



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

JAMUN-A Anti-diabetic Herbal Drug

Krushna P. Jadhav¹, Prof. Aishwarya D.Ghuge², Dr. Swati P. Deshmukh³, shrikrushna M. Khambalkar⁴

Student Shraddha Institute of Pharmacy, Washim

Assistant Professor Department of Pharmaceutics, Shraddha Institute of Pharmacy, Washim

Principal, Shraddha Institute of Pharmacy, Washim

Student Shraddha Institute of Pharmacy, Washim

Abstract :-

Jamun scientifically known as *Syzygium cumini* belonging to family myrtaceae . It is also called as Black jamun. It used for treating type-ii Diabetics . Diabetic mellitus is a metabolic disease which involve inappropriately elevated blood, glucose level. Type –ii diabetic is a conditions that affects the may the body processes blood sugar (glucose). The various parts of the jamun fruits such as well as roots ,seeds ,are used to treat the type-ii diabetic. The bioactive constituents which are rich in carbohydrates ,protein ,minirals,and crude oils .Jamun are responsible for anti-bacterial,anti-fungal,anti-viral,cardioprotective,antiallergic,hepatoprotective,antiulcerogenic,anti-diaherial, anti-hyperlipidimic effects.thus in the present review article a attempt has been made to emphasise specially on the anti-diabetic (type-II) activity of the jamun fruit. The extraction of jamun can be done by varios extraction process.Amongest , all the anti-diabetic properties are the most promising & explored as the seeds contain Jambosin. There for, thee present era demands scientific interaction to expore this plant for its utilizations in the food and pharma industry.

Key words:- Jambosin, Anti-ulcerogenic, Bioactive, Extractions.

INTRODUCTION

JAMUN

Biological source: *Syzygium cumini*

Family: Myrtaceae

Also known as *Syzygium jambolanum* and *Eugenia cumini*. Other names are Jambul, Black Plum, Java Plum, Indian Blackberry, Jamblang, Jamun. It is used in the treatment of type II diabetes.

Diabetes mellitus

Diabetes mellitus is a set of metabolic disorders characterised by hyperglycemia (elevated blood sugar levels). Hyperglycemia is caused by decreased insulin secretion, poor glucose utilisation, and increased glucose production, all of which can be related to the underlying cause of diabetes mellitus. Genetic and environmental factors interact to cause the various forms of diabetes mellitus.

Diabetes is a serious or chronic disease, disease or infection caused by abnormal or excessive production of the kidney. Diabetes is divided into two as diabetes and diabetes insipidus, depending on whether sugar is present in the urine.

Type 1 diabetes, Type 2 diabetes, Gestational diabetes, Genetic defects (beta cell development and insulin action), Neonatal diabetes Endocrine diseases, Blood related diseases diabetes Drug-induced diabetes Immune-mediated diabetes, Other genetic syndromes.

Use of Diabetes Causes Diabetes Islet endocrine cells (beta and alpha) in the pancreas secrete insulin from beta cells and glucagon hormone from alpha cells. Both beta cells and alpha cells adjust hormone release according to the sugar environment and regulate blood sugar levels. Under normal conditions, when blood sugar rises, beta cells in the blood secrete more insulin.

In case of hypoglycemia, alpha cells secrete excess glucagon. Diabetes is caused by hyperglycemia (high blood sugar) caused by low or no insulin production (type 1 diabetes) or decreased insulin or insulin resistance (type 1 diabetes). An autoimmune reaction (an unknown attack on a person's own cells) damages the beta cells of the pancreas, leading to type 1 diabetes.

As a result, beta cells in the body are destroyed and insulin levels decrease. In type 2 diabetes, insulin deficiency and insulin sensitivity cause insulin to have inadequate effect. The insulin released from the beta cells cannot be utilised by the body (skeletal muscle and adipose tissues), signifying insulin resistance. Insulin resistance is complex; however, it is most typically caused by increased body weight and aging.[1]

Type-I

Type 1 diabetes (T1DM) Type 1 diabetes (T1DM) accounts for 5% to 10% of DM and is characterized by autoimmune destruction of insulin-producing beta cells in the pancreatic islets. As a result, there is a complete deficiency of insulin. It is thought that a combination of genetics and environment (such as infections, toxins, or certain foods) cause the immune system to fail. T1DM usually occurs in children and adults, but can occur at any age.[2]

Type-II

. Type –ii diabetic is a conditions that affects the may the body processes blood sugar (glucose).

Type 2 diabetes (T2DM) accounts for approximately 90% of all diabetes cases. In T2DM, the response to insulin is reduced, defined as insulin resistance. In this case, insulin is ineffective and it begins to control glucose levels by producing insulin, but over time, insulin levels decrease, causing T2DM. T2DM usually affects people over the age of 45. However, this condition is more common in children, teenagers and young adults due to the increase in obesity, physical inactivity and malnutrition.[2,3]

Pathophysiology Of Diabetic Type-II

T2DM is an insulin-resistant disease associated with beta cell dysfunction. At first, there is a compensatory increase in insulin to control blood sugar within the normal range. As the disease progresses, beta cells are replaced and insulin secretion is unable to control glucose levels, resulting in hyperglycemia. Most patients with T2DM are obese or have a high amount of body fat, mostly in the abdominal area. Adipose tissue itself stimulates insulin secretion through a variety of conditions, including FFA release and adipokine dysregulation. People with GDM who are physically inactive, have high blood pressure, or have dyslipidemia are also at risk of T2DM. Changes in the data suggest adipokine dysregulation, inflammation, abnormality in incretin biology (with incretins such as glucagon-like peptide-1 (GLP-I) or incretin resistance), hyperglycemia, lypopenemia, increased renal glucose reabsorption, and involvement of the gastrointestinal microbiota in the stomach.[4]

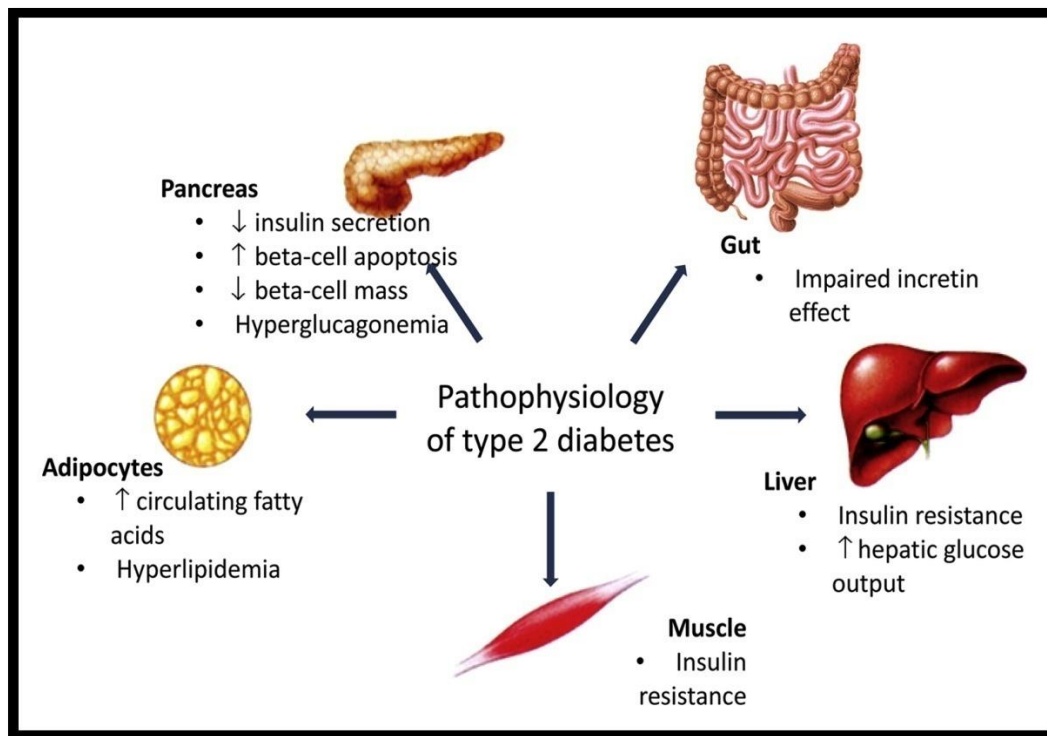


Fig no: Pathophysiology of the diabetic type-II

Fruit Composition

Jamun The nutritional composition of the fruit appears to be rich in carbohydrates (such as glucose, sucrose, fructose and galactose), proteins (aspartate, alanine, glutamine, tyrosine and cysteine; does not contain amino acids), vitamins. . (ascorbic acid, thiamine and niacin) and minerals (potassium, calcium, sodium, phosphorus and iron). It was also found that Jamun contains many bioactive substances that contribute to human health. The color, taste and aroma of jamun are closely related to the amount of phytochemicals (polyphenols, tannins and gallic acid) in its composition.[5,6]

Seed compositions

The nutritional content of salmon fruit was analyzed and the approximate composition of the seeds was found to be (%): moisture content 16.34 ± 0.49 , ash content 2.18 ± 0.06 , protein content 1.97 ± 0.59 , raw fat content 0.65 ± 0.01 , crude fiber content 4.19 ± 0.12 ; The contents of jamun fruit were 82.19 ± 2.46 , 2.04 ± 0.06 , 2.15 ± 0.06 , 0.83 ± 0.02 and 1.76 ± 0.05 , respectively. In another study, according to the results, Jamun seed composition (%). According to previous studies, moisture content is 3.21-53, ash is 1.5-21.72, carbohydrate is 6.05-89.68, fiber is 1.21-16.9, protein is 1.97-8.5, fat is 1.97-8.5, and fat is 1.97-8.5. It has been reported to be 0.65-4.86 and ascorbic acid to be 5.7-5. (mg) 1.25-18.62. A recent analysis of Jamun seeds obtained from the collection of ripe Jamun fruits in Brazil showed that the moisture, ash, carbohydrate, protein and lipid content (%) was $62.25 \pm$

6.32, 0.36 ± 0.02 , $14.95 \pm$ It showed that it was calculated as 6.09 and 19.96 ± 0.00 and 2.47 ± 0.24 . The oil content of jamun seeds varies depending on the fruit, and although different solvents are used, the main fatty acid is oleic acid [21,22]. The fatty acids in jamun seed oil are 32.2% oleic acid, 31.7% myristic acid, 16.1% linoleic acid, 6.5% stearic acid, 4.7% palmitic acid, 3.0% vernonic acid, 2%, It is reported to contain 8 laurin, 2.8% steriferic acid. 1.8%, malvacic acid -1.2%. Recently, Jamun seeds have been purified from fatty acids using different solvents. In this analysis using hexane, the fatty acid composition is as follows (%); oleic acid - 26.8, linoleic acid - 25.2, palmitic acid - 19.9, stearic acid - 6.4, linoleic acid - 2.6, arachidic acid - 1.2, decasapentaenoic acid - 0.6, erucic acid - 0.5, myristic acid - 0.4, docosahexaenoic acid - 0.3 and lauric acid - 0.3. This plant also has many biological chemicals. [7-13]

Geographical distributions

Jamun is found throughout the Indian subcontinent, including India, Bangladesh, Ceylon, Burma, Pakistan and Madagascar. Jamun is grown all over the world, including the United States. Jamun grows well in deep, fertile and well-drained soils. 10-12 It also grows in the West Indies, Israel, California and Algeria. Jamun becomes a mature tree within 40 years, often reaching a height of 100 feet (30 m). The jamun canopy can expand up to 36 feet (11 m) and its trunk can be 2-3 feet (0.6-0.9 m) in diameter. Jamun has many branches that are quickly starting from scratch. Jamun bark stems are often cracked, rough and peeling, with the lower end becoming pale in color. As height increases, the trunk bark becomes smooth and light gray. Jamun leaves are opposite, oblong or elliptical, blunt or tapering to a point at the tip. The leaves are 2 to 10 inches (5-25 cm) long and 1 to 4 inches (2.5-10 cm) wide. New leaves are red, the upper part of mature leaves is dark green, the lower part is lighter, shiny, hard, the midrib is light yellow and smells like turpentine. March-April is the flowering time of Jamun. Jamun produces many flowers ranging from 10 to 40 flowers. Jamun flower is round to oblong in shape, 1 to 4 inches (2.5-10 cm) long and 1/2 inch (12.7 mm) wide, with a fragrant, funnel-shaped blade up to 0.16 inch (4 mm) is long. and 4 to 5 leaves form a small disc. Flowers are green-white, eventually turning pink to red. Jamun begins to bear fruit at the age of 11-14, in summer the number of groups increases to 10 or even 40, and reaches maturity from June to July. Jamun's fruits are oval or round and 1/2 to 2 inches (1.2 to 5 cm) in size. The fruits are green at first and turn from light to dark purple and even black as they ripen. 10-15 Jamun fruit is sweet and sour and after eating Jamun your tongue turns to blood. Jamun seeds are oblong in shape, white in color and turn purple. It turns brown when dry. (Hindus and Buddhists consider Jamun as a sacred tree and it is often found on the premises of Hindu temples. Lord Krishna loves Jamun and its leaves and fruits are part of the offerings made to the god during meals.[14,15,16]

CLIMATE AND SOIL

Due to its wide adaptability, jamun can grow well in tropical and subtropical climates. It is durable, can withstand short and heavy rains and floods (Chovatia and Singh, 2000). It grows well in semi-arid subtropical regions where annual rainfall is between 350 and 500 mm. It also grows in the low mountains of the Himalayas, at an altitude of 1300 meters. However, in order to grow in the first stage, it is necessary to be protected from frost. It can be introduced and grown in arid, semi-arid, resource-poor and barren lands where other crops are difficult to grow. Dry air is needed for flowers and fruits. In subtropical regions, early rains help increase fruit size, colour, ripeness and taste. Jamun can grow in soil in many places. However, heavy growth and high yields can only be achieved by growing deep loamy and well-drained soil that retains good soil moisture. It tolerates saline and saline soils and can grow in bushes and degraded soils. It has been reported that the plant can survive in alkaline soils up to 10.5 Ph. Planting in very heavy and light soils should be avoided.[14.15,16]

Parts of jamun :



Fig. Jamun seed



Fig. Jamun fruit

Species distributions in the country

Sr.no	Species	Common name and use	Distributions	Reference
1	<i>S. aquem</i>	Watery Rose-apple, fruits edible	A small tree distributed in Assam and Meghalaya	16
2	<i>S.ammottlanum</i>	fruits edible	Western Ghats, The Nilgris, Palani and Anamalai hill	16,17
3	<i>S. aromaticum</i>	Clove, dried flower buds commercially important	Evergreen trees cultivated in Tamil Nadu and Kerala	16,17
4	<i>S. claviflorum</i>	fruits edible	The Andamans	16
5	<i>S. fruticosum</i>	Wild jamun	Avenue	16,17
6	<i>S. mappaceum</i>	Ornamental plant	Assam, Meghalaya, Arunachal Pradesh and Tamil Nadu	17
7	<i>S. jambos</i>	Rose-apple	Many part of the india	16,17

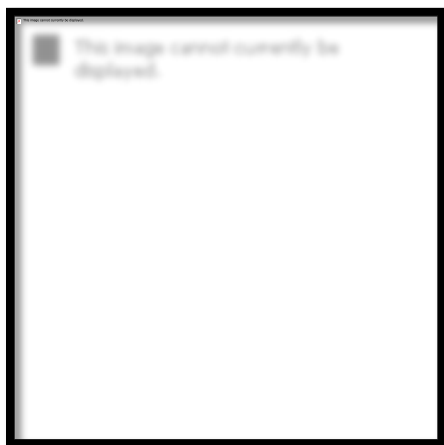
Table no: Species distributions in the country

Chemical constituents present in a the jamun plant

Sr. no	Plant part	Chemical present
1	Seeds	Jambosine ,gallic acid, ellagic acid, corilagin 3,6-hexahydroxy diphenoylglucose,1-galloylglucose, 3-galloylglucose, quercetin, β -sitoterol,4-6 hexahydroxydiphenoylglucose [18,19]
2	Stem bark	Friedelin,friedelen – α -ol ,betulinic acid , β -sitosterol,kaempferol, β -sitisterol-Dglucose, gallic acid, ellagic acid,gallotannin and elligitannin,andmyricetine [18,19]
3	Flowers	Oleanoicacid , ellagic acid, isoquercetin, quercetin,kammpferol and myricetine [20,21]
4	Fruits pulp	Anthocyanins, delphinidin, petunidin,malvidin-diglucosides[18,21,22]
5	Leaves	β -sitosterol, betulinic acid, mycaminose, crategolic (maslinic) acid, n-hepatcosane, n-nonacosane, n-hentriacontane, noctacosanol, n-triacontanol, n-dotricontanol, quercetin, myricetin, myricitrin and the flavonol glycosides myricetin 3-O-(4"-acetyl)- α Lrhamnopyranosides[20,21,22]
6	Essential oils	α -terpeneol, myrtenol, eucarvone, muurolol, α -myrtenal, 1, 8-cineole, geranyl acetone, α -cadinol and pinocarvon [18,22]

Table no: Chemical constituents present in a the jamun plant

Chemical structure



Structure no 01: anthocyanins

Structure 02: Ellagic acid

Analysis methods

Physical Properties

Physical properties such as color and shape were analyzed. By measuring the length (cm) and tenderness ratio, the average fruit weight (g) was calculated using a digital caliper and the percentage of edible material, seeds and fruit juice was obtained and evaluated.

Chemical Properties

Estimate TSS using a handheld refractometer according to the recommended procedure. pH was measured using a digital pH meter (Jenway, UK).

Titration is used to calculate titratable acidity (in % citric acid). The volumetric method was used to estimate the amount of total and reducing sugars. Te ascorbic acid level 2-6 was measured using dichlorophenol-indophenol apparent titration..[23]

Phytochemical Analysis

Stems, fruits, leaves, roots and seeds of Jamun with different phytochemicals (Table 02). Hexane, petroleum ether, chloroform, ethanol, ethyl acetate, methanol and aqueous extracts of Jamun leaves have been reported to contain low to high levels of cardiac glycosides, flavonoids, anthraquinones, saponins, phenols, steroids, phytosterols, panners, proteins, hexane. , petroleum ether, chloroform, amino acids, essential oils, carbohydrates, fixed oils, mucus and fats. Jamun contains micronutrients like magnesium, iron, manganese, calcium, copper, zinc, phosphorus, potassium, nitrogen and sulfur. Flavonoids, terpenoids, tannins and carbohydrates were

detected in the ethanolic extract of jamun leaves. It is found in chloroform, ethyl acetate and methanol extracts.[23]

Extraction:

Extraction is the process of removing active ingredients from solids or liquids using liquid solvents. Selective solvents are used to separate active substances from inactive or inactive substances in plant or animal tissues. In this way, the desired components are dissolved using a solvent called solvent, and the insoluble part is the pulp.

Unwanted items are removed after deletion. Prepare the extract using ethanol or another suitable solvent.

Extract: An extract can be defined as a herbal preparation containing all substances that are soluble in a solvent.

Marc: residue obtained after extraction Car: solvent used for extraction Type of extraction ° Dry products (labels, caps) Belladonna extract ° Ointments (salves, suppositories) Glycerin extracts) Maceration.

- Maceration. ...
- (ii) Infusion. ...
- (iii) Digestion. ...
- (iv) Decoctiona. ...
- (v) Percolation. ...
- (vi) Soxhlet extraction. ...
- (vii) Microwave-assisted extraction. ...
- (viii) Ultrasound-assisted extraction.

Acetone Extract

Jamun leaf extract contains glycosides, phenols, saponins, proteins and resins, while root bark extract contains alkaloids and flavonoids. All phytochemicals except saponins were detected in the root extracts.

Chloroform Extract

Jamun leaf extract was found to contain alkaloids, steroids and proteins, while no protein was seen in the root extract. Alkaloids and tannic acid seed extracts contain phenols, proteins and carbohydrates, while alkaloids and tannins are found only in the root bark chloroform extract. [24]

Methanol Extract

Methanol extracts of leaves and stem skin contain alkaloids, glycosides, flavonoids, phenols, steroids, saponins, tannins and carbohydrates, while root extracts also contain proteins and resin.[24]

Conclusion

Jamun is traditionally used for the treatment of various diseases especially diabetes and related complications. With regard to the antineoplastic activities studies suggest that Jamun is selective in its action in breast cancer cells. The effect of Jamun and its phytochemicals should also be investigated for its chemopreventive effects in other models of carcinogens, that includes chemical, radiation and viral carcinogenesis models. Jamun raw and value added products should be advertised to urban population for its health benefits and especially for promotion of Jamun growers in tribal areas of India[.24,25,26]

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