

Review Article

Amla, a Marvelous Fruit for Type -2 Diabetics-A Review

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ABSTRACT

Amla (*Emblica officinalis*) is widely used in the Indian system of medicine and believed to increase defense against disease. Vitamin C, tannins and flavonoids present in amla have very powerful antioxidant properties. Due to very rich content of Vitamin C, amla is successful used in the treatment of Diabetes mellitus. The Amla is known for its therapeutic properties and holds a reputed position in the ayurvedic and unani system of medicine in the country. The biological effect of Amla has been attributed to the antioxidant properties of the low molecular hydrolysable tannins present in the fruit. Amla is the richest source of Vitamin C and contains gallic acid, ellagic acid and flavonoids. The galleoellagi tannins in the fruit preserve the vitamins under all conditions. Amla possesses antioxidant, anti hyperglycemic and anti-hyper lipidemic properties. The present review, deals with nutritive value of Amla, medicinal properties and use of amla in improving Blood Glucose metabolism in Type 2 Diabetes Mellitus. Amla, being the polyphenols and a mixture of phytochemicals can act as a hypolipidemic agent reducing the risk of cardiovascular complications in diabetics. Thus amla may be used as a supportive therapy for diabetics.

Keywords

Amla,
marvelous
fruit, type 2
diabetics

Introduction

Diabetes Mellitus is a chronic, potentially debilitating disease. The prevalence of Non-Insulin Dependent Diabetes Mellitus is increasing in all populations worldwide. India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the “diabetes capital of the world”. Diabetes is a chronic disorder of carbohydrate, fat and protein metabolism characterized by increased fasting and post prandial blood sugar levels (Gupta, 2005). The number of people with diabetes is increasing due to population growth, aging, urbanization, and increasing

prevalence of obesity and physical inactivity. Traditional Medicines derived from medicinal plants are used by about 60% of the world’s population. Indian herbal drugs and plants are used in the treatment of diabetes, especially in India. (Akhtar *et al.*, 2011). Amla forms an integral part of the Indian system of medicine and is effective in prevention of diabetes mellitus and other diseases. Research concludes that amla supplement is effective in reducing the Fasting and Post Prandial blood glucose levels and HbA1c levels (Akhtar *et al.*, 2011 & Shah *et al.*, 2005). The tannoids of E.

officinalis are potent inhibitors of Aldose Reductase (AR) and suggest that 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. Emblica and its tannoids might counter the polyol pathway-induced oxidative stress as there was a reversal of changes with respect to lipid peroxidation, protein carbonyl content, and activities of antioxidant enzymes. Emblica also prevented aggregation and insolubilization of lens proteins caused by hyperglycemia (Suryanarayan *et al.*, 2009). Aldose reductase plays a role in the development of secondary complication of diabetes including cataract. Amla inhibits aldose reductase and has antihyperglycemic properties (Daisy *et al.*, 2005). Amla due to its high vitamin C content is effective in controlling diabetes. A tablespoon of its juice mixed with bitter melon juice, taken daily for two months will stimulate the pancreas and enable it to secrete insulin, thus reducing the blood sugar in the diabetes. Diet restrictions should be strictly observed while taking this medicine. It will also prevent eye complication in diabetes (Patel and Goyal, 2011). The capacity of tannins to enhance glucose uptake and inhibit adipogenesis, makes them potential drugs for the treatment of non-insulin dependent diabetes mellitus. One of the therapeutic approaches for decreasing postprandial hyperglycemia is to prevent or delay absorption of glucose by the inhibition of carbohydrate hydrolyzing enzymes, α -amylase and α -glucosidase, in the digestive organs (Kimhy *et al.*, 2010 & Anila and Vijayalakshmi, 2000).

Diabetes is a chronic disorder of carbohydrate, fat and protein metabolism characterized by increased fasting and post prandial blood sugar levels. Type 2 Diabetes

is one of the major health problems throughout the world especially in adults in age above 35 years in both sexes (Marshall and Banert, 2004).

Free radicals are capable of damaging cellular molecules, DNA, proteins and lipids leading to altered cellular functions (Tilak *et al.*, 2001). Many recent studies reveal that antioxidants capable of neutralizing free radicals are effective in preventing as well as reducing the severity of diabetic complications (Manisha Modak, 2007).

In spite of the presence of number of synthetic oral antidiabetic drugs in the market, researchers are now diverted their attention to different herbs and medicinal plants in order to find out new active principle with less side effects and better antidiabetic activity (Beigh *et al.*, 2002). Medicinal plants are being looked up once again for the treatment of diabetes. Many conventional drugs have been derived from prototypic molecules in medicinal plants. Metformin exemplifies an efficacious oral glucose lowering agent.

Therefore Emblica *officinalis* was selected for the present study in order to provide some help in patronizing indigenous drugs. Its development was based on the use of Emblica *officinalis* to treat diabetes (Manisha Modak 2007). Emblica *officinalis* (EO) enjoys a hallowed position in Ayurveda - an Indian indigenous system of medicine (Khan 2009). EO primarily contains tannins, alkaloids, phenolic compounds, amino acids and carbohydrates. It is rich in chromium, which makes it very beneficial for diabetes.

It has a therapeutic value in diabetes (Kumar Sampath 2012). It is also known to stimulate the isolated group of cells that secrete the hormone insulin. This decreases the blood

sugar. Amla contains many nutrients, it is abundant with vitamin C and is beneficial for our body no matter in what form it is eaten. It contains many minerals and vitamins like calcium, Phosphorous, iron, carotene and vitamin B complex (Gopalan *et al.*, 1997). It is also a powerful antioxidant, immunomodulator, hypoglycemic, hypolipidemic, hypotensive, antacid. Amla fruit is acrid, cool refrigerant diuretic, laxative, antipyretic vitamin C. 100gms of amla contains about 700mg of vitamin C, which is 30 times the amount found in orange. In addition to vitamin C it too contains calcium, iron, protein, sugar, phosphorous, carbohydrates gallic and tannic acids etc (Muthusamy 2008).

In view of the present study was planned to see the effect of amla an approach towards the control of diabetes mellitus. Gooseberry contains chromium.

It has a therapeutic value in diabetics. Indian Gooseberry or Amla stimulate the isolated group of cells that secrete the hormone insulin. Thus it reduces blood sugar in diabetic patient (Bhattacharya *et al.*, 1999).

Amla is used in Indian medicine for the treatment of various diseases. Amla fruits, also known as Indian gooseberry, are acrid, cooling, diuretic and laxative. The fruits are useful in diabetes, bronchitis, hyperacidity, peptic ulcer, dermatitis, haematogenesis, inflammations, anemia, liver diseases, gastrointestinal tract disorder, menorrhagia and cardiac disorders. Being exceptionally rich in vitamin C, amla is vital for treatment of human scurvy. (Khan, 2009 & Thomas *et al.*, 2013.)

Medicinal properties of amla

According to Ayurveda, Amla or Amla fruit is sour and astringent in taste, with sweet, bitter and pungent secondary tastes.

Amla's qualities are light and dry, the post digestive effect is sweet and its energy is cooling. As per Ayurveda, Amla or Amla balances all the 3 doshas. Amla or Amla is used to revitalising potency and the digestive system, rejuvenating longevity, treat constipation, reduce fever, purify the blood, reduce cough, alleviate asthma, strengthen the heart, benefit the eyes, stimulate hair growth, enliven the body, and enhance intellect. The following are the effects of amla on various organs

Effects on skin

The juice of amla fruit reduces burning sensation of skin. It strengthens the hair follicles and reduces the inflammation of scalp skin. Amla boosts immunity of skin and helps to prevent acne and pimples.

Effects on eyes

Amla fruits help to reduce burning sensation in eyes and help to maintain health of eyes.

Effects on nervous system

Amla enhances memory power and strengthens the nervous system. It sharpens the sensitivity of sense organs.

Effects on digestive system

It normalizes digestion, reduces acidity and rejuvenates liver. It relieves constipation when taken in more quantity.

Effects on Circulatory system

Amla acts as a cardiac tonic and helps in anemia

Effects on respiratory system

Clears respiratory system in infection as it reduces kapha.

Nutritive Values of Amla

Major Nutrients

Major Nutrient	Value per 100 g	% of RDA
Total Calories	48	2.4%
Total Fat	0.5 g	0.5%
Protein	1 g	–
Total Carbohydrate	10 g	3%
Water	86 g	–
Phenolic Compounds (Gallic Acid	3012.5 mg	NA

Carbohydrates

Carbohydrates	Value per 100 g	% of RDA
Total Carbohydrates	10 g	3%
Dietary Fiber	5 g	18%
Sugar	–	–
Starch	–	–

Fat, Lipids & Fatty Acids

Lipids	Value per 100 g	% of RDA
Total Fat	0.5 g	1%
Saturated fat	Nil	–
Monounsaturated fat	0.1 g	–
Polyunsaturated fat	0.3 g	–
Cholesterol	Nil	–
Trans fat	Nil	–
Omega-3 fatty acids	48 mg	–
Omega-6 fatty acids	276 mg	–

Vitamins

Vitamins	Value per 100 g	% of RDA
Vitamin A, IU	290 IU	6%

Vitamin C	478 mg	800%
Vitamin D	–	–
Vitamin E (alpha-tocopherol)	2450 mg*	1225%*
Vitamin K	–	–
Thiamin	–	3%
Riboflavin	–	2%
Niacin	0.3 mg	1%
Vitamin B6	0.1 mg	4%
Folate	6 mcg	1%
Vitamin B12	–	–
Pantothenic Acid	0.3 mg	3%
Choline	–	–
Betaine	–	–

*Approximate.

Minerals

Minerals	Value per 100 g	% of RDA
Calcium, Ca	25 mg	2%
Iron, Fe	0.9 mg	6%
Magnesium, Mg	10 mg	2%
Phosphorus, P	27 mg	3%
Potassium, K	198 mg	6%
Sodium, Na	1 mg	0%
Zinc, Zn	0.12 mg	1%
Copper, Cu	0.1 mg	4%
Manganese	0.1 mg	7%
Selenium	0.6 mcg	1%
Fluoride	–	-

Effects on reproductive system

Amla acts as aphrodisiac and increases sperm count and motility. It helps to rejuvenate male reproductive system.

Effects on urinary system

It helps to soothe inner layers of bladder and helps to reduce frequency of urination.

Amla juice mixed with water help to lower the body temperature during summers. It also helps to reduce body temperature during fever.

Amla helps to expel body toxins. Regular use of amla in the form of powder, juice or raw fruit helps to detoxify liver and body, retard aging process and boosts body immunity.

The berries of amla help to normalize metabolism thus prevents accumulation of fat. Regular consumption of amla helps to rejuvenate liver, reduce acidity and problems arising due to pitta.

Amla has revitalizing effects, as it contains an antiageing element, it improves maintains immunity and strength in old age. It improves body resistance and protects the body against infections (Kumar, 2012). The antioxidant activity of Amla extract is associated with the presence of hydrolysable tannins possessing like vitamin C.

It can be concluded that Amla plays a role in reducing oxidative stress and improving glucose metabolism in type-2 diabetes mellitus (Rao *et al.*, 2005 & Pozhartsakaya *et al.*, 2007).

Experimental work done in human subjects has shown the beneficial effect of amla. Subjects receiving amla have shown significant reduction in mean serum

cholesterol level (Pathak and Gurubacharya, 2002 & Kim *et al.*, 2005).

The polyphenol-rich fruit actually has properties that can protect the body from oxidative properties of high blood sugar. The same compound is also effective in preventing insulin resistance caused due to a high fructose diet. This means that the fruit can actually assist in proper absorption of insulin leading to a drop in blood sugar in diabetics. A study published in the *Journal of Medicinal Food* showed that amla extract significantly reduced sugar levels in induced diabetic rats.

The study suggests that the strong free radical scavenging activity of amla and its efficacy in reducing oxidative stress helped in improving glucose metabolism in diabetic rats. Another study published in the *International Journal of Food Sciences and Nutrition* evaluated sugar lowering property of amla in humans. It was observed that diabetic individuals who were given 1, 2 or 3 gm of amla powder everyday had decreased levels of fasting and 2 hour post-prandial blood glucose levels after 20 days.

But individuals who received 3gm of amla powder showed significantly reduced sugar levels.

Additionally, there are various studies which show that amla also prevents the development of complications like diabetic neuropathy and diabetes-induced heart dysfunction in type-2 diabetic individuals.

All in all, amla has a positive effect on people with diabetes. But there is need to consult doctor to know the quantity of amla and a suitable time to consume it. Hence, with all this scientific information, there is no doubt that amla is a marvelous fruit for diabetics.

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