

## Potential Health Benefits of Amla (*Phyllanthus Emblica*): A Review

Swati Nakhale<sup>1</sup>, Souvik Tewari<sup>2</sup>, Sudhakara Rao J<sup>3</sup>

<sup>1</sup> (Principal, IIFST, Aurangabad, Maharashtra, India.)

<sup>2</sup> (Assistant Professor, Dept. of Home Science, (IIFST, Aurangabad, Maharashtra) cum PhD scholar in FST, WCDT, SHUATS, Allahabad, U.P., India.)

<sup>3</sup> (Assistant Professor cum HOD, Dept. of Home Science, IIFST, Aurangabad, Maharashtra, India.)

<sup>2</sup>Corresponding Author: [souviktevari@gmail.com](mailto:souviktevari@gmail.com)

### To Cite this Article

Swati Nakhale, Souvik Tewari and Sudhakara Rao J, "Potential Health Benefits of Amla (*Phyllanthus Emblica*): A Review", *Journal of Science and Technology*, Vol. 06, Issue 01, Jan-February 2021, pp83-87

### Article Info

Received: 15-08-2020

Revised: 10-11-2020

Accepted: 24-11-2020

Published: 04-12-2020

**Abstract:** Medicinal plants are gifted by nature for growth and maintenance of mankind. They possess most of the health benefits and they are much safer to consume. *Phyllanthus emblica* (Amla) is one of those medicinal plants which play a crucial role in maintaining human health. It is most widely used because it will help to increase body's immune power. *P. emblica* is highly nutrient dense fruit which contain high amount of vitamin C, minerals, amino acids, antioxidants and phytochemical. It also acts as a laxative, diuretic, and used as a tonic in conditions like fever and cold. This review is based on a phytochemical study of *P. emblica*. Amla contain certain naturally occurring bioactive compound or phytochemicals such as tannin, flavonoids, poly phenols, saponine, alkaloids, lupeol, ellagic acid, gallic acid, essential oils, fixed oils, etc. All this bioactive compound may possess an immunomodulatory effect, anti-cancer, anti-microbial, anti-diabetic, hepato protecting, and cardio protecting activities. Nowadays use of such types of natural sources are increasing widely and people are more aware regarding to harmful chemical constituents, therefore this study may helpful in identification of natural bioactive compound which are found in amla. The main objective of this review is to know the bioactive component which presents in Amla and its significant health benefits. This review also includes an overview on detail study of Amla known to be an antioxidant and antimicrobial source.

**Keywords:** Amla, *Phyllanthus emblica*, phytochemicals, bioactive compound, vitamin C, antioxidants.

### I. Introduction

Amla is a medicinal plant which was gifted by nature for growth and maintenance of each and every living animals including mankind. These type of medicinal plants plays a crucial role in maintaining human health (Fairuz and Mohammad 2019). *Emblica officinalis* or *Phyllanthus emblica* Gaertn. belongs to Family–Euphorbiaceae and is commonly known as 'Amla' or Indian gooseberry, which are generally grows in the subtropical and tropical regions of Southeast Asia including southern India and China. (Mirunalini & Krishnaveni 2010; Gaire & Subedi 2014) In Ayurveda preparation Amla is most widely used fruit, because it believed that it helps to boost immunity power and increase defense mechanism of body against certain disease condition. (Panda & Kar 2003) Amla is highly nutrient dense food which contain high amount of vitamin C, amino acids, minerals, and phytochemicals (Srivastu, 2009).

Amla content certain bioactive molecules which are also known as phytochemical (chemical constitute which found in plant) such as tannins (both ellagitannins and Gallo tannins), alkaloids, phenols, flavonoids, saponins, terpenoids, ascorbic acid, carbohydrates and many other compounds (Khan 2009). Some studies show that active compounds like Gallic acid, ellagic acid, 1-O-galloyl-D glucose, chebulinic acid, quercetin, chebulagic acid, kaempferol, mucic acid 1,4-lactone 3-O-gallate, isocorilagin, chebulanin, mallotusin and acylated apigenin glucoside compounds have been isolated from Amla. These bioactive compounds are acts as antioxidants which scavenge free radicals and cancer causing agents (Zhang *et al.*, 2003; Habib ur Rehman *et al.*, 2007; Deousky *et al.*, 2008; Luo *et al.*, 2011). These all phytochemical may show anticancer, hypolipidemic, antibacterial, hypoglycemic (Liu *et al.*, 2012; Jamwal *et al.*, 1959) hepatoprotective, hypolipidemic effects on our body, which makes amla as

superfood (Thakur *et al.*, 1984). Consumption of amla improves digestion, reduce burning sensation and acts as a diuretic, laxative and also used in treatment of anemia (Kumar *et al.*, 2012).

The main objective of this study is to know the various bioactive compound or phytochemicals which are mainly present in amla and its probable health benefits. This review includes an overview on detail study of Amla known to be an antioxidant and antimicrobial source.

## II. Phytochemistry of Amla

### 2.1 General introduction of Phytochemistry

Phytochemicals are chemical constituent which are naturally found in all medicinal plant, leaves, vegetables and roots. These phytochemicals may protect us from disease causing agents and boost our immune system. Phytochemicals are generally divided into two main compounds as follows,

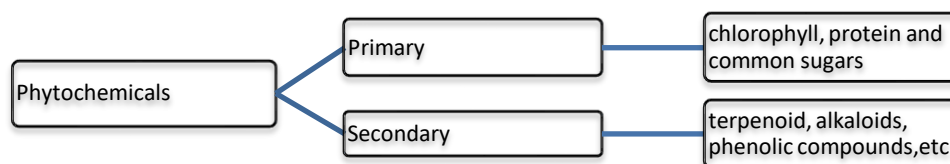


Fig. 2.1 classification of phytochemicals (Wadood *et al.*, 2013)

Each and every part of *Phyllanthus emblica*(Amla) plant constitute of bioactive compound which are illustrate in following table:

Table No. 1.1: chemical constituent found in each part of Amla plant (Khan, 2009).

Part of Amla plant	Chemical constituents found in each part of Amla
Leaves	Gallic acid, chebulic acid, ellagic acid, chebulinic acid, chebulagic acid, amlic acid, alkaloids phyllantine and phyllantidine (phenolic compound, tannin and alkaloids resp)
Seeds	fixed oil, phosphatides and a small quantity of essential oilsuch as linolenic acid (8.78%), linoleic (44%). oleic (28.40%), steric (2.15%), palmitic (2.99%) and meristic acid (0.95%)
Barks	leukodelphinidin, tannin and proanthocyanidin
Roots	Ellagic acid and lupeol

Some studies show that carbohydrates and tannin were also found in amla leaves due to presence of ethanolic extract in *Emblca officinalis* as a chemical constitute (Patil *et al.*, 2018).

2.2 structural representations of some phytochemicals present in *Phyllanthus emblica*

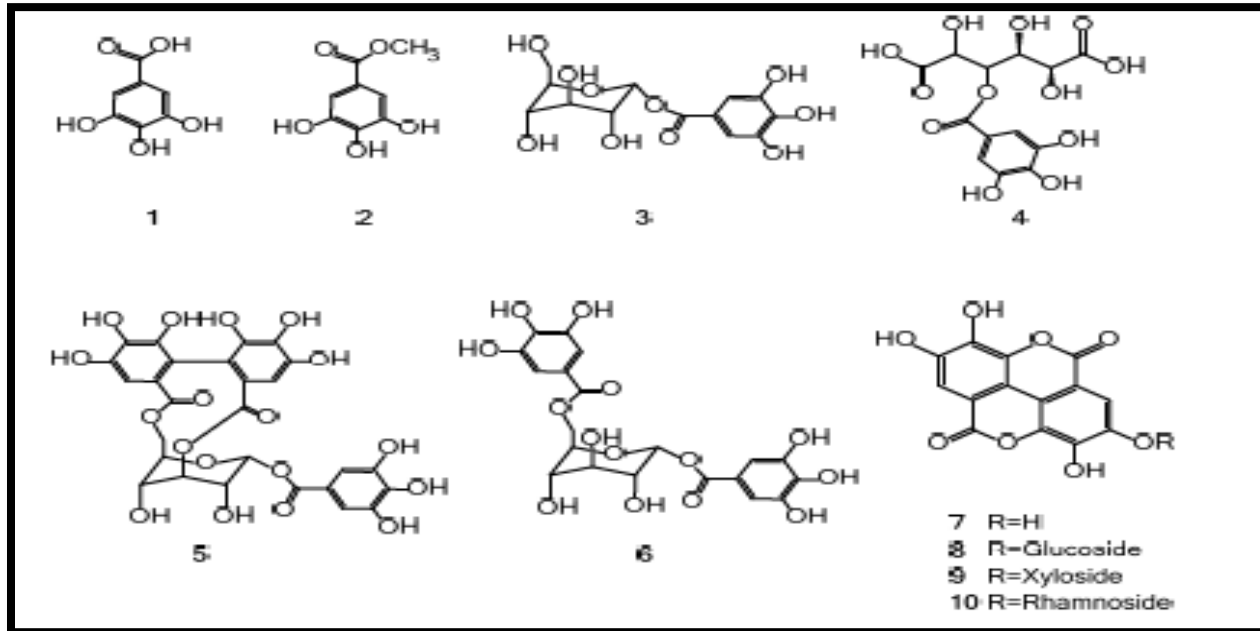


Fig.2.2 chemical structure of some bioactive compound found in *Phyllanthus emblica* with their respective names (Kenneth *et al.*, 2018).

All this bioactive component of amla not only have antioxidant activity but also have anti thrombosis, anti-coagulant, anti-platelet activity which promote vascular health, it also promotes immunomodulatory function of our body (Khanna *et al.*, 2015; Usharani *et al.*, 2013; Vanhoutte, 2009).

### III. Significant Health Benefits of *Phyllanthus Emblica* (Amla)

In Ayurveda, *Phyllanthus emblica* (Amla) is considered as a balanced food because of its taste, nature, and quality. Amla is somehow bitter, sour and sweet in taste and its nature is cool, due to its cooling nature it can be used to overcome burning sensation or simply we can call as acidity regulator. Amla is also useful in the treatment of diabetes, asthma, ulcers inflammations, diarrhea and some other disease condition (Bajracharya, 1979).

#### 3.1: Immunomodulatory Effects

Many bioactive compound or phytochemicals which are present in *Phyllanthus emblica* (Amla) has been shown various biological activities such as immunomodulating property. Tannin and polyphenol are two main bioactive constituents which may be responsible for the immunomodulatory properties of *P. emblica* (Hamada *et al.*, 1997). Corilagin, Geraniin, Gallic acid are three main bioactive constituents which inhibit reactive oxygen species (ROS) and nitrogen oxide (NO) by its antioxidant and immunomodulatory activity. It is also richest source of vitamins C which regulate the body's immunity and help in the treatment of scurvy (Jentan *et al.*, 2014).

#### 3.2: Antimicrobial activity

*Phyllanthus emblica* (Amla) shows some antimicrobial properties which is useful in production of effective medicines (Vasant *et al.*, 2013; Yadav *et al.*, 2017). Generally extract of *Phyllanthus emblica* have antimicrobial properties like antifungal, antiviral and antibacterial activities (Dhama *et al.*, 2014). Tannins are bioactive compound which may stop the activity of extracellular microbial enzymes, which is required for the growth of microbes (Dharmanada, 2003). Some alkaloids and phenolic compounds are effective against microbes which affect the genetic material and enhance antimicrobial properties (Negi, 2012).

### 3.3: Anticancer Activity

*Phyllanthus emblica* also known as anti-neoplastic agent, because some bioactive constituents in *P.emblica* such as gallic acid and phenolic compounds are inhibit the proliferation of neoplastic or cancer cells (Zhong *et al.*, 2009). when we consume a sufficient amount of amla which further produced Gallic acid which inhibit the growth of prostate cancer and further it retards the progression to advanced stage adenocarcinoma (Raina *et al.*, 2008). Gallic acid also suppressed lung tumor growth (Ji *et al.*, 2009). (Gandi and Nair 2005) studied that administration of gallic acid ellagic acid may inhibit radiation induced DNA damage and lipid peroxidation, and hence they have been concluded that *P. emblica* also possess radio protective effects.

### 3.4: Cardio protective Effects

(Jeevangi *et al.*, 2013) studied that administration of *P. emblica* (amla) powder in the diet of hyperlipidemic albino rats may shows some positive changes in lipid profile. We know that amla content good amount of phytochemical in which flavonoids and poly phenols are effective in the treatment of coronary heart disease due to presence of hypolipidemic effects and ability to reduced oxidative stress (Dhuley *et al.*, 1999 and Shymala *et al.*, 2003).

### 2.5: Anti- diabetic, Anti- anemic and diuretic effects

Many research stated that *P. emblica* is richest source of vitamin C which helps in the reduction of blood sugar level. Vitamin C helps in the regeneration of beta cells which secretes insulin the body to reduce the sugar level in blood. Tannin a bioactive compound has capability to reduce blood glucose and inhibit the deposition of excess sugar in adiposities. Tannin may useful in the treatment of non-insulin dependent diabetes mellitus (Sampath *et al.*, 2012). Amla acts as a diuretic because it helps to eliminate toxic substances from body (Mirunalini *et al.*, 2013). *P. emblica* contain approximately 600mg of vitamin C per 100gm of serving, which helps in the absorption of iron from non heam iron sources helps in the treatment of iron deficiency anemia (vasant *et al.*, 2013; charmkar *et al.*, 2017).

## IV. Conclusion

Many plants have medicinal properties due presence of phytochemicals or bioactive compound. *Phyllanthus emblica* is one of those medicinal plants which were gifted by nature to fulfill the need of all living organisms. Each and every part of this plant contents certain beneficial bioactive compounds. Phytochemicals such as tannin, alkaloids, phenols, flavonoids, terpenoids, saponin, ascorbic acid are present in species of *Phyllanthus emblica* (Amla). Some active compounds such as Gallic acid, ellagic acid, 1-O-galloyl-D glucose, chebulinic acid, quercetin, chebulagic acid, kaempferol, mucic acid 1,4-lactone 3-O-gallate, isocorilagin, chebulanin, mallotusin and acylated apigenin glucoside compounds have been isolated from Amla. All this active compounds are found to be effective in treatment of disease such as cancer, diabetes mellitus, cardiovascular disease, anemia and other long term and short term diseases. *Phyllanthus emblica* (Amla) content highest amount of vitamin C i.e. approximately 600mg/100gm of serving which is helpful in the treatment of scurvy. Amlais also a greatest source of antioxidants which is effective against ROS and free radicals and boasts our immunity. *P. emblica* possess anti- microbial, anti-fungal activities. This study concluded that the presence of such types of bioactive compound makes Amla as a super functional food.

## V. Acknowledgement

The authors show gratitude to the Department of Home Science, (IIFST, Aurangabad, Maharashtra) for having provided the library facilities and support for the successful conduct of the study. We have taken the approach in this series to collect the recent information and have submitted a manuscript for publication.

## References

- [1]Bajracharya MB. Ayurvedic medicinal plants and general treatment. Kathmandu: Piyusavarsi Ausadhalaya; 1979.
- [2]Charmkar NK, Singh R. Emblica officinalis Gaertn.(Amla): a wonder gift of nature to humans. Int. J. Curr. Microbiol. App. Sci. 2017;6(7):4267-80.
- [3]Dhama K, Tiwari R, Chakraborty S, Saminathan M, Kumar A, Karthik K, Wani MY, Amarpal SS, Rahal A. Evidence based antibacterial potentials of medicinal plants and herbs countering bacterial pathogens especially in the era of emerging drug resistance: An integrated update. Int J pharmacol. 2014 Jan 1;10(1):1-43.
- [4]Dharmananda S. EmblicMyrobalans: AMLA Key Herb of Ayurvedic Medicine. ITM; 2003.
- [5]Dhuley JN. Anti-oxidant effect of cinnamon(Cinnamon verum) bark and greatercardamom (Amomum subula-tum) seeds inrats fed with high fat diet. Indian J Exp Boil1999; 37: 238-42.
- [6]El-Desouky SK, Ryu SY, Kim YK. A new cytotoxic acylated apigenin glucoside from *Phyllanthus emblica* L. Natural Product Research. 2008 Jan 10;22(1):91-5.
- [8]Gaire BP, Subedi L. Phytochemistry, pharmacology and medicinal properties of *Phyllanthus emblica* Linn. Chinese journal of integrative medicine. 2014 Dec 9:1-8.
- [9]Gandhi NM, Nair CK. Protection of DNA and membrane from gamma radiation induced damage by gallic acid. Molecular and Cellular Biochemistry. 2005 Oct 1;278(1-2):111-7.

- [10]Habib-ur-Rehman, Yasin KA, Choudhary MA, Khaliq N, Atta-ur-Rahman, Choudhary MI, Malik S. Studies on the chemical constituents of *Phyllanthus emblica*. *Natural Product Research*. 2007 Jul 20;21(9):775-81.
- [11]Hamada SI, Kataoka T, Woo JT, YAMADA A, YOSHIDA T, NISHIMURA T, OTAKE N, NAGAI K. Immunosuppressive effects of gallic acid and chebulagic acid on CTL-mediated cytotoxicity. *Biological and Pharmaceutical Bulletin*. 1997 Sep 15;20(9):1017-9.
- [12]Jamwal KS, Sharma IP, Chopra L. Pharmacological investigations on the fruits of *Emblica Officinalis*. *J. Sci. Ind. Res.* 1959;18:180-1.
- [13]Jantan I, Ilankovan M, Mohamad HF. Correlation between the major components of *Phyllanthus amarus* and *Phyllanthus urinaria* and their inhibitory effects on phagocytic activity of human neutrophils. *BMC complementary and alternative medicine*. 2014 Dec 1;14(1):429.
- [14]Jeevangi S, Manjunath S, Sakhare PM. A study of anti-hyperlipidemia, hypolipidemic and anti-atherogenic activity of fruit of *Emblica officinalis* (amla) in high fat fed albino rats. *International Journal of Medical Research & Health Sciences*. 2013;1(2):70-7.
- [15]Ji BC, Hsu WH, Yang JS, Hsia TC, Lu CC, Chiang JH, Yang JL, Lin CH, Lin JJ, Suen LJ, Gibson Wood W. Gallic acid induces apoptosis via caspase-3 and mitochondrion-dependent pathways in vitro and suppresses lung xenograft tumor growth in vivo. *Journal of Agricultural and Food Chemistry*. 2009 Aug 26;57(16):7596-604.
- [16] Khanna S, Das A, Spieldenner J, Rink C, Roy S. Supplementation of a standardized extract from *Phyllanthus emblica* improves cardiovascular risk factors and platelet aggregation in overweight/class-1 obese adults. *Journal of medicinal food*. 2015 Apr 1;18(4):415-20.
- [17]Kumar A, Singh A, Dora J. Essentials perspectives for *Emblica officinalis*. *International journal of pharmaceutical and chemical sciences*. 2012 Jan;1(1):11-8.
- [18]Kumar KS, Bhowmik D, Dutta A, Yadav AP, Paswan S, Srivastava S, Deb L. Recent trends in potential traditional Indian herbs *Emblica officinalis* and its medicinal importance. *Journal of Pharmacognosy and Phytochemistry*. 2012 May 1;1(1):18-28.
- [19]Liu, X., et al. Immunomodulatory and anticancer activities of phenolics from *emblica* fruit (*Phyllanthus emblica* L.), *Food Chem.*, 2012; 131: 685-690.
- [20]Luo W, Zhao M, Yang B, Ren J, Shen G, Rao G. Antioxidant and antiproliferative capacities of phenolics purified from *Phyllanthus emblica* L. fruit. *Food Chemistry*. 2011 May 1;126(1):277-82.
- [21]Mirunalini S, Krishnaveni M. Therapeutic potential of *Phyllanthus emblica* (amla): the ayurvedic wonder. *Journal of basic and clinical physiology and pharmacology*. 2010;21(1):93-105.
- [22]Mirunalini S, Vaithyanathan V, Krishnaveni M. AMLA: A NOVEL AYURVEDIC HERB AS A FUNCTIONAL FOOD FOR HEALTH BENEFITS? -A MINI. *Int J Pharma Pharmaceut Sci*. 2013;5.
- [23]Negi PS. Plant extracts for the control of bacterial growth: Efficacy, stability and safety issues for food application. *International journal of food microbiology*. 2012 May 1;156(1):7-17.
- [24]Panda S, Kar A. Fruit extract of *Emblica officinalis* ameliorates hyperthyroidism and hepatic lipid peroxidation in mice. *Die Pharmazie-An International Journal of Pharmaceutical Sciences*. 2003 Oct 1;58(10):753-5.
- [25]Patil DA, Rasve VR, Ahemad SS, Shirsat MK, Manke MB. PHYTOCHEMICAL ANALYSIS OF METHANOLIC EXTRACT OF *EMBLICA OFFICINALIS* LEAVES.
- [26]Pingali Usharani NF, Muralidhar N. Effects of *Phyllanthus emblica* extract on endothelial dysfunction and biomarkers of oxidative stress in patients with type 2 diabetes mellitus: a randomized, double-blind, controlled study. *Diabetes, metabolic syndrome and obesity: Targets and Therapy*. 2013;6:275.
- [27]Pria FF, Islam MS. *Phyllanthus emblica* Linn.(Amla)-A Natural Gift to Humans: An Overview. *Journal of Diseases and Medicinal Plants*. 2019 Feb 16;5(1):1-9.
- [28]Raina K, Rajamanickam S, Deep G, Singh M, Agarwal R, Agarwal C. Chemopreventive effects of oral gallic acid feeding on tumor growth and progression in TRAMP mice. *Molecular cancer therapeutics*. 2008 May 1;7(5):1258-67.
- [29]Rose K, Wan C, Thomas A, Seeram NP, Ma H. Phenolic compounds isolated and identified from *Amla* (*Phyllanthus emblica*) juice powder and their antioxidant and neuroprotective activities. *Natural Product Communications*. 2018 Oct;13(10):1934578X1801301019.
- [30]Shymala MP, Venukumar MR, Lata MS. Antioxidant potential of the *Syzygium aromaticum* (Gaertn) Linn (Clove) in rats fed with high fat diet. *Indian Journal of Pharmacology* 2003; 35:99-103
- [31]Srivasuki KP. Nutritional and health care benefits of *Amla*. *Journal of Pharmacognosy*. 2012;3(2):147-51. Khan KH (2009). Roles of *Emblica officinalis* in Medicine - A Review. *Bot. Res. Int.* 2(4): 218-228.
- [32]Thakur CP, Mandal K. Effect of *Emblica officinalis* on cholesterol-induced atherosclerosis in rabbits. *The Indian journal of medical research*. 1984 Jan;79:142-6.
- [33]Vanhoutte PM. Endothelial dysfunction. *Circulation Journal*. 2009;73(4):595-601.
- [34]Vasant BS, Bhaskarrao DA, Bhanudas SR. *Emblica officinalis*-the wonder of ayurvedic medicine. *World Journal of Pharmaceutical Sciences*. 2013 Oct 22;3(1):285-306.
- [35]Vasant BS, Bhaskarrao DA, Bhanudas SR. *Emblica officinalis*-the wonder of ayurvedic medicine. *World Journal of Pharmaceutical Sciences*. 2013 Oct 22;3(1):285-306.
- [36]Wadood A, Ghufuran M, Jamal SB, Naeem M, Khan A, Ghaffar R. Phytochemical analysis of medicinal plants occurring in local area of Mardan. *Biochem Anal Biochem*. 2013;2(4):1-4.
- [37]Yadav SS, Singh MK, Singh PK, Kumar V. Traditional knowledge to clinical trials: a review on therapeutic actions of *Emblica officinalis*. *Biomedicine & Pharmacotherapy*. 2017 Sep 1;93:1292-302.
- [38]Zhang LZ, Zhao WH, Guo YJ, Tu GZ, Lin S, Xin LG. Studies on chemical constituents in fruits of Tibetan medicine *Phyllanthus emblica*. *Zhongguo Zhong yao za zhi= Zhongguo zhongyao zazhi= China journal of Chinese materia medica*. 2003 Oct;28(10):940-3.
- [39]Zhong ZG, Huang JL, Liang H, Zhong YN, Zhang WY, Wu DP, Zeng CL, Wang JS, Wei YH. The effect of gallic acid extracted from leaves of *Phyllanthus emblica* on apoptosis of human hepatocellular carcinoma BEL-7404 cells. *Zhong yao cai= Zhongyao cai= Journal of Chinese medicinal materials*. 2009 Jul 1;32(7):1097-101.