

**A COMPLETE PHARMACOGNOSTIC REVIEW ON AMLA****Shreya Talreja<sup>1\*</sup>, Sonam Kumari<sup>1</sup>, Prateek Srivastava<sup>1</sup> AND Swarnima Pandey<sup>2</sup>**<sup>1</sup>IPSR Unnao.<sup>2</sup>Asst Professor, Goel Institute of Pharmacy & Sciences, Lucknow.

Article Received on  
01 Feb. 2019,  
Revised on 21 Feb. 2019,  
Accepted on 12 March 2019  
DOI: 10.20959/wjpps20194-13486

**\*Corresponding Author**

**Shreya Talreja**  
IPSR Unnao.

**ABSTRACT**

*Phyllanthus emblica* Linn. Or *Emblica officinalis* Gaertn. commonly known as Indian gooseberry or Amla. *Emblica officinalis* (Amla) are widely used in the Indian system of medicine (Ayurveda, Unani and Siddha). According to believe in ancient Indian mythology, it is the first tree to be created in the universe. It belongs to the family of Euphorbiaceae. It is the richest natural source of Vitamin C. *Emblica officinalis* (EO) primarily contains tannins, alkaloids, phenolic compounds, amino acids and carbohydrates. Its fruit juice contains the

highest amount of vitamin C, Ellagic acid, Chebulinic acid, Quercetin, Chebulagic acid, Emblicanin-A, Emblicanin-B, Gallic acid and ascorbic acid etc. all parts of amla are useful in the treatment of various diseases but the most important part is fruit. Amla fruit is widely used in the Indian system of medicine as diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, anti-pyretic, hair tonic, ulcer preventive and also useful for common cold, fever; as alone or in combination with other plants. The fruit is used as a major constituent in several Ayurvedic preparations such as Chyavanprash and Rasayana which promotes health and longevity. Regular use of *Emblica officinalis* improves immunity, fight against cancers, chronic diseases like hypertension, high Cholesterol, Diabetes, influenza, Chronic cough and cold, Chronic infections, Chronic fatigue and Chronic inflammatory conditions. According to Ayurveda amla is one of the best herbs for Diabetes, bleeding disorders, strength and stamina promoter. *E. officinalis* is also suitable for used as a anti-aging, sunscreen and general purpose for skin care products. *Emblica officinalis* possesses antioxidant, immunomodulatory, adaptogenic, cardioprotective, nephroprotective, hepatoprotective, antipyretic, analgesic, cytoprotective, antitussive, gastroprotective, wound healing and antidiarrheal properties. It is also used as a hair tonic. Its applications for memory enhancing,

ophthalmic disorders, reducing cholesterol level, prevent peptic ulcer, anaemia etc. The effects of EO in neutralizing snake venom and as an antimicrobial are also included.

**KEYWORDS:** Emblica officinalis, chemical constituents, amla fruit, uses, application, effect.

## INTRODUCTION

Amla commonly known as Indian gooseberry, is a wonder herb and one of the precious gift of nature to human health. It belongs to family Euphorbiaceae.<sup>[1]</sup> According to believe in ancient Indian mythology, it is the first tree to be created in the universe.<sup>[2]</sup> The species is native to India and also grows in tropical and subtropical regions including Pakistan, Uzbekistan, Srilanka, South East Asia, China and Malaysia. It grows about 8-18m height with thin light grey bark, leaves are simple, light green, sub-sessile, closely set along the branchless looks like pinnate leaves; flowers are greenish yellow; fruits are globose, fleshy, pale yellow with six obscure vertical furrows enclosing six trigonous seeds in two seeded three crustaceous cocci.<sup>[3]</sup>

In India, Amla trees are found throughout the forests of tropical area ascending up to 4500 ft on hills.<sup>[4,5]</sup> Amla is rich in fiber, carbohydrate, iron and is reported as the richest source of vitamin C.<sup>[6]</sup> The fruits of EO are widely used in the Ayurveda and are believed to increase defense against diseases. It has its beneficial role in cancer, diabetis, liver treatment, heart trouble, ulcer, anaemia and various other diseases. Similarly, it has application as antioxidant, immunomodulatory, antipyretic, analgesic, cytoprotective, antitussive and gastroprotective. Additionally, it is useful in memory enhancing, ophthalmic disorders and lowering cholesterol level. It is also helpful in neutralizing snake venom and as an antimicrobial. It contains several chemical constituents like tannins, alkaloids and phenols. Among all hydrolysable tannins, Emblicanin A and B; gallic acid, ellagic acid are reported to possess biological activity. The fruit is used either alone or in combination with other plants to treat many ailments such as common cold and fever; as a diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, alterative, antipyretic, antiinflammatory, hair tonic; to prevent peptic ulcer and dyspepsia, and as a digestive disorder.<sup>[7]</sup> It is enormously used as a tonic to restore the lost body's energy and vigor. Entire parts of the plant are used for medicinal purposes, particularly the fruit, which has been used in Ayurveda as a powerful *rasayana* and in customary medicine for the treatment of diarrhea, jaundice, and inflammation.<sup>[8]</sup> fruit ash

contains chromium, Zinc and copper. It is considered as adaptogenic that improves immunity.<sup>[7]</sup>

### Scientific Classification

|  |
|--|
| <b>Kingdom:</b> Plantae                            |
| <b>Order:</b> Malpighiales                         |
| <b>Family:</b> Euphorbiaceae , Phyllanthaceae      |
| <b>Genus:</b> Phyllanthus                          |
| <b>Species:</b> P. emblica                         |
| <b>Binomial name:</b> Phyllanthus emblica          |
| <b>Botanical name:</b> Emblica officinalis Gaertn. |

### Vernacular Names

|   |
|---|
| <b>Sanskrit:</b> Dhatriphala, Amla, Amalaki, Amalakan, Sripthalam, Vayastha |
| <b>Hindi:</b> Amla  |
| <b>English:</b> Emblica myroblan  |
| <b>Italian:</b> Mirabolano emblico  |
| <b>German:</b> Amla   |
| <b>French:</b> Phyllanthe emblica   |
| <b>Nepalese:</b> Amba   |
| <b>Chinese:</b> An Mole   |
| <b>Malaysian:</b> Popok Melaka  |
| <b>Portuguese:</b> Mirabolano emblico                                       |

### Botanical description of amla



|                   |  |
|-------------------|--|
| <b>Appearance</b> | <ul style="list-style-type: none"> <li>• Medium sized deciduous tree, 8-18 meters height with thin light grey bark exfoliating in small thin irregular flakes.<sup>[9]</sup></li> </ul>  |
| <b>Leaves</b>     | <ul style="list-style-type: none"> <li>• Simple, sub sessile, closely set along the branchlets, light green having the appearance of pinnate leaves.<sup>[9]</sup></li> </ul>  |
| <b>Fruits</b>     | <ul style="list-style-type: none"> <li>• 15-20 mm long and 18-25 mm wide, nearly spherical or globular wider than long and with a small and slight conic depression on both apexes. Mesocarp is yellow and endocarp is yellowish brown in ripened condition.</li> <li>• Fresh fruits are light green and ripe fruits turn light brown in colour. The average weight of the fruit is 60 -70 g.<sup>[2]</sup></li> </ul> |
| <b>Seeds</b>      | <ul style="list-style-type: none"> <li>• Four-Six, smooth, dark brown.<sup>[2]</sup></li> </ul>  |
| <b>Barks</b>      | <ul style="list-style-type: none"> <li>• Thick to 12 mm, shining grayish brown or grayish.<sup>[2]</sup></li> </ul>  |

**Parts used** - fruit fresh and dried, seeds, leaves, root, bark and.<sup>[10,2]</sup>

**Chemical constituents:** The fruits of *Embllica officinalis* are rich in tannins. The fruits have 28% of the total tannins distributed in the whole plant. The fruit contains two hydrolysable tannins Emblicanin A and B.<sup>[11]</sup> Which have antioxidant properties, one on hydrolysis gives gallic acid, ellagic acid and glucose wherein the other gives ellagic acid and glucose. The fruit also contains Phyllembin.<sup>[12]</sup>

The fruits, leaves and bark are rich in tannins. The root contains ellagic acid and lupeol and bark contains leucodelphinidin. The seeds yield a fixed oil (16%) which is brownish-yellow in colour. It has the following fatty acids: linolenic (8.8%), linoleic (44.0%), oleic (28.4%), stearic (2.15%), palmitic (3.0%) and myristic (1.0%).<sup>[13]</sup>

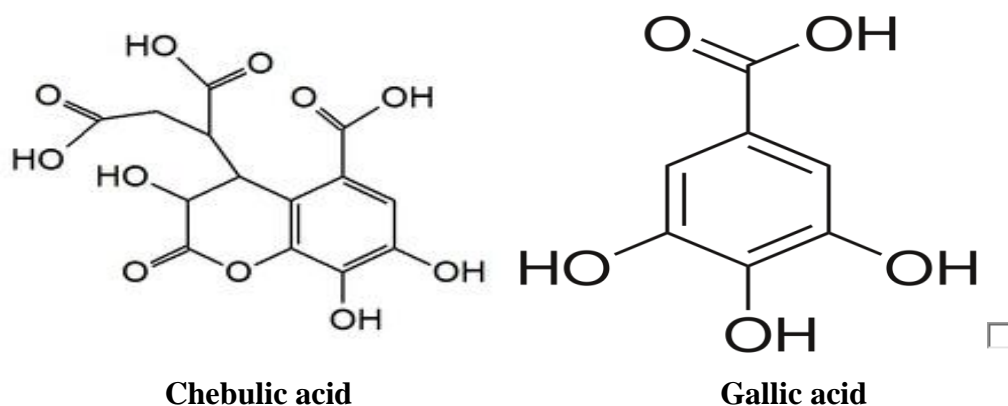
The fruit also contains higher concentration of most minerals and amino acids than apples. fruit ash contains chromium, Zinc and copper. It is considered as adaptogenic that improves Immunity.

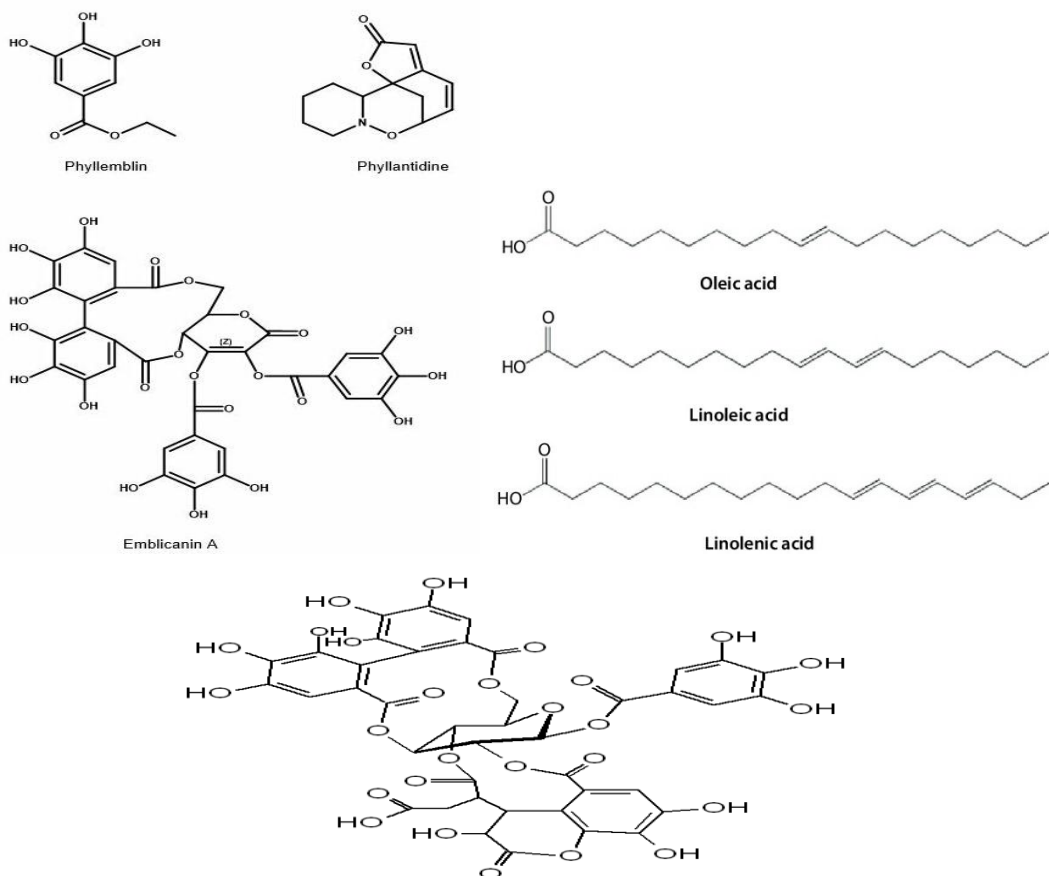
**Leaves:** It contains gallic acid, chebulic acid, ellagic acid, chebulinic acid, chebulagic acid, amlic acid, alkaloids phyllantine and phyllantidine.<sup>[2]</sup>

**Seeds:** A fixed oil, phosphatides and a small quantity of essential oil. Its Contains linolenic acid (8.78%), linoleic (44%). oleic (28.40%), steric (2.15%), palmitic (2.99%) and miristic acid (0.95%).<sup>[2]</sup>

**Barks:** Contain leukodelphinidin, tannin and proanthocyanidin.<sup>[2]</sup>

**Roots:** Contain ellagic acid and lupeol.<sup>[2]</sup>





### Chebulagic acid

Average percentage composition of the fruit pulp of *Emblica officinalis*.<sup>[14]</sup>

| Chemical constituents | Percentage (%) |
|-----------------------|----------------|
| Carbohydrate          | 14.1           |
| Protein               | 0.5            |
| Fat                   | 0.1            |
| Fibers                | 3.7            |
| Mineral matter        | 0.7            |
| Calcium               | 0.05           |
| Phosphorus            | 0.02           |
| Iron                  | 1.5 mg /100g   |
| Vitamin c             | 600 mg/ 100 g  |
| Nicotinic acid        | 0.2 mg /100 g  |

**Some different activities of amla:** Amla possesses some different activities – Anticancer activity, antianaemic activity, hepatoprotective activity, antidiarrheal activity, antimicrobial activity, hypolipidemic activity, insecticidal activity, antioxidant activity, antiageing activity, antidiabetic activity(hypoglycemic activity), cardioprotective activity, antiulcer activity, anti pyretic,analgesic activity, anti inflammatory activity, memory enhancing activity, radioprotective activity etc.

➤ **Antianaemic activity:** Amla is rich in Vitamin C or ascorbic acid an essential ingredient that helps in the absorption of Iron. Supplements of Amla can be very beneficial to patients suffering from Iron deficiency Anaemia.<sup>[15,16,17]</sup>

➤ **Antidiarrheal activity for children**

A compound powder of the emblic seed, Chitrak root, chebulicmyrobalan, pipli and pallone is given in suitable doses according to age with warm water twice daily morning and at bed time. Tender shoots given in butter-milk cure indigestion and diarrhea green fresh leaves combined with curds have a similar effect. Leaves are used as infusion with fenugreek seeds in chronic dysentery and as a bitter tonic. Soak one tola of the seeds in a tinned vessel during the night grind it. Add cow's milk and take. This is a good remedy for biliousness.<sup>[15,16,17]</sup>

➤ **Scurvy:** As an extremely rich source of vitamin C. Indian gooseberry is one of the best remedies for scurvy. Powder of dry gooseberry mixed with equal quantity of sugar should be taken in doses of one teaspoonful three times daily with milk.<sup>[15,16,17]</sup>

➤ **Antioxidant and free radical scavenging activity:** Galic acid equivalent as total phenolic content from fruit and seed of *E. officinalis* has excellent antioxidant properties and play an important role as free radical scavengers required in the maintenance of 'redox homeostasis' responsible for diverse degenerative diseases with milk.<sup>[18]</sup> It is a wonderful antioxidant and a natural Source of Vitamin C. Amla helps scavenge free radicals.

➤ **Insecticidal activity:** Saponins which are important constituents of *E. officinalis* have insecticidal or cytotoxic properties to certain insects.<sup>[19]</sup>

➤ **Hypolipidemic activity:** Amla fruit have been reported to have significant anti-hyperlipidemic, hypolipidemic, and anti-atherogenic effect.<sup>[20]</sup> Treatment with *Emblica officinalis* caused significant reduction of Total Cholesterol (TC), Low Density Lipoprotein (LDL), triglyceride (TG) and Very Low Density Lipoprotein (VLDL), Amla is powerful food for the brain and helps lower cholesterol.

➤ **Hepatoprotective activity:** EO fruits have been reported to be used for hepatoprotection in Ayurveda.<sup>[21]</sup> *Phyllanthus emblica* extract was investigated on ethanol induced rat hepatic injury. Protective roles of this against ethanol induced injury in rats are reported.<sup>[22]</sup>

A hydroalcoholic (50%) extract of fruit of EO (EO-50) decreased the severity of hepatic fibrosis induced by thioacetamide and carbon EO-50 effectively reversed profibrogenic



events possibly due to its antioxidative activity. Hepatoprotective effect of EO-50 against antituberculosis into the body (anti-TB) drugs-induced hepatic injury has been reported. EO-50 exhibits hepatoprotective activity due to its membrane stabilizing, antioxidative and CYP 2E1 inhibitory roles.<sup>[23]</sup> EO also inhibited hepatic toxicity in Wistar rats.<sup>[24]</sup> The extract of EO and Chyavanaprash were investigated for its hepatoprotective activity using carbon tetrachloride (CCl<sub>4</sub>) induced liver injury in rats. Both extracts were observed to inhibit the hepatotoxicity produced by acute and chronic CCl<sub>4</sub> administration as environment or produced within the body, can tip the free radical (pro-oxidant) and anti-free radical (anti-oxidant) balance leading to oxidative stress which may result in tissue injury and subsequent diseases. Amla also helps maintain the functioning of the liver.

➤ **Antidiabetic and hypoglycemic activity:** Herbal formulations prepared by extracts of *Tinospora cordifolia*, *Trigonella foenum* and *Embllica officinalis* were evaluated for hypoglycemic effects and Oral Glucose Tolerance Test (OGTT) in normal and Alloxan induced diabetic rats and significant, marginal and very less decrease in blood glucose level was observed when different herbal combinations were used.<sup>[25]</sup>

➤ **Anticancer activity:** Amla inhibits the growth and spread of various cancers like breast, uterus, pancreas, stomach and liver cancers. It can prevent and/or reduce the side effects of chemotherapy and radiotherapy.<sup>21, 39</sup> More than 18 compounds were identified in amla fruit which can exert anti-proliferative activity on gastric and uterine cancer cells.

EO or its medicinal preparations may prove to be beneficial as a component of combination therapy in cancer patients under cyclophosphamide treatment. Phenolic compounds and the major components from the fruit juice of EO and from the branches, leaves and roots showed stronger inhibition against B16F10 cell growth than against HeLa and MK-1 cell growth. Norsesquiterpenoid glycosides from the roots showed significant antiproliferative activities

➤ **Anti ageing activity:** Indian gooseberry has revitalizing effects as it contains an element which is very valuable in preventing ageing and in maintaining strength in old age. It improves body resistance and protect the body against infection. It strengthens the heart, hair and different gland in the body.

➤ **Cardioprotective activity:** The effects of chronic oral administration of fresh fruit homogenate of Amla on myocardial antioxidant system and oxidative stress induced by

ischemic-reperfusion injury (IRI) were investigated on heart in rats. Chronic EO administration produces myocardial adaptation by augmenting endogenous antioxidants and protects rat hearts from oxidative stress associated with IRI.<sup>[26]</sup>

➤ **Anti-ulcer activity:** A herbomineral formulation of the Ayurveda medicine named Pepticare, composed of EO, Glycyrrhiza glabra and Tinospora cordifolia was tested for its anti-ulcer and anti-oxidant activity in rats. Reports were made that Pepticare exhibit anti-ulcer activity, which can be attributed to its anti-oxidant property.<sup>[27]</sup> Methanolic extract of EO (EOE) was studied against ulcer. EOE had significant ulcer protective and healing effects and this might be due to its effects both on offensive and defensive mucosal factors.<sup>[28]</sup>

➤ **Antipyretic and Analgesic Activity**

Extracts of EO fruits possess potent anti-pyretic and analgesic activities. A single oral dose of ethanolic extract and aqueous extract (500 mg/kg, i.p.) showed significant reduction in hyperthermia in rats induced by brewer's yeast. Both of these extracts elicited pronounced inhibitory effect on acetic acid-induced writhing response in mice in the analgesic test.<sup>[29]</sup> This may be due to the presence of tannins, alkaloids, phenolic compounds, amino acids and carbohydrates.

➤ **Amla as Snake Venom Neutralizer**

Amla and Vitex negundo were explored for the first time for antisnake venom activity. Naja kaouthia and Vipera russellii venom was antagonized by the plant extracts significantly both in vivo and in vitro studies. V. russellii venom-induced coagulant, haemorrhage defibrinogenating and inflammatory activities were significantly neutralized by both 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.<sup>[30]</sup>

➤ **Amla fights with acidity**

The irregular food habits and abnormal intake of sweet, sour, spicy and oily food may cause acidity, and also tea, coffee and smoking are causing that trouble. The physiological factors are anger, grief and depression. This problem is overcome by taken of one gram of amla powder and small amount of sugar mixed with milk or water twice a day.<sup>[31,32,33]</sup>



➤ **Action on toxins**

Some of the toxins may be stored in liver by regular uptake of pain killers, antibiotics, medication and alcohol consumption. Amla prevents the body from these toxins by strengthening the liver thereby amla act as good detoxifier helps to purify the blood.<sup>[33]</sup>

➤ **Memory Enhancing activity:** Amla churna produced a dose-dependent improvement in memory of young and aged rats. It reversed the amnesia induced by scopolamine and diazepam. Amla churna may prove to be a useful remedy for the management of Alzheimer's disease due to its multifarious beneficial effects such as memory improvement and reversal of memory deficits.<sup>[34,35]</sup>

➤ **Anti arthritis activity:** Amla has anti-inflammatory property. Its use has been found beneficial in reducing inflammation in arthritis and other rheumatic conditions.<sup>[36]</sup>

**Medicinal importance of amla**<sup>[2,37]</sup>

**Healing activity**

- Protects cells against free radical damage and provides antioxidant protection.
- To treat skin disorders, respiratory infections, and premature aging.
- Useful in haemorrhage, diarrhoea, dysentery and diabetes.
- Prevents infection and healing of ulcers.
- Laxative to relieve constipation in piles

**Immunity booster:** Increases white blood cell counts and other measures of strengthened immunity in rodents given with Amla tonic.

**Promotes vigor:** One tablespoon juice with honey daily morning for few days.

**Respiratory disorders:** Useful in tuberculosis of the lungs, asthma and bronchitis. A tablespoonful of the fresh juice mixed with equal quantity of honey taken every day in the morning is the surest medicine to prevent one from tuberculosis of lungs, asthma, bronchitis, lung abscess, pneumonia.<sup>[38]</sup>

**Diabetes:** High vitamin C content, is effective in controlling diabetes. Amla juice with bitter gourd juice, used daily for 2 months stimulates the pancreas and enables to secrete insulin.

**Heart disorders**

- Effective remedy for heart disease.
- Tones up the functions of all the organs of the body and builds up health by destroying the heterogeneous or harmful and disease causes elements.
- It also renews energy.

**Eye disorders**

- With honey is useful in preserving eyesight.
- Beneficial in the treatment of conjunctivitis and glaucoma.
- Reduces intra ocular tension in a remarkable manner when juice mixed with honey and taken twice daily.

**Rheumatism:** Teaspoonful powder with 2 teaspoonful of jiggery, twice daily for a month.

**Scurvy:** Rich source of vitamin C, best remedy for scurvy. Amla powder with sugar in equal quantities, 3 times a day with milk.

**Diarrhoea and dysentery**

- A drink made from *amla* mixed with lemon juice and *misriis* considered highly beneficial in controlling acute ancillary dysentery.
- One tablespoonful of the paste of leaves mixed with honey or butter-milk is an effective Medicare in the treatment of diarrhoea and dysentery.

**Ageing**

- Revitalizing effects.
- Prevent ageing and maintains strength in old age. Improves body resistance, strengthens heart, hair and glands of body.
- 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.

**Hair tonic**

- Enriches hair growth and pigmentation. Dried fruit boiled in coconut oil till solid matter becomes.
- Charres, prevents greying.

- The water in which dried amla pieces are soaked overnight is also nourishing to hair. This water.
- Should be used for the last rinse while washing the hair.

#### Other uses<sup>[37,39]</sup>

**For burning in the vagina:** A mixture of the fruit juice and sugar is prescribed as a remedy for burning in the vagina. Juice of the bark combined with honey and turmeric is a remedy for gonorrhoea.

• **To stop nausea and vomiting:** A powder of the amla seed and red sandal wood is given with honey, to stop emesis.

• **For bleeding of the nose:** Seed fried in ghee and ground in conjee is applied as Lep to the forehead to stop bleeding from the nose.

• **For scabies or itch:** Apply the seed burnt, powdered and mixed in oil for scabies or itch.

• increases haemoglobin, red blood cell count. It is useful for Cough, Bronchitis, and Asthma.

• There are various classic Ayurvedic preparations, such as Chyawanprash in which Amla is used as a chief ingredient. It help improve intelligence and memory power.

• Amla cleanses the mouth, strengthens the teeth. Its decoction is used in hyperacidity and with honey as an anthelmintic.

• Amla is powerful food for the brain. And It helps in regulating blood sugar.

• Increases haemoglobin, red blood cell count. It is useful for Cough, Bronchitis and Asthma.

• **As a Vermifuge:** Juice of the fruit with honey is used. The recommended dose is from 1 to 3 drachms.

• **Appetizer:** Use of pickles and preserves made from the green fruits.

• **Irritability of the bladder, In retention of urine, To the forehead in cephalalgia:** Use a paste of the fruit alone or with *Nelumbium speciosum*, Saffron and rose water. Applying it over the affected region.

- In folk medicine, the fruits, which are sour, astringent, bitter, acrid, sweet and anodyne. Exert several beneficial effects include cooling, ophthalmic, carminative, digestive, stomachic, laxative, dyspepsia, aphrodisiac, rejuvenative, diuretic, antipyretic and tonic.
- **Effects on urinary stone:** 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.<sup>[31,32,33]</sup>
- **Improves body weight:** It assists in balancing nitrogen levels and increasing protein levels very well, which helps in increasing your weight. Amla contains minerals including chromium, zinc, and copper, which helps in maintaining proper functioning of the metabolic activities of the body.<sup>[31,32,33]</sup>
- **Jaundice:** Fresh amla fruits are soaking with 4 munnakkas, both are grind with amla juice after one hour. This portion may gives relief in jaundice.<sup>[31,32,33]</sup>
- **Good for reproductive health:** Amla can increase sperm count and it act as an aphrodisiac. White discharge in women is the major problems which can be reduced by taking of dried amla seeds mixed with honey.<sup>[40]</sup>
- **Piles:** 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.<sup>[31]</sup>

## CONCLUSION

Amla is one of the richest natural sources of vitamin C its fresh juice containing nearly twenty times as much vitamin C compare to orange juice. Amla Tonic have different function it is useful in Scurvy and Jaundice prevents Indigestion and controls acidity as well as it is a natural source of anti-ageing. The major group of phytochemicals of like tannins, flavonoids, terpenoids, tannins and other polyphenolic compounds extracted from Amla. Some important Amla phytochemicals like gallic acid, ellagic acid, emblicanin A, emblicanin B, quercetin, phyllantine, phyllantidine and so forth have been confirmed as having different biological activities like antioxidant, antimicrobial-al, anti-inflammatory, antidiabetic, antitussive, anti, radioprotective, chemopreventive, wound healing activity Emblica officinalis (Amla) has an important position in Ayurveda siddha and unani system of medicine due to its strong antioxidant activity and biological properties, prevent health disorders and it contains

essential nutrients and highest amount of vitamin C. *E. officinalis* in the overall useful for the maintenance of health and protection from disease. Amla can be safely used in the treatment of mild to moderate cases of hyperlipidaemia, heart disease, cancer disease etc and it is easy available, no cost effective, and other beneficial effects.

## REFERENCES

1. Singh E, Sharma S, Pareek A, Dwivedi J, Yadav S, Sharma S. Phytochemistry, traditional uses and cancer chemoprotective activity of Amla (*Phyllanthus emblica*): The sustainer. *Journal of Applied Pharmaceutical Science*, 2011; 02(01): 176-183.
2. Khan KH. Roles of *Emblica officinalis* in medicine – A Review. *Botany Research International*, 2009; 2 (4): 218-228.
3. Srivasuki KP, Nutritional and health care benefits of Amla, *Journal of Pharmacognosy*, 2012; 3(2): 141-51.
4. Rai N, Tiwari L, Sharma RK and Verma AK. Pharmaco-botanical Profile on *Emblica officinalis* Gaertn. – A Pharmacopoeial Herbal Drug. *STM Journals*, 2012; 1(1): 29-41.
5. Thilaga S, Largia MJV, Parameswari A, Nair RR and Ganesh D. High frequency somatic embryogenesis from leaf tissue of *Emblica officinalis* Gaertn. - A high valued tree for non-timber forest products. *Aus. J. Crop Sci.*, 2013; 7(10): 1480-1487.
6. Singh E, Sharma S, Pareek A, Dwivedi J, Yadav S and Sharma S. Phytochemistry, traditional uses and cancer chemopreventive activity of Amla (*Phyllanthus emblica*): the sustainer. *J. App. Pharma. Sci.*, 2011; 2(1): 176-183.
7. Dnyaneshwar, W., C. Preeti, J. Kalpana and P. Bhushan, Development and application of RAPD-SCAR marker for identification of *Phyllanthus emblica* LINN. *Biol Pharm Bull.*, 2006; 29(11): 2313-6.
8. Krishnaveni M, Mirunalini S. Therapeutic potential of *Phyllanthus emblica* (amla): The ayurvedic wonder. *J Basic Clin Physiol Pharmacol*, 2010; 21: 93-105.
9. Meena AK, Singh A and Rao MM. Evaluation of physicochemical and preliminary phytochemical studies on the fruit of *Emblica officinalis* Gaertn. *Asian J. Pharma. and Clin. Res.*, 2010; 3(3): 242-243.
10. Kumar KPS, Bhowmik D, Dutta A, Yadav AP, Paswan S, Srivastava S and Deb L (2012b). Recent Trends in Potential Traditional Indian Herbs *Emblica officinalis* and Its Medicinal Importance. *J. Pharmacog. and Phytochem*, 2012b; 1(1): 24-32.

11. Bhattacharya SK, Bhattacharya A, Sairam K, Ghosal S, Effect of bioactive tannoid principles of *Emblica officinalis* on ischemiareperfusion induced oxidative stress in rat heart, *Phytomedicine*, 2002; 9(2): 171-4.
12. Yi-Fei W, Ya-Fenga W, Xiao-Yana W, Zhea R, Chui-Wena Q, Yi-Chenga L, Kitazatoc K, Qing-Duan Q, Yan W, Li-Yun Z, Jin-Hua Z, Chong-Rene Y, Qinge L, Ying-June Z, Phyllaemblicin B inhibits Coxsackie virus B3 induced apoptosis and myocarditis, *Antiviral Research*, 2009; 84: 150-58.
13. Thakur RS, Puri HS, Husain A, Major Medicinal Plants of India, Central Institute of Medicinal and Aromatic Plants, Lucknow, 1989; 24-27.
14. Singh E, Sharma S, Pareek A, Dwivedi J, Yadav S and Sharma S. Phytochemistry, traditional uses and cancer chemopreventive activity of Amla (*Phyllanthus emblica*): the sustainer. *J. App. Pharma. Sci.*, 2011; 2(1): 176-183.
15. Jain SK. Medicinal Plants, National Book Trust, New Delhi, 1968.
16. Udupa KN. Ayurveda for Promotion of Health, *Journal of Ayurveda*, 1985; 3.
17. Dnyaneshwar WC, Preeti J Kalpana and Bhushan P. Development and application of RAPD-SCAR marker for identification of *Phyllanthus emblica* LINN. *Biol Pharm Bull.* 2006; 29(11): 2313-6.
18. Prakash D, Upadhyay G, Gupta C, Pushpangadan P and Singh KK. Antioxidant and free radical scavenging activities of some promising wild edible fruits. *Int. Food Res. J.*, 2012; 19 (3): 1109-1116.
19. Chaieb I. Saponins as insecticides: a review. *Tunisian J. Plant Prot.* 2010; 5: 39-50.
20. Santoshkumar J, Manjunath S and Sakhare PM. A study of anti-hyperlipidemia, hypolipidemic and anti-atherogenic activity of fruit of *Emblica officinalis* (amla) in high fat fed Albino rats. *Int. J. Med. Res. Health Sci.*, 2013; 2(1): 70-77.
21. Bhattacharya, A., M. Kumar, S. Ghosal and S.K. Bhattacharya, Effect of bioactive tannoid principles of *Emblica officinalis* on iron-induced hepatic toxicity in rats. *Phytomedicine*, 2000; 7(2): 173-5.
22. Pramyothin, P., P. Samosorn, S. Pongshompoo and C. Chaichantipyuth, 2006. The protective effects of *Phyllanthus emblica* Linn. extract on ethanol induced rat hepatic injury. *J Ethnopharmacol.*, 2006; 107(3): 361-4.
23. Tasduq, S.A., P. Kaiser, D.K. Gupta, B.K. Kapahi, H.S. Maheshwari, S. Jyotsna, and R.K. Johri, Protective effect of a 50% hydroalcoholic fruit extract of *Emblica officinalis* against anti-tuberculosis drugs induced liver toxicity. *Phytother Res.*, 2005; 19(3): 193-7.

24. Sultana, S., S. Ahmad, N. Khan and T. Jahangir, Effect of *Emblica officinalis* (Gaertn) on CCl<sub>4</sub> induced hepatic toxicity and DNA synthesis in Wistar rats. *Indian J Exp Biol.*, 2005; 43(5): 430-6.
25. Deep P, Murugananthan G and Nandkumar. Herbal formulation and its evaluation for antidiabetic activity. *Pharmacologyonline*, 2011; 3: 1134-1144.
26. Rajak, S., S.K. Banerjee, S. Sood, A.K. Dinda, Y.K.Gupta, S.K. Gupta and S.K. Maulik. *Emblica officinalis* causes myocardial adaptation and protects against oxidative stress in ischemic-reperfusion injury in rats. *Phytother Res.*, 2004; 18(1): 54-60.
27. Bafna, P.A. and R. Balaraman, Anti-ulcer and anti-oxidant activity of pepticare, a herbomineral formulation. *Phytomedicine*, 2005; 12(4): 264-70.
28. Sairam, K., C.V. Rao, M.D. Babu, K.V. Kumar, V.K. Agrawal and R.K. Goel, Antiulcerogenic effect of methanolic extract of *Emblica officinalis*: an experimental study. *J Ethnopharmacol*, 2002; 82(1): 1-9.
29. Perianayagam, J.B., S.K. Sharma, A. Joseph and A.J. Christina, Evaluation of anti-pyretic and analgesic activity of *Emblica officinalis* Gaertn. *J. Ethnopharmacol*, 2004; 95(1): 83-5.
30. Alam, M.I. and A. Gomes, Snake venom 66. neutralization by Indian medicinal plants (*Vitex negundo* and *Emblica officinalis*) root extracts. *J. Ethnopharmacol.*, 2003; 86(1): 75-80.
31. Singletary KW, Jackson SJ, Milner JA. Non-nutritive components in foods as modifiers of the cancer process. In A. Bendich R. J. Deckelbaum (Eds.), *Preventive nutrition: The comprehensive guide for health professionals* Totowa, NY: Humana Press, 2005; 55–88.
32. Zhang YJ, Tanaka T, Iwamoto Y, Yang CR, Kouno I. Phyllaemblic acid, a novel highly oxygenated norbisabolane from the roots of *Phyllanthus emblica*. *Tetrahedron Letters*, 2000; 41: 1781–1784.
33. Kapoor LD. *Handbook of Ayurvedic Medicinal Plants*. CRC Press, Boca Raton. 1990.
34. Vasudevan, M. and M. Parle, Effect of churna (*Emblica officinalis* Gaertn.): an ayurvedic preparation on memory deficit rats. *Yakugaku Zasshi.*, 2007; 127(10): 1701-7.
35. Vasudevan, M. and M. Parle, enhancing activity of Anwala churna (*Emblica.*, *officinalis* Gaertn.): an Ayurvedic preparation. *Physiol Behav.*, 2007; 16; 91(1): 46-54.
36. Dr. Bakhru H. K., *Healing through Natural Food*, Jaico Publishing house, pn, 2014; 62: 115.



37. Sampath Kumar KP, Bhowmik D, Dutta A, Yadav A, Paswan S, Shweta S, Lokesh D, Recent Trends in Potential traditional Indian Herbs Emblica Officinalis and Its Medicinal Importance, *Journal of Pharmacognosy and Phytochemistry*, 2012; 1(1): 24-32.
38. Aman, *Medicinal Secrets of Your Food*, Secretary Indo-American Hospital N.R. Mohalla, 1969; Mysore-7, India, pn. 398-400.
39. Singh E, Sharma S, Pareek A, Dwivedi J, Yadav S, Sharma S, *Phytochemistry, traditional uses and cancer chemopreventive activity of Amla (Phyllanthus emblica): The Sustainer*, *Journal of Applied Pharmaceutical Science*, 2011; 2(1): 176-183.
40. Watson, Cynthia. *Love Potions - a guide to aphrodisiacs*. Optima Books. 1993. ISBN No. 0-356-21049-9.