

**JAMUN: A BOON FOR HUMAN BEINGS: A REVIEW**

\*Adarsh Rajendra Patil, Arpita Ankush Patil, Rutuja Ramesh Patil, Prashant Pandurang Bavadekar,  
Dhanshree Suresh Adasul and Mansi Rajendra Desai

Genesis Institute of Pharmacy Radhanagari.



\*Corresponding author: Adarsh Rajendra Patil  
Genesis Institute of Pharmacy Radhanagari.

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**ABSTRACT**

Jamun (*Syzygium cumini*) commonly known as Indian blackberry is an important fruit of Indian subcontinent and belongs to Myrtaceae family. Jamun has been proved to be a boon to human kind since time immemorial. Every part of the Jamun tree has high medicinal value, right from its fruit to its seed and bark to the leaves. It is an important fruit crop of Indian subcontinent, under-exploited and widely grown successfully due to its wider adaptability and nutraceutical properties. Jamun leages are prescribed for nausea, vomiting, bleeding disorders and metrorrhagia. Jamun could serve a beneficial role against metabolic syndrome (MS). In this review, the latest available scientific literature on Jamun was collected and the clinical trials investigating its effect on diabetes, hypertension, obesity, and hyperlipidemia were analyzed to find out how Jamun could improve the symptoms and biomarkers of MS. Overall, the results of this study found a significant association of Jamun with the prevention and treatment of these biomarkers of MS. In many studies, Jamun showed pharmacological modifications not only in MS but in many other diseases as well. Currently, its utilization as a folk medicine for the treatment of patients with MS is widely acknowledged. Hence, the findings of a large number of clinical studies confirmed the ameliorating effects of Jamun against MS due to its antioxidation, antidiabetic, anti-inflammation anticarcinogenic, and hyperlipidemic effects. More research is still needed to determine and identify the Jamun compounds and to elucidate their mechanisms of action that are responsible for these astounding bioactive properties and health benefits.

**KEYWORDS:** Nutraceuticals and medicinal Jamun, *Syzygium cumin*, metabolic syndrome, Jamun wood glass.

**INTRODUCTION**

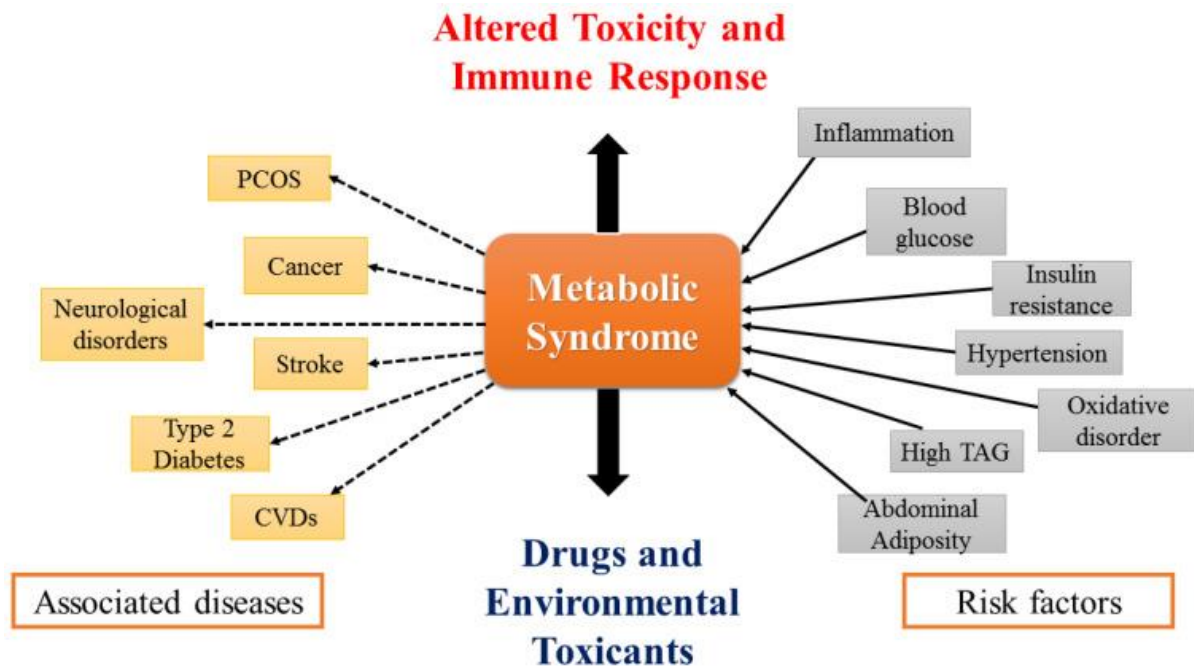
There has been an increasing demand for health promoting foods by the consumers all over the world. This has led to the new term between nutrients and pharmaceuticals, called 'Nutraceuticals'. Nutraceuticals are diet supplements that deliver a concentrated form of a bioactive component from a food and used with the purpose of enhancing health in dosages that sometimes exceeds that of the normal. The medicinal properties of several herbal plants have been documented in ancient Indian literature and the preparations have been found to be effective in the treatment of diseases (Zeisel, 1995).<sup>[1]</sup>

Metabolic disorders are serious health issues in today's world, and the prevalence of metabolic disorders is increasing day by day owing to the adaptation of imbalanced lifestyle patterns, which ultimately has raised the societal health burden of metabolic syndrome (MS).<sup>[2]</sup> MS, commonly referred to as insulin resistance syndrome, is a collection of risk factors for type II diabetes mellitus (T2DM) and cardiovascular disease (CVDs). Over a billion individuals are expected to be

affected by MS globally. According to the World Health Organization (WHO), it is a medical disorder that is characterized by visceral obesity, insulin resistance, high blood pressure, and abnormal cholesterol levels.<sup>[3]</sup> MS distribution is geographically diverse, emphasizing the relevance of environmental and lifestyle variables as key causes. The majority of the mechanisms are activated by visceral obesity. However, neurohormonal activation, insulin resistance, and inflammation are important factors in the initiation, progression, and transition of MS to CVD.<sup>[4]</sup> MS is a collection of dangerous elements that may act as interrelated variables (elaborated in Figure 1) to increase the likelihood of cancer, T2DM, CVD, and other health issues. Currently, researchers were focused on dietary components that have the potential to prevent numerous chronic illnesses. The inflammation-decreasing effects of anthocyanins and other phenolics are effective at minimizing metabolic alterations and inflammation. The primary issues that need to be addressed are dyslipidemia (high levels of LDL, TG, and low levels of HDL), high blood pressure, obesity, and inefficient glucose metabolism or insulin resistance.<sup>[4]</sup> In

the current review, ethnopharmacological investigations have been focused on the antidiabetic, anti-hypertensive, anti-obesogenic, and anti-hyperlipidaemic properties of Jamun. For this purpose, the last five years' clinical

investigations have been scrutinized using the keywords: "Jamun", "Java Plum", "*Syzygium cumini*", "metabolic syndrome", "diabetes", "hypertension", "obesity", and "hyperlipidemia".<sup>[5,9]</sup>



**Fig no 1: Risk factors of MS and its associated diseases.**

Since ancient times, plants or herbs have been the part of folk medicine, traditional medicinal systems like Ayurveda as they possessed various bioactive compounds. Furthermore, there is increased focus and research on extraction and application of natural antioxidants over synthetic antioxidants as utilization of synthetic antioxidants might produce certain side effects thereby many plants and herbs are assessed for their therapeutic benefits and pharmacological application.<sup>[10]</sup> The jamun seeds (JS) is an inedible by-product of the jamun fruits. They also have significant economic potential because of their use in alternative medicinal systems like Ayurveda and Unani, and because of the high concentration of phytochemicals in them, making them valuable components in nutraceuticals.<sup>[11]</sup> The nutritional profile of JS was estimated to be 53 g/100 g moisture, 1.02 g/100g crude fat, 31.62 g/100g crude protein, 7.01 g/100g carbohydrates, 1.51 g/100g crude fiber, and 1.51 g/100g ash. Specifically, JS was discovered to contain vitamin A (3 IU/100g), vitamin B3 (0.09 mg/100g), and vitamin C (0.21 mg/100g). JS powder has the following amounts of minerals: iron 0.140 mg/100g, calcium 0.65 mg/100g, magnesium 0.10 mg/100g, phosphorus 0.72 mg/100g, potassium 16.07 mg/100g, and zinc 0.009 mg/100g. Therefore, the nutritional health benefits of the JS are bolstered by the fact that they contain high levels of proteins, fibres, vitamins and minerals.<sup>[12]</sup>



**Fig no: Jamun Fruits.**

Meanwhile all the parts of Jamun tree have medicinal value. Jamun seed powder is produced commercially by herbal manufacturers in India and is very useful for patients suffering from diabetes. Jamun seeds are used in Ayurveda to treat digestive ailments. Jamun fruit juice is prepared in homes and it is also available commercially 21. The tree fruits once in a year and the berries are sweetish sour to taste. The ripe fruits are used for health drinks, making preserves, squashes, jellies and wine 33. The present review emphasizes on Ayurvedic importance of Jamun with Advanced nutraceutical values.<sup>[13]</sup>

#### **Scientific Classification**

**Kingdom :** Plantae

**Order :** Myrtales

**Family :** Myrtaceae

**Genus :** *Syzygium*

**Species :** *Cumini*

**Binomial name:** *Syzygium cumini* (L.) Skeels.

### Jamun in Ayurveda

**Sanskrit synonyms:** Mahaphala, Kokileshta, Pikabhaksha, Phalendra, Surabhipatra, Jambava, Mahaskandha.

### Phyto-chemistry of Jamun

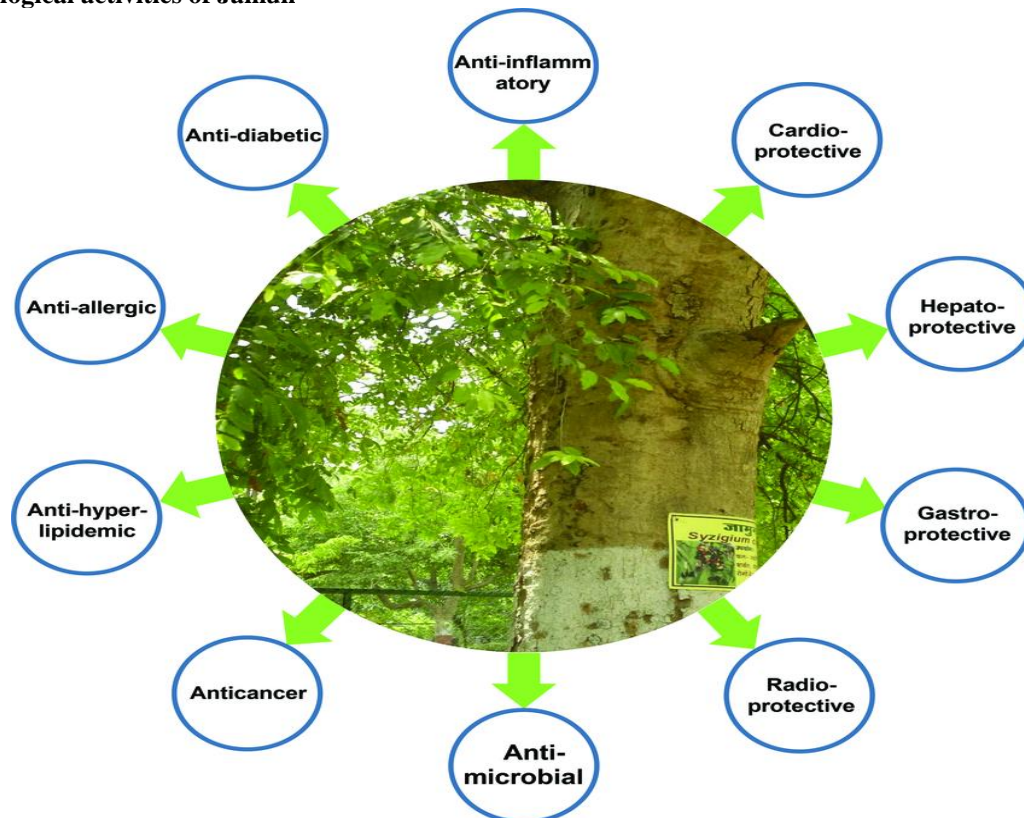
Phyto-chemistry of Jamun Jamun fruits and all other parts are rich in various phytochemical compounds

(Table 1). Fruits are rich in anthocyanins, glucosides, iso-quercetin, kaemferol, myrcetin etc. whereas, seeds contain a considerable amount of phytochemicals such as jambosine, gallic acid, ellagic acid, quercetin,  $\beta$ -sitosterole etc. Flowers are rich in oleanolic acid. Astringency or sourness of fruit is due to gallic acid and tannins. Roots also contain several flavanoids and glycosides (Sahu et al., 2020).<sup>[24]</sup>

**Table 1: Different phyto-chemicals present in different parts of Jamun tree.**

Plant part	Phyto-chemical compounds	References
Seeds	Fats, Jambosine, Gallic acid, ellagic acid, Quercetin, $\beta$ -sitosterole other elements like Chromium, Vanadium, Potassium, Sodium, Zinc, tannins	Nadkarni et al. (1954) <sup>[25]</sup> Chopra et al. (1956) <sup>[26]</sup>
Leaves	Bornyl acetate, Triancontanol, n-Dotricontanol, Quercetin, Maslinic acid, Betulinic acid, Myrcitin, n-nonacosane, n-dotricontanol	Craveiro et al. (1983) <sup>[27]</sup>
Flowers	Oleanolic acid, Ellagic acid, Iso-quercetin, Kamferol, Myrcetin, Dihydro-myrcetin, Quercetin, Arabinoside	Nair et al. (1974) <sup>[28]</sup> ; Sagarwat et al. (2006) <sup>[29]</sup>
Fruits	Raffinose, Citric acid, Fructose, Glucosides, Gallic acid, Malic acid, Anthocyanin, tannins, Delphinidin, Petunidin, Malvidin	Srivastava et al. (1953) <sup>[30]</sup> Lewis et al. (1956) <sup>[31]</sup>
Bark	Ellagic acid, Gallic acid, Gallotannin, Ellagi tannin, Myrcetin, $\beta$ -sitosterole, Betulenic acid	Bhargava et al. (1974) <sup>[32]</sup> ; Nair et al. (1974); Yogeswari et al. (2005)
Roots	Flavonoids, Glycosides and isorhamnetin 3-O-rutinoside	Vaishnava et al. (2012) <sup>[33]</sup>

### Pharmacological activities of Jamun



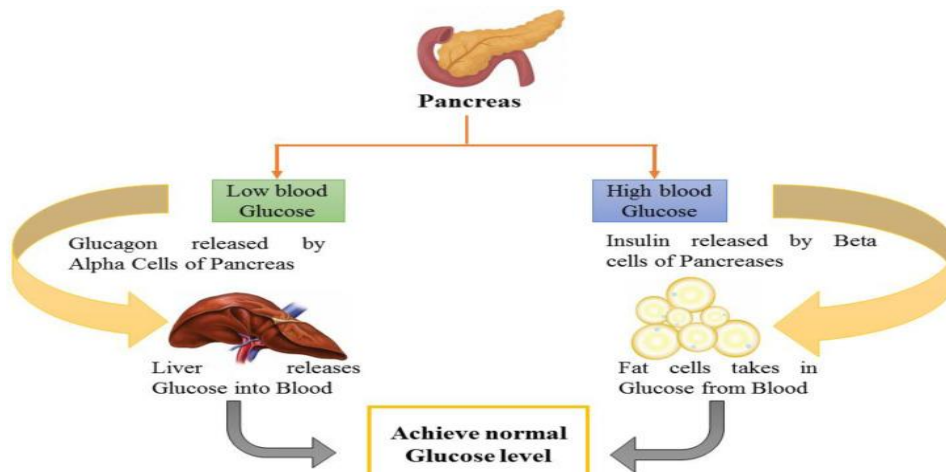
**Fig no 2: Pharmacological activity of Jamun.**

**Therapeutic Effects of Jamun  
Antidiabetic Effects of Jamun**

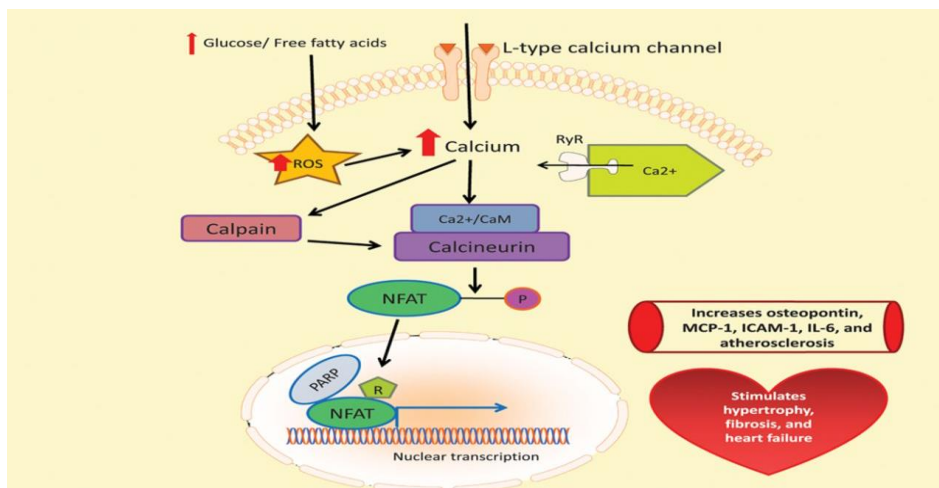
Several scientific researches has been established the foundations for great antidiabetic therapeutic potential. The therapeutic potential, when evaluated via an experimental design in a rat model, resulted in the glycemc alterations of the rat models over 8 weeks. Streptozotocin significantly increased blood glucose levels in rats. Jamun dosages of 100 mg/kg and 200 mg/kg minimized blood glucose levels. Jamun 200 mg/kg, both alone and in combination with metformin, resulted in a substantial decrease in HbA1c levels at the end of the eighth week when compared to their baseline values.<sup>[14-16]</sup>

The hypoglycemic potential of Jamun extracts was similarly assessed in another study by using male Sprague Dawley rats. For 60 days, ethanolic extracts of Jamun fruit and seeds were fed to hyperglycemic/diabetic rats on a regular or high sucrose diet. To assess the hypoglycemic impact of Jamun extracts, insulin and blood glucose levels were measured at periodic intervals. Both seed and fruit extract dramatically lower blood sugar levels as well as control insulin levels in hyperglycemic rats. Jamun fruit extract

reduced blood sugar levels by 12.29% and 5.35% in hyperglycemic normal and normal rats, respectively, while improving sugar levels by 6.19% and 2.82%. In normal and hyperglycemic rats, Jamun seed extract lowered sugar levels by 7.04% and 14.36%, respectively, or exhibited 7.24% and 3.56% raising insulin levels.<sup>[17]</sup> A human trial was also conducted where a 38-year-old male patient with a T2DM clinical history took 32 (20/12) insulin units each day. Taking into account the Dosha and Dusya, a judicial combination of four fundamental ayurvedic drugs, Gudmar, Jamun, Nagarmotha, and Sudarshan, was recommended to be taken orally in the morning and evening with lukewarm water. The HbA1c was 11.1% at the start. After 12 weeks of following the suggested ayurvedic medication coupled with insulin, the HbA1c level dropped to 5.6%. There was no need for further insulin or oral hypoglycemic agent medicines after the ayurvedic therapy. The HbA1c was constantly evaluated, and it has returned to the normal range, resulting in an enhanced quality of life. Even after discontinuing insulin after 12 weeks of initial ayurvedic therapy, the suggested combination of four medications maintained normal blood sugar levels in the T2DM instance.<sup>[18]</sup>



**Fig no 3: Blood glucose maintenance as facilitated by Jamun.**



**Fig no 4: Mechanism of action of Diabetics.**

**Anti-Obesity and Anti-Hypertensive Effects of Jamun**  
Jamun helped in BW reduction by attaining the BW of diabetic rats to 18.20–20.41%, as compared to 22.95% in the standard medicine group.<sup>[19]</sup> If a standardized extract from Jamun a commonly eaten tropical fruit, may reduce obesity and change the gut microbial population in mice fed an HFD. Mice were fed a standard diet (SD) or an HFD with or without Jamun fruit extract (JFE; 100 mg/kg/day) orally for 8 weeks. JFE supplementation significantly decreased diet-induced significant obesity, insulin resistance, and hepatic steatosis. JFE supplementation also repaired HFD-induced gut dysbiosis by restoring the Firmicutes Bacteroidetes ratio, the relative abundance of certain taxa, and the proportion of intestinal short-chain fatty acids. These positive findings suggest a link between gut microbiota regulation and JFE administration metabolism improvement, and they encourage the use and future exploration of Jamun fruit as a dietary intervention method for the prevention

of obesity and associated metabolic diseases.<sup>[20]</sup> Similarly in a study, 20 male Wistar rats were placed into four groups, each with five rats: one was negative control, normal control, and two treatment groups received ethanol extract of Jamun puree at dosages of 100 mg/g and 200 mg/g BW, accordingly. Restraint stress was instilled in the rats by placing them in restraint rats for 30 min each day for seven days. Before and after the therapy, blood pressure was taken, and malondialdehyde (MDA) levels were then measured. A one-way ANOVA was used to evaluate the data. The results revealed that inducing restraint stress considerably elevated the rats' blood pressure. In chronic stress rats, the injection of an ethanol extract of Jamun pulp considerably reduced the blood pressure rise. Chronic restraint stress rats blood pressure and MDA levels can be reduced by administering an ethanol extract of Jamun pulp.<sup>[21]</sup> Figure 3 outlines the overall Jamun's contributory effects on MS as indicated in the literature.

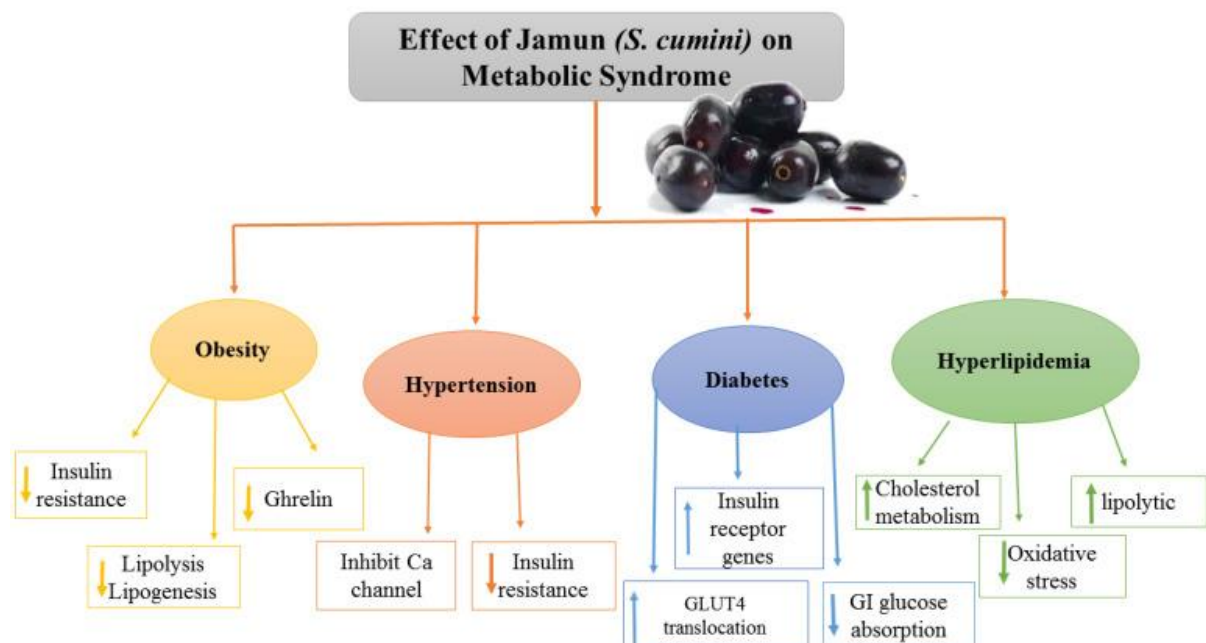


Fig no 5: Effect of Jamun on metabolic syndrome.

#### Anticancer property

Now a day's cancer is proved to be a killer disease. A majority portion of cancer-treating drugs are derived from natural resources.<sup>[22]</sup> Very often, women are suffered from breast cancer. Aquil *et al.* (2016) conducted an experiment to study the potential of Jamun against  $17\beta$ -estrogen-mediated breast cancer and the study of m-RNA in inhibition of disease. Female rats were artificially fed with the diet enriched with Jamun supplement. After two weeks the rats received  $17\beta$ -estradiol and were palpated weekly for mammary tumors. After 26 weeks, it was found that the Jamun enriched diet significantly delayed the first tumor appearance by 21 days. It also reduced the tumor incidence and tumor multiplication as compared to control.<sup>[23]</sup>

#### Jamun wood glass

Anti- Diabetes herbal jamun (Indian black plum tree) wood Glass is thus, a time tested and effective means of controlling diabetes. It is also a means of reducing excess fat from the body controlling blood sugar and purifying blood. it reduces heartburn, bloating gases of stomach very naturally.

#### Jamun wood glasses are said to have many health benefits, including

- Diabetes: Jamun wood glasses are considered a natural Ayurvedic treatment for diabetes.
- Blood sugar: Jamun wood glasses are said to help control blood sugar levels.
- Weight loss: Jamun wood glasses are said to help reduce excess fat from the body.

- Heartburn: Jamun wood glasses are said to help reduce heartburn.
- Stomach bloating: Jamun wood glasses are said to help reduce stomach bloating gases.



Fig no 6: Jamun wood glass.

### CONCLUSION

In spite of its high nutritional and medicinal values the commercial cultivation is lacking which needs to be popularized for commercial acceptance and orchard establishment in arid and semiarid regions of the country. Its fruit has a high potential source of nutritional and medicinal values. The value-added products of the crop need to catch national and international focus so that its nutritional and medicinal characteristics can be utilized in an ideal manner. In India some of the major fruit trees like mango, banana, citrus, guava etc. are cultivated on a large scale still Jamun is cultivated on minimal scale which still collects from forest areas. Despite many phytochemicals and pharmaceutical property in Jamun still, its cultivation is very limited and thus it needs more exploration. Jamun is a rich source of several important phytochemicals and other biochemical compounds. Still, remained as an under-exploitable crop or underutilized crop. It is an emerging fruit crop of 21st century that could play an important role in high medicinal value as well as different plant parts possessed varied uses to mankind. Hence, people should be aware of the health benefits that Jamun possess so that we can go towards a healthy society.

### REFERENCES

1. Zeisel SH. Regulation of Nutraceuticals. *Science*, 1995; 1853-1855.
2. Khot D.S. Ayurveda Internal Medicine for the Management of Common Metabolic Disorders W.S.R. to Madhumeha and Sthoulya. *J. Drug Deliv. Ther.*, 2019; 9: 167–169.
3. Anwar R., Rabail R., Rakha A., Bryla M., Roszko M., Muhammad Aadil R., Kieliszek M. Delving the role of *Caralluma fimbriata*: An edible wild plant to mitigate the biomarkers of metabolic syndrome. *Oxidative Med. Cell. Longev.*, 2022; 2022: 5720372.
4. Rasheed H., Shehzad M., Rabail R., Kowalczewski P.L., Kidoń M., Jeżowski P., Ranjha M.M.A.N., Rakha A., Din A., Aadil R.M. Delving into the Nutraceutical Benefits of Purple Carrot against Metabolic Syndrome and Cancer: A Review. *Appl. Sci.*, 2022; 12: 3170.
5. Oluwafemi Omoniyi Oguntibeju Type 2 diabetes mellitus, oxidative stress and inflammation: Examining the links. *Int. J. Physiol. Pathophysiol. Pharmacol.*, 2019; 11: 45–63.
6. Srivastava HC. Paper chromatography of fruit Juice: part 1. *J. Sci. Industr. Res.*, 1953; 12(B): 363-365.
7. Vaishnava MM, Tripathy AK, Gupta KR. Flavonoids glycosides from roots of *Eugenia jambolana*. *Fitoterapia*, 2012; 63(3): 259-260.
8. Parikh N., Brahmabhatt R., Shah K., Engineer S., Chauhan B. Herbal Approach for the Management of Obesity—A Review. *Indo Am. J. Pharm. Sci.*, 2018; 5: 1694–1703.
9. Lorenzo D., Transl J., De Lorenzo A., Gratteri S., Gualtieri P., Cammarano A., Bertucci P., Di Renzo L. Why primary obesity is a disease? *J. Transl. Med.*, 2019; 17: 169.
10. Khan M.I., Maqsood M., Saeed R.A., Alam A., Sahar A., Kieliszek M., Miecznikowski A., Muzammil H.S., Aadil R.M. Phytochemistry, food application, and therapeutic potential of the medicinal plant (*Withania coagulans*): A review. *Molecules*, 2021; 26: 6881.
11. Buddhi P., Thapa A., Sigdel K.R., Adhikari S., Basnyat B. Adverse events with ayurvedic medicines-possible adulteration and some inherent toxicities. *Wellcome Open Res.*, 2019; 4: 23.
12. Ahmed R., Tariq M., Hussain M., Andleeb A., Masoud M.S., Ali I., Mraiche F., Hasan A. Phenolic contents-based assessment of therapeutic potential of *Syzygium cumini* leaves extract. *PLoS One*, 2019; 14:1–16.
13. Sagar A., Dubey A. Post-harvest value addition of *Syzygium cumini* L. (Jamun) *Int. J. Chem. Stud.*, 2019; 7: 590–593.
14. Rb K., Gb D., Ar S., Nm D. Physico-chemical and nutritional properties of jamun (*Syzygium cumini*) seed. *J. Pharmacogn. Phytochem.*, 2019; 8: 211–213.
15. Rather G.J., Hamidudin, Naquibuddin M., Mohd I., Zaman R. Antidiabetic potential and related activity of Jamun (*Syzygium cumini* Linn.) and its utilization in Unani medicine: An overview. *Int. J. Herb. Med.*, 2019; 7: 7–11.
16. Kumar S., Singh B. *Syzygium cumini* (jamun) its medicinal uses. *Int. J. Pharmacogn.*, 2021; 8: 361–372.
17. Joshi M., Paudel M., Upreti S. Therapeutic influence of Jamun (*Syzygium cumini*): A review. *J. Pharmacogn. Phytochem.*, 2019; 8: 1056–1059.
18. Parveen S., Khan A.A., Khan Q.A. Antihyperlipidemic effect of seeds of Jamun (*Eugenia jambolana*) in subjects of intermediate hyperglycemia: A pilot study. *Tradit. Integr. Med.*, 2020; 5: 191–197. doi: 10.18502/tim.v5i4.5164.

19. Sood M., Bandral J.D., Kaur M. Development and quality evaluation of jamun seed powder supplemented noodles. *J. Pharmacogn. Phytochem*, 2018; 7: 1411–1416.
20. Ghosh P., Pradhan R.C., Mishra S., Patel A.S., Kar A. Physicochemical and nutritional characterization of jamun (*Syzygium cuminii*) *Curr. Res. Nutr. Food Sci*, 2017; 5: 25–35.
21. Binita K., Sharma V., Yadav S. The therapeutic potential of *Syzygium cumini* seeds in diabetes mellitus. *J. Med. Plants Stud*, 2017; 5: 212–218.
22. Gajera H.P., Gevariya S.N., Patel S.V., Golakiya B.A. Nutritional profile and molecular fingerprints of indigenous black jamun (*Syzygium cumini* L.) landraces. *J. Food Sci. Technol*, 2018; 55: 730–739.
23. Singh Y., Bhatnagar P., Kumar S. A review on bio-active compounds and medicinal strength of A review on bio-active compounds and medicinal strength of Jamun (*Syzygium cumini* Skeels) *Int. J. Chem. Stud*, 2019; 7: 3112–3117.
24. Sahu PP, Behera L, Nayak S, Samal KC. Health benefits of Jamun (*Syzygium cumini*) an Underutilised fruit: A ray in nanotechnology field, 2020; 74-80.
25. Nadkarni KM. *Indian Materia Medica*, 1954; 1: 516-18.
26. Chopra RN, Nayer SI, Chopra IC. *Glossery of Indian medicinal plants*, 1956; 238.
27. Craveiro AA, Androde CHS, Matos FJA, Machado MIL. Essential oils of *Eugenia jambolena*, *Journal of natural products*, 1983; 46(1): 591-592.
28. Nair AGR, Subramanian SS. Chemical examination of the flowers of *Eugenia jambolena*. *J. Sci. Industr. Res.*, 1974; 457-458.
29. Sagarwat H, Mann A, Kharya M. Pharmacological Potential of *Eugenia Jambolana*: A Review. *Pharmacogenesis Magazine*, 2006; 96-104.
30. Srivastava HC. Paper chromatography of fruit Juice: part 1. *J Sci. Industr. Res*, 1953; 12(B): 363-365.
31. Lewis YS, Dwarkanath DS Johar. Acids and sugars in *Eugenia Jambolena*. *J Sci. Industur*, 1956; 280-281.
32. Bhargava KK, Dayal R, Seshadri TR. Chemical components of *Eugenia Jambolena* stem and bark. *Current Science*, 1974; 43(20): 645-46.
33. Nair AGR, Subramanian SS. Chemical examination of the flowers of *Eugenia jambolena*. *J. Sci. Industr. Res*, 1974; 21(B): 457-458.
34. Yogeswari P, Sriram D. *Med. Chem*, 2005; 657-666.
35. Vaishnava MM, Tripathy AK, Gupta KR. Flavonoids glycosides from roots of *Eugenia jambolana*, *Fitoterapia*, 2012; 63(3): 259-260.