



A Review On Embelica Officinalis Gaertn

1 Shivani Mahendra Karale, 2 Rutuja Suresh wade , 3 Sachin Arjun Kumbhar, 4 Shaikh Sadique Shaikh Ameen,5 Praful Ananta Misal.

1,2,3,4,5:- Student of SSGMCOP Buldhana

Abstract :- In Indian tradition system more than 8000 medicinal plant species are present which have therapeutic effect to cure the disorders. Emblica Officinalis gaertn is plant-derived species have synonym phyllanthus Emblica linn and it is also referred as the and Amla or Aaola and Indian gooseberry. Emblica officinalis is belongs to the family Euphorbiaceae. The overall tree of Amla of their overall parts Roots, bark, stem, flower, fruit, leaf, seed utilised for formulation of different medicine in the Ayurvedic system and unani system which helps to improve the digestive process and decrease fever.

Medicinal plants are the god given gifts to the human beings as they promote disease free healthy life. The sharbat of Amla is considered to be useful in Jaundice, hemorrhoids, dyspnea and flatulence. Amla tree is native to India and cultivated in to Pakistan, Uzbekistan, Sri Lanka, south east Asia, China , Malaysia it is also beneficial for treatment numerous illnesses.

It is extensively used as a medication as neurodegenerative disorders, memory enhancer, Antioxidant, Anti-cancer, Ant Immuno-modulatory, Hepatoprotective Anti-inflammatory, cardio-protective, Anti-diabetic, and Anti-microbial. The fruit (Amla) contains various chemical constituents like gallic acid, ellagic acid, emblicanin A and B and biochemical components like alkaloids, phenols, tannis which promotes the health benefits.

since few years various research papers are published that clearly shows how the Amla and their parts are utilised to promote the health benefits which gives directions to future generations.

Keywords: Emblica officinalis, Antioxidant, Amla, Neurodegenerative Disorders. Anemia, cardio vascular disorders, Hepato-protective memory enhancer.

Introduction:- In traditional system of medicine, number of different plant species have been used as medicine because of their therapeutic effect which are used to manage many diseases. These are obtained naturally or plant derived drug which gives positive effect on human health - which relatively having less of no side effect as synthetic medicines. more than 8000 plant species are used to manage disorders.

Emblica officinalis Gaertn. is one of the medicinal plants which is first used to treat diseases as nutraceuticals. *Emblica officinalis* Gaertn. has a synonym *Phyllanthus emblica* Linn. and also has popular names like Amla, Indian gooseberry, Aola, which belongs to the family Euphorbiaceae. By the age-old Indian mythology it is claimed that Amla is a tree which is first originated on the earth.

All parts of the Amla tree like bark, leaves, seed, root, flower, and fruit have a therapeutic effect by which we can make the medicines to treat various diseases.

Table 1: Vernacular names of *E. Officinalis*

Sr. No.	Language	Vernacular Names
1.	Sanskrit	Amla, Amaliki, Dhatriphala, Amalkan, Sripalam, Vayastha
2.	Hindi	Amla
3.	Punjabi	Aula
4.	Gujarati	Amla
5.	Urdu	Aavnlaa, Amlaj
6.	Bengali	Amlaki
7.	Marathi	Avala
8.	Odiya	Anla
9.	Kashmiri	Aonla
10.	Assamese	Amlakhi
11.	Maithili	Dhatric
12.	Malayalam	Neilli
13.	Telugu	Usiri kaay
14.	Tamil	Nelli
15.	Manipuri	Heikru
16.	Kannada	Bettada neilkkayi
17.	Nepalese	Amba, Amala
18.	French	Phyllanthe emblica
19.	Chinese	Anmole
20.	Persian	Aamlah
21.	Italian	Mirabolano emblico
22.	Tibetan	Skyu-ru-ra
23.	Malaysian	Popok Melaka
24.	Portuguese	Mirabolano emblico
25.	German	Amla
26.	Arabic	Halilaj or Ihlilaj
27.	English	Indian Gooseberry
28.	Indonesia	Balakka
29.	Lao	Mak kham bom
30.	Thai	Mak kham pom
31.	Konkani	Aavalo

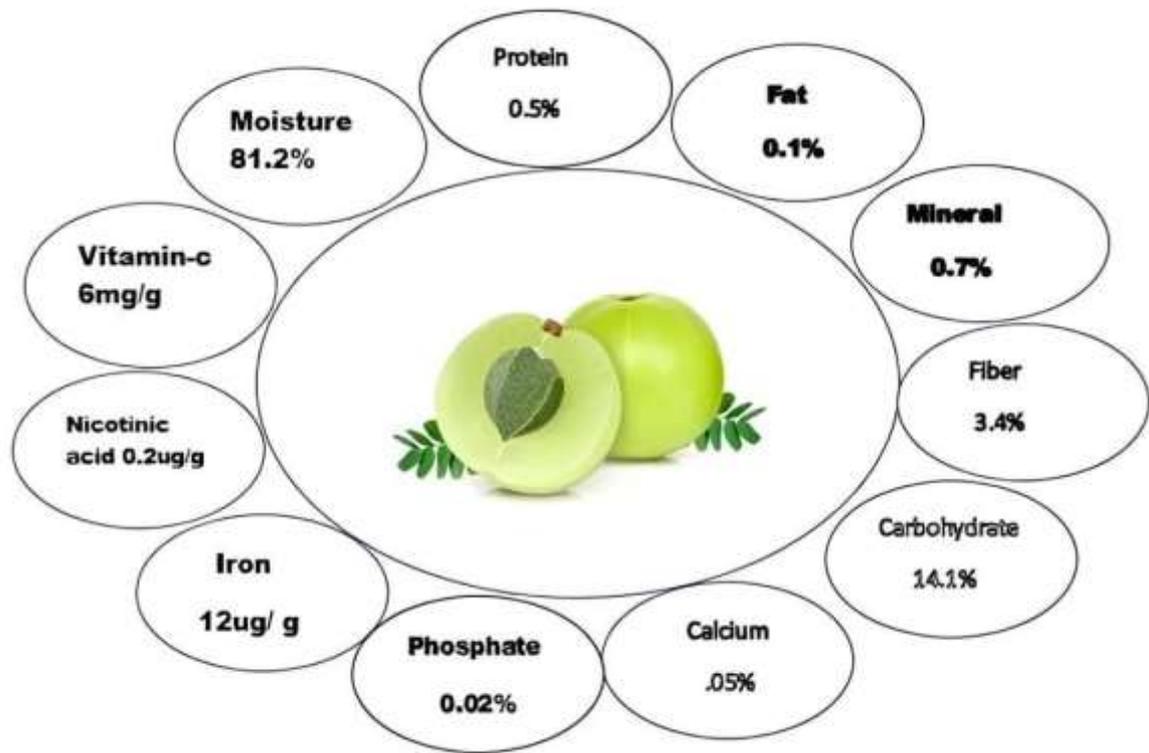
Reference: (Lanka, 2018; Variya *et al.*, 2016; Baliga and Dsouza, 2010; Khan, 2009)^[19]

Geographical Distribution:- specially it is originated from the India.

Emblica officinalis Gaertn. is widely distributed in most tropical and subtropical countries. This tree is grown in most of the tropical and subtropical countries such as China, Bangladesh, Malaysia, Mascarene Islands, Myanmar, Pakistan, Malay Peninsula, Sri Lanka, Uzbekistan, Indonesia. In India it is mostly found in various regions like coastal, tropical, subtropical and it is also found in cultivated on the plain land of Kashmir. It is also cultivated in the eastern and southern states of India.

Taxonomic Classification of Amla

Category	Classification
Kingdom	Plantae
Class	Magnoliopsida (Dicotyledons)
Order	Myrtales
Family	Phyllanthaceae
Genus	Phyllanthus
Species	Phyllanthus emblica
Common Name	Amla (Indian gooseberry)



Macroscopic characters:-

Colour:- The green colour changes to light yellow or brick red at maturity.

odour:- odourless

Taste:- sore and astringent.

Size:-The average size of amla is between 1.5 and 2.5 cm in diameter

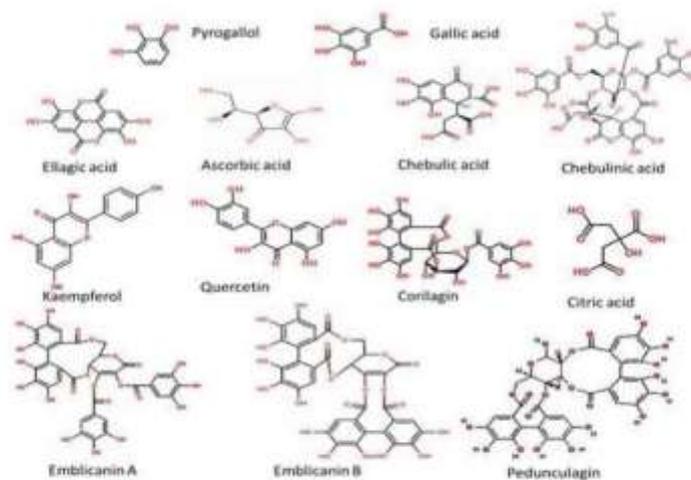
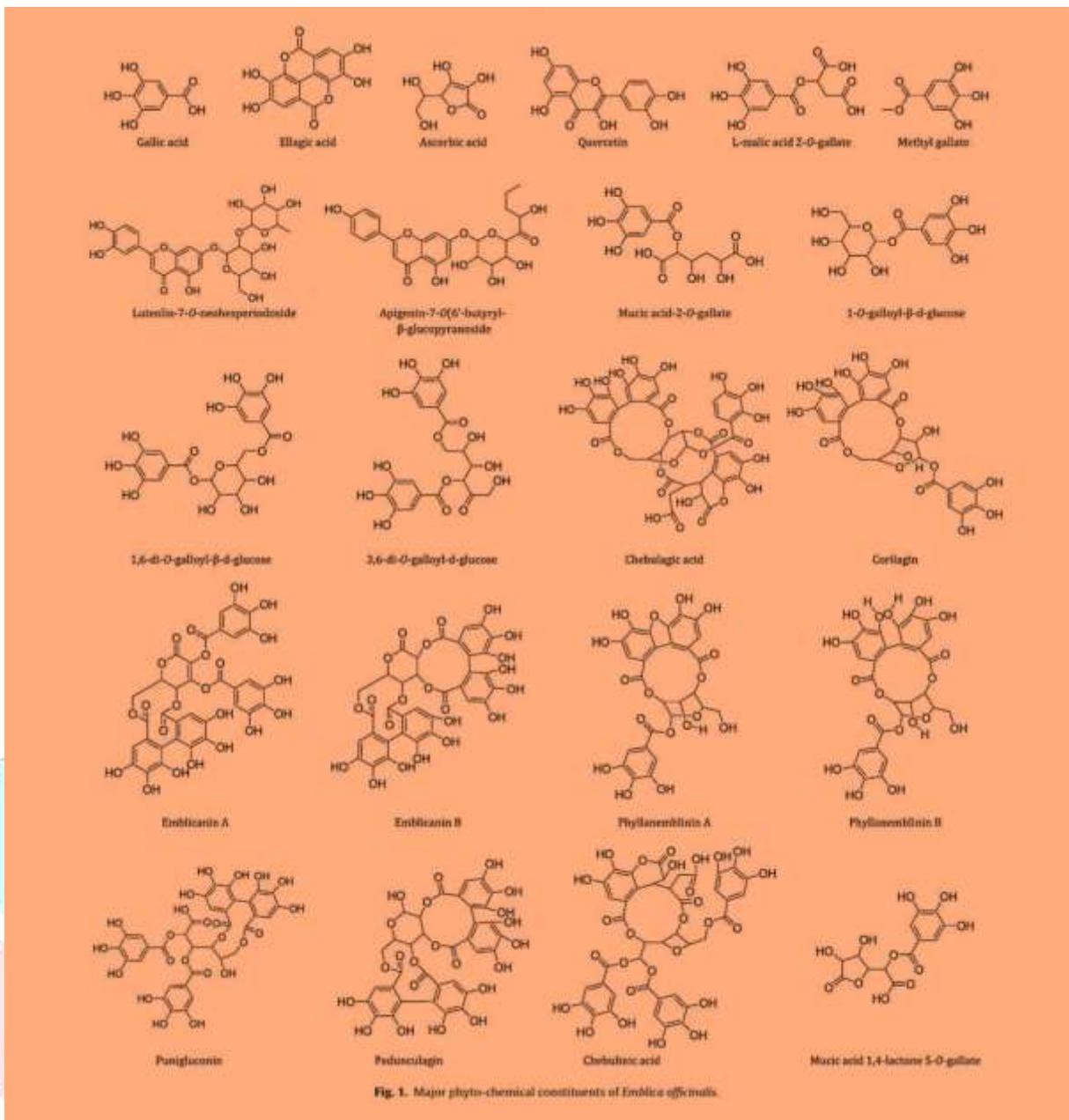
Shape:- The fruits are depressed, globular

Chemical Constituent:-

E. officinalis have various nutrient qualities as per Research. The chemical constituents which tannins, alkaloids, glycosides, Phenolic, Flavonol, sesquiterpenoids, Flavone, carbohydrates, phenolic glycosides, amino acid, mucic acid. The fruit contains two hydrolysable tannins Emblicanin A and B The both tannis have the high Antioxidant properties.

The fruit also contain some Phytochemicals like gallic acid, rallgic acid, Phyllenbin corilagin, furosin, Flavonoids (auerctin). vitamin C is present in the Amla fruit in the highest concentration. The fruit is highly nutritious and consume as food.

Type	Chemical Constituents
Hydrolyzable Tannins	Emblicanin A and B, Punigluconin, Pedunculagin, Chebulinic acid (Ellagitannin), Chebulagic acid (Benzopyran tannin), Corilagin (Ellagitannin), Geraniin (Dehydro-ellagitanin), Ellagotannin
Alkaloids	Phyllantine, Phyllenbein, Phyllantidine
Phenolic Compounds	Gallic acid, Methyl gallate, Ellagic acid, Tetra-galloyl glucose
Amino Acids	Glutamic acid, Proline, Aspartic acid, Alanine, Cysteine, Lysine
Carbohydrates	Pectin
Vitamins	Ascorbic acid (Vitamin C)
Flavonoids	Quercetin, Kaempferol
Organic Acid	Citric acid



Pharmaceutical Uses:-

The *E. officinalis* used against various diseases and promotes the health benefits. The overall tree of amla is used as a medication. The tree consist bark, stem, Flower, seed, root which is used as fresh or dried to makes the medicines. which are mainly involved in the Ayurvedic, Siddha, and unani system.

The fruit is extensively used to treat various diseases like it's improve overall digestive process along with the constipation. It promotes hair growth. It acts as a blood purifier, it decreases fever, it relives asthma and cough as well. It also improve the heart health,

It also have the beneficial effect to treat the various disorder such as neurological disorders Cardiological diseases, hypertension, Tuberculosis, skin diseases, Inflammation, cancer, Type2 diabetes mellitus, Type II hyperlipidaemia Obesity, hyper-acidity, etc.

Various medicinal importance are like it protects cell against free radical damage, and treat skin disorders, respiratory infections, premature aging, hemorrhage, diarrhea, dysentery also have an immunity booster effect which increases WBC count. If we mix amla with honey it can act as preserving eyesight, which is helpful in conjunctivitis and glaucoma.

- **Pharmacological Action**

1. Wound healing

During wound healing, the wound area is abundant in oxidants like hydrogen peroxide, mainly contributed by neutrophils and macrophages. Ascorbic acid and low molecular weight tannins, specifically emblicanin A (2,3-di-O-galloyl-4,6-(S)-hexahydroxydiphenoyl-2-keto-glucono-d-lactone) and emblicanin B (2,3,4,6-bis-(S)-hexahydroxydiphenoyl-2-keto-glucono-d-lactone) found in *Emblica officinalis* (amla), have demonstrated potent antioxidant effects. We hypothesized that introducing these antioxidants into the wound environment would enhance the healing process. This study aimed to evaluate the effectiveness of amla on dermal wound healing in vivo. Full-thickness excision wounds were created on the backs of rats, and topical application of amla accelerated wound contraction and closure. Amla enhanced cellular proliferation and collagen cross-linking at the wound site, indicated by increased extracellular signal-regulated kinase 1/2 activity, DNA, type III collagen, acid-soluble collagen, aldehyde content, shrinkage temperature, and tensile strength. Higher levels of tissue ascorbic acid, alpha-tocopherol, reduced glutathione, superoxide dismutase, catalase, and glutathione peroxidase support that amla application promotes antioxidant activity at the wound site. In conclusion, this study provides strong evidence that topical application of amla is a viable and effective approach to support dermal wound healing. Wound healing is a characteristic of living organisms that counters entropy to restore function and sustain life. Healing involves a series of processes necessary for removing invading pathogens from damaged tissue and remodeling injured tissues either partially or completely. Generally, wound healing occurs in three interconnected and overlapping phases: inflammation, granulation, and remodeling. Various natural products, particularly plant-based products containing active compounds like triterpenes, alkaloids, flavonoids, and biomolecules, promote the wound healing process by affecting one or more of these phases. *Emblica officinalis* (Family: Euphorbiaceae), also known as amla, is a tropical evergreen plant. Its fruit extract exhibits numerous pharmacological activities, such as inhibiting micronuclei formation, sister chromatid exchanges, and clastogenicity and mutagenicity induced by metals like lead, aluminum, cadmium, nickel, and cesium. It also offers radiation protection, has antidiabetic properties, inhibits clastogenicity of benzopyrene and cyclophosphamide, and provides gastroprotective, cytoprotective, and immunomodulating effects. Recent studies have uncovered additional pharmacological benefits of amla: it has cytoprotective effects against chromium, guards against oxidative stress in ischemic-reperfusion injury, possesses antivenom properties, alleviates hyperthyroidism and hepatic lipid

peroxidation, and exhibits antitussive, anti-inflammatory, antispasmodic, and antioxidant properties. Although the medicinal properties of amla have been well-documented, there has been no report on its biochemical significance in relation to changes in collagen characteristics and antioxidant profiles during wound healing. This study explores the potential of amla in healing cutaneous wounds in a male Wistar albino rat model.

2. Memory enhancer

Anwala churna (administered at doses of 50, 100, and 200 mg/kg, orally) resulted in a dose-dependent enhancement of memory scores in both young and aged mice. Additionally, it counteracted amnesia induced by scopolamine (0.4 mg/kg, intraperitoneally) and diazepam (1 mg/kg, intraperitoneally). Notably, oral administration of Anwala churna for 15 days led to a reduction in brain cholinesterase activity and total cholesterol levels.

Anwala churna could be a valuable treatment for Alzheimer's disease due to its multiple beneficial effects, including memory enhancement, cholesterol reduction, and anticholinesterase activity.

3. Anti Diabetic

Most of the signs and complications of diabetes mellitus stem from hyperglycemia, which ultimately harms cells. Hyperglycemia enhances protein glycation, leading to an accumulation of advanced glycation end products (AGEs) in tissues. Protein glycation produces free radicals through the autoxidation of glucose and glycated proteins and through the interaction of AGEs with their cell surface receptors (known as RAGE). These free radicals damage proteins, lipids, and nucleic acids, contributing to oxidative stress in diabetes mellitus.

- **Amla's Hypoglycemic Effects**

Research over the past decade indicates that amla alleviates diabetes induced by alloxan, streptozotocin (STZ), and high-fat diets in rats. One early study by Sabu and Kuttan (2002) found that administering a methanolic extract of amla fruits (100 mg/kg body weight) induced hypoglycemia in both normal and diabetic (alloxan-induced) rats. The hypoglycemic effects were more pronounced with continuous administration for 11 days. Studies also show that the aqueous extract of amla reduces serum glucose and glycosylated hemoglobin (HbA1C), comparable to the anti-diabetic drug chlorpropamide. Fresh juice and hydroalcoholic extracts of amla have similarly lowered fasting blood glucose and increased serum insulin in STZ-induced diabetic rats. Recent studies have found that amla extracts from leaves and seeds also have anti-hyperglycemic effects in diabetic rats. Human studies have shown that regular intake of amla powder (1, 2, or 3 grams for 21 days) lowers fasting and post-prandial blood glucose in both normal and diabetic subjects. The key constituents of amla, such as gallic acid and ellagic acid, have been identified to have hypoglycemic properties. These findings suggest that amla and its constituents possess significant hypoglycemic properties beneficial for diabetes management.

- **Amla Prevents Diabetes-Induced Cardiac Complications**

Cardiovascular disease is a prevalent complication of diabetes, accounting for 80% of mortality in diabetic patients. Hyperglycemia and hyperlipidemia trigger a series of events causing endothelial cell dysfunction and damage. Low-density lipoproteins impair endothelial repair processes, increasing cardiovascular risk. Studies have demonstrated that regular intake of amla capsules (dried amla fruit powder; 500 mg for 42 days) effectively reduces total cholesterol (TC), low-density lipoproteins (LDL), triglycerides (TG), very low-density lipoproteins (VLDL), and increases high-density lipoproteins (HDL) in type II hyperlipidemic individuals, with effects comparable to simvastatin. Preclinical studies with rats showed that amla fruit juice

prevents diabetes (STZ)-induced myocardial dysfunction, reducing serum lactate dehydrogenase (LDH) and creatinine kinase MB (CK-MB) levels, and alleviating hypertension, bradycardia, hypertrophy, and myocardial functional alterations. Amla or its polyphenol-rich fraction was effective in lowering serum creatinine levels.

- **Amla Prevents Diabetes-Induced Nephrotoxicity**

Diabetic nephropathy is a leading cause of chronic renal failure and end-stage kidney disease, linked with increased mortality and morbidity. Cell injury caused by free radicals is a significant component of diabetes mellitus. Gallotannin, a major constituent of amla, has shown nephroprotective effects in diabetic rats, reducing plasma creatinine levels and apoptosis by inhibiting poly-ADP-ribose polymerase (PARP) cleavage. Oral administration of gallic acid (20 mg/kg body weight) for 28 days to STZ-induced diabetic rats decreases serum urea, uric acid, creatinine, and restores total protein and albumin levels. Ellagic acid also protects kidneys, reducing urine output, urinary glycosylated albumin, renal carboxymethyllysine, pentosidine, sorbitol, and fructose. Mechanistic studies reveal that ellagic acid decreases the activity of aldose reductase and sorbitol dehydrogenase and suppresses the mRNA expression of aldose reductase in kidneys.

- **Amla Prevents Diabetes-Induced Neuropathy**

Diabetic neuropathy is a frequent complication of diabetes, with prevalence ranging from 14 to 63%. Reactive dicarbonyls forming AGEs due to hyperglycemia play a role in sensory neuron damage. Kumar et al. demonstrated that amla extract reduces diabetes-induced axonal degeneration. Oral administration of the aqueous extract of amla (250, 500, and 1000 mg/kg per day) ameliorates diabetic neuropathy, decreasing behavioral, biochemical, and molecular alterations in diabetic rats. Amla combined with insulin reduces neuropathic pain and oxidative-nitrosative stress. Gallic acid also reduces oxidative stress and tissue damage in the brain of diabetic rats.

- **Amla Prevents Diabetes-Induced Cataractogenesis**

Cataractogenesis is a common complication of diabetes mellitus, with aldose reductase (ALR) playing a crucial role. Studies with diabetic rats show that amla extract and tannoid-enriched fractions reduce ALR activity. Recent studies reveal that β -glucogallin from amla inhibits aldose reductase in an ex vivo lens culture model. Ellagic acid, another major constituent of amla, inhibits ALR, reducing sorbitol accumulation in erythrocytes, lenses, and sciatic nerves, thereby preventing diabetic cataractogenesis. In vitro studies demonstrate that tannoid-rich fractions of amla preserve α -crystallin chaperone activity and prevent cataract formation.

- **Amla Reduces Diabetes-Induced Wasting**

Protein-energy wasting is common in advanced diabetes and related comorbidities like ischemic vascular disease, hypertension, gastrointestinal dysfunction, and neuropathy. Factors contributing to this include anorexia, reduced food intake, concurrent illnesses, inflammatory processes, physical or mental debility, acidemia, physical deconditioning, oxidant and carbonyl stress, insulin deficiency or resistance, and elevated counter-regulatory hormones. Studies indicate that administering amla or its polyphenol-rich fraction prevents weight loss in diabetic rats. Amla fruit juice administration for eight weeks prevents diabetes-induced body weight loss, reduced water, and food intake. Feeding diabetic mice an ellagic acid-containing diet (5% for 12 weeks) decreases diabetes-induced weight loss. Oral administration of gallic acid (20 mg/kg body weight) for 28 days prevents body weight loss in diabetic rats.

- **Mechanisms of Amla's Actions**

Free Radical Scavenging and Antioxidant Effects: Persistent hyperglycemia in diabetic patients generates oxidative stress through autoxidation of glucose, non-enzymatic glycosylation of body proteins, and the polyol pathway. This leads to the production of reactive oxygen species (ROS) and reactive nitrogen species (RNS), damaging DNA, proteins, and lipids. Amla has been shown to be a potent free radical scavenger in numerous assays, reducing hyperglycemia-induced oxidative stress, AGE, and TBARS production in animal studies. Gallic acid reduces lipid hydroperoxides and increases antioxidant enzyme activities in diabetic rats.

Glucose Utilization and Homeostasis: Amla enhances glucose homeostasis by increasing liver and muscle glycogen content, enhancing glycogenesis and glycolysis enzymes, and reducing gluconeogenesis enzymes in diabetic animals. It has also been shown to improve glucose uptake in adipocytes, with effects comparable to insulin. Gallic acid administration increases hepatic hexokinase activity and decreases glucose-6-phosphatase and fructose-1,6-bisphosphatase activities in diabetic rats.

Pancreatic Insulin Secretion and β -Cell Function: Optimal pancreatic β -cell function is essential for glucose regulation. Amla increases serum insulin levels and stimulates β -cell regeneration. Gallic acid prevents glucose- and palmitate-induced apoptosis and stimulates insulin secretion in β -cells.

Adipokine Modulation: Amla increases adiponectin levels, which has insulin-sensitizing, anti-inflammatory, and anti-atherogenic properties. Ellagic acid reduces serum resistin levels, linking obesity and type II diabetes.

AGE Inhibition: Amla and its constituents inhibit AGE production and RAGE-mediated effects, reducing hyperglycemia-induced oxidative stress and inflammation.

α -Glucosidase Inhibition: Amla possesses α -glucosidase inhibitory effects, comparable to oral anti-diabetic drugs like acarbose, miglitol, and voglibose.

- **Conclusions**

Amla and its phytochemicals, such as gallic acid and ellagic acid, exhibit anti-diabetic effects. They improve glucose utilization, maintain glucose homeostasis, stimulate insulin secretion, regenerate β -cells, prevent β -cell apoptosis, scavenge free radicals, enhance antioxidant levels, modulate adipokines, reduce AGE, and inhibit α -glucosidase. Despite extensive preclinical evidence, clinical data are limited and require well-designed trials to validate the benefits of amla in diabetes management. Further studies could establish amla as a therapeutic option for diabetes.

4. Anti diarrheal and spasmodic activities

The crude extract of *Phyllanthus emblica* (Pe.Cr), which contains alkaloids, tannins, terpenes, flavonoids, sterols, and coumarins, exhibited significant anti-diarrheal and antispasmodic properties. In mice, doses of 500–700 mg/kg of Pe.Cr reduced castor oil-induced diarrhea and decreased intestinal fluid accumulation. In isolated rabbit jejunum, Pe.Cr relaxed contractions induced by carbachol (CCh) and high potassium (80 mM) in a manner similar to dicyclomine.

In guinea pig ileum, preincubation with Pe.Cr (0.3 mg/mL) caused a rightward parallel shift in the acetylcholine concentration-response curves (CRCs) without reducing the maximum response. At a higher concentration (1 mg/mL), Pe.Cr produced a non-parallel rightward shift with a reduction in

the maximum response, indicating anticholinergic and Ca²⁺ channel blocking (CCB)-like antispasmodic effects. This CCB-like activity was further confirmed when pre-treatment with Pe.Cr shifted the CRCs of Ca²⁺ to the right, reducing the maximum response, similar to the effects of nifedipine or dicyclomine.

Activity-directed fractions of Pe.Cr revealed a mix of Ca²⁺ antagonist and anticholinergic components with varying potency across different fractions. These findings suggest that *Phyllanthus emblica* fruit extract possesses both antidiarrheal and spasmolytic activities, likely due to the dual blockade of muscarinic receptors and Ca²⁺ channels, supporting its traditional medicinal use for treating diarrhea.

5. Anti cancer activity

Emblica officinalis extract demonstrated a reduction in the genotoxic effects of heavy metals and the carcinogen benzopyrene in murine models. In a murine model of skin carcinogenesis, continual administration of *Emblica officinalis* extract at 100 mg/kg decreased tumor incidence by approximately 60%. Likewise, two separate studies indicated that the polyphenol or aqueous fractions of *Emblica officinalis*, administered at 60–250 mg/kg, prevented N-nitrosodiethylamine-induced hepatocellular carcinoma by approximately 80–100% [12, 13]. However, such remarkable outcomes were not observed when *Emblica officinalis* extract was evaluated for chemoprevention of liver tumors induced by initiation with diethylnitrosamine followed by promotion with 2-acetylaminofluorene. This discrepancy suggests that *Emblica officinalis* may have the potential to prevent the onset of some, but not all cancers, depending on the initiator. This is understandable considering that carcinogenic compounds have diverse modes of action; thus, it is unrealistic to expect a single extract to be universally chemopreventive. Hopefully, future investigations will build upon these studies to explore the efficacy of *Emblica officinalis* in preventing tumors initiated by a broader range of carcinogens at various tissue sites.

How do these extracts exert chemopreventive effects? There are four potential mechanisms. Firstly, *Phyllanthus emblica* exhibits potent free radical scavenging activities, which could prevent DNA damage and oncogenesis induced by reactive oxygen species. However, in the animal models discussed above, it remains unclear to what extent reactive oxygen species contribute to the underlying pathology, suggesting that alternative mechanisms may be involved. Secondly, the extract possesses properties that enable it to reduce the levels of cytochrome enzymes in liver cells. Cytochromes, such as Cyp 450, metabolize xenobiotics into potentially carcinogenic substances in an attempt to eliminate them from the body. However, this concept is contentious as Amla extract did not decrease Cyp 450 levels in at least two other studies. Thirdly, *Phyllanthus emblica* extracts exhibit anti-inflammatory activities that could potentially prevent inflammation-related cancers. Finally, as described below, *Phyllanthus emblica* harbors potent antitumor activity. Even exposure to low levels of extract from these berries may suffice to impede tumor progression at early stages. It is worth noting that there are concerns regarding potential hepatotoxicity after long-term Amla ingestion. This issue may need to be addressed in the future through clinical and epidemiological studies before *Phyllanthus emblica* extract can be safely recommended for long-term consumption for cancer prevention purposes.

- Table Molecules from *Phyllanthus emblica* fruit extract having proven anticancer properties.

Phenolic compounds from <i>Phyllanthus emblica</i> extract identified by HPLC having anticancer properties	Cancer model utilized to identify antiproliferative and antitumor properties
Ellagic acid (tannin)	Colon, prostate cell lines, and breast and prostate xenografts
Corilagin (tannin)	Ovarian cancer cells, liver cancer cells, and hepatocarcinoma xenografts
Pyrogallol (tannin)	Lung cancer cells, gastric cancer cells, and lung adenocarcinoma xenografts
Chebulagic acid (tannin)	Retinoblastoma colon cancer, breast cancer, prostate cancer, and leukemia cancer cell lines
Gallic acid (tannin)	Breast and lung cancer cell lines, some activity against lung cancer xenograft
Quercetin (flavonoid)	Numerous cancer cell lines from multiple tissue types, transgenic murine model of breast cancer, leukemia xenograft, and phase I clinical trial

6. Skin anti ageing

The extract from the amla branch, appearing as a dark brown powder, contained various phenolic acids, predominantly sinapic and ferulic acids. This extract demonstrated robust antioxidant properties and effectively inhibited tyrosinase in vitro. It also suppressed melanin production by inhibiting both tyrosinase and tyrosinase-related protein-2 activities. Additionally, it exhibited strong antioxidant effects and effectively inhibited matrix metalloproteinase-2 in cellular assays at a concentration of 0.1 mg/mL. A topical gel formulation containing 0.1% of the extract was stable and deemed safe for use. Clinical studies validated its remarkable efficacy in combating skin aging, manifesting in skin lightening, improved elasticity and hydration, and reduction of wrinkles.

7. Hepatoprotective agent

Emblca officinalis Gaertn or *Phyllanthus emblica* Linn, commonly referred to as the Indian gooseberry in English or amla in Hindi, stands as a pivotal botanical entity in the realms of both medicine and nutrition within the Indian subcontinent. The fruit holds significant dietary and medicinal value, finding extensive utilization in traditional as well as folk medicinal practices. Scientific inquiries have highlighted amla's efficacy in thwarting or mitigating the adverse impacts of hepatotoxic agents such as ethanol, paracetamol, carbon tetrachloride, heavy metals, ochratoxins, hexachlorocyclohexane, antitubercular drugs, and hepatotoxicity induced by iron overload. Furthermore, amla is reputed for its capacity to bolster liver function, alleviate hyperlipidemia, and address metabolic syndrome. Studies indicate that amla exerts protective effects against chemically induced hepatocarcinogenesis in animal models. Moreover, phytochemicals like quercetin, gallic

acid, corilagin, and ellagic acid are recognized for their ability to counteract the cytotoxic effects of paracetamol, microcystins, galactosamine, and lipopolysaccharide. The hepatoprotective attributes of amla seem to stem from its antioxidative properties, free radical scavenging abilities, anti-inflammatory properties, and its influence on xenobiotic detoxification processes and lipid metabolism.

8. Antipyretic and Analgesic activity

Various studies have been done on antipyretic analgesic activity of amla

Animals:

Swiss Albino mice (20–35 g) and Wistar Albino rats (150–200 g) of both genders were utilized in this study. They were provided with ad libitum access to rat pellet food and water. Prior to the experimental procedures, all animals underwent a acclimatization period of at least 1 week in the laboratory environment.

Yeast-induced Hyperthermia in Rats:

Hyperthermia was induced in rats following the method described by Teotino et al. (1963). Rats received a subcutaneous injection of 10 ml/kg of a 20% aqueous suspension of brewer's yeast. Rectal temperatures were recorded initially and at 18 hours post-injection. Animals exhibiting a body temperature elevation of 1°C or more were selected for the study. At the peak of temperature increase (18 hours post-injection), EEO and AEO (500 mg/kg, i.p.), aspirin (400 mg/kg, i.p.), and control vehicle (5 ml/kg, i.p.) were administered intraperitoneally. Body temperature was monitored at 1-hour intervals for up to 3 hours following drug or plant extract administration.

Acetic Acid-induced Writhing in Mice:

The writhing syndrome was induced in Swiss Albino mice (20–35 g) following the method described by Collier et al. (1968). Mice received an intraperitoneal injection of 0.7% acetic acid at a dose of 0.1 ml/10 g body weight. EEO and AEO at a dose of 500 mg/kg, aspirin (400 mg/kg, i.p.), and normal saline (5 ml/kg, i.p.) were administered intraperitoneally 60 minutes prior to acetic acid injection. The number of writhing movements was counted for 15 minutes, and the percentage of inhibition of writhing movement was calculated.

Tail-immersion Test in Mice:

Swiss Albino mice (20–35 g) of both genders were subjected to the tail-immersion test. EEO and AEO at a dose of 500 mg/kg, pentazocine (5 mg/kg), and normal saline (5 ml/kg) were administered intraperitoneally. The mice were secured in a suitable restrainer with their tails extended outwards. The tail (up to 5 cm) was immersed in a water bath maintained at $55 \pm 0.5^\circ\text{C}$. The time taken in seconds for the mice to withdraw their tails from the water was recorded as the reaction time at 30, 60, and 120 minutes post-administration of the test drugs (Palanichamy and Nagarajan, 1990).

9. respiratory disorder curer

Common Cold: Amla fruit is useful for treating the common cold, either alone or in combination with other plants.

Chronic Cough and Cold: Regular use of *Emblca officinalis* helps in fighting against chronic cough and cold.

Antitussive Properties: Amla possesses antitussive properties, which means it can help relieve or suppress coughing.

10. Hair Growth promotion

Phyllanthus emblica Linn. (PE) has been utilized to enhance hair growth for many years. In this research, dried PE fruit powder was extracted, evaluated for biological activities, and encapsulated in transfersomes for targeted delivery to hair follicles. Prior to freeze-drying, PE fruit powder was extracted using two solvent systems: water and 30% ethanol. The 30% ethanolic PE extract exhibited higher antioxidant activity and greater total phenolic content compared to the aqueous PE extract. However, the cytotoxicity of the 30% ethanolic PE extract was higher than that of the aqueous PE extract. Consequently, the aqueous PE extract was analyzed via ultra-performance liquid chromatography, revealing gallic acid as the primary component. Subsequently, the aqueous PE extract was tested for its ability to activate genes associated with hair growth promotion in human keratinocytes. At a non-toxic concentration (10 µg/mL), this extract enhanced various growth factors similarly to 1% minoxidil. PE-loaded transfersomes were formulated to deliver the aqueous PE extract to the hair follicles. The particle size and polydispersity index of the PE-loaded transfersomes were 228 nm and 0.25, respectively. After 3 months of storage, the particle size at 4°C and 30°C was 218 nm and 241 nm, respectively, which was similar to its initial size. However, at 40°C, the particle size significantly increased (315 nm). The fluorescent dye, rhodamine B, was employed to assess the ability of transfersomes to target hair follicles. Rhodamine B transfersomes demonstrated better penetration and accumulation in hair follicles than the rhodamine B solution. In conclusion, the aqueous PE extract, primarily consisting of gallic acid, can stimulate hair growth gene expression. The extract can be encapsulated in hair follicle-targeting transfersomes. Therefore, PE-loaded transfersomes represent a promising delivery system for promoting hair growth by targeting hair follicles.

• Conclusion

Amla of *emblca officinalis* is a known Indian medicinal herb which provides numerous health benefits. Now a days, research on Indian tradition medicinal plants has gained a new a recommence. All the parts of the tree posses medicinal properties. Particularly in fruit. Which is utilized in Ayurveda as a powerful rasayana and also it is utilized in medicine These medicines treat the various diseases like diarrhea, diabetes, inflammation, Cancer, Jaundice, etc. The Amla contains the anticancer properties due to high concentration of Polyphenols.

All over the world, plant derived drugs are extensively utilised as a nutraceutical for primary health care. The Amla contains highest amount of vitamin c which can prevent the innumerable health disorders. The Amla contains various biochemical contents carbohydrates ,protein, fiber, alkaloids tanin and the main chemical constituent in Amla are gallic acid ,ellagic acid allergic acid emblicanin a and b corilagin and others it also contains some organic acid like like citric acid , fumaric acid mallic acid and tartaric acid

Amla is available in the market in various form like amla candy, amla chutney, Amla sauce, amla pickle, Amla bar, amla jam. It can also be used as food additive in biopharmaceutical industry. In this review we try to make a summary all over information of Amla there is a colossal necessity to evident and explore its medicinal value at molecular level with the help of technological tools and various latest technology

• Reference

1. Anjali Ashok Rao kalamkar, Poonam I Lal, Pankaj h Chaudhary and Depti B Kumari 2023 a review on *Emblica officinalis* gaertn INT J cognosy and ceutical science 5 (3) close 111 – 117
2. Syeda mona Hassan, asma Sharif Mughal Mohammad Farman (2020) a perspective review and distinctive properties and therapeutic application of Amla (*Emblica officinalis*) 10.7537
3. Md. Rubaiyat Hasan, MD nasirul Islam and MD rokibul Islam (2016) a review on phytochemistry, pharmacological activity and traditional uses of *Emblica officinalis* . INT current pharmaceutical Journal 5 (2): 14-21
4. Saikat gantai ,Manish Malhotra, Soumen bera, Sandip Kumar Verma (2021) Advances in biotechnology of *Emblica officinalis* gaertn syn. *Phyllanthus emblica* l: a neutraceutical rich fruit tree with multifaceted ethnomedical uses 11:62
5. Fqtaneh Hashem - Dabaghian , mujtaba ziaee, samad ghaffari, farzaneh Nabati, Saeed kiabakht (2018) A systemic review on the cardiovascular pharmacology of *Emblica officinalis* gaertn. Review article 10(3): 118-128.
6. suseela lanka (2018) A review on pharmacological, medical and ethnobotanical important pnat : *phyllantus emblica* linn (SYN. *Emblica officinalis*). World journal of pharmaceutical research 7(4).
7. Suraj Singh Yadav, Manish Kumar Singh, Pawan Kumar Singh ,Vipin Kumar (2017) traditional knowledge of clinical trials : A review on therapeutic action of *emblica officinalis*, biomedicine and pharmacotherapy 93:1292-1302
8. Sabir bhat, Abid Faroq and arsheed Iqbal (2023) : A comprehensive review of *emblica officinalis* (Amla) it's medicinal properties and therapeutic uses. INT.J. of Unani and integrative medicine 7 (1): 01-03
9. Ibrahim Hussain ,Saima Zameer T,ushar madaan, Akram minhaj, Wasim Ahmad ,Asif Iqbal (2019). Exploring the multifaceted neuroprotective action of *emblica officinalis* (Amla): A review artical (10.1007)
10. Md Farhan (2012) *emblica officinalis* A review (1557)
11. Swetha darsaroju, Krishna mohan gottumukkala, current Trend in the research of *emblica officinalis* (amla): A pharmacological perspective.(2013) 24 (2) 150-159.
12. Elham Teimouri , Stephanie R. Rainey-smith, Prashant bharawaj, Amla therapy as a potential modulator of Alzheimer's disease risk factors and physiological change. Journal of Alzheimer's disease ××(20××)× -××
13. C.k kokate, A.P purohit, S.B gokhale book of pharmacognosy, edition 55th of Nirali prakashan pune . Page no: 10.5
14. Sanjana shrivastava, jaspreet Kaur, mahrukh mehraj, Fathima feroz, Jyoti Chawla (Amla) : A comprehensive review of the miracle berry. The pharma innovation journal 11(6) : 06-16.

15. Ishwar Chandra chaurasiya, shashikant maurya, Piyush Yadav, Kumar yadav,(2021). A review on :- medicinal uses of amla, volume 8 , issue 5 : ISSN.
16. pawar snehal s, Hole bharaifi R , Sathe Ganesh S, Dawane Kiran D, Dr. Umalkar Deepak G, Sai Krupa Institute of pharmacy ghargaon(2021) A pharmacological Review on amla (emblica) . International Journal of creative Research thoughts, Volume 9, Issue 2.
- 17.Mani Vasudeva Milind Parle 2007 memory enhancing activity of anwala churna (Emblica officinalis gaertn): an ayurvedic preparation department of pharmaceutical sciences, physiology and behaviour 91-46-54 page number 1
- 18.meriyala Sumitra,panchatchharam manikadan. Vinaya subramani Gayathri ,panchatcharam mahendram,lonchin suguna (2008) Emblica officinalis exerts wound healing action through up-regulated kinases (ERK112) 1524-475×. PAGE NO.1
- 19.Jason Jereme O'souza ,Prema pancy D'Souza Farhan Fazal , Ashish Kumar, harshith p.bhat ,manjeshwar shrinath baliga .anti-diabetic effect of the Indian indigenous fruit Emblica officinalis gaertn: active constituents and modes of action. Food and function (2014) 5-635 page no. 4-8
20. Malik Hassan mehmoood, Hasan Salam siddiqi , amvarul Hassan Gilani , the antidiarrheal and spasmodic activities of phyllanthus Emblica are mediated through dual blockade of muscarinic receptor 133;(2011) 856-865 page no.1
21. Tiejun zhae , Qiang sun , Maud maraues, Michael witcher, Anti-cancer properties of phyllanthus Emblica (Indian gooseberry) , Hindwali (2015) 10.1155 page no 2 and 4
21. Puxvadae chaikul , Mayuree kanlayavattankul , Joriya somakummerd, nattaya lurith. Phyllanthus Emblica l. (Omla) Brach : A safe and effective ingredients against skin aging (2021) Journal of traditional and complementary medicine page no. 1
- 22.karadka Ramdas thilakchand Rashmi Teresa mathai, paul siman , rithin T. Ravi , manjeshwar Poonam Baliga-Rao , manjeshwar shrinath baliga (2013) food and function 4(10) 1423- 1554 : page no.2
23. James B. Perianayagoam ,S.k sharma , aney Joseph , AJM. Christina. Evaluation of antipyretic and analgesic activity of Emblica officinalis gaertn. Journal of ethnopharmacology 95(2004)83-85 page no.4
- 24.shreya Talreva, Sonam Kumari, Prateek Shrivastav, swarnima Pandey.A complete pharmacognostic Review of amla , world Journal of pharmacy page no. 1
25. Amaraporn wongrakpanich. Jiraporan Leopoich arrenchal,Boontida Morakul, warisara Parichatikanonda, veerawat teeranachaideekul (2022). Phyllanthus emblica extract loaded Transfersomes for Hair follicle targeting: phyto constituent, characterization,and Hair growth promotion,J olea sci 71(7): 1085-1096