

A REVIEW ON SYZYGIUM CUMINI (JAMUN)

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DOI : <https://www.doi.org/10.56726/IRJMETS65969>

ABSTRACT

Business development of Jamun organic product (*Syzygium cumini* L.), an individual from the Myrtaceae family, is rehearsed in tropical and subtropical locales of the world. Its organic products have heavenly tissue that is sweet, sharp, and astringent. During the modern handling of natural product mash into drinks, jams, jam, vinegar, wine, and squash, jamun organic product seeds are discarded as waste. The picked papers that were possibly significant about jamun seed were evaluated in the wake of looking through unambiguous writing. Jamun seeds are a potential wellspring of bioactive substances like hydrolysable tannins, phenolic acids, flavonoids, different phenolics, terpenoids, phloroglucinol subsidiaries, and saponins. These substances have been connected to various natural exercises, including antimicrobial, cell reinforcement, gastroprotective, antidiabetic, hypolipidemic, cardio defensive, immunomodulatory, mitigating, hostile to pyretic, chemo preventive, against pale, Neuro psychopharmacological, and hostile to unfavorably susceptible also. In any case, to approve the protected utilization limit what's more, lay out additional remedial jobs of jamun seeds for their boundless use as a nutraceutical or drug part, exhaustive and calculated in vivo clinical exploration including human subjects should be completed. Research is additionally expected to decide the exact cycles fundamental the bioactivities showed by jamun seeds.^[1,2,3]

Keywords: *Antioxidants, Bioactive, Consumption, Jamun, Seed.*

I. INTRODUCTION

Cancer prevention agent, bioactive, utilization, jamun, seed Presentation Nature has reliably filled in as an extraordinary illustration of the exceptional peculiarity of beneficial interaction. There is a developing interest in regular item treatments with a basic way to deal with nature as individuals become more aware of the adequacy and adverse consequences of manufactured drugs. *Syzygium cumini* L. (family Myrtaceae) (Pursue et al, 2009) regularly known as Jamun, Jaman, Duhat in Hindi and Dark Plum, Indian Blackberry, Jambolana, Java plum, Malabar plum, Portugese plum in English. Jamun is a significant conventional therapeutic plant, a colossal local to India and its lining nations like Nepal, Pakistan and so on. All pieces of the jamun or Jambul tree track down a wide assortment of purposes. The ready jamun natural products are generally utilized however different parts like bark, leaves and critically the seeds are additionally utilized to treat a scope of sicknesses. Jamun seeds are normally not consumed crude by individuals. Each jamun natural products has a solitary weed which involves practically 25% of the absolute organic product weight (Sehwag et al, 2014) . The seeds are of incredible advantage since it brings down blood glucose level. It additionally contains L-ascorbic acid and Nutrient A, riboflavin, nicotinic corrosive, choline, folic corrosive, calcium, phosphorus and so on(Janick et al, 2008) Jamun seed powder is utilized to treat diabetes by a few conventional specialists. Logically it has a low glycemic file making it a decent choice for treatment of diabetes mellitus. Antidiabetic impacts of jamun seed recommending it holds huge potential to create more secure medications for diabetes treatment, another review showed that jamun seeds can bring down blood glucose by 30%. Concentrates likewise show that utilization of jamun seed powder may likewise give benefits during chemotherapy and radiation (Jagetia et al, 2005).

II. TAXANOMICAL CLASSIFICATION OF SYZYGIUM CUMINI

Domain	Eukaryota
Kingdom	Plantae
Phylum	Spermatophyta
Subphylum	Angiospermae

Class	Dicotyledonae
Order	Myrtales
Family	Myrtaceae
Genus	Syzygium
Species	S. Cumini

III. PHYTOCHEMICAL CONSTITUENTS

The Jamun fruit seeds & pulp have been reported very effective to lower the blood glucose levels in diabetes.

- Seeds-** Jambosine, gallic acid, ellagic acid, corilagin, 3,6-hexahydroxy diphenoylglucose, 1-galloylglucose, 3-galloylglucose, quercetin, β -sitosterol, 4,6 hexahydroxydiphenoylglucose.
- Stem bark-** Friedelin, friedelan-3- α -ol, betulinic acid, β -sitosterol, kaempferol, β -sitosterol Dglucoside, gallic acid, ellagic acid, gallotannin and ellagitannin and myricetin.
- Flowers-** Oleanolic acid, ellagic acids, isoquercetin, quercetin, kampferol and myricetin.
- Fruit pulp-** Anthocyanins, delphinidin, petunidin, malvidin-diglucosides.
- Leaves-** β -sitosterol, betulinic acid, mycaminose, crategolic (maslinic) acid, n-hepatcosane, nnonacosane, n-hentriacontane, noctacosanol, ntriacontanol, n-dotricontanol, quercetin, myricetin, myricitrin and the flavonol glycosides myricetin 3-O-(4''-acetyl)- α Lrhamnopyranosides.
- Essential oils-** α -terpeneol, myrtenol, eucarvone, muurolol, α -myrtenal, 1, 8-cineole, geranyl acetone, α -cadinol.



Fig 1: Jamun *Syzygium Cumini* Seeds



Fig 2: Jamun *Syzygium Cumini* Stem



Fig 3: Jamun *Syzygium Cumini* Flower



Fig 4: Jamun *Syzygium Cumini* Fruit



Fig 5: Jamun *Syzygium Cumini* Leaves

IV. PLANT DESCRIPTION

A major, 30-meter-tall evergreen tree, the jamun. Most frequently found on old stems, bark has an unpleasant surface and is pale brown in tint. The leaves are rugged, obovate-elliptic, and 6 to 12 centimeters in length. They might change in shape, are smooth also, sparkling, and have many nerves that combine at the edge. The tip of the leaf is expansive and less sharpen. Most panicles, estimating 4 to 6 cm, are created by branchlets that are situated underneath the leaves. Blossoms are fragrant, greenishwhite, 7.5-13 mm across, in stretched bunches at the tips of the stems. The calyx is cup formed, and the four petals are intertwined into a cap. The calyx has teeth, is pipe molded, and is 4 mm long. (Master et al, 2012) (Kirtikar et al, 2003) Plant Depiction A major, 30-meter-tall evergreen tree, the jamun. Most frequently found on old stems, bark has an unpleasant surface and is pale brown in tint. The leaves are rugged, obovate-elliptic, and 6 to 12 centimeters in length. They might change in shape, are smooth also, sparkling, and have many nerves that combine at the edge. The tip of the leaf is expansive and less sharpen. Most panicles, estimating 4 to 6 cm, are created by branchlets that are situated underneath the leaves. Blossoms are fragrant, greenishwhite, 7.5-13 mm across, in stretched bunches at the tips of the stems. The calyx is cup-formed, and the four petals are intertwined into a cap. The calyx has teeth, is pipe molded, and is 4 mm long. (Master et al, 2012) (Kirtikar et al, 2003). [4,5]



Fig 6: Jamun *Syzygium cumini* fruit

V. SEEDS DESCRIPTION

The shade of jamun seed is white to pink with an elliptical shape. The seed has length of approx. 18.2mm and width 11.05mm. The normal load of jamun seed is 1.62g. The surface is coarse. (Kshirsagar et al, 2019). [6]



Fig 7: Jamun Seed

VI. COMPOSITION OF JAMUN

Jamun organic product is for the most part recognized to be exceptionally excellent for its therapeutic capability mainly against diabetes as a result of its impact on pancreas. Jamun seeds likewise contains egg whites, fat, glycosides, an alkaloid; jambosine, sap, ellagic corrosive, quercetin, gallic corrosive as well as components of zinc, vanadium, chromium, sodium and potassium. Sitosterol is available in unsaponifiable material of seed fat. The plant is wealthy in compounds containing anthocyanins, glucoside, ellagic corrosive, isoquercetin, kaemferol and myrecetin. The seeds are professed to contain alkaloid, jambosine, and glycoside jambolin or antimellin, which stops the diastatic change of starch into sugar [19]. [7]

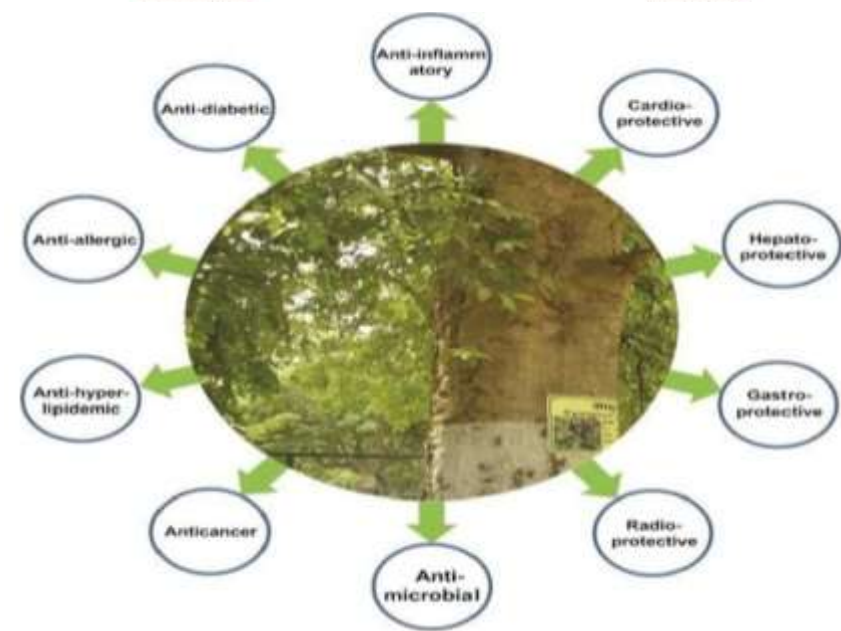
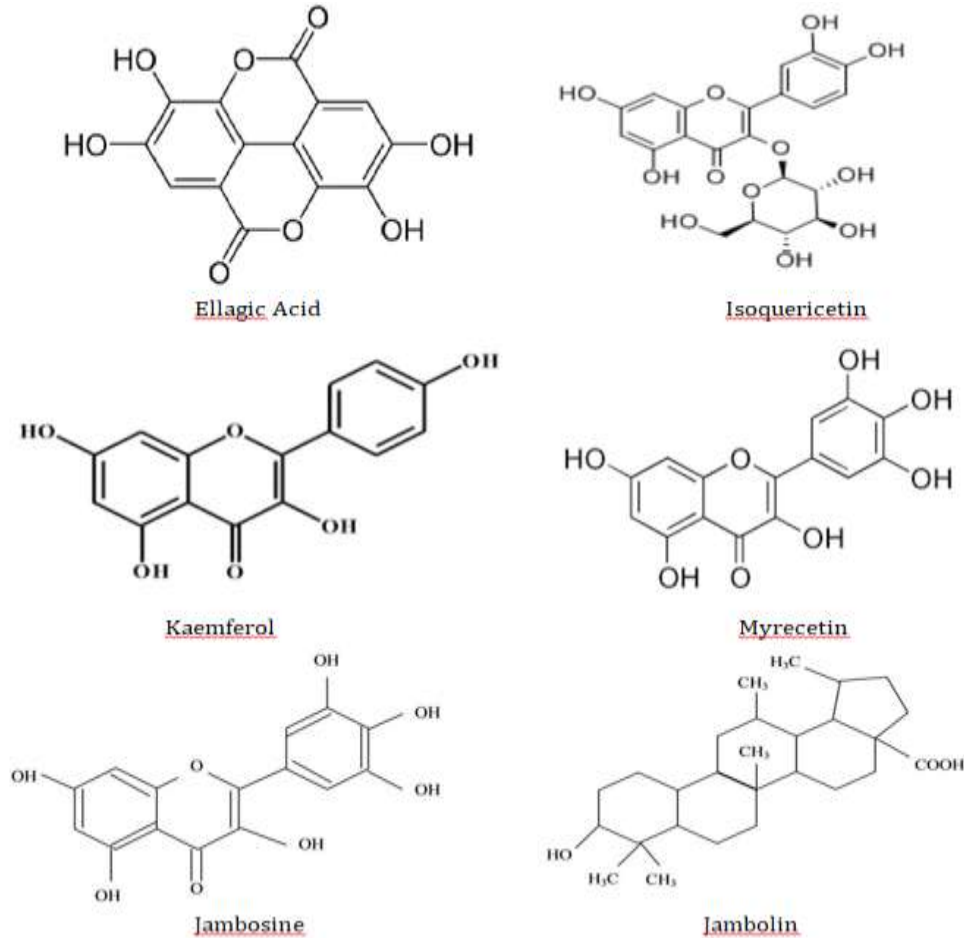


Fig 8: Pharmacological Action of Jamun

VII. MEDICINAL PROPERTIES

The bark is bitter, sweet, stomach related, astringent to the insides, anthelmintic also, utilized for the treatment of sore throat, bronchitis, asthma, thirst, biliousness, loose bowels what's more, ulcers. It is likewise a decent blood purifier. The organic product is bitter, sweet, cooling and astringent to the insides and eliminates terrible stench structure mouth, biliousness, stomachic, astringent, diuretic and antidiabetic . The

natural product has an extremely lengthy history of purpose for different therapeutic purposes and at present has a huge market for the treatment of ongoing loose bowels and other intestinal problems. The seed is sweet, astringent to the insides and great for diabetes. The debris of the leaves is utilized for fortifying the teeth and gums. Vinegar ready from the juice of the ready organic product is an pleasant stomachic and carminative and utilized as diuretic and it is additionally helpful in spleen amplification and a productive astringent in constant looseness of the bowels. Juice of delicate leaves of this plant, leaves of mango and myrobalan are blended and regulated alongside goat's milk and honey to treat loose bowels with ridiculous release, though juice of delicate lets be or in mix with carminatives like cardamom or cinnamon is given in goat's milk to treat the runs in youngsters . Customary clinical healers in Madagascar have been utilizing the seeds of jambolan for ages as the focal point of a viable treatment for checking the sluggish weakening effects of diabetes . The seed extricate is utilized to treat cold, hack, fever and skin issues like rashes and the mouth, throat, digestive organs and genitourinary parcel ulcers [infected by *Candida albicans* by the locals of Tamil Nadu . Jambolan natural product can be eaten crude and can be made into tarts, sauces and sticks. Great quality jambolan juice is astounding for sherbet, syrup and "squash", an Indian beverage.^[14,15]

Benefits of Black Plum:

Too known as Jambul or Jamun, can help a ton in controlling glucose. Analysts from the Father Muller Clinical School in India checked out the impacts of dark plums in the treatment of diabetes. The presence of anthocyanins, ellagic corrosive and hydrolysable tannins in dark plums makes this organic product very valuable for diabetic individuals. The organic product helps control the change of carbs into glucose. The inordinate thirst and incessant pee issues normal among diabetic individuals can likewise be constrained by this organic product. Alongside the organic product, the leaves, berry what's more, seeds of the dark plum tree can be utilized to control glucose level.

VIII. PHARMACOLOGICAL EFFECT OF S. CUMINI

1. AntiMicrobial Activity:

Bhuiyan et al. revealed that a jamun seed extricate was powerful as an antibacterial specialist against *Bacillus cereus*, *Bacillus subtilis*, *Bacillus megaterium*, *Streptococcus beta-haemolyticus*, *Staphylococcus aureus*, and *Shigella diarrheas*, *Shiga*, *Sh. boydii*, *Sh. flexneriae*, *Sh. Sonnei*, *Escherichia coli*, *Salmonella typhi* B, *Sal. Typhi* B-56 and *Klebsiella* species. As indicated by Jadhav et al, the methanolic concentrate of the seeds have expansive antimicrobial range against *Vibrio cholera*, *Aeromonas hydrophila* and *B. subtilis* with least inhibitory fixation (MIC) and least bactericidal fixation (MBC) going from 1.5-12.0 and 1.5-16.0 mg/ml . Banerjee et al, 2011 revealed antibacterial impact of ethanolic extricate against two gram positive (*S. aureus* and *E. faecalis*) and three Gram negative microorganisms (*E. coli*, *K. pneumonia* and *P. aeruginosa*). Because of the presence of monoterpene aldehydes, which block protease activity and bactericidally affect oral microbes, *S. cumini* has antibacterial properties. The phyto-synthetic examination and examination of the spasmolytic movement of the hydro alcoholic concentrate inferred from *S. cumini* seeds were finished in a concentrate . The seeds' spasmolytic, antibacterial, and hostile to insect diarrheal properties were joined, showing that they share similar auxiliary metabolites, demonstrating their remedial potential for the treatment of colic as well as the runs.^[16,17]

2. Antioxidant Activity:

Cancer prevention agent control free revolutionaries which lead to a few sicknesses and speed up maturing. A few in vitro examinations have exhibited such possibility utilizing alcoholic concentrates of the seed. The concentrates could act in different ways by catching free revolutionary like superoxide, hydroxyl, lipid-peroxide and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) and nitric oxide and by chelating change metal impetus like ferric particles. On the side of catching component, restraint of autooxidation in β -carotene and linoleic corrosive has been accounted for by Bhajpai et al. The fact that the cancer prevention agent capability of makes it revealed the seed extricate against superoxide extremist is multiple times higher than Trolox and is focus subordinate. In-vitro cancer prevention agent profiling was analyzed utilizing the half $(CH_3)_2CO$ concentrate of jamun seeds. Most extreme DPPH revolutionary rummaging action was displayed in the concentrate, trailed by 2, 2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic corrosive) ABTS revolutionary

rummaging movement. Nitric oxide rummaging and weighty metal chelation were noticed, yet lipid peroxidation, H₂O₂, and Gracious Searching were moderate.^[18,19]

3. Gastroprotective Activity:

As indicated by Chaturvedi et al., jamun seed ethanolic remove can forestall stomach ulcers in rodents welcomed on by cool restriction stress, headache medicine, 95% ethanol, and pylorus ligation. Decreased corrosive pepsis emission, cell shedding, lipid peroxidation, and expanded mucin and mucosal glycoprotein were utilized to distinguish the component of activity. As indicated by them, the concentrate's positive advantages on diabetic rodents with coinciding stomach ulcers might be owing to its immediate advancement of gastric mucosal guard and against diabetic activities . The fact that there was a critical makes it seen decline in the gastric ulcer list after the organization SC extricate alone and as well as in mix with Acarbose (5mg/kg).^[20]

4. Hypolipidemic Activity:

One of the most successive results of diabetes mellitus is an adjustment in lipid profile, and in this regard, the hypolipidemic impact of jamun seed on both alloxan and streptozotocin-incited diabetic rodents has been completely examined. The proportion of all out serum cholesterol to high thickness lipoprotein cholesterol, Low Thickness Lipoproteins (LDL), and fatty substances can all be diminished by ethanolic concentrate of seeds. As indicated by Ravi et al., oral treatment of the ethanolic concentrate of jamun part caused the elevated degrees of cholesterol, phospholipids, fatty substances, and free unsaturated fats in the plasma, liver, and kidney tissues of streptozotocin-prompted diabetic rodents to return to ordinary. They guaranteed that the decreasing impact was equivalent to that of normal prescription treatment (glibenclamide). It has been conjectured by Modi et al that antihyperlipidemic impact of jamun seeds might be expected to presence of alkaloids, tannins, saponins, phenols, flavonoids furthermore, triterpenes.^[21]

5. Cardioprotective Activity:

In pale skinned person rodents, Mastan et al , found that a methanolic concentrate of jamun seeds gave cardiovascular security against isoproterenol-incited myocardial dead tissue. The phytochemicals present in the concentrate, like alkaloids, amino acids, flavonoids, glycosides, phytosterols, saponins, steroids, tannins, and triterpenoids, reasonable added to the influence by supporting the heart film.^[22]

6. Immunomodulatory Activity:

Immunomodulatory alludes to the control of the resistant framework through feeling and hindrance of safe framework cells and organs. Immunomodulatory treatment is currently perceived to be a practical option to conventional chemotherapy for a scope of debilitated infections. The methanolic concentrate of jamun seeds, as per Mastan et al., appears to have promising immunomodulatory impacts. They detailed a huge expansion in all out white platelet, neutrophils, and lymphocytes include in a portion subordinate way while concentrating on humoral and cell resistance in mice by infusing carbon ink suspension, hemagglutination response, and postponed type touchiness reaction in rodents actuated by sheep red platelet.^[23]

7. Anti-inflammatory Activity:

To treat paw oedema in wister rodents, Kumar et al. revealed utilizing ethyl acetic acid derivation and methanol extricates as an calming . As per Modi et al, oral organization of the methanolic and watery extricates @250mg/kg body weight diminished the oedema by 48.29% and 68.85%, individually, when contrasted with the untreated benchmark group, while diclofenac sodium, the standard medicine, at 100mg/kg body weight diminished it by 75.08%. A diligent sort of fiery sickness in the joints is joint pain. Arya et al, additionally saw that methanolic separate affects adjuvant induced joint pain in rodents.^[24,25]

8. Antiallergic Activity :

Mahapatra et al, showed that Flavonoids, which have been disengaged from Myrtaceae species, including jamun seed, are believed to be answerable for the concentrate's antiallergic properties. These mixtures have been displayed to serious areas of strength for have inhibitory impacts on various chemicals associated with cell actuation and the development of fiery go between. Jamun seeds can thusly be utilized to treat hypersensitive ailments.^[26]

9. Antidiabetic Activity:

Chloroform concentrate to actuate islet neogenesis in vivo too as in vitro examinations. The antidiabetic impact of seed removes has likewise been seen in respect with bringing down adequacy of starch hydrolyzing catalysts including a-amylase, pancreatic amylase and a-glucoamylase (Karthic et al, Sharma et al), portrayed the system towards keeping up with carb homeostasis by expanding and diminishing the action of key compounds for glycolysis and gluconeogenesis. The concentrate additionally actuates glucose transport in a phosphatidylinositol 3 kinase-subordinate style in cell culture way. Concentrates by (Grover et al, and Tanwaret al), have shown that jamun seeds likewise forestall diabetic incited optional pathogenesis like kidney harm, neuropathy and gastropathy. The seed likewise decreases hyperglycemia initiated oxidative pressure by reestablishing levels of glutathione, expanding exercises of superoxide dismutase, catalase and thus diminishing the degrees of lipid peroxidase (Ruler et al, 1998) [39]. At the point when taken multiple times day to day with water as a 25gm powder, seed extricate diminishes glucose and diabetes. Hence, jamun seed could be considered as clever restorative armamentarium for treatment of diabetes.^[27, 28, 29, 30, 31]

IX. MECHANISM OF ACTION

Numerous researchers have concentrated on the conceivable component of activity of S.cumini. As per Achrekar et al., Concentrates of the juice of natural product mash of E.jambolana have shown hypoglycemic action by invigorating insulin creation. Bansal et al. detailed an expansion in plasmainsulins actuated by S seeds. cumini could be called toproinsulin insulin alteration conceivable by pancreatic cathepsin Band orits creation. S. cumin has a double impact for example a mix of the instrument of sulfonylurea and biguanids.B. Sharma et al. showed that the anti hyperglycemic impact of the flavonoid-rich ex-lot of S seeds. cumini because of its immediate insulinotropic activity. In vivo research utilizing mice Goto-kakizaki (GK), Shinde et al. inspected, the arrival of ac-etone was a intense inhibitor of alpha glucosidase hydrolysis of maltose contrasted and untreated control creatures. This impact subsequently focuses to the restraint of alpha glucosidase as a chance. Kumar et al., A mycaminose disconnected from S.cumini seed methanol with antidiabetic movement. The expected system of activity might be because of the potential for plasma insulin impact by expanding the insulin creation of the pancreas in β -cells of isletsof Lagerhans or its delivery in bound structure. A mycaminose-like type of glibenclamide.

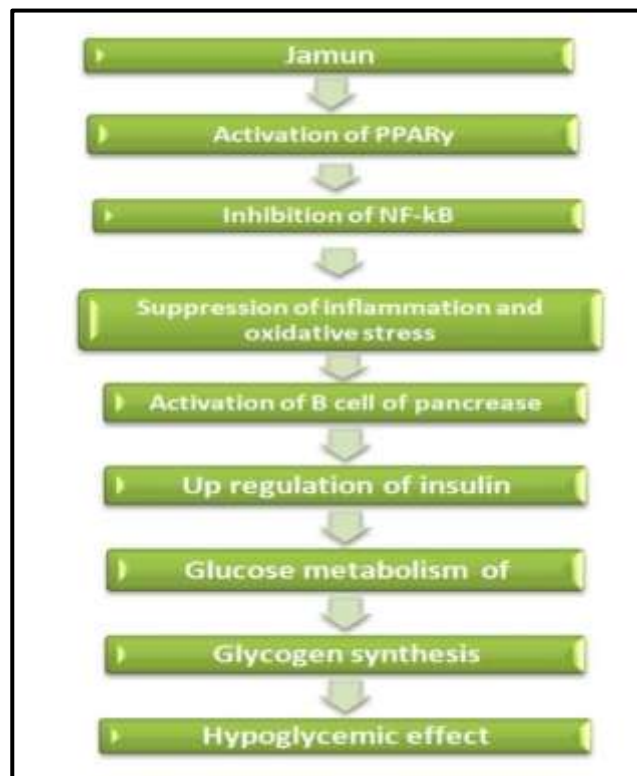


Fig 9: Mechanism of Action of S. Cumini

X. CONCLUSION

Jamun seeds (*Syzygium cumini*) offer a wide range of potential health benefits, particularly in the management of diabetes, due to their bioactive compounds like anthocyanins, flavonoids, and alkaloids. These seeds have shown promise in regulating blood sugar levels, improving insulin sensitivity, and exhibiting antioxidant and anti-inflammatory properties. Additionally, Jamun seeds have applications in promoting digestive health, managing cardiovascular risks, and supporting overall well-being. While traditional use and preliminary research highlight their therapeutic potential, further clinical studies are required to fully understand their mechanisms of action, efficacy, and safety for broader medicinal use. Overall, Jamun seeds present an intriguing natural remedy with significant potential, warranting further exploration.

Jamun seeds have demonstrated promising antidiabetic activity, supported by both traditional uses and scientific research. The bioactive compounds in Jamun seeds, including anthocyanins, flavonoids, and alkaloids, have been shown to help regulate blood glucose levels by improving insulin sensitivity, reducing oxidative stress, and modulating glucose metabolism. These effects highlight the potential of Jamun seeds as a natural therapeutic option for managing diabetes. However, further clinical studies are needed to confirm their efficacy and establish optimal dosage for therapeutic use. The seeds are rich wellspring of phytochemicals including phenolic as well as non-phenolic bio actives. Pharmacological studies relate the phytochemicals to give enhanced helpful impacts like enemy of oxidative, anticancerous, antidiabetic, antimicrobial, radio defensive and others, the most generally researched one being the improving activity against diabetes mellitus.

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