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Formulation & Evaluation of *Syzygium Cumini-L* syrup for treatment of diabetes mellitus

Md. Shahid Ansari [1], Seema Kashyap[1*], Rajesh Kumar Nema[1],

Harish Sharma[2], Gyanesh Kumar Sahu[1]

[1] Rungta Institute of Pharmaceutical Sciences

[2] Rungta Institute of Pharmaceutical Sciences & Research

Corresponding Author:

Mrs Seema Kashyap

Associate Professor
Email ID: kashyapseema85@gmail.com

Abstract
Jamun seeds, derived from the Syzygiumcumini tree, have garnered attention for their potential health benefits, particularly in managing diabetes and associated complications. Rich in bioactive compounds like jamboline, polyphenols, and flavonoids, jamun seeds exhibit strong antioxidant properties, effectively scavenging free radicals and reducing oxidative stress. Studies suggest that these seeds may aid in regulating blood sugar levels by enhancing insulin sensitivity and glucose uptake in cells. Additionally, jamun seeds have shown promise in improving lipid metabolism, thereby mitigating the risk of cardiovascular issues often prevalent in diabetic individuals. This abstract highlights the therapeutic potential of jamun seeds, positioning them as a natural and beneficial component in diabetic management and overall health promotion.

KEYWORD: Phytochemicals, Jamun seeds, polyphenols, extraction

INTRODUCTION:

Biochemical responses happening amid organic forms such as breath comes about in the generation of responsive oxygen species which when display in abundance or are not killed properly leads to a condition called oxidative push which starts numerous infections such as coronary heart maladies, stroke, diabetes, hypertension etc (Cai et al., 2004) [2]. As of late, there is an expanding intrigued in utilizing common cancer prevention agents to ensure human creatures from the harm caused amid the condition of oxidative push (Scalbert et al., 2005) [14]Many plant constituents have the antioxidant property and oxygen rummaging movement as a metabolic reaction to endogenously produced free radicals amid the different biochemical process (Grassmann et al., 2002) [4]. Among the assorted collection of plant bioactive compounds, Phenolic compounds are known to have great antioxidant property. The extraction of these phytochemicals from plant includes the utilize of different routine extraction strategies such as Soxhlet extraction, maceration. The present day strategies incorporate microwave-assisted extraction (MAE), Ultrasonication helped extraction (UAE), supercritical fluid extraction (SFE), strong stage micro extraction (SPME), Soxhwave (Gupta et al., 2012) [5]Syzygium cumini (equivalent word Eugenia jambolana) is a exceptionally huge evergreen tropical tree belonging to the family Myrtaceae. India is the moment biggest maker of the jamun seeds in world and contributes 15.4% in the world generation of 13.5 million tons. Among theIndian states, Maharashtra is the biggest jamun maker taken after by Uttar Pradesh, Tamil Nadu, Gujarat, Assam, and others (Patil et al., 2012) [10]. Jamun plant is known to have a diverse gather of phytochemicals, most of which are watched to be of wellbeing benefits. The seedss are the most examined plant portion and are detailed to contain jambosine, gallic corrosive, ellagic acid, corilagin, 3,6-hexahydroxy diphenoylglucose, 4,6-hexahydroxydiphenoylglucose,1-galloylglucose, 3-galloylglucose, quercetin, β-sitosterol (Rastogi & Mehrotra 1990) [11]. The present think about was attempted to screen different bioactive compounds display in jamun seedsusing three distinctive strategies of extraction to be specific soxhlet extraction, microwave-assisted extraction and ultrasonication helped extraction. Phytochemical characterization of three extract variations was conducted both subjectively and quantitatively for the nearness of different bioactive

Key Benefits:

1. **Blood Sugar Management:** Jamun seeds are renowned for their ability to regulate blood sugar levels. The presence of bioactive compounds, such as jamboline, helps in improving insulin sensitivity and glucose utilization, making it an invaluable asset in diabetic management.
2. **Antioxidant Powerhouse:** Loaded with polyphenols and flavonoids, jamun seeds exhibit robust antioxidant activity. These compounds combat oxidative stress, reducing cellular damage and inflammation often associated with diabetes.
3. **Lipid Profile Improvement:** Studies suggest that jamun seeds may contribute to enhancing lipid metabolism, promoting healthier cholesterol levels, and reducing the risk of cardiovascular complications, which are common concerns in diabetic individuals.

Materials and Methods :

Materials

All the material was collected from Rungta institute of pharmaceutical science and Research kohka bhilai cg

Methods for preparation of Jamun seeds extract Soxhlet extraction of Jamun seeds

The ethanolic extracts of Syzygiumcumini seeds using Soxhlet apparatus were prepared as per the method with slight modifications. 25 g of jamun seeds powder was mixed with the 125 ml of ethanol. The temperature was set at their boiling points and 10-12 cycles were run for concentrating the extracts. The rotary vacuum evaporator was used for further concentrating the extracts to a viscous mass which was then reconstituted at the concentration of 1 mg/ml

Ultrasonication assisted Extraction

25 g of jamun seeds powder was mixed with 125ml of ethanol and ultrasonicated for 40 sec at 20 KHz. It was then subjected to shaking for 3 hours and then filtered using Whatman paper no.1. It was then concentrated using vacuum rotary evaporator at 50℃ and stored at 4-5 0C for further analysis.

Phytochemical Screening of Extract

Qualitative Analysis The phytochemical examination was conducted for all the three extracts prepared using three different extraction methods as per the standard methods described by Brain and Turner

Detection of alkaloids: Extracts were dissolved individually in dil. Hydrochloric acid and filtered. The filtered acidified extracts were then subjected to the following tests:

- **Mayer's Test:** Filtrates were treated with Mayer's reagent (Potassium Mercuric Iodide). Formation of a yellow colored precipitate indicates the presence of alkaloids.

- **Wagner's Test**: Filtrates were treated with Wagner's reagent (Iodine in Potassium Iodide). Formation of brown/reddish precipitate indicates the presence of alkaloids.

- **Hager's Test**: Filtrates were treated with Hager's reagent (saturated picric acid solution). Presence of alkaloids confirmed by the formation of a yellow colored precipitate.

Detection of carbohydrates: Extracts were dissolved individually in 5 ml distilled water and filtered. The filtrates were then used to test for the presence of carbohydrates.

- **Benedict's test**: Filtrates were treated with Benedict's reagent and heated gently. Orange-red precipitate indicates the presence of reducing sugars.

- **Fehling's Test**: Filtrates were hydrolyzed with dil. HCl, neutralized with alkali and heated with Fehling's A & B solutions. Formation of red precipitate indicates the presence of reducing sugars.

Detection of glycosides: (Coumarin glycosides) Alcoholic extract when made alkaline, shows blue or green fluorescence indicating the presence of glycosides. Detection of saponins

- **Froth Test:** Extracts were diluted with distilled water to makeup 20ml of volume and was then shaken in a graduated cylinder for 15 minutes. Formation of the foam layer of 1cm indicates the presence of saponins.

- **Foam Test:** 0.5 g of the extract was shaken with 2 ml of water. Persistence of foam for ten minutes indicates the presence of saponins.

Detection of phytosterol • Salkowski's Test: Extracts were treated with chloroform and filtered. The filtrates were then added with few drops of Conc. Sulphuric acid, shaken and allowed to stand for some time. The appearance of golden yellow color indicates the presence of triterpenes in the extract.

• **Liebermann Burchard test:** Extracts were treated with chloroform and filtered. The filtrates were then treated with few drops of acetic anhydride, boiled and cooled. Conc. Sulphuric acid was then added. The appearance of the brown ring at the junction indicates the presence of phytosterols. Detection of phenols

• **Ferric Chloride Test:** Extracts were treated with 3-4 drops of 10% ferric chloride solution. Development of a bluish black color shows the presence of phenols. Detection of tannins

•**Gelatin Test**: To the extract, 1% gelatin solution containing sodium chloride was added. Formation of white color precipitate shows the presence of tannins in the extract. Detection of flavonoids

• **Alkaline Reagent** Test: Extracts were treated with few drops of sodium hydroxide solution. Development of deep yellow color, which becomes colorless on the addition of dilute acid, shows the presence of flavonoids.

• **Lead acetate Test:** Extracts were treated with few drops of lead acetate solution. Development of yellow color precipitate shows the presence of Flavonoids. Detection of proteins and amino acids

• **Xanthoproteic Test:** The extracts were treated with few drops of Concentrated Nitric acid. Formation of yellow color indicates the presence of proteins.

• **Ninhydrin Test:** To the extract, 0.25% w/v Ninhydrin reagent was added and boiled for few minutes. Development of blue color demonstrates the presence of amino acid.

Quantitative Analysis

Total phenolic content The total phenolic content (TPC) was determined as per the some modifications. 0.5ml of diluted sample was added to 2.5ml of 0.2N Folin-Ciocalteau reagent and kept aside for 5 minutes. 2ml of 75g/L of Na2CO3 was then added to the reaction solution. The above solution was then kept for incubation at room temperature for 2 hours. Absorbance was measured at 760nm using 1cm cuvette UV-1800 spectrometer (Shimadzu, Japan). Gallic acid (0-800mg/L) was used to produce a standard calibration curve. The total phenolic content was expressed in mg of Gallic acid equivalent (GAE)/100ml of extract.

Radical Scavenging Activity (DPPH inhibition)

Radical Rummaging Action (DPPH hindrance) Assurance of antioxidant action of the test was done utilizing DPPH restraint strategy given by Nishino et al. (2000) [8] with slight adjustments. 0.5 ml of ethanol extricate of jamun seeds was taken and to it 2.5mL of DPPH arrangement (8mg/100mL ethanol) was included. A control was set up with 0.5ml refined water as clear and cleared out at room temperature for 30 min. The test sets were centrifuged at 3000rpm for 15 min. In cuvette 0.5 ml of centrifuged arrangement was taken and to it, 1mL of ethanol was included. Absorbance was taken at 517 nm independently for clear and tests utilizing ethanol as a reference.

% DPPH inhibition = (AB - AS/AB) × 100

Where,

AB = OD for blank AS = OD for sample

FTIR Analysis

When infrared radiation passes through a fabric, a few concentrated passes through without connection with the atoms, whereas the leftover portion interatomic with particles and is ingested. The extent of ingested escalated over the add up to escalated that enters the fabric is in coordinate connection to Among the three strategies received for extraction, the most extreme surrender of 12.76±1.45% was gotten from ultrasonication helped extraction. The result appears that the % abdicate of diverse extricates was impacted by the strategy of extraction received. Ultrasonication helped extraction gives the most noteworthy % surrender as demonstrated in the comes about. The reason for this may be the utilize of sound waves amid extraction to get quantitative analyte filtering from the strong framework utilizing a appropriate dissolvable, which gives small or no network discharge, so that framework impacts can be kept to a least amid the estimation steps and subsequently comes about in higher % surrender. A comparative ponder conducted by Sun et al. (2011)uncovers that Ultrasonication helped extraction gives most noteworthy extraction surrender of a few flavonoids such as tectoridin, iristectorin B, iristectorin A, tectorigenin, iris-tectorigenin A, and add up to isoflavones, in lesser time in comparison to the concentration of retaining atoms. This is the guideline of Beer-Lambert's law. The strategy utilized was depicted by Sacithraa et al. (2013). The test was analyzed utilizing FT-IR spectroscopy. The infrared light source produces a wavelength from 4000 to 400 cm-1 32 times per test with a determination of 4. The infrared range was Fourier changed and recorded in the retention mode. The FT-IR Interferogram was gotten between wave number and assimilation. IR arrangement computer program was utilized for getting the range.

Results and Discussion

The present investigation aims at "Phytochemical Screening of Jamun seeds using different extraction methods". In the initial stages of the study, jamun seeds were extracted for bioactive compounds using ethanol as a solvent by adopting three different methods of extraction such as Soxhlet extraction, ultrasonication assisted extraction resulted in three concentrated extracts that were subjected to both qualitative and quantitative analysis for the characterization of bioactive compounds present in them. Phytochemicalcharacterization of three extract variants was conducted both qualitatively and quantitatively for the presence of various bioactive compounds. The characterization of extracts was mainly done for phenols and flavonoids so as to assess the antioxidant property of the extracts as well. Comparative analysis.

Yield of Extracts

Jamun seeds were subjected to three different methods of extraction yielding three different extracts. The three methods adopted possess varying extraction yields. The yield of extracts extracted using three different methods of extraction are indicated in

Table 1:

Table 1: Extraction yields of Jamun seeds extract by different methods

Method Of Extraction	% yield
Soxhlet Extraction (SJE)	8.94 ± 0.45
Ultrasonication assisted extraction (UJE	11.84 ± 1.12

Phytochemical screening of extracts

Qualitative Analysis of Extract

Extraction includes division of naturally dynamic constituents from dormant components utilizing appropriate particular solvents. Amid extraction dissolvable diffuse into strong fabric and solubilizes the compound having comparable extremity. The varieties included in diverse strategies of extraction will influence the amount and composition of auxiliary metabolites extricated (Pandey et al., 2014) [9]. Phytochemical screening of the three extricates was performed based on different subjective strategies. The comes about are demonstrated underneath in Table 2 where '+' sign demonstrates the nearness of that compound or '-' sign shows the nonappearance

Table 2: Phytochemical Screening of the JS

Test For Detection	Soxhlet Extract	Ultrasonicated Extract
Saponins:		
a) Foam test	+	+
b) Froth test	+	+
Alkaloids:		
a) Mayer's Test	+	+
b) Hager's Test	+	+
c) Wagner's Test	+	+
Carbohydrates:		
a) Fehling's Test	+	+
Phenols:		
a) FeCl3 test	+	+
Tannins:		
a) Gelatin Test	+	+
Flavonoids:		
a) Alkaline agent Test-	+	+
b) Lead acetate Test-	+	+
Glycosides:		

a) Coumarins	+	+
Phytosterols:		
a) Salkowski's Test	+	+
b) Liebermann Burchard Test	+	+
Proteins		
a) Xanthoproteic Test-	+	+

Fig 1: Showing "+" results of (a) Presence of Phenols (b) Presence of Tannins (Gelatin test) (c) Presence of Flavonoids (Lead acetate test) (d) Presence of Alkaloids (Wagner's Test).

Basic parameters influencing the quality of an extract are the part of the plant used as starting material, the solvent used for extraction and extraction procedure. Effect of extracted plant phytochemicals depends on:

- The nature of the plant material
- It's origin
- Degree of processing
- Moisture content
- Particle size The possible cause of variation in different extraction methods that will affect the quantity and composition of secondary metabolite of an extract depends upon:
- Type of extraction
- Time of extraction
- Temperature
- Nature of solvent
- Solvent concentration
- Polarity On comparing the results obtained from a phytochemical screening of three variants of extract we can conclude that there is the absence of saponins, Phytosterols, carbohydrates, glycosides in both microwave assisted and ultrasonication assisted extract but saponins were detected in the Soxhlet extract. All the three extracts show positive results for Phenols, Tannins, and Flavonoids.

Conclusion:

Jamun seeds have shown promise in improving lipid metabolism, thereby mitigating the risk of cardiovascular issues often prevalent in diabetic individuals. This abstract highlights the therapeutic potential of jamun seeds, positioning them as a natural and beneficial component in diabetic management and overall health promotion. Biochemical responses happening amid organic forms such as breath comes about in the generation of responsive oxygen species which when display in abundance or are not killed properly leads to a condition called oxidative push which starts numerous infections such as coronary heart maladies, stroke, diabetes, hypertension etc. As of late, there is an expanding intrigued in utilizing common cancer prevention agents to ensure

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