



Oral Health Benefits of *Phyllanthus Emblica*

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ABSTRACT: <i>Phyllanthus emblica</i> also known as <i>Emblica officinalis</i> belongs to the Euphorbiaceae family. It is also known as Indian gooseberry, emblic myrobalans, and Amla (in Hindi). It has anti-inflammatory, antioxidant, cryoprotective, antiaging, antidiabetic and hepatoprotective properties. The fruit of Amla is rich in vitamin C (ascorbic acid) and contains several bioactive phytochemicals. It also contains polyphenols such as ellagic acid, chebulinic acid, gallic acid, chebulagic acid, aepigenin, quercetin, corilagin, leutolin. It has antimicrobial and anti-ulcerative property. It is used for management of oral ulcers and periodontal diseases.	REVIEW PAPER
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INTRODUCTION

Phyllanthus Emblica, also known as emblic, emblic myrobalan, myrobalan, Indian gooseberry, Malacca tree, or amla from Sanskrit amalaki is a deciduous tree of the family Phyllanthaceae. It is an important medicinal plant in the traditional Indian system of Ayurvedic medicine. The plant species is native to India, also growing in Sri Lanka, Uzbekistan, South East Asia, and China nowadays [1]. The fruits, which are of both dietary and medicinal use, are shown to possess myriad medicinal benefits and used in various folk and Indian traditional medicinal systems. *Phyllanthus emblica* is highly nutritious and is an important dietary source of vitamin C, amino acids, and minerals. The plant also contains phenolic compounds, tannins, phyllembelic acid, phyllembelin, rutin, curcuminoids, and emblicol. All parts of the plant are used for medicinal purposes, especially the fruit, which has been used in Ayurveda as a potent rasayana and in traditional medicine for the treatment of diarrhea, jaundice, and inflammation [2].

Description of *Phyllanthus Emblica* in Ayurveda

It is described in Ayurveda as a fruit having five tastes, including sweet, bitter, and pungent with sour taste being the dominant. It is effective in Vata, kapha and pitta humor. It has cooling nature with light and dry quality making it beneficial in management of inflammation and fever. Its natural balance of tastes (sweet, sour, pungent, bitter and astringent) stimulates the brain to rebalance the three main components of all physiological functions, the water, fire, and air elements within the body [3].

Chemical Composition of *Phyllanthus Emblica*

It is often used in the form of Triphala, which is an herbal formulation containing fruits of *Terminalia bellirica*, *Terminalia chebula*, and *Emblica officinalis* in equal amount. *Terminalia bellirica* is composed of tannic acid, gallic acid, ellagic acid, anolignan B, flavonoids and termilignan. It has an antioxidant, antibacterial, anti-spasmodic, cardioprotective, hepatoprotective, hypoglycemic and bronchodilatory properties. Therefore, it is beneficial in the management

of various diseases like diarrhea, hypertension asthma, inflammation. *Terminalia chebula* is composed of tannin, polyphenols and anthraquinones. It has antiviral, antifungal, antibacterial, antioxidant, anti-mutagenic properties. It has been used effectively in the treatment of diabetes, hypercholesterolemia and retinopathy. *Emblica officinalis* is composed of Vitamin C, riboflavin, carotene, nicotinic acid and tannins. It has antipyretic, analgesic, immunomodulatory, anti-tussive and cytoprotective properties. It is effectively used in the management of ulcers, diabetes, cancer, ophthalmic disorders, and liver disorders [4]. Triphala is also composed of tannins, alkaloids, phenolic compounds, amino acids, and carbohydrates. Its fruit juice contains the highest Vitamin C (478.56 mg/100 mL). It also contains gallic acid, ellagic acid, 1-O-galloyl-beta-D-glucose, 3, 6-di-O-galloyl-D-glucose, 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 isostrictinin. *P. emblica* is also composed of flavonoids, kaempferol-3-O-alpha-L-(6"-methyl)-rhamnopyranoside, and kaempferol-3-O-alpha-L-(6"-ethyl)-rhamnopyranoside. A new acylated apigenin glucoside (apigenin-7-O-(6"-butyryl-beta-glucopyranoside) was isolated from the methanolic extract of the leaves of *P. Emblica* together with the known compounds; gallic acid, methyl gallate, 1, 2, 3, 4, 6-penta-O-galloylglucose, and luteolin-4'-O-neohesperidoside were also reported [4].

Tannins: It is a group of polymeric phenols possessing astringent property. This group of compounds, especially green teas and red wines, prevent variety of illnesses. They have been shown to exhibit physiologic properties such as stimulation of phagocytic cells, host-mediated tumor activity and a wide range of anti-infective actions. The anti-microbial action may due to their ability to inactivate microbial adhesions, enzymes, and cell envelope transport proteins [5].

Quinones: It has an antimicrobial property. Its potential sites of action are surface-exposed adhesins, cell wall polypeptides, and membrane-bound enzymes. It provides a source of stable free radicals leading to the inactivation of the protein and loss of function [6].

Flavones, flavonoids, and flavanols: These are effective antimicrobial substances against a wide array of microorganisms. They are mainly synthesized by plants in response to microbial infection. They bind with the extracellular proteins and form complex with the bacterial cell wall [7].

Mechanism of action of *Phyllanthus Emblica*

Disease is the result of the imbalance in the natural homeostasis of the body. It causes increased

production of free radicals or inability of antioxidants to scavenge free radicals to protect the body against ill effects of free radicals. *Phyllanthus Emblica* contains Vitamin-C and hydrolysable tannins having antioxidant properties. Tannins in the form of emblicanin A, emblicanin B, punigloconin and pendunculagin protect the body against oxidized free radicals. Tannins also recycle the sugar molecule and convert them into medium and high molecular weight tannins. Due to powerful antioxidant property, it enhances natural cell killer (NK) activity and protect the gingiva against oral micro pathogens [8].

Oral health benefits of *Phyllanthus Emblica* Cancer Prevention

Phyllanthus Emblica might prevent reactive oxygen species induced DNA damage and oncogenesis due to its potent free radical scavenging activities. *Phyllanthus Emblica* extracts have anti-inflammatory activities that might prevent cancer related inflammation. Finally, *Phyllanthus Emblica* possess potent antitumor activity. Studies have shown that even exposure to low levels of extract from these berries may be enough to impair tumor progression at early stages. *Phyllanthus Emblica* is rich in polyphenols and hydrolysable tannin derived compounds which act as antioxidants. Well-studied examples include ellagic acid, gallic acid, and chebulagic acid. These and other tannins from *Phyllanthus Emblica* have been demonstrated to prevent mutagenesis and lipid peroxidation in response to carcinogens and reactive oxygen species. It is likely that the combination of these compounds acting in synergy allows Amla extract to soak up free radicals with such efficiency and imparts the extracts with cancer-preventative properties. Alkylating carcinogens generate DNA mutations through carbon oxidation or conjugation reactions with nucleic acids. Tannins from *Phyllanthus Emblica* impairing NF-kappa B inhibition include chebulagic acid, ellagic acid, and corilagin. All of them have been shown to have antiproliferative and proapoptotic properties against cancer cells [9].

Oral Ulcers

The tannins and phenolic compounds, having antioxidant properties, are effective in the management of oral ulcers. It is beneficial in the healing of oral ulcers when used in the combination with honey. A decoction of the leaves is useful as a mouthwash in the treatment of aphthous stomatitis [10].

Candidiasis

Various in vitro studies have shown that the extracts have inhibitory effect on the growth of various fungus, such as Trichophyton species, Candida species (including clotrimazole-resistant Candida albicans), Aspergillus species, and Torulopsis glabrata. Hence it can be used as an antifungal agent [11-13].

Gingival and Periodontal Diseases

Emblica Officinalis is rich in Vitamin C and other phytoconstituent. It acts as antioxidant and antibiotic agent; hence it can be used in treatment of desquamative gingivitis. A study using 10% *Emblica Officinalis* mouthwash has found to significantly reduce plaque index, bleeding index and pocket depth. Many in vitro and in vivo studies have shown that its decoction as mouthwash has effectively controlled the growth of plaque causing bacteria. Hence it can be used as an effective plaque controlling agent [14-16]. The powder of the dry herb, mixed with an equal quantity of sugar, can be taken in doses of one teaspoon, thrice daily with milk can be effectively used in management of Scurvy [17].

Dental Caries

Terminalia chebula extract have shown to inhibit the growth as well as sucrose and glucan induced adherence of *S. mutans*. This would prevent the plaque accumulation and acid production, thereby preventing the development of dental caries [18, 19].

Endodontic Infections

Various studies have shown that extracts of Triphala have an anti-bacterial effect on the facultative anaerobic bacteria present in the root canals. It can be used as effective root canal irrigant in endodontic infections during the root canal treatment [20, 21].

CONCLUSION

Phyllanthus Emblica is beneficial against various diseases such as diabetes, respiratory disorder, diarrhea, heart and dental disease. It cleanses the mouth and strengthens the teeth. It increases the cell survival and decreases free radical production. There are various classic Ayurvedic preparations, such as Chyawanprash, in which *Phyllanthus Emblica* is used as a chief ingredient. It helps to improve intelligence and memory power. *Phyllanthus Emblica* has anti-cariogenic effect. Its extract should be used in various forms and preparations for root canal irrigation and management of periodontal diseases.

Reply to the reviewers' comments

Reviewer Number	Original comments of the reviewer	Reply by the author(s)	Changes done on page number and line number
1	Kindly read more literature before writing a review article seems like article has to be checked for grammar, Role of Triphala in dentistry Shobha Prakash, Anup U. Shelke J Indian Soc Periodontol. 2014 Mar-Apr; 18(2): 132-135. doi: 10.4103/0972-124X.131299 PMID: PMC4033874 Determining the antibacterial substantivity of Triphala mouthwash and comparing it with 0.2% chlorhexidine gluconate after a single oral rinse: A crossover clinical trial. J Indian Soc Periodontol. 2018 Nov-Dec;22(6):498-502. doi: 10.4103/jisp.jisp_265_18. Herbal panacea: The need for today in dentistry Mukut Seal, Rahul Rishi, G. Satish, K. T. Divya, Pratim Talukdar, Radhika Maniyar J Int Soc Prev Community Dent. 2016 Mar-Apr; 6(2): 105-109. doi: 10.4103/2231-0762.178744 https://www.researchgate.net/publication/259353989_An_in-vivo_comparative_evaluation_of_two_herbal_extracts_Emblica_officinalis_and_Terminalia_Chebula_with_chlorhexidine_as_an_anticalcaries_agent_A_preliminary_study https://www.phytojournal.com/vol1Issue1/Issue_may_2012/2.pdf --- kindly read this article seemed to have copied a lot from other articles Kindly check the article for grammar, rephrase the sentences.	Thank you for your expert comment. I have made the necessary corrections in the manuscript and also added the needful.	2-10 page number

Reply by the author(s)

Determining the antibacterial substantivity of Triphala mouthwash and comparing it with 0.2% chlorhexidine gluconate after a single oral rinse: A crossover clinical trial

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