Jamun: A Multifunctional Medicinal Plant

Syeda Mona Hassan¹*, Shabnum Zulfiqar¹, Talha Sajid¹, Syed Khurram Hassan², Asif Ibrahim³, Abdul Majeed⁴, Huma Hassan⁵

1. Department of Chemistry, Lahore Garrison University, Lahore, Pakistan.
2. Institute of Quality and Technology Management, University of the Punjab, Lahore, Pakistan.
3. Department of Mathematics, Lahore Garrison University, Lahore, Pakistan.
4. Department of Biology, Lahore Garrison University, Lahore, Pakistan.
5. Department of Chemical Engineering NFCIE&FR, Faisalabad, Pakistan.

*Corresponding Author’s Email: s.monahassan@lgu.edu.pk.

Abstract: According to Ayurveda, different parts of jamun tree possess various medicinal properties. Many properties such as anti-inflammatory, anti-viral, anti-oxidant and anti-diabetic are shown by jamun. In the present review important effects such as anti-diabetic, anti-oxidant, anti-inflammatory and radio-protective effects also have been studied.

Keywords: Jamun, anti-diabetic, anti-oxidant, anti-inflammatory

INTRODUCTION

Jamun is a big evergreen tree which is famous in Subcontinent. Its scientific name is Syzygium cumini. It belongs to family Myrtaceae. Common names of jamun are Indian blackberry, java plum, black plum and Jambul. Jamun is chiefly produced in India. Worldwide, the production of jamun is almost 13.5 million tones and only India contributes about 15.4% (Raza et al. 2015). It is also grown in other countries of Southeast Asia as well including Myanmar, Malaysia, Afghanistan and Pakistan. This tree was also introduced to Florida, USA in 1911 by the United States Department of Agriculture and is now usually planted in Suriname (Chowdhury et al. 2007). It has two diversities. The big one is oval shaped and is regularly called as Suva-jumun. The small one is round shaped and is called as Kutta-jamun. The bigger diversity is sweeter than the smaller one. The fruit is a juicy berry with an only stone. It is black outside and violet inside; has a sourish-sweet mash and greenish yellow seed (Raju et al. 2011). It is stated that the jamun seed extracts given to animals with
5 g/Kg body weight was more effectual than glibenclamide hypoglycemic or an anti-diabetic drug mostly given orally in case of diabetes type-2. It is also information that glibenclamide possibly will inhibit glucoamylase \textit{in vivo}. Thus it controls the degradation of glycogen and maintains glucose intensity in the blood (Gangadhar et al., 2011). This evergreen tree has coarse, grayish white young stems and discolored bark. The simple leaves are elliptic to broadly smooth, glossy, oblong, somewhat leathery, opposite, and short pointed at tips. Its fruit is ovoid, having one seed, the berry to 2 cm long, shiny dark purplish red along with white to lavender flesh. This plant also exhibits various biological activities. The ethanol extract of \textit{S. cumini} bark has a powerful anti-inflammatory action against various part of inflammation with no side-effect on gastric mucosa (Dualy et al., 2016). Jamun, a moderately fast growing class, can reach altitude of up to 30m and can live for more than 100 years. It is either found wild or cultivated by planting the graft. The jamun tree is functional in several ways. The wood is tough, strong, and water resistant. It is used in making railway sleepers, cheap furniture and village residence though it is comparatively tough to work on (Chowdhury et al., 2007).

The fruits have been recognized to have several medicinal characteristics in the Indian tradition medicine system. The fruits are used for therapeutic diarrhea and are also used as a general tonic for the liver. In addition, numerous other medicinal uses have been attributed to this fruits such as, strengthens teeth and gums; it enriches the blood; good lotion for ringworm; useful astringent in bilious diarrhea; good gargle for sore throat; etc (Patel et al., 2012). Phytochemical screening of extracts of \textit{Syzygium cumini} discovered that seed contains steroids, saponins, amino acids, alkaloids, tannins, triterpenoids and phytosterols, etc. and leaf have crude calcium 1.3\%, fat 4.3\%, Phosphorus 0.19\%, ash 7\%, crude fiber 17\%, and protein 9.1\%. These phytochemicals possibly explain the plant’s medicinal characteristics. The seed and bark have anti-diabetic activity; bark has anti-ulcerogenic and gastroprotective effects and leaf has anti-vibrio and anti-allergic cholera activity and seed has Radioprotective activity, anti-inflammatory activity, and antibacterial potential against, \textit{B subtilis}, \textit{P. aeruginosa}, \textit{E. coli}, and \textit{S. aureus} (Haque et al., 2017). Jamun fruit is rich of carbohydrates, minerals, vitamins and contain glucose and fructose as primary sugars. Research studies in last 20 years has shown that jamun have a great complex of antioxidant compounds naturally present in it. Moreover, studies on bioactive components present in jamun have revealed that jamun has great nutritional and pharmacological potentials. The large amount of anthocyanins is also present in fruit that show signs of good antioxidant characteristics (Suradkar et al., 2017).

**Phytochemistry**

The word ‘Phyto’ is the “Greek” word for plant. Several families of phytochemicals are present which help the human body in a various ways. The Phytochemicals may also protect human body from a host of diseases. Phytochemicals are non nutritional chemicals present in plant. They have protective effects and disease preventive characteristics. Fruit of \textit{Syzygium cumini} have Malic acid which is the major acid (0.59 of the wt of fruit), a minor quantity of oxalic acid is also present. Tannins and Gallic acid account for astringency of the fruit of \textit{Syzygium cumini}. The Fruit is purple in colour because of the cyaniding diglycosides.
Syzygium cumini seed powder: it is Brown coloured, which shows some parenchymatous cells along with many oval, rounded starch grains having 7-28 μ diameters. Syzygium cumini seeds are broadly used for various ailments such as antidiabetic, hypolipidaemic, anti-inflammatory, antioxidant and neuroprotective. It is also recently reported for the DNA protection against radiation (Anjali et al., 2017). The principle component Jambolan contains chemical constituents like ellagic acid, isoquercetin, nanthocyanins, kaemferol, glucoside and myrecetin. Glycoside jambolin or antimellin are believed to have retarding effect to the diastatic conversion of starch into sugar. The fruit contain rich sugar, mineral salts; vitamins C. Fruit have non reducing sugar (9.26%), sugar (8.09%), and sulfuric acid (1.21%). Fructose, Glucose, mannose and galactose are the major sugars. Jamun is also known to be protective in liver disease which can prevent liver to damage. Additionally, studies also demonstrated an anti-cancer potential of fruit extract. These could be probably due to numerous bioactive phytochemicals including polyphenols which have the purple pigment called anthocyanin. Many scientists have studied the pharmacological activity of Syzygium cumini like anti diarrhoeal, antioxidant, gastro-protective, anti-allergic, astringent, analgesic, anti-inflammatory, anti-plaque, antimicrobial and the most important antidiabetic activity (Margaret et al., 2015). Bark of stem of Syzygium cumini have epi-friedelanol, β-sitosterol, betulinic acid, friedelin, and new ester of epi-friedelanol (eugenin). It possesses quercetin, β-sitosterol-D-glucoside, kaempferol-3-o glucoside, astragalin, myricetin, gallic acid, betulinic acid, crategolic (maslinic) acid and sitosterol. They detected n-hentriacontane, n-nonacosane, n-heptacosane, n-octacosanol, n-triacontanol and ndotricontanol by GLC and sugars – fructose, glucose, acidoxalic, citric,glycolic
acids and aminoacids – alanine, glycine, leucine and tyrosine by paper chromatography in the leaves of *E. jambolana*. 18 myricitrin (0.009%), Quercetin (0.0085%), myricetin (0.023%), myricetin 3-0-(4”-acetyl) –α-L-rhamnopyranoside (0.059%) (Jadhav et al., 2009).

Chemical structures of some important Phyto-chemicals present in different parts of Jamun, *Syzygium cumini* (Jagetia, 2017)
Pharmaceutical properties

Antidiabetic activity

Diabetes is a chronic metabolic disorder. It is upsetting a large number of population globally. A constant reduction in hyperglycemia will reduce the threat of developing micro vascular diseases and reduce their problem. The usual treatments for diabetes may have many limitations, such as side effects and high ratio of secondary malfunction. On the other hand, herbal extracts are estimated to have similar effectiveness, without any side-effects, to that of conventional treatments. A number of scientific studies in animals have substantiated the role of jambul in the management of diabetes (Jadhav et al. 2009). A glycoside in the seed named as jamboline. It is considered to have anti-diabetic properties. More seasoned French research demonstrates that the seed of Syzygium cumini have a critical hypoglycemic impact in diabetic rabbits. Jamun organic product seeds and mash have been accounted for to fill different needs in diabetic patients, for example, deferring diabetic confusions including neuropathy and waterfalls, and bringing down blood glucose levels. Jamun is oftenly known as an adjuvant treatment in sort-2 diabetes. This has been followed not exclusively to its anthocyanin-rich, dim purple fle-modest mash yet additionally to its seeds, which have been most concentrated for their antidiabetic standards. (Dagadkhair et al., 2017). Diabetes burdens countless total populace, and Indians are particularly inclined to it. Regardless of the way that this infirmity was phenomenal in antiquated occasions, its seed powder is accounted for to control high glucose levels. In the Western world, Jamun has been connected as a treatment to control glucose levels for more than 130 (Jagetia. 2017).

Antioxidant activity

Ethanolic concentrate of Syzygium cumini seed part bringing down the expanded oxidative pressure associated with pathogenesis and movement of diabetic tissue harm. Ethanolic concentrate of Syzygium cumini seed part additionally bringing down the ThioBarbituric Corrosive Responsive Substance (TBARS) and expanded in decreased superoxide dismutase (SOD), catalase (CAT) and glutathione (GSH) (Kumar et al. 2008). Antioxidant activity of the skin of fruit was examined using various test, such as, superoxide radical-scavenging assay, hydroxyl radical-scavenging method, lipid peroxidation assay and DPPH radicalscavenging assay. It was proposed that cancer prevention agent property of Syzygium cumini natural product skin may be because of the nearness of cell reinforcement nutrients, phenolics or tannins and anthocyanins (Pradhan. 2016).

Anti-inflammatory activity

Jamun has been accounted for to go about as a calming operator, decreasing both intense and interminable aggravation. Preclinical investigations utilizing creature models have demonstrated that the ethanol concentrate of Jamun stem bark displays mitigating movement. The fluid leaf separate has additionally been accounted for to lessen indomethacin-prompted incendiary changes in the mice by decreasing nitric oxide synthase (iNOS), tumor corruption factor-alpha (TNF-α) and cyclooxygenase (COX) compounds. The flavonoids part of Jamun has been accounted for to ease provocative reaction in human lymphocytes, monocytes and neutrophils against the hepatitis B antibody. The fluid seed remove was found to apply mitigating movement in diabetic rodents, as demonstrated by the concealment of ectonucleotidase, adenosine deaminase, acetyl
cholinesterase, dipeptidyl peptidase IV and NO exercises (Jagetia. 2017). Ethanolic concentrate of *Syzygium cumini* bark has been accounted for to have mitigating action against histamine, serotonin and prostaglandin (Sah et al. 2011). The ethanolic concentrates of leaves and watery concentrates of seeds were found to have high enemy of microbial property for an extensive variety of gram positive and gram negative bacterial strains (Dagadkhair et al. 2017).

**Radio-protective Effect**

It is reported that aqueous alcoholic, dichloromethane seeds and leaf extracts of jamun possess radio-protective property. The special term used for these chemical compounds is radio protectors. Histopathological assessment has revealed that Jamun leaf treatment before the radiation elevated the number of crypts and decreased the goblet and dead cells when compared with the concurrent irradiation control. The recovery was quicker in Jamun pretreated person. Jamun separates additionally provides insurance to the DNA in opposition to the radiation-incited DNA (Swami et al., 2012). Leaf concentrate of *Syzygium cumini* deferred the mortality rate and side effect of radiation disorder, by providing the security against GI demise thereby expanding the survival rate (Sah and Verma, 2011).

**CONCLUSION**

One of the most important sources of medicines are plants. It is well documented from ancient times till date all over the world, medicinal plants are stimulating the ability of human health to handle with the unpleasant and difficult circumstances. The potential sources of drugs are secondary metabolites due to their therapeutic importance. These secondary metabolites are rich in medicinal plants. As therapeutic agents, the interest in the use of plant extracts is increasing. One of the most popular fruit is jamun in all over the world. From the literature investigation, it is stated that a potential source of anti-diabetic, anticancer, antimicrobial and anti-inflammatory activity is present in jamun.

**REFERENCES**


