

A Review

Phyllanthus Emblica: The Miracle of Ayurveda

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Abstract- *Phyllanthus emblica*, a small to medium-sized deciduous tree endemic to the Indian subcontinent, is also known as amla or Indian gooseberry. This overview of plants explores *P. emblica*'s taxonomic categorization, unique morphological characteristics, and historical and modern significance. Because of its unique phytochemical makeup, the plant is highly valued in traditional Ayurvedic medicine, where it has been used for ages to cure a wide range of illnesses. *Phyllanthus emblica* has a high vitamin C concentration that is superior to many other fruits, making it a prominent characteristic. Recent study has focused on the antioxidant qualities, highlighting its ability to fight chronic illnesses and oxidative stress. This presentation offers an overview of the bioactive substances present in *Phyllanthus emblica*. The fruit is used in traditional medicine to treat Digestive health, Antioxidant properties, Hair care, Skin care, Cholesterol Management, Diabetes Management, Respiratory Health, Liver Health. They also display Anticancer, Antipyretic, Cardioprotective, Analgesic, Ophthalmic, Immunomodulatory, Anti-diabetic, Anti-inflammatory, Gastroprotective, Hepatoprotective, Anti-diarrheal, Antimicrobial.

Keywords- *Phyllanthus emblica*, pharmacology, medicinal property.

I. INTRODUCTION

Phyllanthus emblica Linn or *Emblica officinalis*, often referred to as amla or the Indian gooseberry, this nutraceutical is widely used to treat a wide range of illnesses due to its capacity to increase immunity.^[1] Originally from India, this plant, which is a member of the Euphorbiaceae family, is now grown in Pakistan, Uzbekistan, Sri Lanka, Southeast Asia, China, and Malaysia.^[2] The tree is up to 5.5 meter's tall and is small to medium in size. The bark is scale like and has a greenish-grey hue. The most often utilized portion of the plant is its fruits, which have both culinary and therapeutic uses.^[3] In the Ayurvedic and Unani medical system, the fruit of *Emblica* is one of the most significant and commonly used herbal medications. ^[4] Given that it has over 30 times the amount of vitamin C found in oranges, it is one of

the finest sources of the vitamin. *Phyllanthus emblica* is among the most popular crude medication sold in the commerce. Primarily the fruit portion, which has a variety of uses in the food, cosmetic, and healthcare industries.^[5] The fruits are essential system, where they are used to treat a wide range of conditions such as diabetes, hepatitis, asthma, bronchitis, skin diseases, hemorrhoid's, nerve debility, leprosy, inflammation, emaciation, dyspepsia, colic, flatulence, hyper-acidity, peptic ulcer, jaundice, strangury, diarrhea, dysentery, hemorrhage, leukorrhea, menorrhagia, cardiac disorders.^[6]



FIGURE:1 PHYLLANTHUS EMBLICA

TAXONOMICAL CLASSIFICATION:

- KINGDOM: **Plantae**
- CLASS: Magnoliopsida-Dicotyledonae
- DIVISION: Angiospermae
- FAMILY: Euphorbiaceae
- GENUS: *Emblica*
- KINDOM: **Plantae**
- ORDER: Geraniales
- SPECIES: *Emblica officinalis* Linn.
- SYNONYM: *Phyllanthus emblica* Linn.

VERNACULAR NAMES OF PHYLLANTHUS EMBLICA:

- TAMIL: Nelli
- ENGLISH: Indian goose berry
- HINDI: Amla
- LATIN: Emblica officinalis, Gaerte
- SANSKRIT: Amalaki
- KANNADA: Nalika
- MARATHI: Amla
- CHINESE: An Mole
- GERMAN: Amla
- MALAYSIAN: Popok Melaka
- ITALIAN: Mirabolano emblica
- TELUGU: Usirikaya
- PORTUGUESE: Mirabolano emblica
- NEPALESE: Amba
- BANGLA: Aamalki
- TIBETAN: Skyu-ru-ra

BOTANICAL DESCRIPTION: 1

It's a small to medium-sized tree with spreading branches and a crooked trunk. The bark is greyish- green and peels off in flakes. The leaves are simple, subsessile and tightly spaced along the branchlets, which are glabrous or faintly pubescent, 10-20cm long, and typically deciduous. The leaves are pinnately shaped and have a bright green color. Globe-shaped fruit develops from the greenish-yellow flowers that are fleshy, depressed globose, with a diameter of 1-2cm and six obscurely lobed seeds that are trigonous in shape. When they are not ripe, they are green; When they are ripe that become light yellow or brick red. ^[7]

MORPHOLOGY:

Color	Light green to greenish-yellow when ripe
Odor	None
Taste	Sour, Bitter and Astringent
Size	1.5 to 2.5 cm in diameter
Shape	The fruits are globose

FRUIT:

15 – 25 mm length and 18-35 mm in width, more broadly globular than long, the mesocarp is yellow and the endocarp greenish is yellowish brown.

FLOWER:

yellow, unisexual, in axillary fascicles, males numerous on short pedicels and females few subsessile, ovary 3-celled.

SEEDS:

smooth, dark brown. Seedings start bearing fruits in 7 years after planting.

BARKS:

thick to 12 mm, grayish brown or grayish green.

FLOWERING AND FRUITING:

February-may, December – January

CULTIVATION:

Climate and soil:

Tropical and subtropical regions are ideal for amla growth. The optimum soil has a pH range of 5.5 to 7.0 and is well drained.

Propagation:

Common propagation techniques include air layering, cuttings, and seeds. During monsoon season, seeds should be sown in beds that have been well prepared.

Planting:

when seedings are 6 to 8 months old, transplant than onto the main field using rooted cuttings. Keep your distance between plants between 6 and 8 meters.

Irrigation:

Amla needs to be watered frequently, particularly in dry seasons. It is advantageous to use drip irrigation to avoid waterlogging.

Fertilizer:

During the growth season, apply balanced fertilisers and well-rotted organic manure.

Trimming:

To sharp the plant and get rid of unhealthy or dead branches, prune it. This adds in keeping the tree robust and fruitful.

Weed Management:

Eliminate weeds in the vicinity of the plant to lessen nutrient competition .

Management of Diseases and Pests:

Keep an eye out for illness like powdery mildew and pests like aphids. When required, apply chemical or organic controls.

Gathering:

After planting, amla tree usually begin to bear fruit three to four years later. When the fruits are ripe but still hard, harvest them.

Care after harvest:

Take caution when handling the picked fruits to prevent bruises. Keep it in a dry, cold environment.

PHYTOCHEMISTRY:

P. Emblica fruit contains the highest concentration of ascorbic acid, also known as vitamin C. In addition, fixed oil, phosphatides, essential oils, tannins, minerals, vitamins, amnio acids, fatty acids, glycosides, and other phytochemicals have been identified from this plant. There have been reports of fatty acids from P. emblica including myristic, stearic, oleic, linolenic, and palmitic acids. The sugars are represented by the residue D-glucose, D-fructose, D-myo-inositol, D-rhamnosyl, D- xylosyl, D-glucosyl, D-mannosyl and D-galactosyl. Tannins identified from this plant are pedunculagin, punigluconin and emblicanins A and B, gallic acids, amlaic acids, arginine, aspartic acids, astragaline, chebulinic acid, chebulagic acid, ellagic acid, gibberellins, glutamic acid, glycine, histidine, isoleucine, methionine, emblicol, leucodelphinidin, rutin, thiamine, threonine, tryptophan, riboflavin, quercetin, valine, etc. ^[8-12]

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Portions of plant	Phytochemicals	Reference
Leaves	It contains gallic acid, chebulic acid, ellagic acid, chebulagic acid, amlaic acid, alkaloids phyllantine and phyllantidine, rutin, tannin.	(Khan, 2009)
Fruit	Alanine, arginine, ascorbic acid, aspartic acid, β - carotene, carbohydrates, calcium, boran, ellagic acid, phosphorus, flavonoids, phenylalanine, gallotanins, emblicol, cystine etc.	

Seeds	A fixed oil and small quantity of essential oil. Linolenic acid, linoleic acid, oleic, steric, palmitic and miristic acid.	(Khan, 2009)
Roots	It contains ellagic acid, lupeol, glycosides, phyllaemblic acid, phyllaemblicin A, B and C.	(Khan, 2009)
Bark	It contains leukodelphinidine, tannins and proanthocyanidin, lupeol, botulin.	(Khan, 2009)

PHARMACOLOGY ACTIVITY:

Antibacterial activity:

Using the agar disc diffusion method, the antibacterial activity of the extracts of the leaves and fruits at different concentrations (10 mg and 20 mg/ml) were assessed against a few common pathogenic bacteria. Staphylococcus and other gram-positive bacteria. Gram-negative bacteria such as *Pseudomonas aeruginosa* and *Bacillus subtilis*, and using *Escherichia coli*, the concentrated extracts' antibacterial activity was assessed in relation to the aforementioned microorganisms using the diameter zone of inhibition. Garden Both gramme positive and gramme negative bacteria were susceptible to the action of extracts. The earlier *P. emblica* has been found to have broad range antibacterial activity and a possible source of novel antibiotic classes with potential therapeutic benefits for infectious diseases both control and chemotherapy. The investigation on the chemical's isolation was also carried out. components that are found in the plant. Using aqueous and organic solvents, the phytochemical components of the dried powdered plant fruits and leaves were extracted. The findings showed the presence of alkaloids, oil, fat, glyceroids, carbohydrates, phenolics, tannins, and lignin. Flavonoids, terpenoids, saponins, etc. *Phyllanthus emblica*. leaf solvent extracts have shown antibacterial activity against every test organism. Tests were conducted on *P. emblica* leaves and fruit extracts in petroleum ether, chloroform, and alcohol against a range of Gramme-positive and Gramme-negative bacteria. Among the extracts tested, *P. emblica* leaf extracts with alcohol showed good effectiveness against *S. aureus* at 20 mg/ml; for instance, the diameter zone of inhibition was measured at 22 mm. ^[14]

Antioxidant activity:

We evaluated the antioxidant activity of aqueous amla extract by looking at its capacity to prevent superoxide dismutase (SOD) damage in rat liver mitochondria and lipid peroxidation (LPO) in rat liver microsomes caused by γ -

radiation. Amla extract was introduced to the LPO experiment in its aqueous solution, and radiation was applied at various intervals. The amount of thiobarbituric acid reactive compounds was used to quantify the extent of LPO. It has been noted that amla extract functions as an excellent antioxidant to prevent LPO caused by γ -radiation. It was also discovered to prevent harm to the antioxidant enzyme SOD. It was discovered that the amla extract's antioxidant activity depended on both dose and concentration. HPLC and titrimetric analysis were used to standardise the ascorbic acid content of amla. ^[15]

Antidiabetic activity:

The purpose of this study was to investigate the scientific underpinnings of the traditional use of *Phyllanthus emblica* in hyperglycemic patients as an anti-diabetic medication. To assess the phytochemical agents, an ethanolic extract of the dried fruits underwent both qualitative and quantitative analysis. Next, it is anti-diabetic and antioxidant. Activity was discovered. The findings showed the presence of alkaloids, phenols, tannins, and carbohydrates. proteins, amino acids, saponins, glycosides, and flavonoids in a crude extract including phenolic and flavonoid concentrations demonstrated as 100 mg/g of rutin and 9.9 mg/g of gallic acid, respectively. Radical liberties the plant extract's scavenging activity was found to be $68 \pm 0.33\%$, whereas rutin's was found to be $58 \pm 1.15\%$ at dosage of 2.56 mg/ml. Likewise, in vivo research revealed that *Phyllanthus emblica* 80 mg/kg considerably decreased the diabetic rats' blood glucose levels to 166 ± 0.7 mg/dl on day 8 at 8 h, in contrast to rats with diabetes. 380 mg/dl ± 0.7 mg. Rat weight was likewise decreased, coming down to 274.11 ± 0.97 g from 310.71 ± 0.57 g. That was noted prior to therapy. So, it was determined that *Phyllanthus emblica* possesses strong antioxidant properties as well as being an antidiabetic. It was shown that *Phyllanthus emblica* fruit extract had a substantial hypoglycemic effect and that, as indicated by the decreased glucose levels, it may have alleviation.

Insulin resistance by increasing insulin sensitivity in peripheral tissues. Aldose reductase (AR) may be inhibited by tannins found in plant extracts. ^[16]

Antidiarrheal activity:

The results of the antibacterial screening tests support the use of *Phyllanthus emblica* (Linn.) ethanolic fruit extract as a treatment for several bacterial infections. When *Phyllanthus emblica* (Linn.) extract was used in the antidiarrheal activity screening at a dose of 500 mg/kg body weight, it provided approximately 0.5389 of the mean latent

period for the diarrheal episode in comparison to the control group. This result was significant ($P < 0.2$). The study's first, second, third, and fourth hour mean counts of stool were 8.2, 9.6, 7.8, and 4.4, respectively. In a castor oil-induced test on mice, *Phyllanthus emblica* (Linn.) had a mild antidiarrheal effect and produced an expansion of the latent period, which postponed the start of a diarrheal episode and reduced the occurrence of defecation. By comparing the test group's mean latent period with that of the control group and comparing it to a positive control group, it is possible to conclude that *Phyllanthus emblica* (Linn.) has antidiarrheal properties.^[17]

Anti-Cancer:

Simple aqueous extracts or *Phyllanthus emblica* berry extract enhanced with polyphenols have also demonstrated cytotoxic action against cervical and ovarian cancer cells.^[18,19] There is little evidence, in contrast to in vitro research, that *Phyllanthus emblica* inhibits tumour growth in in vivo cancer models. The translation of these studies into something that is clinically useful requires the use of such preclinical models. Nonetheless, a noteworthy investigation was conducted using oral Indian gooseberry aqueous extracts against an ovarian cancer xenograft model.^[18]

Anti-inflammatory:

P. emblica is present in a polyherbal formulation called Aller-7, which has strong anti-inflammatory properties against compound 48/80-induced paw oedema in Balb/c mice and Swiss Albino mice, as well as against carrageenan-induced paw oedema in Wistar albino rats. Additionally, against Freund's adjuvant-induced arthritis in Wistar Albino rats, Aller-7 demonstrated a dose-dependent anti-inflammatory impact, approximately 63% inhibitory effects, and excellent trypsin inhibitory activities.^[20]

Hepatoprotective:

Using a rat liver injury model and carbon tetrachloride (CCl₄), the hepatoprotective effects of extracts were investigated. It was shown that EO and CHY extracts could prevent the hepatotoxicity caused by both acute and long-term CCl₄ treatment. The decreased concentrations of glutamate-pyruvate transaminase, hepatic LPOs, and serum phosphatase alkaline. It was previously discovered that prolonged CCl₄ treatment also provided liver Fibrosis is shown in the accelerated phases of pathological collagen hydroxyproline. EO and CHY extracts were four significantly lower these elevated levels through examination. suggesting that the extract may prevent rats from developing fibrosis.^[21]

Hypolipidemic:

The flavonoid concentration of *Phyllanthus emblica*, which has a hypolipidemic impact in atherogenic albino rats, may be responsible for these effects. *Phyllanthus emblica*'s flavonoids work as hypolipidemic agents by blocking HMG-CoA reductase activity and simultaneously raising plasma lecithin cholesterol acyl transferase (LCAT) activity

Gastroprotective:

The antisecretory and antiulcer properties of an ethanol extract of *Emblica officinalis* Gaertn. 'Amla' were tested using various experimental models in rats, such as Shay rats with pylorus ligation, indomethacin, gastric ulcers caused by hypothermic restraint stress, and necrotizing agents (80% ethanol, 0.2 M NaOH, and 25% NaCl). In all test models, the development of gastric lesions was considerably reduced by oral administration of Amla extract at doses of 250 mg/kg and 500 mg/kg. Additionally, it significantly reduced the titratable acidity, gastric mucosal damage, and basal gastric secretion induced by pyloric ligation. Additionally, amla extract provided defence against the lowering of nonprotein sulfhydryl content and the depletion of stomach wall mucus caused by ethanol. Pharmacological and biochemical results are well supported by histopathological investigations. According to the findings, amla extract has antisecretory, antiulcer. The cytoprotective qualities Rats were used in several experimental paradigms, such as pylorus ligation, to test the antisecretory and antiulcer properties of an ethanol extract of 'Amla' *Emblica officinalis* Gaertn. The gastrointestinal ulcer caused by hypothermic restraint stress, indomethacin, shaky rats, and necrotizing chemicals (80% ethanol, 0.2 M NaOH, and 25% NaCl) are all investigated. In all test models, the development of gastric lesions was considerably reduced by oral administration of Amla extract at doses of 250 mg/kg and 500 mg/kg. Additionally, it significantly reduced the titratable acidity, gastric mucosal damage, and basal gastric secretion induced by pyloric ligation. Additionally, amla extract provided defence against the lowering of nonprotein sulfhydryl content and the depletion of stomach wall mucus caused by ethanol. Pharmacological and biochemical results are well supported by histopathological investigations. The findings show that amla extract has antiulcer, antisecretory, and Cytoprotective property.^[23]

Anti-fungal:

According to this study, *Phyllanthus emblica* leaf extract in petroleum ether showed potential antibacterial and

antifungal activity against all tested strains, with the exception of faecalis enterococcus.^[24]

II. CONCLUSION

Commonly used in Ayurvedic medicine is amla, also known as *Phyllanthus emblica*. It is a potent source of vitamin C and can be used in place of vitamin C. This study examined the pharmacology, phytochemistry, and general information of *Phyllanthus emblica*, a herbal remedy that shows promise due to its efficacy and safety. The fruit of the plant can reveal a number of prospective treatments; thus, numerous scientific investigations should be conducted to determine the medicinal applications of this ayurvedic medication.

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