

**Review Article**

# *Phyllanthus emblica* Linn. (Amla) - A Natural Gift to Humans: An Overview

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**Abstract:** Medicinal plants are the precious gift of nature which plays vital role in healthcare system of developing nation and potent source of medicament to heal various diseases in the world. It plays a vital role to preserve our health. Medicinal plants are believed to be much safer. These days, the use of herbal products has become the foremost option for human all over the world because of curing treatment without any side effect. Ayurveda, the oldest health system in the world, provokes the uses amla to treat a host of diseases and promote positive health. It is a well-known fact that all parts of amla are useful in the treatment of various diseases. Among all, the most important part is fruit. Amla fruit is the richest source of vitamin C. Chemical composition of the amla fruit contains more than 80% of water. It also contains protein, carbohydrates, fiber, amino acids and minerals such as calcium, phosphorus, iron, niacin, carotene, thiamine, riboflavin etc. The chemical constituents present in the plant include tannins, gallic acid, ellagic acid, emblicol, phyllembin, lupeol, essential oil, fixed oil etc. Amla fruit is widely used as diuretic, laxative, liver tonic, antipyretic, hair tonic, ulcer preventive and for common cold, fever as alone or in combination with other plants. Research reports on amla reveals its analgesic, anti-tussive, cardioprotective, cytoprotective, immunomodulatory, chemopreventive, antioxidant, memory enhancing, anticancer, antidiabetic and some others properties. In this article, we review the morphology, distribution, nutritional value, chemical constituents, medicinal uses of amla.

**Keywords:** *Phyllanthus emblica*, Amla, Medicinal Herb, Nutritional Value, Chemical Constituents, Medicinal Uses

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## 1. Introduction

Medicinal plants are the most precious creation of nature which is the ultimate gift for all the creatures includes mankind also. It plays vital role for maintaining the human health. According to WHO survey 80% of the populations living in the developing countries rely almost exclusively on traditional medicine for their primary health care needs and play an important role in health care system of remaining 20% of population. Amla (Indian gooseberry) is a gift of nature to mankind. It is an indispensable part of the ayurvedic and unani system with amazing remedial qualities. *Phyllanthus emblica* fruit is one of the top selling botanicals having diverse applications in healthcare, food and cosmetic industry. According to believe in ancient Indian mythology, it is the first tree to be created in the universe. It is also used in

“TRIPHALA” formulation. Triphala (tri = three and phala = fruits), is an ayurvedic preparation composed of three equal proportions of herbal fruits native to the Indian subcontinent. They are: *Terminalia chebula*, *Phyllanthus emblica*, and *Terminalia bellerica*. Triphala is rich in polyphenols, vitamin C and flavonoids.

Triphala is known to cure cataract and effective in the treatment of Acquired immune deficiency syndrome (AIDS). There is growing evidence that the humble amla berry offers nearly legendary powers in healing and preventing atherosclerosis and related cardiovascular disease. The amla can make a landscape attractive ornamental tree, especially when it wears its pale green berries.



Figure 1. *Phyllanthus emblica* Linn. (Amla).

## 2. Methodology

This study is a secondary research and secondary data has been used to conduct the study. Secondary data has been collected from different sources like reports of various organization, various books, journals, newspaper and articles. Also vast data have been collected from various web links. By collecting various information we tried to write a summarized overview about *Phyllanthus emblica* (Amlaki).

## 3. Result

### 3.1. Geographical Distribution

*Phyllanthus emblica* is widely distributed in most tropical and subtropical countries including India, China, Indonesia, Burma, and on the Malay Peninsula. It is native to tropical southeastern Asia, particularly in central and southern India, Nepal, Pakistan, Bangladesh, Bhutan, Srilanka, and the Mascarene Islands. It is abundant in deciduous forests of Madhya Pradesh. Originally, it was cultivated in Madagascar. It additionally grows in Pakistan, Sri Lanka, Uzbekistan, Malaysia, Ceylon, Indonesia, and some other countries over the world. Amla is found throughout the seacoast districts and on hill slopes upto 200 meters and is also cultivated in plains. It is a potential crop which grows in the marginal soils and various kinds degraded lands such as salt affected soils, salines and dry and semi-dry regions. With orchard cultivation, about 200 trees can also be accommodated per acre. [1, 12, 13]

### 3.2. Botanical Description of the Plant

Amla is a small to medium sized fruity tree and 8-18 meters height with thin light grey bark exfoliating in small thin

### 3.6. Chemical Constituents

Table 3. Chemical constituents of Amla.

Part	Constituent
Fruit	3-6-di-o-galloyl-glucose, Alanine (5.4%), Arginine, Ascorbic acid, Aspartic acid, $\beta$ -carotene, Boron, Calcium, Carbohydrates, Chebulagic acid, Fiber, Chebulaginic acid, Chebulic acid, Chibulinic acid, Chloride, Chromium (2.5ppm), Copper (3ppm), Corilagic acid, Corilagin, Cystine, Ellagic acid, Emblicanins, Emblicol, Ethyl gallate, Flavonoids, Gallic acid, zinc ethylester, Gallic acid, Gallotannins, Gibberellin-a-1, Gibberellin- a-3,

irregular flakes, leaves are simple, subsessile, closely set along the branchlets, light green having the pinnate appearance. The flowers are greenish yellow, unisexual. The fruit is nearly globose, quite smooth, fleshy and hard on appearance with six vertical stripes or furrows. The fruits ripen in autumn. It is sour, bitter and astringent in taste and quite fibrous. [5, 12]

### 3.3. Taxonomical Classification

Table 1. Taxonomical Classification.

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Euphorbiales
Family	Euphorbiaceae
Genus	<i>Phyllanthus</i> L.
Species	<i>Phyllanthus</i> Linn. <i>emblica</i>

[16]

### 3.4. Synonyms

*Cicca emblica* (L.) Kurz  
*Diasperus emblica* (L.) Kuntze  
*Dichelactina nodicaulis* Hance  
*Emblica arborea* Raf.  
*Emblica officinalis* Gaertn.  
*Phyllanthus glomeratus* Roxb. ex Wall. nom. inval.  
*Phyllanthus mairei* H. Lév.  
*Phyllanthus mimosifolius* Salisb.  
*Phyllanthus taxifolius* D. Don  
 [4]

### 3.5. Nutritional Value

Table 2. Nutritive value per 100g of amla fruit.

Chemical components	Percentage
Fruits: Moisture	81.2%
Mineral matter	0.7%
Fat	0.1%
Fiber	3.4%
Carbohydrate	14.1%
Protein	0.5%
Bulk elements Mg/100g	Net weight
Calcium	0.05%
Phosphorus	0.02%
Iron	1.2 mg/100g
Vitamin C	600 mg
Nicotinic acid	0.2 mg/100g

[3]

Part	Constituent
	Glutamic acid, Glycine, Histidine, Iron, Isoleucine, Kaempferol, Leucine, Lysine, Magnesium, Manganese, Methionine, Myo-inositol, Myristic acid, Niacin, Nitrogen, Pectin, Phenylalanine, Phosphorus, Phyllanthidine, Proline, Phyllantine, Phyllemblic acid, Phyllembin, Phyllemblic acid, Sulfur, Proanthocyanidins, Proteins, Putranjivin A, Riboflavin, Trigalloyl glucose, Selenium, Serine, Silica, Sodium, Starch, Sucrose, Thiamine, Threonine, Tryptophan, Tyrosine, Valine, Zeatin, Zeatin nucleotide, Gibberellin-a-4, Gibberellina-7, Gibberellin-a-9, Glucogallin, Glucose, Zeatin riboside.
Leaf	Amlaic acid, Astrogalin, Ellagic acid, Gallo-tannin, Kaempferol, Kaempferol-3oglucoside, Phyllanthin, Rutin, Tannin.
Shoot	Chebularic acid, $\beta$ -sitosterol, Chibulnic acid, Corilagin, Ellagic acid, Gallic acid, Glucogallin, Lupeol.
Bark	Leucodelphinidin, Lupeol, $\beta$ -sitosterol, Betulin, $\beta$ -Humulene, Friedelan-3one and Tannins.
Seed	Linoleic acid, Linolenic acid, Myristic acid, Oleic acid, Palmitic acid, Phosphatides, Stearic acid, $\beta$ -sitosterol.
Root	Ellagic acid, Lupeol and Glycosides.
Pericarp	Ellagic acid, Emblicol, Gallic acid and Phyllemblic acid.
Fruit	Constitutes 90.97% of the whole fruit, Ascorbic acid, Albumin, Calcium, Crude cellulose, Gallic acid, Gum, Iron, Magnesium, Mineral matter,
Pulp	Pectin, Phosphorus, Potassium, Protein, Reducing sugars, Tannins.
Seed oil	Arachidic acid, Behenic acid, $\beta$ -sitosterol, Linoleic acid, Linolenic acid, Myristic acid, Oleic acid, Palmitic acid and Stearic acid.

[6-11, 13, 15, 17]

### 3.7. Medicinal Importance

#### 3.7.1. Traditional Uses in Ayurveda

The Amla fruit has these properties using the Ayurvedic classifications:

Rasa (taste): Sour and astringent are the most dominant, but the fruit has five tastes including sweet, bitter, and pungent.

Veerya (nature): Cooling, it uses in treatment of burning sensation in inflammation and fever which are considered to be manifestations of pitta (fire) agitation.

Vipaka (taste developed through digestion): Sweet.

Guna (qualities): Light, dry.

Doshas (effect on humors): Quietens all three doshas: vata, kapha, pitta, and is especially effective for pitta.

Due to its cooling nature, amla is a common ingredient in treatments for a burning sensation anywhere in the body and for many types of inflammation and fever; these are manifestations of pitta (fire) agitation. Amla or Amlaki has been considered the best of the Ayurvedic rejuvenative herbs. It has a natural balance of tastes (sweet, sour, pungent, bitter and astringent) all in one fruit, so, stimulates the brain to rebalance the three main components of all physiological functions, the water, fire, and air elements within the body. [2]

In traditional folk medicine, the fruits exert several beneficial effects include cooling, ophthalmic, carminative, digestive, stomachic, laxative, dyspepsia, rejuvenative, diuretic, antipyretic and tonic. They are also useful in diabetes, cough, asthma, bronchitis, dyspepsia, flatulence, peptic ulcer, skin diseases, leprosy, inflammations, diarrhoea, haemorrhages, cardiac disorders, hair tonic and some other disease conditions.

#### 3.7.2. Acts as an Antioxidant, a Potent Source of Vitamin C and Used To Prevent Scurvy and Jaundice

The Amla is a rich source of vitamin C and low molecular weight hydrolysable tannins. For this amla is a good source of antioxidant. The Vitamin C is bonded with tannins that protect it from being destroyed by heat or light.

The research studies shown that amla preparations contained high levels of the free-radical scavenger, superoxide dimutase (SOD) in the experimental subjects. Amla reduced

UV-induced erythema and showed free-radical quenching ability, chelating ability to iron and copper as well as MMP-1 and MMP3 inhibitory activity.

Ellagic acid, as a powerful antioxidant present in amla has the ability to inhibit mutations in genes and repairs the chromosomal abnormalities. [20-24]

Amla or Indian gooseberry is one of the best remedy for scurvy as it is an extremely rich source of vitamin C.

Oral administration of powder of the dry herb, mixed with an equal quantity of sugar, 3 times a day with milk can prevent scurvy.

Drinking amla juice early in the morning with an empty stomach is a natural tonic prevent outbreak of scurvy and jaundice. [24]

#### 3.7.3. Memory Enhancing and Antidepressant Activity

Amla-Berry is good for the brain. It is supportive for the mind and enhance coordination. It sharpen the intellect and helps in mental functioning. It supports the nervous system and strengthens the senses.

*P. emblica* is traditionally used to treat disorders of the central nervous system (CNS). Powder of amla produced a dose-dependent improvement in memory of young and aged rats. It reversed the amnesia induced by scopolamine and diazepam. Powder of amla may prove to be a useful remedy for the management of Alzheimer's disease due to its beneficial effects on memory improvement and reversal of memory deficits.

A test on Albino mice confirmed the antidepressant action of amla as comparable to usual antidepressant drugs. [24, 31, 43]

#### 3.7.4. Cardioprotective Activity, Hepatoprotective Activity, Anti-inflammatory, Antipyretic and Analgesic Effects, Hypo-cholesterolemic and Hypo-lipidemic Properties

It supports the heart, blood and circulation. It protects the cardiovascular system and sometimes acts as cardiac stimulant. Research shows that, Amla helps to lower cholesterol level and protect heart from diseases. Various studies shown that, Ischaemia-reperfusion injury (IRI), occur due to oxidative stress can be treated with amla fruit as fruit

extract enriched with emblicanin A and B. Oral administration of a *P. emblica* fruit extract enriched with emblicanin A and B (50 mg and 100 mg kg<sup>-1</sup> BW twice per day for 14 days) significantly reversed the effects of IRI. [24, 31]

Amla fruits have been reported to be used for hepatoprotection in Ayurveda.

The amla extract was found to be hepatoprotective, due to its membrane stabilising, antioxidant and CYP 2E1 inhibitory properties. Treatment of rats with amla extract (75 mg kg<sup>-1</sup> per day) also enhanced liver cell recovery by bringing the levels of AST, ALT and IL-1 $\beta$  back to normal. Amla-fruit helps to purify the nutrient fluid and blood, thus support the functions of the liver. It also strengthens the liver, helps in the removal of toxins from the body. A hydroalcoholic (50%) extract of *P. emblica* (fruit) reduced the severity of hepatic fibrosis induced by carbon tetrachloride and thioacetamide. [38]

Extracts of leaves and fruits possess potent anti-inflammatory, antipyretic as well as analgesic activity. This may be due to the presence of tannins, alkaloids, phenolic compounds, amino acids and carbohydrates. Decoction of *P. emblica* leaves is used to treat fever and the fresh fruit is refrigerant. The seeds are given internally as a cooling remedy in bilious affections, nausea and in fevers.

Another research reported that, fruit extract was found to be an effective anticoagulant and anti-inflammatory agent as it potentially and significantly reduced lipopolysaccharide (LPS) induced tissue factor expression and it also decreased the concentrations of pro-inflammatory cytokines, TNF.

Often after a fever there is a loss of taste and a decoction of the emblic seed, dried grapes and sugar is used for gargling.

A paste of the fruit act as analgesic in case of cephalalgia (headache). [33, 36, 40]

Treatment with *P. emblica* fruit for 28 days in hyper-cholesterolemic patients, showed decreases in total serum cholesterol levels. *P. emblica* extract was shown to inhibit cholesteremia at a higher level than the anti-cholesterol drug Probuocol.

Another study shown that, rats fed extract along with a high cholesterol diet for 20 days showed significantly reduced the levels of total, free and low-density lipoprotein (LDL) cholesterol compared to that of diet fed group. An oxidized LDL (ox-LDL) level in the animal blood serum was also reduced. The results suggesting that *P. emblica* may be effective for hypercholesterolemia and prevention of atherosclerosis.

In other study it was found that, *P. emblica* also reduces serum, aortic and hepatic cholesterol in rabbits. [42]

The lipid-lowering activity of *P. emblica* fruits evaluated in rabbits which fed a high cholesterol diet. The fresh juice of fruits at a dose of 5 mL/(kg•day) for 60 days lowered serum cholesterol, triglycerides, phospholipids and LDL levels. [42]

### 3.7.5. Antimicrobial, Antimutagenic and Anticancer Activity, Immunomodulatory and Antiproliferative Effects and Cause Apoptosis (Programmed Cell Death)

Various research studies shown that, Amla fruit, leaf and

bark has antimicrobial activity which includes antibacterial, antifungal and antiviral properties. In the antimicrobial study, it was observed that, the extract of *Phyllanthus emblica* showed high activity against all gram- positive, gram-negative and resistant- bacteria. Especially showed highest activity against *Bacillus subtilis*, and the zone of inhibition was 25mm. It showed lowest activity against *Salmonella paratyphi*, *Sarcina lutea*, *Pseudomonas spp.*, *Salmonella typhi* and the zone of inhibition was 8mm. Antifungal property of amla for *Aspergillus* is reported. Fruit ethanol and acetone extracts confirmed average pastime toward *Fusarium equiseti* and *Candida albicans* where griseofulvin was once used as ordinary antibiotic.

Antiviral activity also reported. Pentagalloylglucose can inhibit influenza, a virulent disease. [43]

Amla is a wonder fruit known for the treatment and prevention of Cancer. The potential anticancer effects of aqueous fruit extract of *P. emblica* was tested in several different human cancer cell lines such as A549 (lung), HepG2 (liver), HeLa (cervical), MDA-MB-231 (breast), SKOV3 (ovarian) and SW620 (Colorectal). It inhibits the growth and spread of different types of cancer cell lines at doses of 50-100  $\mu$ g/ml. It also reduces the side effect induced by radiotherapy and chemotherapy, which generally used for the treatment of cancer.

Cyclophosphamide (CP) is one of the most commonly used alkylating anticancer drugs, but has toxic side effects including immunotoxicity, hematotoxicity and mutagenicity.

It is found that oral administration of an extract of *P. emblica* to rats at a dose of 100 mg kg<sup>-1</sup> body weight (BW) per day for 10 days resulted in the modulation of immunological parameters and antioxidants in the kidney and liver in normal as well as cyclophosphamide (50 mg kg<sup>-1</sup>)-treated animals. The result suggested that, amla extract is very effective in reducing the cyclophosphamide induced suppression of humoral immunity. [24, 29, 36]

Immune system acts as great barrier against any type of infection in our body and immune activation is an effective as well as protective approach against emerging infectious diseases. Amla modulate the immune system and the inflammatory response. Immunomodulatory properties of fruit extracts of *P. emblica* were evaluated using chromium (VI) as an immunosuppressive agent induced arthritic (AIA) rats, indicating that these drugs may provide an alternative approach for the treatment of the arthritis. [37]

The antiproliferative activity of phenolic compounds obtained from *P. emblica* was determined by a 3 (4, 5 dimethylthiazol-2-yl)-2, 5-diphenyl tetrazolium bromide (MTT) assay, using three tumor cell lines, MK-1, HeLa, and B16F10 cells. All the phenolic compounds showed strong inhibition against B16F10 cell growth at a concentration of less than 68 mg/mL compared to HeLa and MK1 cell growth. The results suggested that, such compounds must be taken in consideration for developing potential cancer chemopreventive agent. [14]

Apoptosis (programmed cell death) is a useful marker for predicting tumour response after anticancer treatment. *P.*

*emblica* extract was found to inhibit cell cycle regulating enzymes cdc 25 phosphatase in a dose dependent manner. [39]

### **3.7.6. Antidiabetic Effect, Diuretic and Supports the Urinary System**

The anti-diabetic activities of amla due to its high vitamin C content that is effective in controlling diabetes. One tablespoon of its juice mixed with bitter gourd juice, taken daily for two months will stimulate the pancreas and enable it to secrete insulin, thus reducing the blood sugar level. Diet restrictions should be strictly maintained while taking this medication. It will also prevent eye complication in diabetes.

It also involved in regeneration and rejuvenation of beta cells, thus leading to an increased insulin production and secretion. This mechanism greatly decreases the blood sugar levels. Tannins has the capability to enhance glucose uptake and inhibit adipogenesis to make them potential drugs for the treatment of non-insulin dependent diabetes mellitus. The extract exerted rapid protective effects against lipid peroxidation by scavenging the free radicals. Decoctions of the leaves and seeds are used in the treatment of diabetes. Different studies suggested that, fruits, infusion of seeds and decoctions of the leaves and seeds are also used in the treatment of diabetes mellitus. [17, 24, 28]

The fresh fruit is diuretic. A paste of the fruit alone or in combination with *Nelumbium speciosum* (the Egyptian Lotus), Saffron [more likely to be *Curcuma longa* (Indian saffron) than *Crocus sativus* (saffron)] and rose water is a useful application over the pubic region in irritability of the bladder, in retention of urine. It is used as a febrifuge, as an anti-inflammatory and unusually as an anti-diuretic. [24]

Amla-Berry is very supportive to the urinary system and can be helpful if anyone feel a mild burning sensation while urinating. It supports natural diuretic action, but does not force water from the body like diuretic pills. In other words, it helps eliminate waste from the body but does not over-stimulate the urinary system.

The paste made by 20gms of pulp of dried *E.officinalis* in 160 gms of water till 40 gms are left.

This was mixed with 20gms of Gur. Regular use of this portion may cure urinary problem. Having amla powder with radish can break the stones present in urinary bladder and washed it out through urine. The best time to have them is morning or evening. [24, 27, 35]

### **3.7.7. Lightens Headache, Promotes Body Weight, Enhances Food Absorption and Used as Appetizer and Has Antisecretory, Cytoprotective and Gastroprotective Properties**

Applying mixtures of amla with buttermilk make temperature reduction and give chillness to head and its paste reduce headache. [35]

It helps in balancing nitrogen levels and increasing protein levels very well, which promotes body weight. *P. emblica* contains minerals including chromium, zinc and copper which helps in maintaining proper functioning of the metabolic activities of the body. [35]

The regular use of Amla-Berry can strengthen digestion,

absorption and assimilation of food. People taking it feel that they enjoy the taste of food better than before. It improves assimilation of iron for healthy blood. Pickles made from the green fruits used as appetizer. [24, 36]

It improves digestion but does not heat the body, Amla is ideal for calming mild to moderate hyperacidity and some digestive problems. Amla (ethanolic extract) was investigated for its antisecretory and antiulcer activities using various experimental models in rats. It was then suggested that Amla extract exhibit antisecretory, cytoprotective and gastroprotective properties. [24, 31, 36]

### **3.7.8. Amla as an Anti- Anaemic Agent, Enhances Fertility and Remedy for Menstrual Disorders, Effective in Vaginal Irritations and HIV-Reverse Transcriptase ((HIV-RT)) Inhibitory Activity**

Anemia is a condition that develops when blood does not contain healthy red blood cells or haemoglobin. Main function of RBC is the transportation of oxygen into the tissues and anemia is caused due to decrease in oxygen carrying capacity. Anemia can be caused due to various factors such as inadequate absorption or intake of iron, reduced intake of vitamin B12 or folic acid, destruction of red bone marrow, hereditary conditions etc. Amla is a good absorption agent of iron. Vitamin C or ascorbic acid is highly present in amla, which helps to reduce iron deficiency.

The synergistic effect of Neem leaves (*Azadirachta indica*) in combination with amla can be very effective to patients suffering from iron deficiency anaemia. [36]

Amla-fruit keeps menstruation regular and healthy. It supports the reproductive systems of both men and women and can help overcome difficulty in conceiving. It enhances the reproductive tissue and nurtures the ovaries and sperm that enhances fertility and the possibility of conception. It is especially supportive for women, strengthens the uterus and protects the reproductive system. White discharge in women is the major problems which can be reduced by taking dried amla seeds mixed with honey.

Amla can also increase the sperm count and it acts as an aphrodisiac. [24, 36]

A mixture of the fruit juice and sugar is used for the relief of burning in the vagina. [33, 36]

Inhibition of HIV-Reverse Transcriptase (HIV-RT) by amla plant extract fractions was tested on Peripheral Blood Mononuclear Cells. The study concluded that, aqueous fraction and n-hexane fraction have highest inhibition of recombinant HIV-RT (91% and 89%, respectively) at 1 mg/ml concentration. Chloroform fraction showed highest inhibition of HIV-RT at 0.5 mg/ml and carbon tetrachloride fraction at 0.12 mg/ml concentration. At 0.12 mg/ml and 0.5 concentrations 50% of the HIV-RT activity is inhibited in n-hexane fraction and carbon tetrachloride fraction respectively. [41]

### **3.7.9. Hair Tonic and Eye Tonic**

Amla-Berry boosts absorption of calcium, thus creating healthier bones, teeth, nails and hair. It also helps maintain vernal hair color and retards premature graying, and supports

the strength of the hair follicles, so there is less thinning of hair with age.

Dried fruit boiled in coconut oil till solid matter becomes charred, prevents greying. The water in which dried amla pieces are soaked overnight is also nourishing to hair. [24, 34, 35]

The juice of fresh amla has been found to improve eyesight and may be helpful in treating conjunctivitis and glaucoma. A cup full of amla juice mixed with honey should be taken twice daily for eye problems. Even if one does not suffer from eye disease, amla is also used to reduce intraocular tension and weakness of the eyes.

In another treatment an infusion of the seeds is also used as a collyrium and applied in the inflammations of the conjunctiva and other eye complaints. The exudate collected from incisions made on the fruit is applied externally on inflammation of the eye.

Ophthacare is a herbal eye drop preparation containing basic principles of different herbs in patients suffering from different ophthalmic disorders such as conjunctival xerosis, conjunctivitis, acute dacryocystitis etc. In most cases improvement observed with the treatment of the herbal eye drop. During the course of study no side effects were observed and the eye drop was well tolerated by the patients. Ophthacare exhibit beneficial role in a number of inflammatory, infective and degenerative ophthalmic disorders. [26, 31]

### 3.7.10. Miscellaneous

#### (i) In Osteoporosis and Dental Problems

Osteoclasts (OCs) are involved in rheumatoid arthritis and in numerous pathologies associated with bone loss. Current results support the concept that, certain medicinal plants as well as derived natural products from them are of great interest for developing therapeutic approaches against bone disorders, including rheumatoid arthritis and osteoporosis.

A study reported that, extracts of amla fruits exhibit probable activity for the treatment of rheumatoid arthritis and osteoporosis by triggering programmed cell death of human primary osteoclasts. Furthermore, there is a need for effective nutraceuticals for osteoarthritis care. [45]

The roots of *Phyllanthus emblica* Linn. (10 g) are ground and taken twice daily for one day only after taking food.

Alternatively, the leaves of *Phyllanthus emblica* Linn. are squeezed to extract the juice. This juice then put in the ear (a few drops) to relief from toothache.

A final alternative is to grind the node of a *Phyllanthus emblica* Linn. and mix it with water. After vigorous stirring it is filtered through a cloth. This water is put drop by drop in the right ear if the teeth on the left hand side are in pain and vice versa. The remedy is continuing for three days. A cytokine like substances, Zeatin is also present in amla leaves and fruits that helps in refining the mouth, strengthens teeth and bones. [26]

#### (ii) Snake Venom Neutralizer, Mosquitocidal and Larvicidal Activity

Studies shown that, *Phyllanthus emblica* possess

anti-venom activity both in vivo and in vitro studies. The plant extracts which neutralized the defibrinogenating and inflammatory activity of *Vipera russellii* snake venom. *V. russellii* venom-caused hemorrhage, coagulant and inflammatory undertaking was greatly neutralized via each plant extracts. No precipitating bands were formed between the snake venom and plant extract which confirmed that the plant extracts possess potent snake venom neutralizing capacity and need further investigation. [31]

In a mosquitocidal property evaluation test observed the larvicidal and pupicidal activities of methanol extract of amla against the malarial vector, *Anopheles stephensi* showing 98% mortality rate at 100 ppm. The methanol and ethanol extracts of amla also exerted 100% mortality (no hatchability) at 400 ppm and above.

Another study shown the larvicidal activity of amla ethyl acetate leaf extracts.

The study concluded that the ethyl acetate extract of *P. emblica* exhibited the maximum larvicidal activity (99.6%) with LC50 (lethal Concentration brings out 50% mortality) value of 78.89 ppm against the larvae of *Aedes aegypti*. [36]

#### (iii) Used in Respiratory Diseases and Reduces Harmful Effects of Cigarette Smoke

*P. emblica* is the richest natural source of flavonoids and vitamin C. Dietary supplement with amla protects against *K. pneumoniae* mediated respiratory tract infection by keeping a supervision on the induction of pro-inflammatory cytokine like TNF. The expressed juice of the fruit along with other ingredients is used to cure cough, hiccough, asthma and other diseases. [36]

Research suggested that intake of amla juice regularly reduces harmful effects of the cigarette smoke in the lungs. Due to its high anti-oxidant contents, it fights with free radicals liberated from the smoke. [26]

#### (iv) Improves Muscle Tone and Skin, Revitalizing Effects and Used in Boils and Spots

Amla-fruit promotes protein synthesis that is why it is good for strengthening muscles and building lean muscle mass. It is an extraordinary Ayurvedic action that offers the athletes and body-builders a natural way to tone muscles and build lean mass. [24]

As amla improves digestion, helps the liver in detoxification and is rich in Vitamin C and other minerals, it is very good for the skin. It moisturizes the skin, cleanses the tissues of toxins, and supports immunity of the skin against bacterial infection. It helps to enhance glow and luster. Also acts against pimples. Pimples on face caused by impure blood and can be removed by taking amla in combination with neem. [26, 35]

Amla-Berry increases energy and removes fatigue. It supports regeneration of cells- the process by which old cells are replaced by vital and new ones. Revitalizing effects slow the aging process and maintains strength in old age. Improves body resistance, strengthens heart, hair and glands of body. It also has rejuvenating effect on all organs. It is said that the great ancient sage Muni Chyawan rejuvenated himself in his

late 70s and regained his virility by the use of amla. [24, 33]

The pericarp of the fruit is often used as decoctions along with other ingredients and also applied externally on boils with cow ghee to promote suppuration. [24-26].

#### **(v) Heals Wounds and Mouth Ulcers**

Various research suggested that, ascorbic acid and tannins namely emblicanin A and emblicanin B have strong antioxidant action and it is proposed that the addition of these antioxidants support the repair process of cells. [36]

A decoction of the leaves is used as a chemical-free bacteriocidal mouthwash. Bark of the root mixed with honey is applied to inflammations of the mouth and a decoction of the leaves is also useful as a mouth wash in the treatment of aphthae. Another remedy suggests root bark rubbed with honey is used in aphthous stomatitis (an inflammation of the mouth). [26]

#### **(vi) Used in Gonorrhoea and Gout, Effective in Both Diarrhea and Constipation**

The juice of the bark combined with honey and turmeric can be used to treat gonorrhoea. The Barks notorious to exert anti-diarrheic effects and for treatment of leucorrhoea (vaginal infection). Juice of the bark combined with honey and turmeric is used to cure gonorrhoea. [24, 26, 32]

Gout is a form of inflammatory arthritis that develops in some people who have high levels of uric acid and its salts deposited on the blood and joints. This problem is cured by taken of a amla juice with old ghee makes softening of joints and helps in curing gout and also removing the spots caused by measles, chicken pox, small pox. [35]

Fruit decoction is used for the treatment of diarrhea. Mixed with sour milk it can be given in cases of dysentery. A decoction and evaporation of the root solution produces an astringent extract equal to catechu. Infusion of the leaves with fenugreek seed is used during chronic diarrhea. Recent report shows that, the *P. emblica* fruit extract possesses antidiarrheal and spasmolytic activities, by blocking muscarinic receptors and Calcium ion channels. [24, 28, 30]

The fruit sometimes pickled or preserved in sugar. When dry it can be used as laxative, according to some sources the fresh fruit is also laxative and one or two fruits being sufficient for a dose. [26]

#### **(vii) Cures Sleep Disorder, Acts as a Body Coolant and Removes Toxins from Body**

Amla cures sleep disorders like the insomnia. [31]

Amla-Berry is good for all seasons but especially effective in the hot season. In Tibetan medicine, the fruit have been described as having a sour taste with cooling potency. [24, 36]

Individuals who have been eating "junk" food, preservatives and additives have a tend to accumulated and deposited on the liver. In other hand, consumption of alcohol, pain killers, medicines etc regularly increases the buildup of large amount of toxins in our body. Amla-Berry helps the liver in removing chemicals and additives from the body. [24, 31]

#### **(viii) Reduces the Risk of Gall Stone Formation, Effective in Piles and Useful as an Anthelmintic Medicine**

Amla reduces the risk of gall stone formation in the gall bladder. When there is excess cholesterol in the bile, gall stones are formed. Amla helps in reducing them as it contains vitamin C, which converts the cholesterol into bile acid in the liver. [24]

Piles, also known as haemorrhoids, are swollen veins and muscles around anus or in anal canal. Drinking fresh amla juice with half teaspoon of ghee and 1 teaspoon of honey and 100 Gms of milk after lunch cures chronic piles problem. [35]

In Persia the juice of the fruit is used as a vermifuge and it is generally given with honey; the dose is from 1 to 3 drachms. [14]

#### **(ix) To Stop Nausea, Vomiting and Bleeding of the Nose**

A powder of the amla seed and red sandalwood is given with honey, to stop emesis. [33, 36]

Seed fried in ghee and ground in conjee is applied as Lep to the forehead to stop bleeding from the nose. [33, 36]

#### **(x) In Water Purification**

In certain regions the natives put the young branches into the wells to impart a pleasant flavour to the water, especially if it be impure from the accumulation of vegetable matter or other causes. [35]

## **4. Safety Study and Contraindications**

Few phytosterol compounds from *P. emblica* have been reported to have cytotoxic effect in tumor and non-tumor cell lines. Otherwise no reported toxicity has been observed. [19]

Contraindications have not been identified. Information regarding safety and efficacy in pregnancy and lactation is lacking. [14]

## **5. Discussion**

From the ancient time to till present, medicinal plants have been playing a key role in the healthcare system of mankind as an extraordinary source of natural medicine. Nowadays the use of herbal products increasing day by day for low or no side effect all over the world. Amla is an important medicinal plant of Ayurveda- an Indian indigenous system of medicine. Due to its strong antioxidant, highest vitamin C contents and essential biological properties amla used to prevent various innumerable health disorders. It can be used as a possible food additive or in nutraceuticals and pharmaceutical industries. Various extracts and herbal formulations of amla showed activities against various diseases and result is similar to standard drugs. The traditional use of *P. emblica* enforces its effects on almost all of the human ailments, but very few of them have been validated through clinical research. It is the need of hour to explore its medicinal values at molecular level with help of various biotechnological tools and techniques. In future it can act as the diverse subject for the research and development of alternative and complementary medicine.

## 6. Conclusion

On the basis of its traditional uses on various potential remedies this plant can be used as a natural source for the future drug development. Therefore, our careful consideration must be needed for increasing the use of amla for the treatment of various diseases and its development as a established, potential and safe dosage form.

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