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A REVIEW ON MEDICINAL IMPORTANCE OF *EMBLICA OFFICINALIS*

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Keywords:

Emblica officinalis, immune modulatory, analgesic, cytoprotective, antitussive

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ABSTRACT: Research in medicinal plants has gained a renewed focus recently. The prime reason is that other system of medicine although effective come with a number of side effects that often lead to serious complications. Plant based system of medicine being natural does not pose any serious problems. Although *Emblica officinalis* has a range of medicinal applications, but it is the need much period of time to explore. The use of *Emblica officinalis* as antioxidant, immune modulatory, antipyretic, analgesic, cytoprotective, anti ulser, immune modulatory, anti inflammatory, antitussive and gastroprotective are also studied. *Emblica officinalis* having a strong Memory enhancing property, in lowering cholesterol level, applicable in ophthalmic disorder, are reviewed. The effects of *Emblica officinalis* also take account as an antimicrobial action and in neutralizing snake venom are also included.

INTRODUCTION: Plants have formed the basis of sophisticated traditional medicine system and natural product make excellent lead to for a new drug development[1]. In worldwide approximately 80% of world Inhabitants lean on traditional medicine for their primary health care and play an important role in health care system of remaining 20% of population[2].

The WHO is encouraging, promoting and facilitating the effective use of herbal medicine for the developing countries health program[3]. The human race started using plants and plant products successfully as a source for treatment of disease and injuries as effective therapeutic tool from the early days of civilization to morden age[5, 6].

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Medicinal plants are the "local heritage with global importance" playing a vital role in world health care system for developing countrie [6]. *Emblica officinalis* (Euphorbiaceae) is a valuable tree known for its medicinal as well as pharmacological importance for centuries.

CLASSIFICATION

Kingdom: Plantae
Division: Angiospermae
Class: Dicotyledonae
Order: Geraniales
Family: Euphorbiaceae
Genus: *Emblica*
Species: *officinalis Geartn.*

Liver toxins, high blood cholesterol, and age-related kidney disorders have all been scientifically proven to be corrected with the antioxidant properties contained in amla berries. Amla fruits are used as a diuretic, refrigerant and laxative. Dried fruits are given in diabetes and dysentery. They are also administered in jaundice, dyspepsia and anemia along with iron compound. It is

reported that fixed oil from fruits possess the property of promoting hair growth. Seeds of the fruits are used in treatment of asthma and bronchitis. The leaves are used as fodder. Alcoholic extract of the fruit is anti–viral. It is a popular ingredient of "*Triphala"* and *"Chyawanprash".* There fruits they are rich in Vitamin C (Lascorbic acid) content, ranging from 0.1 to 0.7 % in fresh pericarp [8].

Amla, being rich source of vitamin C, is considered to be effective in slowing down the ageing process. Ageing is a cumulative result of damage to various cells and tissues, mainly by oxygen free radicals. Vitamin C is a scavenger of free radicals which breaks them down; it has an antioxidant synergism with vitamin E which prevents pre-oxidation of lipids.

Amla is a major ingredient of ancient ayurvedic preparation "Chyawanprash", which believed to prolong the ageing process and helps to keep young [9].The fruits of plants have been used in ayurveda as a potent *rasayana* [10]. The *rasayanas* are used to promote health and longevity by increasing defense against disease, arresting the aging process and revitalizing the body in debilitated conditions. The clinical efficacy of amla is referred to as a *Maharasayana* in ayurveda. Many papers are published about the magical effects of amla. However, little is known about the chemistry and biological activity of its major constituents, hydrolysable tannins (10-12 % in pericarp),except that they contained galic acid and ellagic acids that inhibits the degradation of vitamin C and had some pharmacological activity entirely unrelated to the clinical use of fruits [8].

TABLE 1. VERNACULAR NAMES OF AMLA

S.No.	Language	Vernacular Names
1	Sanskrit	Dhatriphala, Amla, Amaliki, Amalakan, Sriphalam, Vayastha
2	Hindi	Amla
3	English	Emblica myroblan
4	Nepalese	Amba
5	Chinese	An Mole
6	Malaysian	PopokMelaka
7	Marathi	Awla
8	Gujrati	Ambla
9	Malyalam	NeliKayi
10	Tamil	Neli
11	Telagu	Usirikaya
12	Kashmir	Aonla
13	Bangali	Amolki
14	Punjabi	Aula

A recent study on fresh juice and solvents extractes of *E.officinalis* fruits indicated the complete absence of vitamin C-like activity of fruits was due to low molecular weight (Mol.wt<1000) hydrolysable tannins. Four such compounds, emblicanin A, amblicanin B, punigluconin and pedunculagin, were isolated from fresh pericarp and their chemical structures were established by spectroscopic analyses and chemical transformations[8].

GENERAL DESCRIPTION OF AMLA

The amla plant having 8-18 meters height with thin light grey bark exfoliating insmall thin irregular flakes. Leaves aresimple, sub sessile, closely set along the branch lets, light green having the appearance of pinnate leaves; flowers are greenish yellow, in auxiliary fascicles, unisexual, males numerous on short slender pedicels, females few, sub sessile, ovary 3- celled; fruits globose, fleshy, pale yellow with six obscure vertical furrows enclosing six trigonous seeds in 2- seeded 3 crustaceous cocci found throughout India, the sea-coast districts and on hill slopes up to 200 meters, also cultivated in plains.

TABLE 2. GENERAL DESCRIPTION OF *EMBLICA OFFICINALIS*

S.No.	Different aspects	Description
1.	Habitat	India, Pakistan, Uzbekistan, Sri lanka, South East Asia, China and Malaysia.
2.	Used Parts	Dried fruits, Fresh fruit, seed, leaves, root bark, flowers.
3.	Fruits	a) Ripen from November to February. b) Nearly spherical or globular, wider than long and with a small and slight conic depression on both apexes. c) Fruit is 18-25mm wide and 15-20mm long. d) Surface is smooth with 6 obscure vertical pointed furrow. e) Mesocarp is yellow and endocarp is yellowish brown in ripened condition. f) In fresh fruit mesocarp is acidulous and in dried fruit it is acidulous astringent.
4.	Leaves	a) Leaf is 8-10 mm or more long and 2-3 m broad, hairless light green outside, palegreen or often pubescent beneath. b) It contains gallic acid, ellagic acid, chebulic acid, chebulinic acid,agallantonic called amlic acid, alkaloids phyllantidine, chebulagic acid, phyllantine.
5.	Seeds	a)Four-Six, smooth, dark brown. b) A fixed oil, phosphatides and a small quantity of essential oil.
6.	Bark	a) Thick to 12 mm, shining grayish brown or grayish green. b) Leukodelphinidin, tannin and proanthocyanidin.

The fruits are sour astringent, bitter, acrid, sweet, cooling, anodyne, ophthalmic, carminative, digestive, stomachic, laxative, alterant, aphrodisiac, rejuvenative, diuretic, antipyretic and tonic. They are useful in vitiated conditions of tridosha, diabetes, cough, asthma, bronchitis, cephalalgia, ophthalmopathy, dyspepsia, colic, flatulence, hyperacidity, peptic ulcer,erysipelas, skin diseases, leprosy, haematogenesis, inflammations, anemia, emaciation, hepatopathy, jaundice, strangury, diarrhea, dysentery, hemorrhages, leucorrhoea, and menorrhagia. Cardiac disorders, intermittent fevers and grey ness of hair[7]. Some more description shown in **Table 2**.

PHYSICAL AND CHEMICHAL PROPERTIES OF AMLA SEEDS

Emblica officinalis primarily contains tannins, alkaloids, phenolic, amino acids and carbohydrates. Its fruit juice contains the highest amount of vitamin C (478.56 mg/100 mL). The fruit when blended with other fruits boosted their nutritional quality in terms of vitamin C content [12]. Compounds isolated from *Emblica officinalis* were galic acid, ellagic acid, 1-O galloyl-beta-D-glucose, 3,6-di-Ogalloyl- Dglucose, chebulinic acid, quercetin, chebulagic acid, corilagin, 1,6- di-O -galloyl beta D glucose, 3 Ethylgallic acid (3 ethoxy 4,5 dihydroxy benzoic acid) and isostrictiniin [13].

Phyllanthusemblica also contains flavonoids, kaempferol 3 O alpha L (6" methyl) rhamnopyranoside and kaempferol 3 O alpha L (6"ethyl) rhamnopyranoside [14]. A new acylatedapigenin glucoside (apigenin 7 O (6" butyryl beta glucopyranoside) was isolated from the methanolic extract of the leaves of *Phyllanthus emblica*together with the known compounds; gallic acid, methyl gallate, 1,2,3,4,6-penta-O-galloylglucose and luteolin-4'-Oneohesperiodoside were also reported [15].

CULTURAL AND RELIGIOUS SIGNIFICANCE

Amla has been regarded as the sacred tree in India. The tree was worshipped as Mother earth and is believed to nurture Human kind because the fruits are very nourishing. The leaves, fruits and Houses are used in worship in India. Kartik Mahatma and Vrat Kaumudi order the worship of this tree. The leaves are offered to the lord of shri Satyanarayana Vrata, Samba on Shri Shani Pradosha Vrata and Shiva and Gowri on Nitya Somvara Vrata. In Himachal Pradesh, this tree is worshipped in the month Kartik as propitious and chaste [16].

TABLE 3: AVERAGE PERCENTAGE COMPOSITION OF THE FRUIT PULP OF *EMBLICA OFFICINALIS.*

S.no.	Component	Percentage
1	Moisture	81.2 %
2	Protein	0.5%
3	Fat	0.1%
4	Mineral matter	0.7%
5	Fibre	3.4 %
6	Carbohydrate	14.1%
7	Calcium	0.05 %
8	Phosphorus	0.02%
9	Iron	1,2mg/100gm
10	Nicotinic acid	0.2mg/100gm
11	Vitamin C	600 mg/100 gm
12	Vitamin B_3	0.4 mg/100 gm

DIFFERENT PROPERTIES OF AMLA

Antioxidant activity: Free radicals are the fundamental to any biochemical process and represent an essential part of the aerobic life and our metabolism. They are continuously produced by body's normal use of oxygen such as respiration and some cell mediated immune functions. Naturally, there is a dynamic balance between the amount of free radicals generated in the body and antioxidant to quench and/or scavenge them and protect the body against their deleterious effects.

It is obvious therefore that any additional burden of free radicals either from 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. Thus, the oxidant status in human reflects the dynamic balance between the antioxidant defense and pro-oxidant conditions and has been suggested as a useful tool in estimating the risk of oxidative damage.

Emblica officinalis was studied against the cold stress-induced alterations in the behavioral and biochemical abnormalities. Triphala administered orally about 1g/kg/animal body weight for 48 days significantly prevented cold stress-induced behavioral and biochemical abnormalities in albino

rats. Thus, triphala supplementation can be regarded as a protective drug against stress [17]. Vitamin C in *Emblica officinalis* accounts for approximately 45-70% of the antioxidant activity[18].

Rats were examined for the antioxidant properties of Amla extracts and its effect on the oxidative stress in streptozotocin induced diabetes was also reported. The extracts showed strong free radical scavenging activity. Amla extracts orally administered to the diabetic rats slightly improved body weight gain and also significantly increased various oxidative stress indices of the serum of the diabetic rats [19].

DHC-1, an herbal formulation was made from the important herbal plants like *Emblica officinalis*, *Bacopa monniera*, *Glycyrrhiza glabra*, *Mangifera indica* and *Syzygium aromaticum* was studied for its antioxidant activity. The protective effect of DHC-1 was studied in isoproterenol induced myocardial infarction and cisplatin-induced renal damage.

DHC-1 possesses a protective effect against both damaged kidneys and heart in rats. This protective effect may be attributed, at least in part, to its antioxidant activity. 35 The plant extract lowered hepatic lipid peroxidation (LPO) and increased the superoxide dismutase (SOD) and catalase (CAT) activities in hyperthyroid mice, exhibiting its hepatoprotective nature. It potentially ameliorate the hyperthyroidism with an additional hepato protective benefit [20].

Emblica officinalis is used to protect the skin from the devastating effects of free radicals, non-radicals and transition metal-induced oxidative stress. It is suitable for use in, anti-aging, general purpose skin care products and as sunscreen [21]. The fruits of EO contain tannoid principles that have been reported to exhibit antioxidant activity *in vitro* and *in vivo*. Emblicanin-A (37%) and -B (33%) enriched fraction of fresh juice of *Emblica officinalis* fruits was investigated for antioxidant activity against ischemia-reperfusion - induced oxidative stress in rat heart. The study confirms the antioxidant effect of *Emblica officinalis* and also indicated that the fruits of the plant may exhibit a cardioprotective effect [22].

The antioxidant activity of EO extract is associated with the presence of hydrolysable tannins having ascorbic acid-like action have been also reported [23]. A number of medicinal plants, traditionally used for thousands of years, are present in a group of herbal preparations of the Indian traditional health care system (Ayurveda) named Rasayana identified for their interesting antioxidant activities. *Emblica officinalis* have been reported for its antioxidant activity[24]. It contains tannoid principlescomprising of emblicanin A, emblicanin B,punigluconin and pedunculagin, have been reported to possess antioxidant activity *in-vitro* and *in-vivo* [25].

Anti-ulcer Activities:

Methanolic extract of *Emblica officinalis* was studied against ulcer. *Emblica officinalis* had significant ulcer protective and healing effects and this might be due to its effects both on offensive and defensive mucosal factors [26].

Immune modulatory Activities:

Immune activation is an effective as well asprotective approach against emerging infectious diseases. Albino rats were used to assess the immune modulatory activities of Triphala on various neutrophil functions like adherence, phagocytic index, avidity index and nitro blue tetrazolium. Oral administration of Triphala appears to stimulate the neutrophil functions in the immunized rats and stress induced suppression in the neutrophil functions were significantly prevented by Triphala [27].

Antipyretic and Analgesic Activities:

Extracts of *Emblica officinalis* fruits possess potent anti-pyretic and analgesic activities. A single oral dose of ethanolic extract and aqueous extract (500 mg/kg) 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[28]. Malays use a decoction of its leaves to treat fever [29]. The fresh fruit is refrigerant [30]. The seeds are given internally as a cooling remedy in bilious affections and in infusion make a good drink in fevers [30,31]. The flowers are employed by the Hindu doctors for their supposed refrigerant and aperient qualities. 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.

Hepatoprotective Activity:

Hepatoprotective activity of *Emblica officinalis* (EO) and chyawanprash (CHY) extracts was studied using Carbon tetrachloride induced liver injury model in rats. *Emblica officinalis* and CHY extracts were found to inhibit the hepatotoxicity produced by acute and chronic administration as seen from the decreased levels of serum and liver lipid peroxides (LPO), glutamate-pyruvate transaminase (GPT), and alkaline phosphatase (ALP).

Chronic CCI (4) administration was also found to produce liver fibrosis as seen from the increased levels of collagen hydroxyl proline and pathological analysis. *Emblica officinalis* and CHY extracts were found to reduce the elevated levels significantly, indicating that the extract could inhibit the induction of fibrosis in rats [7].

Anti-Inflammatory Activity: Leaves and fruits of *Phyllanthus emblica* L. have been used for the anti-inflammatory and antipyretic treatment of rural populations in its growing areas in subtropical and tropical parts of China, India, Indonesia, and the Malay Peninsula. In the present study, leaves of *Phyllanthus emblica* were extracted with ten different solvents (nhexane, diethyl ether, and methanol, tetrahydrofuran, acetic acid, dichloromethane, 1, 4 - dioxane, toluene, chloroform and water).

The inhibitory activity of the extracts against human poly morphs nuclear leukocyte (PMN) and platelet functions was studied. Methanol, tetrahydrofuran, and 1, 4-dioxane extracts (50 micrograms/ml) inhibited leukotriene B4-induced migration of human PMNs by 90% and N-formyl-L-methionyl- L-phenylalanine (FMLP)-induced degranulation by 25-35%. Diethyl either extract (50 micrograms/ml) inhibited calcium ionosphere A23187-induced leucotrienes Release form human PMNs by 40% thromboxane B2 production in platelet during blood clotting by 40% and adrenaline induced platelet aggregation by 36%. Ellagic acid, garlic acid and rutin all compounds isolated earlier from *P. emblica.* Anti-inflammatory activity was found in the water fraction of methanol extract of the plant leaves. The water fraction of the methanol extract inhibited migration of human PMNs in human platelets during clotting; suggesting that the mechanism of the anti-inflammatory action found in the rat paw model does not involve inhibition of the synthesis of the measured lipid mediators [7].

Cardio-protective 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 *Emblica officinalis* administration produces myocardial adaptation by augmenting endogenous antioxidants and protects rat hearts from oxidative stress associated with IRI[32].

Anti cancer activity:

The important advantages claimed for therapeutic use of medicinal plants in chemoprevention. Chemoprevention is a rapidly growing area of oncology which focuses towards the cancer preventive strategy of natural or synthetic interventions, nowadays chemoprevention is achieved by herbs and herbal products replacing the use of synthetic agents which shows toxic and harmful side effects. Amla is one of the foremost plants utilized from antiquity till to date.

Emblica officinalis is valued for its unique tannins and flavanoids, which exhibit very powerful antioxidant properties. The inhibition of tumor incidences by fruit extract of this plant has been evaluated on two-stage process of skin carcinogenesis in Swiss albino mice. Chemopreventive potential of *Emblica officinalis* fruit extract on 7,12-dimethylbenz(a)anthracene (DMBA) induced skin tumourogenesis in Swiss albino mice have been found [33].

Triphala also significantly increased the antioxidant status of animals which might have contributed to the chemoprevention [34]. The suppression of the growth of cancer cells due to the galic acid-a major polyphenol as observed in "Triphala" have been reported [35]. The breast cancer is one of the most common cancers in women. Lipid-metabolizing

enzymes, lipids and lipoproteins have been associated with the risk of breast cancer [36]. The cytotoxic effects of aqueous extract of Triphala were investigated on a transplantable mouse thymic lymphoma (barcl-95) and human breast cancer cell line (MCF-7).

The differential response of normal cells and tumor cells to Triphala *in vitro* and the substantial regression of transplanted tumor in mice fed with Triphala indicate to its potential use as an anticancer drug for clinical treatment [36]. The potential anticancer effects of aqueous fruit extract of *P. emblica* was tested in several different human cancer cell lines such as Aqueous extracts of *P.emblica* can inhibit L929 cells growth in a dose dependent manner. Its IC50 value was 16.5µg/ml and it was most active in inhibiting *in vitro* cell proliferation[38].

The efficacy of *Emblica officinalis* polyphenols (EOP) on the induction of apoptosis in mouse and human carcinoma cell lines. EOP was reported to induce apoptosis in DLA and CeHa cell lines. In addition, it also inhibited DNA topoisomerase I in *Saccharomyces cerevisae*, mutant cell cultures and the activity of cdc-25 tyrosine phosphatase [39].

In -vitro anti proliferative activity of extracts from medicinal plants toward human tumor cell lines, including human erythromyeloid K562, T-lymphoid Jurkat, B-lymphoid Raji, erythroleukemic HEL cell lines were compared. Extracts from *Emblica officinalis* were the most active in inhibiting *in vitro* cell proliferation have been found [38]. Cyclophosphamide is one of the most famous alkylating anticancer drugs in spite of its toxic side effects including hematotoxicity, immunotoxicity and mutagenicity.

Emblica officinalis or its medicinal preparations may prove to be beneficial as a component of combination therapy in cancer patients under cyclophosphamide treatment[40].

Phenolic compounds and the major components from the fruit juice of *Emblica officinalis* 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 anti proliferative activities[41]. Antimicrobial and Anti mutagenic Activity:

Emblica officinalis has been reported for the antimicrobial activities[42]. The plant have been reported to possess potent antibacterial activity against *Escherichia coli*, K. ozaenae, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa, S. paratyphi A, S. paratyphi B* and *Serratia marcescens* [43].

Water, chloroform and acetone extracts of Triphala were investigated to evaluate an antimutagenic effect using an Ames histidine reversion assay having TA98 and TA100 tester strains of *Salmonella typhimurium* against the direct-acting mutagens, 4-nitro-o-phenylenediamine (NPD), sodium azide and the indirect-acting promutagen, 2-aminofluorene (2AF), in the presence of phenobarbitone-induced rat hepatic S9. The results with chloroform and acetone extracts showed inhibition of mutagenicity induced by both direct and S9- dependent mutagens [44].

Pharmacological Perspectives Antitumor Activity:

Aqueous extract of *Emblica officinalis* was found to be cytotoxic to L 929 cells in culture in a dose Dependent manner. Concentration needed for 50% inhibition was found to be 16.5g/ml. *Emblica officinalis* and chyavanaprash (a nontoxic herbal preparation containing 50% *Emblicaofficinalis*) extracts were found to reduce ascites and solid tumors in mice induced by DLA cells. Animals treated with 1.25 g/kg b.wt. of *Emblica officinalis* extract increased life span of tumour bearing animals (20%) while animals treated with 2.5 g/kg b.wt of Chyavanaprash produced 60.9% increase in the life span.

Both *Emblica officinalis* and chyavanaprash significantly reduced the solid tumours. Tumour volume of control animals on 30th day was 4.6 ml whereas animals treated with 1.25 g/kg b.wt of emblica officinalis extract and 2.5 g/kg by.wt chyavanaprash showed tumour volume of 1.75 and 0.75 ml, respectively *Emblica officinalis* extract was found to inhibit cell cycle regulating enzymes cdc 25 phosphates in a dose dependent manner.

Concentration needed or 50% inhibition of cdc 25 phosphatase was found to be 5 g/ml and that needed for inhibition of cdc2 Chinese was found to be>100g/ml. The results suggest that antitumor activity of *emblica officinalis* extract may partially be due to its interaction with cell cycle regulation [7].

Cytoprotective, Antitussive, Gastro-protective activity:

Emblica officinalis has been reported for its cytoprotective and immune modulating properties against chromium (VI) induced oxidative damage. It inhibited chromium induced immuno suppression and restored gamma-IFN production by macrophages and phagocytosis [45].

Emblica officinalis was tested for its antitussive activity in conscious cats by mechanical stimulation of the laryngo-pharyngeal and trachea-bronchial mucous areas of airways. Antitussive activity of *Emblica officinalis* was more effective than the non-narcotic antitussive agent dropropizine but less effective than shown by the classical narcotic antitussive drug codeine. It is supposed that the dry extract of *Emblica officinalis* exhibit the antitussive activity not only due to antiphlogistic, antispasmolytic and antioxidant efficacy effects, but also to its effect on mucus secretion in the airways [46].

Emblica officinalis (ethanolic extract) was investigated for its antisecretory and antiulcer activities using various experimental models in rats, including pylorus ligation Shay rats, indometha cin,hypothermic restraint stress induced gastric ulcer and necrotizing agents. It was then reported that Amla extract exhibit antisecretory, cytoprotective and antiulcer properties [47].

Memory Enhancing Effects:

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 [48].

Chelating Agent: Photo aging of the skin is a complex biologic process affecting various layers of the skin with major changes seen in the connective tissue within the dermis. *Emblica officinalis* was shown to reduce UV-induced erythema and had excellent free-radical quenching ability, chelating ability to iron and copper as well as MMP-1 and MMP-3 inhibitory activity [7].

Hair Growth Property:

A fixed oil is obtained from the berries that are used to strengthen and promote the growth of hair. The dried fruits have a good effect on hair hygiene and have long been respected as an ingredient of shampoo and hair oil. Indian gooseberry is an accepted hair tonic in traditional recipes for enriching hair growth and also pigmentation. A fixed oil obtained from the berries strengthens and promotes the growth of hair. The water in which dried Amla pieces are soaked overnight is also said to be nourishing to the hair[7].

As Snake Venom Neutralizer:

EO and *Vitex negundo* were explored for the first time for antisnake venom activity. Najakaouthia 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 [49].

ALMA USED IN CURING VARIOUS DISEASE.

In Respiratory disease:

The fresh fruit is used in Turkeystan in inflammations of the lungs. The juice or extract of the fruit is mixed with honey and pipit added is given to stop hiccough and also in painful respiration. The expressed juice of the fruit along with other ingredients is used to cure cough, hiccough, asthma and other diseases[50].

In Diabetes:

Oral administration of the extracts (100 mg/kg body weight) reduced the blood sugar level in normal and in alloxan (120 mg/kg) diabetic rats significantly within 4 hours. *Emblica officinalis*

and an enriched fraction of its tannoids are effective in delaying development of diabetic cataract in rats[51]. Aldose reductase (AR) has its involvement in the development of secondary complications of diabetes including cataract. *Emblica officinalis* is proved as an important inhibitor of AR. Exploring the therapeutic value of natural ingredients that people can incorporate into everyday life may be an effective approach in the management of diabetic complications[52].

In Gonorrhoea:
The juice of the bark combined with honey and turmeric is a remedy for gonorrhea[50, 30].

Nausea:
Amla powder is mixed with red sandalwood (*Pterocarpus santalinum*) and prepared in honey to relieve nausea and vomiting[53].

In Constipation:
The fruit is occasionally pickled or preserved in sugar. When dry it is said to be gently laxative[31]. According to some sources the fresh fruit is also laxative[30]. The fresh ripe fruits are used extensively in India as a laxative, one or two fruits being sufficient for a dose. They have been exported to Europe, preserved in sugar, and are valued as a pleasant laxative for children and made into a confection consisting of the pulp of the de-seeded fruit [7].

In Diarrhoea:
It is used medicinally for the treatment of diarrhoea. As a fruit decoction it is mixed with sour milk and given by the natives in cases of dysentery. The bark partakes of the astringency of the fruit. A decoction and evaporation of the root solution produces an astringent extract equal to catechu. An infusion of the leaves with fenugreek seed is given for chronic diarrhea[50].

In Skin cancer:
The cancer preventive effect of *Emblica officinalis* was investigated on two stage process of skin cancer induced by 7, 12-dimethylbenz (a) anthracene (DMBA) in swiss albino mice. It showed significant chemo-preventive effects on DMBA-initiated and croton oil (1% in 100µl of acetone) promoted skin cancer development. *P. emblica* exhibited a significant reduction in tumor incidence, tumor yield, tumor burden and cumulative number of papillomas. These finding were indicative of chemo-preventive potential of *P. Emblica* against skin carcinogenesis[33].

In Ophthalmic Disorder:
Ophtha care is a herbal eye drop preparation containing basic principles of different herbs viz *Carum copticum*, *Terminalia belerica*, EO, *Curcuma longa*, *Ocimum sanctum*, *Cinnamomum camphora*, *Rosa damascene* and *Melde spumapum*. Clinical trial was conducted in patients suffering from different ophthalmic disorders namely, conjunctival xerosis, conjunctivitis, acute dacryocystitis, degenerative conditions and postoperative cataract patients with a herbal eye drop preparation. In most cases improvement was 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. Ophtha care exhibit beneficial role in a number of inflammatory, infective and degenerative ophthalmic disorders[54]. Infusion of the leaves is applied to sore eyes[31].

The dried fruit immersed in water in a new earthen vessel a whole night yields a decoction which is used as a collyrium (a medical lotion applied to the eye as eyewash) in ophthalmic. It may be applied cold or warm[30]. In another treatment an infusion of the seeds is also used as a collyrium and applied with benefit to recent inflammations of the conjunctive and other eye complaints. The exudates collected from incisions made on the fruit are applied externally on inflammation of the eye[50]. In Ayurvedic terms it lowers pitta without disrupting the other two doshas and so Amla is frequently used in cataract medicine.

Hair Growth:
Amla-Berry boosts absorption of calcium, thus creating healthier bones, teeth, nails and hair. It also helps maintain youthful hair color and retards premature graying, and supports the strength of the hair follicles, so there is less thinning with age [55]. The crushed fruits have a good effect on hair growth and prevent hair graying [55].

In Reducing Cholesterol and Dyslipidemia:
Cu2+induced LDL oxidation and cholesterol fed rats were used to investigate the effects of Amla on low-density lipoprotein (LDL) oxidation and cholesterol levels *in vitro* and *in vivo*. It was concluded that Amla may be effective for hypercholesterolemia and prevention of atherosclerosis[56]. *Emblica officinalis* and *Mangifera Indica* contains flavanoids which reduce the levels of lipid in serum and tissues of rats induced hyper lipidemia. Both cause the degradation and elimination of cholesterol[57].

In Dental disease:
The roots of *Emblica officinalis* (10 g) are ground and taken twice daily for one day only after taking food. Alternatively, the leaves of Emblica officinalis are squeezed and the juice extracted. This juice is put in the ear (a few drops) to find relief from toothache[7].

In Headache:
A paste of the fruit is a useful application to the forehead in cases of cephalalgia (headache). The name "Itrifal" of Unani medicine is the same as "Triphala" in the Ayurvedic system and represents a group of preparations used for the care of all manner of cranial conditions[58]. The expressed juice of the fruit along with other ingredients is used to cure fits and insanity[50].In Indonesia, the pulp of the fruit is smeared on the head to dispel headache and dizziness caused by excessive heat.Amla is mixed with buttermilk for anointing and "cooling" the head [53].

Nanoparticles:
The design, synthesis and characterization of biologically synthesized nanomaterials have become an area of significant interest. In this paper, we report the extracellular synthesis of gold and silver nanoparticles using *Emblica Officinalis* (amla, Indian Gooseberry) fruit extract as the reducing agent to synthesize Ag and Au nanoparticles, their subsequent phase transfer to an organic solution and the transmetallation reaction of hydrophobized silver nanoparticles with hydrophobized chloroaurate ions. On treating aqueous silver sulfate and chloroauric acid solutions with *Emblica Officinalis* fruit extract, rapid reduction of the silver and chloroaurate ions is observed leading to the formation of highly stable silver and gold nanoparticles in solution.

Transmission Electron Microscopy analysis of the silver and gold nanoparticles indicated that they ranged in size from 10 to 20 nm and 15 to 25 nm respectively. Ag and Au nanoparticles thus synthesized were then phase transferred into an organic solution using a cationic surfactant octadecylamine. Transmetallation reaction between hydrophobized silver nanoparticles and hydrophobizedchloroaurate ions in chloroform resulted in the formation of gold nanoparticles[59].

In Skin Sores and Wounds:
The milky juice of the leaves is a good application to sores. Grind the bark of *Emblica officinalis* (10g) into a paste and apply to the cut or wound area once daily for 2 to 3days. Alternatively, squeeze *Emblica officinalis* leaves and extract the juice to the cutonce daily for 3 to 4 days. Healing occurs when the dynamic harmony of the doshas is restored[53].

Skin Whitening:
Skin lightening agents have been widely used to either lighten or depigment the skin in the Asia, Far East and Middle East countries, whereas in the European market products tend to be employed for age spots and freckles. The effectiveness of astandardized antioxidant fraction of *Phyllanthus emblica* fruits as a skin lightener and also as an antioxidant was proven[60].

IN CURING OF OTHER DISEASES
Triphala containing one of the ingredients as EO is used to treat diseases such as anemia, fever, chronic ulcers, constipation, jaundice and asthma. Polyphenolic fractions isolated from Triphala exhibit antimutagenic effect[61]. Active principles of Triphala was further evaluated and used as an excellent therapeutic formulation for infected wounds[62].

Flavonoids derived from EO exibit maximum beneficial action by eliciting highly potent hypolipidaemic and hypoglycaemic activities. In addition to this, flavonoids were found to be effective in elevating the haemoglobin levels in rats[57]. It is also reported to be as antitumor[63].

Emblica officinalis reversed such alterations with significant regenerative changes indicating its preventive role in prefibroenesis of liver[64].

Extract of *Withania. Somnifera* root, but not *Emblica officinalis* fruit, caused a reproducible, dose dependent, inhibition of colony formation of CHO cells[65]. Hyper cholestermia is one of the factors that create coronary artery disease. Triphala formulation exhibit hypolipidemic effects on the experimentally induced hypercholesteremic rats were reported[66].

AMLA APPLIED IN VARIOUS COMBINATIONS

Emblica officinalis and *Evolvulus alsinoides* (Shankhpushpi) were assessed for its immune modulatory activity in adjuvant induced arthritic (AIA) rat model. Complete Freund's adjuvant (CFA) was injected in right hind paw of the animals induced inflammation. Lymphocyte proliferation activity and histopathological severity of synovial hyperplasia were used to study the anti-inflammatory response of both the extracts. Both the extracts showed a marked reduction in inflammation and edema and caused immunosuppression in AIA rats, indicating that they may provide an alternative approach for the treatment of arthritis[67].

EuMil is a polyherbal formulation composed of standardized extracts of *Ocimum sanctum, Withania somnifera, Asparagus racemosus* and *Emblica officinalis,* was used as an anti-stress agent to attenuate the various aspects of stress related disorders.

It has significant anti-stress and adaptogenic activities, qualitatively comparable to *Panex ginseng,* against a number of behavioral, biochemical and physiological perturbations, induced by unpredictable stress, which has been proposed to be a better indicator of clinical stress than acute stress. The contribution of the individual constituents of EuMil (polyherbal formulation) in the adaptogenic action has been reported[68].

Immu-21 is an Ayurvedic polyherbal formulation containing extracts of *Emblica officinalis, Ocimum sanctum, Withania somnifera* and *Tinospora cordifolia*. Its immune modulatory activity was studied on proliferative response of splenic leukocytes to T cell mitogens, concanavalin (Con)-A and phyto hemagglutinin (PHA) and B cell mitogen, lipopolysaccharide (LPS*) in vitro* by [3H]-thymidine uptake assay in mice. Pretreatment with Immu-21 selectively elevated the proliferation of splenic leukocyte to B cell mitogen, LPS and cytotoxic activity against K 562 cells in mice[69].

A herbo-mineral formulation of the Ayurveda medicine named Peptic8are, composed of *Emblica officinalis, Glycyrrhiza glaba* and *Tinosporacordifolia* was tested for its anti-ulcer anti-oxidant activity in rats. Reports were made that Pepticare exhibit antiulcer activity, which can be attributed to its anti-oxidant property[17].

Triphala is a traditional Ayurvedic herbal formulation, consisting of equal parts of three medicinal plants namely *Emblica officinalis, Terminalia chebula* and *Terminalia belerica*. Triphala strengthens the different tissues of the body, prevents ageing, promote health and immunity[70].

Kalpaamruthaa (KA) is a modified Siddha preparation containing *Emblica officinalis, Semecarpusan acardium* (SA and honey). The elevated levels of free cholesterol, total cholesterol, triglycerides, phospholipids and free fatty acids and decreased levels of ester cholesterol in plasma, kidney and liver found in cancer suffering animals were reverted back to near normal levels on treatment with KA and SA[36].

Dyspnoea (breathing difficulty): The following materials are all ground into a paste *Emblica officinalis* (10g leaves), *Terminalia chebula* (5 fruits), *Piper nigrum* (9 seeds), one garlic, 25 ml ghee (made from cow's milk) and a clove.Take the paste orally once daily for seven days to get relief. It is also used for oligopnoea (shallow or infrequent breaths) [7].

Fruits along with those of *Terminalia bellirica* and *T. chebula* are the constituents of "Triphala" which are used as a laxative[58].

A paste of the fruit alone or in combination with *Nelumbium speciosum* (the Egyptian Lotus),

Saffron [author's note: more likely to be *Curcumalonga* (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. A sherbet prepared from the fresh fruit with (or without) raisins and honey is a favoured cooling drink which has a diuretic effect. A decoction of the fruit with stems of *Tinospora cordifolia* is a wellknown remedy for various urinary diseases[71].

CONCLUSIONS: *Emblica officinalis* is a versatile plant due to its various medicinal properties. It is one of the oldest medicinal plant mentioned in Ayurveda as potential effects for various ailments. Fruit of *Emblica officinalis* are rich in Vitamin C, phyllaemblic compounds, gallic acid, tannins, flavonoids, pectin, and quercetin and also contains various polyphenolic compounds. A broad range of phytochemical components such as terpenoids, alkaloids, flavonoids, and tannins reviewed that it posses antioxidant, anticancer, antitumor, antigenotoxic, and anticarcinogenic effects and other pharmacological or biological activities. It is considered to be a safe herbal medicine without any adverse effects. So it can concluded that Indian gooseberry is a traditionally and clinical proven fruit for both its application and efficacy.

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Reviewer's recommendations:

1. Check for references. Kindly refer IJPSR format.
2. Check for spelling, grammar and punctuation error(s).