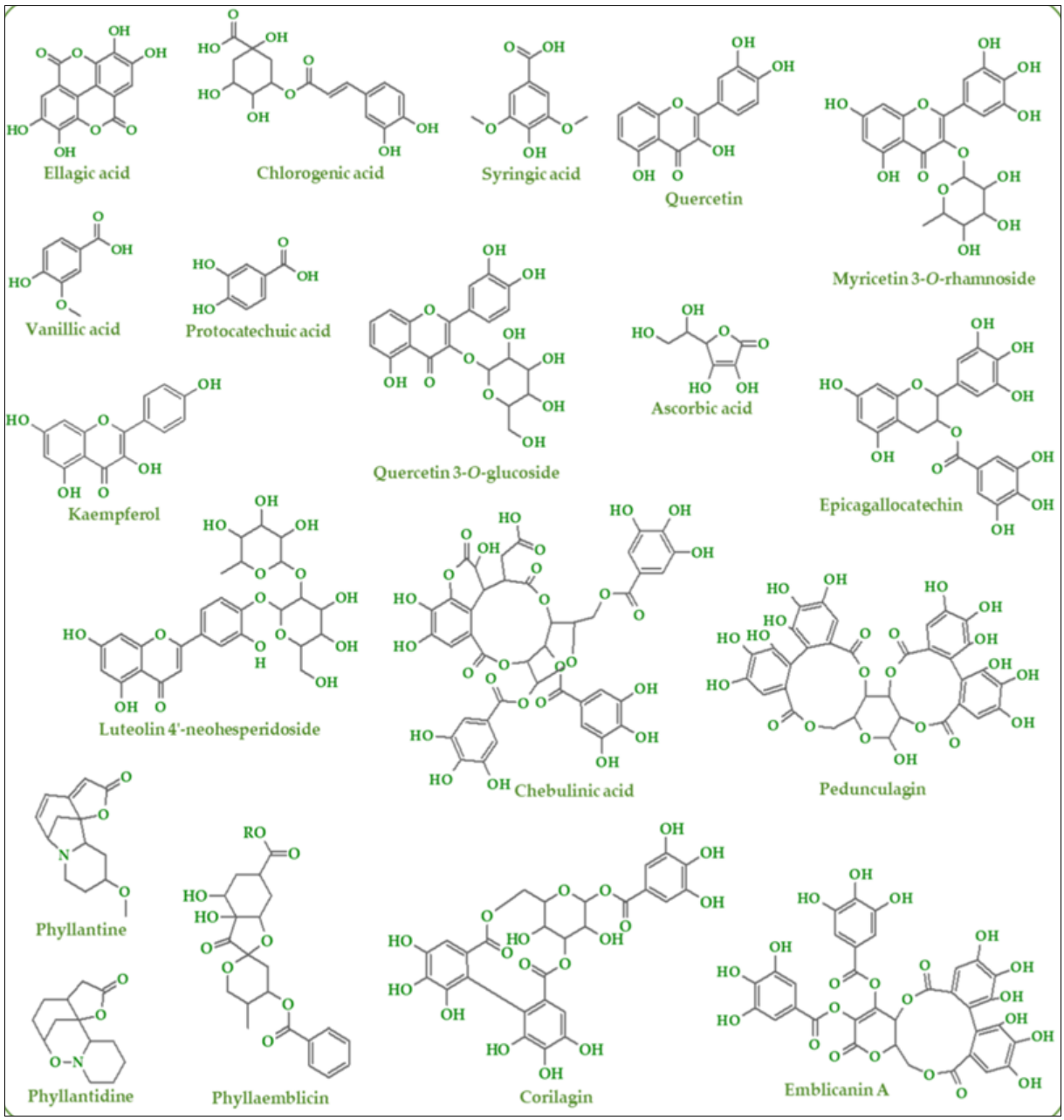

Fig 4: Phytochemicals found in Amla [3]

Nutritional value

E. officinalis (Amla) has been dubbed the "Queen of the Ayurvedic Rejuvenating Herbs" due to the usual balance of tastes (sweet, sour, pungent, bitter, and astringent) multi-function fruit and is well known for its dietary properties. The fruit of *E. officinalis* (Amla) is frequently the richest known natural source of Vitamin C (200-900 mg/100 g of safe to eat component). Fruit juice contains nearly 30 times as much Vitamin C as orange juice, and a single fruit has the same antiscorbutic value as at least one or two oranges. Minerals and amino acids are also present, as well as calcium, phosphorus, iron, niacin, carotene, thiamine, riboflavin, and nicotinic acid. (Fig no.6) [9]

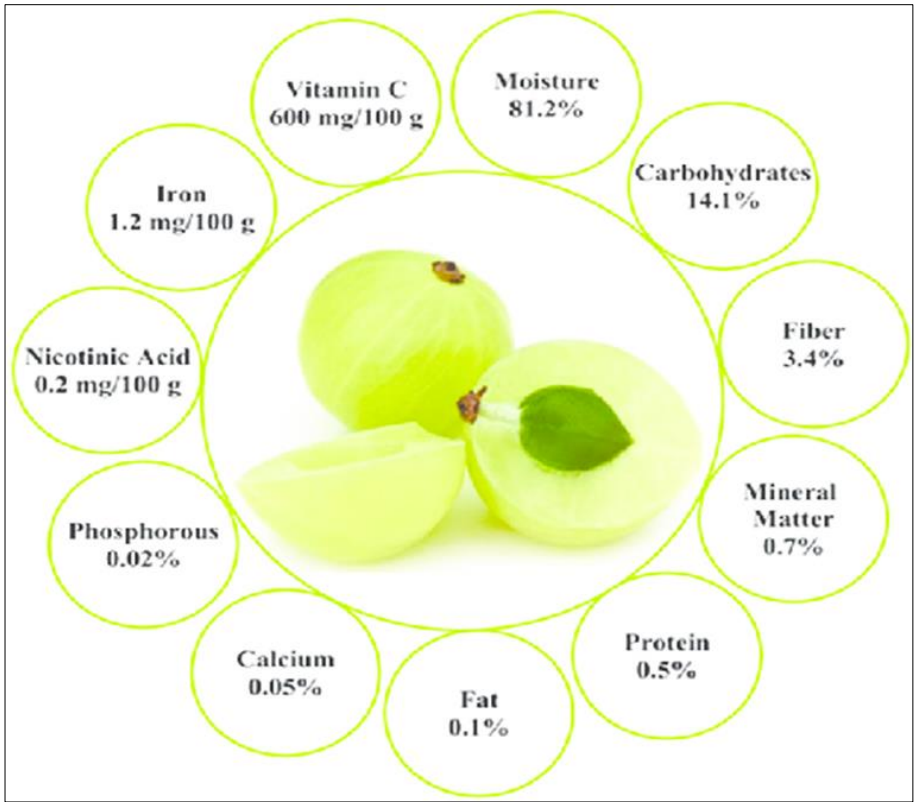

Fig 5: Nutritional value of fruit of *Emblica Officinalis* (Amla) (% or per 100g) [9]

Pharmacological importance [10]

(i) Diabetes and Related Complications

Daily routine foodstuffs participate in controlling the diabetes level. Like garlic, onion, and turmeric, amla (*E. officinalis*) shows also positive effect in lowering the diabetes level. Approximately 2-3g of *E. officinalis* powder efficiently helps in improving the HDL cholesterol level and controlling the LDL cholesterol level. Furthermore amla fruit is also being in use to get remedy from neuropathy development, for diabetic patient (Srinivasan K, 2005).

(ii) Eye Disorders

For remedy of eye disease, *E. officinalis* and its tannoids are used which decreased the possibilities of oxidative pressure as there was a reversal of adjustments with appreciate to lipid peroxidation, carbonyl content of protein, and roles of anti-oxidant enzymes. Amla additionally prevented aggregation and insolubilization of lens proteins resulting from hyperglycemia (Suryanarayana P *et al*. 2007).

(iii) Nephroprotective

The study about amla also describes its efficacy against kidney-infection within the body of rats which promote with aging process (Yokozawa T *et al*., 2007).

(iv) Cardioprotective

Beside the other benefits, its major advantage is protection from CVD, atherosclerosis and other heart diseases. The remedy from atherosclerosis is possible only when the oxidation of injury or LDL is minimized. The juice of amla fruit ensured that it is rich in polyphenol amount. Moreover the surgical pathology recovery of cardiac muscles guaranteed the preventative activity of *E. officinalis*. All the research and discussion argued that *E. officinalis* shows heart-protective, antioxidant and free radical scavenging Properties (Patel, Goyal 2011; Zhao *et al*., 2008).

(v) Anticancer

Like other natural medicinal plant, *E. officinalis* is better for anticancer because of high concentration of polyphenol constituents in it. Polyphenols involve the mechanisms associated with anticarcinogenic effect, inflammation and radiation retardant (Priego S, *et al*., 2008).

(vi) Osteoporosis

Amla (*E. officinalis*) fruit is very useful for strengthening the weak and fragile bones (i.e. osteoporosis). It often takes more time even several years to appear or required only diagnoses the *E. officinalis* extract is used to mature OCs. Penolazzi *et al*., reveals the implement of extracts of *E. officinalis* (Penolazzi L *et al*., 2008).

(vii) Dermoprotective

Beside the other medicinal plants, *E. officinalis* extract is very useful in skin care, antiaging, dermatological disorder since more than 20 years. Amla extract protects human skin against oxidative stress because of its antioxidant nature. *E. officinalis* defends the skin from free radical that causes skin-damage. Furthermore amla (*E. officinalis*) is best for anti-aging, and used for production of cosmetics for skin care (Datta & Paramesh, 2010).

(viii) Immuno stimulant

As we are familiar with various plants, that are immune stimulant in nature. Similarly amla is best source of ascorbic acid that enhances immuno-activity (i.e. make 2-times more effective) by stimulating immune cells and antibodies (Kumar S *et al*. 2011).

(ix) Gastroprotective

Amla is not only anticarcinogenic but also its phytochemical components are best for prevention gastrointestinal infection (Romano, Vitaglione, Sellitto, & D'Argenio, 2012).

According to Mehmood *et al*., amla (*E. officinalis*) extract is used in treatment of diarrhea and showed spasmolytic activities (Mehmood MH *et al*., 2011).

Ethnomedicinal uses [11]

E. officinalis is regarded as a potent rasayana (rejuvenator) and is beneficial in delaying the degenerative and ageing processes. It promotes longevity, improves digestion, and relieves constipation. According to the ayurvedic medical system, it also reduces fever, cleanses the blood, reduces cough, eases asthma, strengthens the heart, benefits the eyes, encourages hair growth, invigorates the body, and enhances the intellect.

Fruit contains chemical constituents such as alanine, alagine, gallic acid, glucose, Glutamic acid, niacin, pectin, phenylanaline, glucogallin, manganese, magnesium, ethyl gallate, calcium, carbohydtrate chebulic acid, fat, fibre, and flavonoids that are edible and increase appetite; when applied to the scalp, it blackens and strengthens hair and prevent premature greyings of hair.

Diarrhoea, ingestion, ulcers, inflammation, sickness, nausea, fever, skin sores, wounds, and scurvy are all treated with it. Red blood cell production.

Astringent fruits are used to treat inflammation, skin sores, wounds and scurvy, ophthalmic problems, gastritis, hyperacidity, colitis, haemorrhoids, hematuria, menorrhagia, anaemia, diabetes, asthma, osteoporosis, weakness, and fatigue in several folk medicines.

Conclusion

Amla (*Emblica Officinalis*) is a well-known Indian medicinal herb that has a variety of health benefits. Amla fruit is widely available in tropical and subtropical regions. All parts of this fruit are medicinal, especially the fruit, which is used in Ayurveda as a powerful Rasayana and in medicine to treat respiratory disorders, eye disorders, diabetes, inflammation, and a variety of other ailments. Antioxidants and Phytonutrients aid in the fight against free radicals. Because of its high polyphenol content, Amla has anticancer properties. Amla's rich phytochemistry composition can be viewed as a valuable source of compounds with potential health benefits. The antioxidant (derived from the rich polyphenol composition) is a significant property, with scientific evidence supporting the direct inhibition of oxidative reactions as well as the induction of an endogenous antioxidant defence system.

Although there is a promising scenario for Amla, it is critical to encourage the progression of studies in order to strengthen the current evidence with more studies (especially at animal and human levels). Hence, it is summarized the nutritional value, ethno medicinal and pharamacological importance, and uses of Amla in this review, as well as their basic mechanisms. As Amla plays an important role in the treatment of various diseases, herbal medicine alleviates many of the problems. Because it contains important vitamins, particularly ascorbic acid, and has a higher antioxidant and biological nature, Amla can help you avoid a slew of health problems.

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