

An Analysis Regarding Properties and Health Benefits of Amla

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ABSTRACT: *Phyllanthus emblica* (Synonym: *Emblica officinalis*), often known as Indian gooseberry trees, has an important role in the treatment and management of illnesses and has been recorded since ancient times. It contains tannins, alkaloids, gallic acid, fiber, glucose, vitamin C, and is an excellent source of antioxidants. Because of its antioxidant properties, amla fruits are widely used to cure a variety of illnesses. Based on in vivo and in vitro research, Amla (*Emblica officinalis*) has a key role in lowering lipid peroxidation, oxidative stress, and reactive oxygen species, and increasing antioxidant levels, ultimately inhibiting pathogenesis. Its antioxidant, anti-inflammatory, hepatoprotective, gastroprotective, anti-diabetic, antibacterial, neuroprotective, cardioprotective, and immunomodulatory properties have been shown. Furthermore, many research have shown its function in cancer management. Through a review of in vivo and in vitro studies, this review comprehensively summarizes the function of Amla (*Emblica officinalis*) in illness treatment and management.

KEYWORDS: *Amla, Emblica officinalis, fruit, medicine, plant.*

1. INTRODUCTION

Plants and herbs are often utilized to treat a variety of illnesses by creating various medications or medicines from them. According to a global study, 80% of the population utilized traditional medications for primary health care, which were found to be appropriate for the other 20% of the population. Medicinal plants are extensively utilized in poor nations to cure a variety of illnesses. The amla tree (*Emblica officinalis*) is a well-known tree that is used to make herbal and pharmaceutical remedies. Acid, gallic acid, and phenols are found in *E. officinalis* trees. The majority of them are small or medium in size (8–18 m) and may be found in Pakistan, India, Sri Lanka, China, and Malaysia, among other places. Their leaves resemble pinnate leaves in that they are simple, dull green, and stalkless; their bark is thin and light gray in color; their blooms are greenish-yellow in color; and their fruits are pale yellow in color with six trigonal seeds packed in three firm shells each.

Amla has a high nutritional content and is the greatest source of inorganic content, amino acids, and ascorbic acid (Vitamin C). Alkaloids, tannins, and emblicanin A and B are some additional significant chemical components; the ellagic portion of *E. officinalis* has therapeutic properties, and the fruits, in particular, are used to treat jaundice, diarrhea, and inflammation. Amla is also used in medicine, either alone or in combination with other beneficial herbs, to treat stomach infections, liver infections, hair tonics, and ulcer prevention. Amla's pain-relieving properties, free radical rummaging properties, antimutagenic properties, cardioprotective, gastroprotective, nephron-protective, neuroprotective, and anticancerp roperties are all documented in pharmaceutical studies or study papers. All of the aforementioned characteristics make it more effective in treating a variety of illnesses, including cancer, diabetes, stomach ulcers, liver infections, cardiovascular diseases (CVD), and others[1].

The present debate is an attempt to understand the significance of Amla from a medical standpoint, as well as its nutritional benefits, common applications, and biochemical components. It also analyzes the research done on Amla and explains the characteristics of Amla that guarantee its significance and application in the treatment of various illnesses for future study[2].



Figure 1: Representation of Physical structure of Amla[3].

1.1. Chemomodulatory effect of amla:

Chemotherapy has been shown to have negative effects on normal cells. The side effects may be very severe at times, forcing the physician to stop or decrease the therapy dosage. This will have an impact on cancer control and, eventually, the patient's survival. Furthermore, the emergence of drug resistance is a significant issue in the treatment of cancer, since chemoresistance may lead to uninterrupted tumor cell growth and nonspecific toxicity of the antineoplastic agent given to normal cells. As a result, an agent that may selectively shield normal cells from the harmful effects of chemotherapy (chemoprotective agents) or sensitize tumor cells to anticancer medicines (chemosensetizers) is an appealing prospect in cancer treatment and a research aim[4].

The aqueous extract of amla was shown to be beneficial in decreasing cyclophosphamide-induced reduction of humoral immunity and restoring glutathione and antioxidant enzyme levels in mice's kidneys and liver. Amla has been shown to reduce cyclophosphamide-induced DNA damage in mouse bone marrow cells, as assessed by a decrease in both micronuclei and chromosomal aberration. Amla decreased cytochrome (Cyt) P450 levels, raised glutathione levels, antioxidant enzymes [glutathione peroxidase (GPx), glutathione reductase], and enhanced the detoxifying enzyme glutathione-S-transferase (GST), all of which contributed to these findings[5].

Amla significantly reduced the growth of human hepatocellular carcinoma (HepG2) and lung cancer (A549) cells in vitro, and synergized the lethal effects of doxorubicin and cisplatin, two

commonly used antineoplastic medicines. The cardiac myoblasts H9c2 cells were similarly protected from doxorubicin-induced toxicity by an ethanolic extract of amla. All of these findings point to the possibility that amla protects normal cardiac myoblasts from doxorubicin-induced cardiotoxicity while also sensitizing cancer cells to antineoplastic effects. However, further research is needed to confirm this theory, particularly in the relevant animal models of study[6].

1.2.Amla as a radioprotective agent:

Since the discovery of ionizing radiation's harmful effects, the goal of radiation research has been to create chemical radio protectors that can reduce the harmful effects of radiation on normal tissues. Amifostine, a thiol compound, is the only radio protector authorized by the Food and Drug Administration to decrease the incidence and severity of xerostomia in head and neck cancer patients receiving radiation. Unfortunately, the drug's use has been less than ideal so far, due to its unfavourable toxicity often being seen at the optimum radio protective dosages. In terms of amla's radio protective properties, research have demonstrated that giving it to mice once a day for 7 days before they were exposed to a sub lethal dose of g-radiation protected them against radiation-induced cancer. The best effect was seen at 100 mg/kg b.w. out of all the dosages tested. When compared to a control group, it delayed radiation-induced death and resulted in an 87.5 percent survival rate. No survivors were found in placebo-treated irradiation groups[7].

1.3.Amla as a chemopreventive agent:

Cancer chemoprevention has historically been described as a dietary or pharmacological strategy that uses nontoxic substances to prevent, postpone, or reverse carcinogenesis. In many kinds of human cancer, epidemiological studies have shown that natural food chemicals may alter the process of carcinogenesis, which comprises the three critical stages of start, promotion, and progression. Experiments have also shown the effectiveness of a variety of bioactive dietary components, indicating that natural dietary chemicals may soon be accepted as chemo preventive medicines. The potential of amla to provide chemo preventive benefits is addressed in the following sections. Amla is claimed to be effective in preventing the start, promotion, and development of cancer. The researchers discovered that feeding amla for seven days before and after DMBA therapy was less effective than giving it during the promotion (starting from the time of croton oil treatment and continued till the end of experiment for 16 weeks)[8].

However, when amla was supplied throughout the trial time, that is, before and after DMBA administration, as well as during the promotional stage, the greatest impact was seen. These findings may be attributed to the numerous protection systems in place. When amla is given before DMBA therapy, levels of antioxidant and phase II enzymes rise, but phase I detoxifying enzymes fall, perhaps preventing or reducing carcinogenesis. Amla, on the other hand, when given during the promotion period, may cause selective death of mutant and preneoplastic cells, reducing carcinogenesis. Amla phytochemicals such ellagic acid, gallic acid, and quercetin have chemopreventive properties and may have been responsible for the positive benefits[9].

1.4.Anti-inflammatory effects of amla:

Chronic inflammation has been shown to produce free radicals, and the oxidative and nitrosative stress that results is known to contribute directly or indirectly to malignant cell transformation by inducing genomic instability, epigenetic changes, inappropriate gene expression, and increased proliferation of mutated cells, apoptosis resistance, tumor neovascularization, and metastasis.

Experiments have revealed that the aqueous portion of the methanol extract of the leaves has anti-inflammatory properties in rat hind paw enema caused by carrageenan and dextran. The extract reduced migration of human polymorph nuclear cells and had anti-inflammatory properties, according to the findings. Amla extract and the phytochemical pyrogallol have also been found to have anti-inflammatory properties in studies. Recently, a researcher discovered that the phenolic compounds in amla had anti-inflammatory properties in animal models of study including carrageenan and cotton pellet-induced acute and chronic inflammatory responses. At large dosages, the impact was substantial and similar to the positive control[10].

1.5.Amla possesses immunomodulatory effects:

Immune activation is a good way to defend yourself against new infectious illnesses and certain malignancies. Immunostimulants boost the host's general immunity, trigger a nonspecific immunological response against microbial pathogens, and boost humoral and cellular immune responses by either increasing cytokine production or directly stimulating B- and T-lymphocytes. Amla is regarded an immunostimulatory agent in Ayurveda, and scientific investigations have confirmed this. Because of the increased activation of splenic NK cell activity and antibody-dependent cellular cytotoxicity, amla extends the life span of tumor-bearing mice. When the activities of NK cells and killer cells were reduced, either by cyclophosphamide or anti-asialo-GM1 antibody therapy, the increase in survival was entirely abolished, indicating that the observed benefits were due to immunomodulatory effects.

1.6.Amla as an antioxidant:

Superoxide dismutase, catalase, glutathione (GSH), GSH peroxidases, reductase, Vitamin E (tocopherols and tocotrienols), Vitamin C, and other dietary components are examples of protective antioxidant processes provided by nature. According to several epidemiological research, higher intake of antioxidant-rich components/nutrients is linked to a reduced incidence of a variety of human morbidities and deaths. Ongoing research has shown a wide range of possible uses for antioxidant/free radical interventions in disease prevention and control. Antioxidant activity has been found in natural compounds derived from dietary components such as Indian spices and medicinal herbs. The chemistry and antioxidant effects of EO fruit extracts were studied by Poltanov et al. The total phenol, total avonoid, and total tannin tests all yielded good results when extracts were used.

1.7.Amla as skin protector/UV protection:

The effects of amla extract on matrix metalloproteinases (MMPs) and procollagen synthesis in human skin fibroblasts were studied in vitro. The findings show that extract promoted fibroblast proliferation in a concentration-dependent manner, as well as procollagen synthesis in a time and concentration-dependent manner. It stimulates TIMP-1 in a significant way by

controlling collagen metabolism, and it works well in aesthetic, medicinal, and mitigation applications. Another research found that when emblica extract concentration was compared to untreated cells at 0.5 mg/ml, it provided a 9.5 0.28-fold protective response against UVB-induced collagen damage. At a dosage of 0.5 mg/ml, ascorbic acid provided 3.7 0.07-fold protection. The effectiveness of *Emblica officinalis* fruit in inhibiting photo-aging caused by UVB in human skin fibroblasts was discovered. UVB reduced cellular proliferation and promoted the protective pro-collagen 1 in *Emblica officinalis* fruit. The hyaluronidase inhibitory action of *Emblica officinalis* prevented the disrupted cell cycle caused by UVB from returning to its normal phase.

1.8. Role as skin protector/UV protection:

The purpose of this study was to determine the activity of *Emblica officinalis* fruits. In the therapy of osteoporosis and rheumatoid arthritis, extracts are used. *Emblica officinalis* extracts were shown to have a function in the triggering of mature cell death. It may be a crucial approach for reducing and preventing osteoporosis, joint degeneration, and skeletal complications caused by arthritis. The use of an aqueous extract of In a rat model, petroleum ether extracts of *Emblica officinalis* and *Cissus quadrangularis* significantly raised serum ALP levels, whereas serum hydroxyproline and TRAP levels returned to normal. Treatments with *Emblica officinalis* and *Cissus quadrangularis* showed a significant reduction in osteoporosis-induced loss of bone mass and strength.

2. DISCUSSION

Emblica officinalis Gaertn. or *Phyllanthus emblica* Linn, often known as Indian gooseberry or amla, is the most significant medicinal plant in Ayurveda, India's ancient medical system. The fruit is the most significant component of the plant, since it is used to cure a variety of illnesses. The fruit is used to treat a variety of ailments, including the common cold and fever; as a diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, alterative, antipyretic, anti-inflammatory, and hair tonic; to prevent peptic ulcer and dyspepsia; and as a digestive, either alone or in combination with other plants. Antipyretic, analgesic, antitussive, antiatherogenic, adaptogenic, cardioprotective, gastroprotective, antianemia, antihypercholesterolemia, wound healing, antidiarrheal, antiatherosclerotic, hepatoprotective, nephroprotective, and neuroprotective properties have been demonstrated in preclinical studies. Amla and several of its phytochemicals, such as gallic acid, ellagic acid, pyrogallol, certain norsesquiterpenoids, corilagin, geraniin, elaeocarpusin, and prodelphinidins B1 and B2, have also been found to have anticancer properties in research. Amla also has radiomodulatory, chemomodulatory, chemopreventive, free radical scavenging, antioxidant, anti-inflammatory, antimutagenic, and immunomodulatory characteristics, all of which are useful in the treatment and prevention of cancer. For the first time, this review analyses the findings linked to these characteristics and highlights the areas that need further investigation in order to determine its efficacy and usefulness as a cancer preventative and therapeutic medication in people.

3. CONCLUSION

For the most part, 80 percent of the population depends on traditional plant-derived capsules for basic health care. Furthermore, many naturally occurring medicines may be obtained quickly using plants. Furthermore, there may be a large market for natural medicines for purifying herbal tablets. Consumption of natural medicinal plants reduces a country's reliance on imported drugs. As a result, all herbal medications and unfinished natural pharmaceuticals should face the same cost-effective pharmaceutical challenge, which has become critical for new imitative prescription drugs. Although alternate drug structures are effective, they come with certain undesirable side effects that often create serious problems. Amla, a herbal medical medication, helps to alleviate many of the problems, as it plays an important part in the treatment of many illnesses. Amla, due of its higher antioxidant and biological nature, may help you avoid a slew of health problems by supplying essential vitamins, especially ascorbic acid.

Amla is the most frequently utilized herb in the Ayurvedic system of treatment, according to science. Amla has been shown to be effective in the treatment of a variety of serious illnesses, including diabetes, respiratory disorders, diarrhea, heart disease, and dental disease. Amla is a mouth cleanser and a tooth strengthener. Cell viability is improved, free radical generation is reduced, and antioxidant levels are increased when amla is present. Amla is a key component in a number of traditional Ayurvedic medicines, including Chyawanprash. It aids in the enhancement of intellect and memory. Amla has been utilized in traditional medicine for millennia, including Triphala and Brahma Rasayana. Dental patients should use amla in a variety of forms and formulations to maintain oral hygiene.

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