

## A Review on *Emblica officinalis* (Amla): A review of therapeutic applications

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### ABSTRACT: -

Amla or Amalaki is arguably the natural remedy's most popular ingredient. It serves as a food and a medication. The tiny fruit is packed with more health advantages than one could possibly think. Natural remedies from plants help people live healthy, disease-free lives. Widely grown in tropical and subtropical regions, the Indian gooseberry, or "amla," has the ability to treat harmful ailments. (2013) Vasant B.S. et al. Amla, which is the Hindi name for a fruit tree (*Phyllanthus emblica* or *Emblica officinalis*) that grows all over India and produces sour fruits that resemble gooseberries, literally means "sour." The Sanskrit term "Amalaki" is another name for amla. Other titles for amla in Sanskrit include "mother," "nurse," and "immortality," which bear witness to the fruit's power for healing. Amla improves digestion, regulates stomach acid, fortifies the liver, feeds the brain and mental function, supports the heart, bolsters the lungs, controls free radical elimination, improves fertility, aids the urinary system, improves skin health, promotes healthier hair, acts as a body coolant, flushes out toxins, boosts vitality, fortifies eyes, strengthens muscles, and acts as an antioxidant. The fruit that you can consume regularly without experiencing any bad effects is definitely amla. Being natural, it can be consumed frequently for a long period without producing any negative or even desired effects. Numerous benefits come with this specific natural substance, according to Forman. Amla becomes a staple in practically all the foods because of its numerous health benefits: the digestive system, the eyes, and the hair.

**Keywords-**Amla, Health Benefits,

### I. INTRODUCTION

The foundational tenets of yoga and naturopathy state that good physical and mental health go hand in hand. Amla is therefore a gift from nature to people and is given by mother nature as a blessing from God to their offspring (humans), providing us with a long and healthy life. Amla is an animal port and medicinal plant, widely known as Indian Gooseberry in English. The Sanskrit term amlaki, which signifies the sustainer or prosperity, is where the English word amla is originated. Its fruit pulp has anti-aging benefits and is utilized for rejuvenation (Sri Vasuki, 2012). (Sri Vasuki, 2012). It has strong antioxidant and immunomodulatory effects (Jain et al., 2015). Amalaki supplies a good number of minerals, including Vitamin C, while lowering free radicals in the body.<sup>[1]</sup>

It is held in equal reverence by physicians who practice Islam and Hinduism. No other fruit or food can currently be compared to this berry as a source of vitamin C, as confirmed by laboratory tests (Kulrajan 1983). Amla is good at reducing the effects of ageing. Damage to numerous cells and tissues, primarily caused by oxygen free radicals, over time results in ageing. Free radicals are destroyed by vitamin C, which also acts as a scavenger for them. Vitamin C and vitamin E work together as an antioxidant to stop the pre-oxidation of lipids. The antioxidant capabilities of Amla berries have been scientifically shown to treat liver toxins, high blood cholesterol, and age-related renal diseases (Jain et al., 2015). It has always been held in high regard.

Formerly known as "Earth Mother." The

fruit of the tree is what is most renowned. The fruit has six vertically striped firm seeds within and is tiny and light green in hue. Three sides and three angles make up the seed.<sup>[1]</sup>

**CLASSIFICATION: -**

Kingdom: Plantae

Division: Angiospermae

Class: Dicotyledonae

Order: Geraniales

Family: Euphorbiaceae

Genus: *Emblica*

Species: *officinalis* Geartn.<sup>[1]</sup>

**Uses**

*E. officinalis* is used in the Siddha, Unani, Tibetan, Sri Lankan, and Chinese systems of medicine.

*E. officinalis* is regarded as a potent rasayana (rejuvenator) and is helpful in postponing both the degenerative process and the ageing process. It promotes longevity, better digestion, and the relief of constipation. According to the ayurvedic medical system, it also lowers fever, purifies the blood, lessens cough, soothes asthma, strengthens the heart, benefits the eyes, promotes hair development, energizes the body, and sharpens the mind. The astringent fruits are used in many traditional medicines to treat a variety of ailments, including ophthalmic issues, dyspepsia, gastritis, hyperacidity, constipation, colitis, hemorrhoids, hematuria, menorrhagia, anemia, diabetes, cough, asthma, osteoporosis, premature greying of hair, weakness, and fatigue. Additional benefits of *E. officinalis* include hepatoprotective, cardioprotective, diuretic, laxative, refrigerant, stomachic, restorative, alterative, antipyretic, and anti-inflammatory effects. *E. officinalis* is a digestive aid and a hair tonic in addition to preventing peptic ulcer dyspepsia.<sup>[2,5]</sup>

**POTENTIAL THERAPEUTIC APPLICATION: ANTIOXIDANT:**

Superoxide dismutase (SOD), catalase (CAT), glutathione (GSH), GSH peroxidases, reductase, vitamin E (tocopherols and tocotrienols), vitamin C, and other protective antioxidant processes have been bestowed upon us by nature. According to various epidemiological research, higher consumption of substances or minerals having antioxidant properties has been linked to a reduced frequency of a variety of human morbidities or fatalities. Ongoing research has shown a variety of possible uses for manipulating free radicals or antioxidants in the prevention or

treatment of disease. Antioxidant activity is known to be present in natural compounds derived from dietary components such as Indian spices and medicinal herbs.<sup>[6]</sup> The chemistry and antioxidant qualities of *E. officinalis* fruit extracts were studied in the Poltanovetal investigation. The total phenol, total flavonoid, and total tannin assays gave extracts favorable results.<sup>[7]</sup>

**Hepatoprotective**

The use of natural treatments for liver problems has a long history, starting with Ayurvedic medicine and progressing to Chinese, European, and other traditional medical systems.<sup>[11]</sup> In addition to being isolated, these phytochemicals can also be produced into single-ingredient medications that meet the quality and requirements of contemporary medicine. Each hepatoprotecting plant should undergo pharmacological validation, which includes an assessment of its effectiveness against liver illnesses brought on by various substances.

Injury to the liver is exacerbated by oxidative stress and inflammation. The antioxidant *E. officinalis*, which is high in vitamin C, gallic acid, flavonoids, and tannins, guards against liver damage brought on by hepatotoxicity. Through its antioxidant, anti-inflammation, anti-apoptosis, and anti-autophagy capabilities, *E. officinalis* supplement activity counteracts N-nitrosodimethylamine (NDEA) produced liver injury.<sup>[13]</sup> The pretreatment of *E. officinalis* for seven days in a row demonstrated a significant pathological protection to liver cells as defined by unit vacuolate hepatocytes. Prior to the harmful action of CCl<sub>4</sub> (Carbon Tetrachloride), pretreatment with *E. officinalis* caused a significant drop in serum levels.

DNA synthesis, lipid peroxidation (LPO), lactate dehydrogenase (LDH), serum glutamic pyruvic transaminase, glutamic oxaloacetic transaminase, and GSH-S-transferase. Additionally, levels of decreased GSH, GSH reductase, and GSH peroxidase were elevated. The findings imply that *E. officinalis* prevents Wistar rats' liver damage.<sup>[14]</sup> Tasduqetal, exemplified a 50% hydroalcoholic extract of *E. officinalis* (fruit) fruits' hepatoprotective qualities against anti-tuberculosis drug-induced liver damage. It was discovered that EO-50's hepatoprotective efficacy was a result of its membrane stabilizing, antioxidative, and CYP 2E1 inhibiting properties.<sup>[15]</sup> Two of the key underlying processes causing alcohol-induced liver damage and mitochondrial

dysfunction are oxidative stress and ROS-mediated toxicity. It was investigated how *E. officinalis* fruit extract (EFE) affected alcohol-induced liver damage in rats. According to in vitro research, EFE has antioxidant and nitric oxide (NO) scavenging properties.

In vivo injection of EFE to intoxicated rats considerably reduced the level of soft lipid peroxidation and protein carbonyls while also significantly increasing the level of both enzymatic and non-enzymatic antioxidants. A liver histopathology investigation confirmed this observation. Accordingly, these findings imply that the tannoid, flavonoid, and NO-scavenging chemicals found in EFE may provide protection against free radical-mediated oxidative stress in rat hepatocytes of animals with alcohol-induced liver injury. Atypical histology was found after long-term CCl<sub>4</sub> and thioacetamide treatment, which is suggestive of pre-fibrotic events. With significant regenerative changes that are indicative of its preventative effect in liver pre-fibrogenesis, EO corrected such modifications. Pre-fibrotic processes might be reversed as a result of its beneficial antioxidant activity.<sup>[18,20]</sup>

#### **NEPHROPROTECTIVE: -**

The effects of *E. officinalis* on renal failure brought on by oxidative stress throughout the ageing process were studied by Yokozuna et al. Following the injection of *E. officinalis* extract, the aged rats' elevated serum creatinine and urea nitrogen levels decreased. The tail arterial blood pressure was also much lower. The extract significantly decreased the amounts of thiobarbituric acid-reactive material in the blood, renal homogenate, and mitochondria of elderly rats, indicating that *E. officinalis* would ameliorate oxidative stress brought on by ageing. Age-related increases in cyclooxygenase (COX)<sub>2</sub> and inducible nitric oxide synthase (iNOS) expression. Additionally, rats were severely decreased. With age, there was also an increase in the expression of renal nuclear factor kappa B, cytoplasmic ion inhibition, and COX<sub>2</sub> protein levels. These findings suggest that *E. officinalis* might be an excellent antioxidant for the prevention of kidney illness associated with ageing. Chen et al. investigated the possibility of reducing oxidative stress in uremia patients by supplementing with *E. officinalis* extract. According to the results, supplementing uremic patients with *E. officinalis* extract for four months lowered plasma levels of the oxidative marker 8-isoprostaglandin and

enhanced plasma total antioxidant status.<sup>[25]</sup>

#### **HYPOLIPIDEMIC: -**

India is currently dealing with a secret epidemic of ischemic heart disease, type 2 diabetes mellitus (T2DM), hypertension, and stroke. Compared to white individuals, Indians experience both diabetes and chemical heart disease ten years earlier. The emerging findings that certain medicinal plants have hypoglycemic, lipid-lowering, and immune-modulating capabilities because of their abundant flavonoid and/or other glucose-lowering active ingredients should be subjected to scientific investigation.

Lipid levels, including cholesterol and triacyl glycerides, that were noticeably elevated in the liver and serum of elderly control rats were significantly decreased by the injection of *E. officinalis*. The transcription of genes encoding proteins that govern lipid and cholesterol metabolism is well known to be regulated by peroxisome proliferator-activated receptors (PPA-Ralpha). However, an oral dose of *E. officinalis* significantly increased the level of liver Para alpha protein. Additionally, aged rats receiving oral doses of *E. officinalis* had considerably lower levels of blood and liver Thio-barbituric acid-reactive material. These findings suggest that by reducing oxidative stress associated with ageing, *E. officinalis* may prevent age-related hyperlipidemia.<sup>[26]</sup>

In response to treatment with *E. officinalis*, levels of total cholesterol (TC), low-density lipoprotein (LDL), triglyceride (TG), and very LDL significantly decreased, while levels of HDL significantly increased. A large amount of protection against atherosclerosis and coronary artery disease would be provided by adding *E. officinalis* to the current hypolipidemic therapy, according to the aforementioned findings. A decrease in the dosage and undesirable effects of the hypolipidemic medications may help<sup>[27]</sup>

#### **METALICSYNDROME: -**

The hyper triacyl glycerol anemia and hyper cholesterol anemia caused by high fructose were both reduced by the ethyl acetate extract of *E. officinalis*. These results imply that the polyphenol-rich fraction of *E. officinalis* attenuates the metabolic syndrome caused by fructose.<sup>[29]</sup>

#### **CARDIOPROTECTIVE: -**

OxLDL is the primary etiologic factor in atherogenesis, and antioxidants are recognized as a

successful atherosclerosis treatment. According to the findings, *Phyllanthus emblica* can slow the progression of atherosclerosis by reducing oxidative stress or by preventing ox-LDL-induced vascular smooth muscle cell proliferation. These potential treatment options for atherosclerosis are suggested by the results.

Regulating hyperglycemia, hyperlipidemia, and oxidative stress are crucial goals in preventing cardiac dysfunction brought on by diabetes. Patel et al. investigated the effects of the fruit juice from *E. officinalis* on cardiac dysfunction in diabetic rats. Treatment with the fruit juice stopped not only the streptozotocin-induced weight loss, increases in food and water intake, increases in serum glucose levels, and altered lipid profiles, but also the rise in serum LDH and creatinine kinase MB levels, cardiac hypertrophy, and cardiomyopathy. In diabetic hearts, there was a decline in antioxidant enzyme levels (in SOD, decreased GSH, and CAT), which might be repaired by fruit juice therapy. Fruit juice from *E. officinalis* may therefore be helpful in treating cardiac damage brought on by type 1 diabetes mellitus. Fruit juice from *E. officinalis* has greater effectiveness than tributes praised for the amount of polyphenol present.<sup>[31]</sup>

#### DIABETIC: -

Diet has been acknowledged as the foundation for managing diabetes mellitus. Experimental studies have shown that the anti-diabetic properties of fenugreek seeds (*Trigonella foenumgraecum*), garlic (*Allium sativum*), onion (*Allium cepa*), and turmeric (*Curcuma longa*) exist. Few investigations have revealed the hypoglycemic properties of cumin seeds (*Cuminum cyminum*), ginger (*Zingiber officinale*), mustard (*Brassica nigra*), curry leaves (*Murray konini*), and coriander (*Coriandrum sativum*)<sup>[33]</sup>.

One of the most typical types of neuropathies is diabetic more than 50% of diabetic individuals are troubled by the microvascular consequences of diabetes mellitus. According to the Tiwari et al. study, *E. officinalis* extracts not only reduced diabetes symptoms in diabetic rats but also cured neuropathic pain by modulating oxidative and nitrate stress.<sup>[35]</sup>

Even Kumaretal looked into the effects of a fruit extract from the *E. officinalis* plant on type II diabetic neuropathy in male Sprague-Dawley rats. In comparison to control rats, diabetic rats treated with *E. officinalis* extract (EOE) showed a significantly higher tail flick delay in the hot

immersion test and a higher pain threshold level in the hot plate test. The increases in lipid peroxidation status and anti-oxidant enzyme levels (SOD and CAT) shown in diabetic rats were effectively reversed by *E. officinalis* extract. *E. officinalis* extract also reduced the axonal damage brought on by diabetes. In an animal model of diabetic neuropathy, the study provides scientific proof of the preventative and therapeutic effects of *E. officinalis* on nerve function and oxidative stress.

*E. officinalis* fruit may be considered for preventive therapy in diabetic individuals at risk of developing neuropathy because it is being used clinically for diabetic patients.<sup>[36]</sup>

#### IMMUNOSTIMULANT: -

Numerous plants have immunostimulatory properties.<sup>[38]</sup> It has been discovered that *E. officinalis*, a superb source of vitamin C (ascorbate), enhances the activity of natural killer (NK) cells and antibody-dependent cellular cytotoxicity. Splenic NK cell activity was increased by two-fold as a result of *E. officinalis* stimulation. *E. officinalis* treatment gave tumor-bearing mice a 35% longer life expectancy.<sup>[39]</sup> Using chromium (VI) as an immunosuppressive agent, Sai Ram et al. also looked into the anti-oxidant and immunomodulatory characteristics of *E. officinalis*.

Chromium causes cytotoxicity, the formation of oxidative radicals, lipid peroxidation, reduced GPx activity, and decreased Shelves. Significant inhibition of lipopolysaccharide- and concanavalin-A-stimulated lymphocyte proliferation was also observed. Additionally, concanavalin A induced interleukin 2 and gamma interferon production was reduced by chromium. Cr increased DNA fragmentation and apoptosis. The formation of free radicals caused by Cr was greatly reduced by *E. officinalis*, and the antioxidant status was returned to normal. Additionally, *E. officinalis* prevented Cr-induced DNA fragmentation and apoptosis.

It's interesting to note that *E. officinalis* significantly increased the generation of IL-2 and gamma-IFN and reduced the immunosuppressive effects of Cr on lymphocyte proliferation.<sup>[40]</sup>

#### ANTIMICROBIAL: -

Globally, infectious diseases are a significant cause of morbidity and mortality. It may be the cause of up to 20% of deaths in America and as much as 50% of all deaths in tropical nations.

Despite the significant progress made in microbiology and the management of microorganisms, periodic outbreaks of epidemics caused by drug-resistant germs and previously unidentified disease-causing microbes constitute a serious threat to public health. These unfavorable health trends necessitate a global initiative for the creation of cutting-edge strategies for the prevention and treatment of infectious disease. Chemical compounds derived from medicinal plants have been used as models for many clinically effective medications for over a century; these compounds are now being reevaluated as potential antibacterial agents. The reasons for this resurgence include a decline in the number of new antibacterial drugs in the pharmaceutical pipeline, a rise in antimicrobial resistance, and the fact that many medicinal plants are effective against a variety of gramme positive as well as gramme negative bacteria and that many plant species have been tested in vitro against hundreds of bacterial strains.<sup>[41]</sup>

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