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Evaluation of antidiabetic activity of *Syzygium cumini* seed extract in Alloxan induced diabetic rats

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Abstract
Aim: The goal of the current study was to assess the anti-diabetic effect of the phytochemical bioactive components from *Syzygium cumini* seed extract.
Methods: The phytochemical screening of Ethanoloic Extract of *Syzygium Cumini* (EESC) revealed a significant level of steroids and flavonoids in the seed extract and assesed the antidiabetic and antihyperlipidemic activity.
Results: The extract shows a dose-dependent glucose reduction and antioxidant. The results indicated that the antidiabetic activities of ethanoloic extract of *Syzygium cumini* (EESC) are caused by a substantial number of flavonoids, which are supported by a stronger antioxidant and antidiabetic activity.
Conclusion: The *S. cumini* seed extracts investigation showed that strong antioxidant, reduction of blood glucose, SGOT & SGPT and lipid profiles, LDL-cholesterol, triglyceride levels were reduced but HDL cholesterol was increased. The *S. cumini* seed extracts have a strong antidiabetic and antihyperlipidemic effect was determined in this study

Keywords: Antidiabetic, blood glucose, lipid profile, Alloxan, *Syzygium cumini*

Introduction

Chronic hyperglycemia and decreased insulin signaling are the hallmarks of diabetes, a metabolic disease that eventually affects all bodily tissues due to metabolic abnormalities and inflammation. Hyperglycemia in Diabetes Mellitus (DM) is primarily caused by tissues producing too much glucose and using it less increased hepatic glycogenolysis and gluconeogenesis could be the cause of excessive production [1]. Among all major ethnic groups, Asian Indians have one of the highest risks of developing diabetes, and their conversion from pre-diabetes to diabetes happens more quickly [2-3]. According to the Center for Cardio-Metabolic Risk Reduction in South Asia study, the total prevalence of diabetes was 22.8% (21.5-24.1%) in Chennai (south India) and 25.2% (23.6-26.8%) in Delhi (north India) [4].

It has been demonstrated that the rate of increase in diabetes prevalence is larger in men than in women. Over the past forty years, diabetes has become much more common as a result of dietary changes. Serious adverse effects are a common feature of the oral hypoglycemic medications now used in clinical practice [5]. The negative effects of long-term synthetic medication use have prompted the use of plant-based therapy, which may offer maximal recovery with the least amount of side effects. Plants and their extracts have been used to treat diabetes since ancient times. There are 21,000 plants that are used medicinally worldwide, according to the World Health Organization (WHO). Of them, 150 species are widely utilized in commerce [6, 7].

Certain medicinal plants have been used empirically in anti-diabetic and anti-hyperlipidemic treatments and have been reported to be beneficial for diabetes worldwide. Glycosides, alkaloids, terpenoids, flavonoids, carotenoids, and other compounds found in most plants are regularly linked to antidiabetic effects [8].

Syzygium cumini is a member of the Myrtaceae family and Jamun in India. India is the indigenous home of *Syzygium cumini*. Madagascar, Thailand, the Philippines, and a few other nations are also home to it. Numerous other tropical nations, including the West Indies, East and West Africa, and certain subtropical areas like Florida, California, Algeria, and Israel, have successfully adopted the strategy [9].

The fruits are oblong berries with a pinkish pulp and a deep purple or bluish color. They are employed in Ayurveda as a stomachic, astringent, antiscorbutic, diuretic, antidiabetic, and in cases of chronic diarrhea and spleen enlargement [10, 11]. In alloxan-induced diabetic mice, *S. cumini* seed extract dramatically lowers blood glucose, blood urea, serum cholesterol, and serum triglyceride levels [12]. The fruit of *S. cumini* is widely used as an antibiotic [13] and for the treatment of chronic diarrhea and other intestinal diseases. In cultured human peripheral blood lymphocytes, the leaves have been shown to lessen radiation-induced DNA damage [14].

S. cumini seeds have been shown to help diabetic patients in a number of ways, including reducing blood glucose levels and postponing diabetic sequelae including cataracts and neuropathy [15]. Even though technology and medicine have advanced significantly in recent years, certain nations including India have made it mandatory to use natural goods for a variety of purposes. Because of this, we have selected *S. cumini*, a native plant that is commonly used in traditional medicine to treat diabetes. The current study's objective was to assess *S. cumini's* active components and emphasize its antidiabetic qualities.

Materials and Methods

Sample Collection

Syzygium cumini seeds were gathered from the local market Center for this project Studies in Hanamkonda. A plant

biologist identified the sample's taxonomy. In the Department of Zoology, these seeds were allowed to air dry at room temperature until they reached a consistent weight. An electric blender was used to grind the dry seeds into a fine powder.

Solvent Extraction and Preliminary Chemical Evaluations

A quantity of the dried seed powder was soaked in analytical-grade ethanol in a conical flask, which was then covered with aluminum foil and shaken occasionally for 72 hours. Whatman filter paper No. 1 was used to filter the extracts after 72 hours. Vacuum distillation was used to remove the solvent from the extract. For additional photochemical screening research, the concentrated ethanoloic extract of *Syzygium cumini* (EESC) was dried and kept at 4ºC.

Phytochemical screening to identify these secondary metabolites in the extract, the phytochemical screening Glycosides, alkaloids, terpenoids, flavonoids, steroids, Phenols, tannins, saponins, resins, terpenoids and carotenoids, and other compounds found was qualitatively assessed in accordance with Harborne [16].

Experimental Animals

Male Wister rats weighing about 150-180 g were used. They were purchased from the sai enterprises Hyderabad. They were kept under observation for about 7 days before the onset of the experiment to exclude any intercurrent infection. The chosen animals were housed well aerated cages at normal atmospheric temperature (25±5 °C) and normal 12- hour light/dark cycle. Moreover, they had free access to water and standard diet of known composition *ad libitum*. All animal procedures were in accordance with the recommendations of the ethical committee guidelines for Care and Use of Animals.

Induction and Treatment of Diabetes

Diabetes was induced by a single injection of alloxan (120 mg/kg i. p) fasting for at least 16 hours, in freshly prepared 1% sodium carboxy methyl cellulose, blood glucose levels were measured 48 hours after alloxan administration, development of diabetes mellitus was proven by sustained hyperglycemia (diabetic rats had glycaemia > 200 mg/dL).The diabetes developed rats were selected for the study and treated with the Ethanolic Extract Of *Syzygium Cumini* (EESC) 200mg/kg per oral (p.o), Ethanolic Extract Of *Syzygium Cumini* (EESC)400 mg/kg (p.o.) and Metformine 60mg/kg (p.o) for 14 consecutive days (after alloxan administration).

Experimental Study Design

The rats were randomly divided into 5 groups (n =6) as follows:

Group I : control animals (sod. carboxymethyl cellulose-1%, orally).
Group II: diabetic animals (alloxan 120mg/dL *ip*)
Group III: (alloxan 120mg/dL) + EESC 200mg/kg.po
Group IV: (alloxan 120mg/dL) + EESC 400mg/kg.po
Group V: Metformin 60mg/kg po

Biochemical Evaluation

Blood samples were collected from the retro orbital puncture of rats on 0 and 14th days of control, diabetic and Ethanoloic Extract of *Syzygium Cumini* (EESC) treated diabetic rats and determined blood glucose levels, Lipid profiles, and SGOP and SGPT were estimated after 14 days treatment.

Statistical Analysis

The data are presented as mean ± S.D Statistical comparisons were made by one-way analysis of variance (ANOVA) and followed by Student-Neuman-Keuls test. Data were considered significant when *p* values were lower than 0.05.

Results and Discussion

The phytochemical components of the Ethanolic Extract of *Syzygium Cumini* (EESC). The seed extract passed the biochemical test for alkaloids, flavonoids, glycosides, steroids, cardiac glycosides, saponins, resins, phenols, tannins, and terpenoids. The seed extract contains significant amounts of steroids and flavonoids as well as moderate amounts of phenols, glycosides, and alkaloids (Table 1).

Alkaloids are naturally occurring chemical compounds with basic nitrogen atoms that are utilized as recreational and medicinal drugs [17]. When too much glucose is produced, glucoside can prevent the conversion of starch to sugar [12]. Plant phenols are the main scavengers of free radicals and antioxidants. Studies on animals have also demonstrated that the terpenoids lower blood sugar levels [18]. It has been observed that saponins have antidiabetic and hypochoesterolemic qualities, in order to lessen the consequences of diabetes, flavonoids function as either insulin secretagogues or insulin mimetics, most likely by affecting pleiotropic pathways. Flavonoids act as antioxidants and improve the benefits of vitamin C. The activity and expression of the rate-limiting enzymes involved in the metabolism of carbohydrates are regulated by bioflavonoids, which also stimulate the absorption of glucose in peripheral tissues [19-20]. Due to their potential to bind with proteins, plant polyphenols and flavonoids are among the naturally occurring antidiabetic drugs that are known to exhibit an inhibitory action on glucose hydrolyzing enzyme inhibition. Flavonoids, which are responsible for the antidiabetic effects, were found in significant amounts in the seed extract used in this study [21-22].

Table1: Phytochemical constituents of *S. cumini* seeds extract

Sl. No	Phytochemical constituents *S. cumini*	Methanolic extact of *S. cumini*
1	Alkaloids	++
2	Flavonoids	+++
3	Glycosides	++
4	Steroids	+++
5	Cardiacglycosides	+
6	Saponins	+

7	Resins	+
8	Phenols	++
9	Tannins	+
10	Terpenoid	+

+=present, ++=moderatelypresent, +++ =Appreciableamount

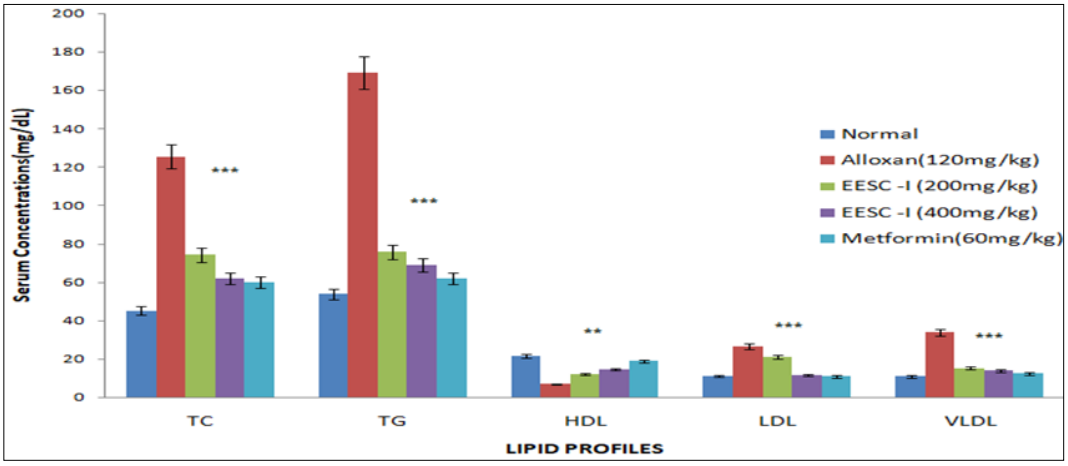

Fig 1: Table 1: Serum lipid profile levels were estimated in Normal, Diabetic control &Treatment groups (EESC –I (200mg/kg), EESC –II (400mg/kg & Metformin (25mg/kg)

Table 2: Blood glucose and SGOT & SGPT levels were estimated in Normal, Diabetic control &Treatment groups (EESC –I (200mg/kg), EESC –II (400mg/kg & Metformin (25mg/kg)

Groups	Blood glucose (mg/dL)	SGOT (mg/dL)	SGPT (mg/dL)
Normal	84.3 ±11.2	25±3	42.6 ±9
Alloxan(120mg/kg)	357.6 ±62.4	56.6 ±8	86.6 ±8
EESC -I (200mg/kg)	203.6 ±48.6	51.6 ±5.7	76.3 ±3.2
EESC -II (400mg/kg)	173.3 ±45.1	40.6 ±4.2	61.6 ±4.9
Metformin (60mg/kg)	113.3 ±21.4	32.3±3.1	55.3 ±4.7

In our study alloxan-induced diabetes, the ethanol extract of *S. cumini* seed administered orally at different doses markedly reduced blood sugar levels, SGOT & SGPT Table 2. Other studies even after stopping the extract for 15 days, the blood sugar level remained normal [23]. After 30 days of treatment with ethanolic extract of *S. cumini* seed at doses of 100 mg/kg/day [24], the blood and urine glucose levels of streptozotocin-induced diabetic rats decreased.

In present study ALT and AST activities were assessed as it is the more specific index of liver cell damage in humans and in experimental animals. Thus, lowering of these enzymes content in serum is a definite indication of hepatoprotective action of a drug. High level of AST indicates hepato cellular damage. Activity of AST in serum was increased in alloxan intoxication *S. cumini* seed extract afforded a significant protection against alloxan induced increase in the serum enzyme level. Ethanolic extract of *S. cumini* seed *extract* may induce accelerated regeneration of liver cells by reducing the leakage of AST in to blood there by lowering its value to normal levels. ALT is more specific to the liver and a better parameter for detecting liver damage (200). In the present study alloxan induced ALT level was brought back to normal by the administration of *S. cumini* seed *extract (*Table 2)

In the present study indicates that diabetic animals had prior high blood glucose level. After administration of *S. cumini extract* reduced the LDL-cholesterol, total cholesterol, triglyceride levels were observed in alloxan induced rats and plant containing flavonoids and other constituents were inhibited the dyslipidemea in our study is support of further findings of Jung *et al*. (2006) reported that can inhibit lipogenesis and lower plasmatic triglycerides levels by enhancing LDL receptors expression and increasing fat bile rejection from the results of clinical studies.

Conclusion

The current investigation showed that the ethanolic extract of *S. cumini* seeds contains phytochemicals of significant therapeutic activity, including alkaloids, flavonoids, glycosides, steroids, cardiac glycosides, saponins, resins, phenols, tannins, and terpenoids. Additionally, this investigation showed that the extract contains a strong antioxidant with a higher degree of reduction of blood glucose SGOT & SGPT and lipid profiles LDL-cholesterol, total cholesterol, triglyceride levels. According to the findings, *S. cumini* seeds have a strong antidiabetic and antihyperlipidemic effect is determined by this study.

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References

1. Boteanu RM, Uyy E, Suica VI, Antohe F. High-mobility group box 1 enhances the inflammatory process in diabetic lung. Archives of Biochemistry and Biophysics,2015:6:55-64.
2. Anjana RM, Pradeepa R, Deepa M, *et al*. ICMR–INDIAB Collaborative Study Group. Prevalence of diabetes and pre-diabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural

India: phase I results of the Indian Council of Medical Research-INDIAB (ICMR-INDIAB) study. Diabetologia,2011:54(12):3022-7.
3. Deepa M, Grace M, Binukumar B, *et al*. CARRS Surveillance Research Group Study. Diabetes Research and Clinical Practice,2015:110(2):172-82.
4. Misra A, Khurana L. Obesity-related non-communicable diseases: South Asians vs. White Caucasians. International Journal of Obesity (London),2011:35:167-87.
5. Holman RR, Turner RC. Oral agents and insulin in the treatment of NIDDM. In: Pickup J, Williams G, editors. Text Book of Diabetes. Blackwell, Oxford, 1991, 467-469.
6. Zohary D, Hopf M. Domestication of plants in the Old World. Oxford University Press, 2000, 122.
7. Joseph B, Jini D. Insight into the hypoglycaemic effect of traditional Indian herbs used in the treatment of diabetes. Research Journal of Medicinal Plants,2011:5(4):352-376.
8. Malviya N, Jain S, Malviya S. Antidiabetic potential of medicinal plants. Acta Poloniae Pharmaceutica,2010:67(2):113-8.
9. Ross I. *Syzygium cumini* (Linn.) Skeels. In: Medicinal Plants of the World. Chemical Constituents, Traditional and Modern Medicinal Uses. 2nd ed. Humana Press, Totowa, NJ, Vol. 1, 2003, 445-454.
10. Morton J. Fruits of Warm Climates. Miami, FL, 1987, 375.
11. Achrekar S, Kaklij GS, Pote MS, Kelkar SM. Hypoglycemic activity of *Eugenia jambolana* and *Ficus bengalensis*: mechanism of action. *In Vivo*,1991:5:133-148.
12. Giri J, Sathidevi T, Dushyanth N. Effect of Jamun seed extract on alloxan induced diabetes in rats. Journal of the Diabetic Association of India,1985:25:115-119.
13. Migliato KF. Standardization of the extract of *Syzygium cumini* (L.) Skeels fruits through the antimicrobial activity. Caderno de Farmácia,2005:21(1):55-56.
14. Jagetia GC, Baliga MS. *Syzygium cumini* (Jamun) reduces the radiation-induced DNA damage in the cultured human peripheral blood lymphocytes: A preliminary study. Toxicology Letters,2002:132:19-25.
15. Helmstadter. *Syzygium cumini* (L.) Skeels (Myrtaceae) against diabetes: 125 years of research. Pharmazie,2008:63(2):91-101.
16. Harborne JB. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. Chapman and Hall, London Ltd, 1973, 49-188.
17. Rhoades DF. Evolution of Plant Chemical Defense against Herbivores. In: Rosenthal GA, Janzen DH, editors. Herbivores: Their Interaction with Secondary Plant Metabolites. Academic Press, New York, 1979, 41.
18. Luo J, Cheung J, Yevich E. Novel terpenoids-type quinines isolated from Pycnanthus angolensis of potential utility in the treatment of type 2 diabetes. Journal of Pharmacology and Experimental Therapeutics,1999:288:529-534.
19. Rupasinghe HP, Jackson CJ, Poysa V, Di Berado C, Bewley JD, Jenkinson J. Soyaapogenol A and B distribution in soybean (*Glycine max* L. Merr.) in relation to seed physiology, genetic variability and growing location. Journal of Agricultural and Food Chemistry,2003:51:5888-5894.
20. Gupta R, Sharma AK, Dobhal MP, Sharma MC, Gupta RS. Antidiabetic and antioxidant potential of β-sitosterol in streptozotocin-induced experimental hyperglycemia. Journal of Diabetes,2011:3:29-37.
21. Ganeshpurkar A, Diwedi V, Bhardwaj Y. *In vitro* α-amylase and α-glucosidase inhibitory potential of *Trigonella foenum-graecum* leaves extract. Ayu,2013:34(1):109-112.
22. Béjaoui A, Boulila A, Sanaa A, Boussaid M, Fernandez X. Antioxidant activity and α-amylase inhibitory effect of polyphenolic-rich extract from *Origanum glandulosum* Desf. Journal of Food Biochemistry,2016:41(1):1-8.
23. Singh N, Gupta M. Effect of ethanol extract of *Syzygium cumini* seed powder on pancreatic islet of alloxan diabetic rats. Indian Journal of Experimental Biology,2007:45(10):861-7.
24. Ravi K, Rajasekaran S, Subramanian S. Hypoglycemic effect of *Eugenia jambolana* seed kernels on streptozotocin-induced diabetes in rats. Pharmaceutical Biology,2003:41:598-603.