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ANTI-DIABETIC ACTIVITY OF THE METHANOLIC EXTRACT OF SEEDS OF *SYZYGIUM CUMINI* IN STZ-INDUCED TYPE I DIABETES IN RATS

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Keywords:

Syzygium cumini, STZ, Toxicity, Diabetes, Cytokines, Antioxidant enzymes

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ABSTRACT: Background: *Syzygium cumini (SC)* usually acknowledged as Jamun. All components of the Jamun may keep used medicinally because of a wide range of diseases like cough, diabetes, dysentery and inflammation. **Objectives:** Present investigational on the anti-diabetic activity of the methanolic extract seeds of *SC* in STZ-induced Type I Diabetes in rats. **Methods:** Extracted *SC* was to be evaluated the toxicity as OECD 425 guidelines, and biochemical, hematological then gross pathological evaluation has been assessed. Type I diabetes has been triggered in Wistar rats via STZ 65mg/kg/b.w. I.P. During the experiment, Rat's body weight and blood glucose level were monitored. At the end of the study, animals amongst complete groups were sacrificed, and biochemical parameters; Lipid profile, C-Peptide, HbA1c, Serum insulin, pancreatic insulin, and histology on the pancreas were performed. *SC* was also screened for pro-inflammatory cytokines *viz.*, IL-1β, IL-6 and TNF-α had been performed *via* ELISA. Furthermore, Antioxidant Enzymes as SOD, CAT, LPO, and GSH were also performed. **Results:** The observed extract *SC* was proven safe among the toxicity data. Conclusion and has been shown massive an impact on in-vivo in imitation of managing diabetic markers like weight gain, blood glucose, lipid profile, C-Peptide, HbA1c, the release of insulin secretion, and pancreatic insulin. Diabetic pancreas on rats confirmed fall of beta-cell density and disruption of normal architecture. But the treated group was observed to restore the mass of beta cells. Mediator over inflammatory cytokines kind of elevated in STZ group and was once inhibited by using *SC*. Elevated oxidative enzymes have also hold been seen to control the therapy with *SC.* **Conclusion:** All the findings and phytoconstituents present in the extract could keep the possible chemical compounds involved in the counteraction of diabetes.

INTRODUCTION: Diabetes mellitus is a group of metabolic ailments characterized by hyperglycemia ensuing due to the defects between insulin secretion, insulin action or both. The total number of humans with diabetes is projected in accordance with explode from 171 million in 2000 to 366 million in 2030.

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Modern drug treatments like Biguanides, Sulphonylureas and Thiozolidinediones are available to remedy DM, but they also bear undesired effects associated with their uses.

Herbal drugs used traditionally are on hand for the cure of DM with advantages in effectiveness, lesser side effects, affordability, or acceptability, but these drug treatments are with much less recognized scientific basis of their functioning [1, 2]. India is the hub of distinctive traditional plants and drugs appropriate imitation to its diverse cultural heritage. Many plants have been stated for their therapeutic value for diabetes, including a one-of-a-kind mode of action.

However, absolutely less herbal formulations are seen in demand than accessible for frequent humans due to their sluggish action and the high dose required. These plants can be a substantial source proviso a proper method is organized with fewer doses. This is only viable if exceptional drugs with the distinctive mechanism of action are introduced collectively and a system produces a synergistic effect [3]. A polyherbal method is a system that incorporates a combination of two or greater medicinal inter for a specific disease. Ayurveda Polyherbal formula is anticipated to bear greater effectiveness and lesser side-effect. A low dose additionally produces lesser side effects [4].

Plants have been the essential substances of various medications in the traditional Indian provision of medicine, the Ayurveda and one such plant of extensive value is *Syzygium cumini,* Myrtaceae is also known as Jamun, Java plum, Blackberry, Jambul, *etc*. today, these trees are found growing at some point of the Asian subcontinent, Africa, South America. All components on the trees are important, and importantly, the seeds are aged to deal with a range of ailments, the nearly necessary being diabetes mellitus. The phytochemicals present among the Jamun seeds have been ambosine, gallic acid, ellagic acid, corilagin, 3,6-hexahydroxy diphenoylglucose, 1-galloylglucose, 3-galloylglucose, quercetin, β-sitoterol, 4,6 hexahydroxydiphenoyl glucose [5]. Different components concerning the trees were also suggested for its antioxidants, anti-inflammatory, neuropshycho- pharmacological, anti-microbial, anti-bacterial, and anti-fungal. Studies have also shown nitric oxide scavenging, free radical scavenging, antifertility, anti-diarrheal, gastroprotective, anti-ulcerogenic yet radio-protective activities [6, 7].

They are also used in nutrition, natural medicine, and cosmetics [8]. Seed extracts over *S. cumini,* the piece just fast ancient in Ayurvedic medicine, were formerly shown to have high levels of total phenolic and a good exercise in the TEAC or FRAP antioxidant assays [9]. Most pharmacological works were led out along this plant, however, need to conjoin more additional facts and knowledge to discover the pharmacological potent regarding the plant. Therefore, that idea is designed to evaluate the seeds over the plant to remedy diabetes in Rats.

MATERIALS AND METHODS:

Collection of Plant Material: The Seeds of *Syzygium cumini* were brought from Bangalore, Karnataka, India. The plant specimen has been identified and authenticated by the department of botany, University of Rajasthan, Jaipur and specimens were kept for reference. And reference number was RUBL 211759.

Extraction of Seeds of *Syzygium cumini* [10-14]:

Preparation of Extract: The Seeds of *Syzygium cumini* were chopped into small pieces and dried under shade at room temperature for seven days. The dried seeds were powdered and passed through the sieve (Coarse 10/40). The powder was used for the preparation of methanolic extract.

Method of Extraction: Each 100gm powder was subjected to extraction with 1000ml methanol in a reflux condenser for 3 cycles of 7hrs each till the volume was reduced to half. The extract was filtered through Whatman filter paper No.1 and evaporated to dryness to get constant weight.

Experimental Animals: Female *Albino* mice weighing between 25-35gm for toxicity studies and Wistar male rats (8-10 weeks old) weighing 150-200gm were used for the main experiment. All the experiments conducted on the animals were in accordance with the standards set for the use of the laboratory animal use and the experimental protocols were duly approved by the IAEC of Karnataka College of pharmacy, Bangalore (Reg. Number: 1564/PO/Re/S/11/CPCSEA).

Experimental Design:

Acute Oral Toxicity Study: The acute oral toxicity study was performed according to the OECD guidelines No. 425. Animals were observed individually after dosing at least once during the first 30 min, periodically during the first 24 h, with special attention given during the first 4 h and daily thereafter, for a total of 14 days. Parameters were analyzed: Bodyweight, Blood Glucose Level, Lipid Profile, Renal Function Test (RFT), Liver Function Test (LFT), and Hematological parameters. Blood samples were performed using an Automatic Hematology Analyzer) and Vital Tissue Histology (*i.e.,* Kidney, Liver, Spleen, Heart and Lung). A dose of 1/10th and 1/20th were considered to be high dose and low dose prepared by dissolving in

miliQ water. The doses were prepared as per the OECD guideline No. 425.

Model for Type I Diabetes Mellitus:

STZ-induced Diabetes Mellitus [15]: Wistar male rats (150-200g) were considered for this analysis and diabetes-induced through I.P., a dose of STZ 65mg/kg/b.w.

STZ was made freshly before administration and dissolved in the buffer of 0.1 M cold sodium citrate and pH 4.5. In order to avoid hypoglycaemia, STZ-Rats were fed 5% w/v glucose solution for 24 h. After 72 h, rats were recorded FBS >180 mg/dL and chosen for the analysis.

All the animals were given free access to tap water and pellet diet and held in polyethylene cages at room temperature. Rat's body weight, FBS levels of rats were taken with one-touch glucometer prior to and after the end of the test, *i.e.* 0 and 30 days.

TABLE 1: GROUPINGS WERE DONE BY FOLLOWING MANNER, WHERE N = 6 ANIMALS IN EACH GROUP

01.	STZ Induced Diabetes Mellitus in Rat's Model	Group I: Normal Control Group – Vehicle Only.	6 rats
		Group II: Disease Control, Received STZ 65mg/kg/b.w I.P	6 rats
		Group III: Standard drug, Received Insulin 4U/kg/b.w. i.p + STZ 65mg/kg/b.w I.P	6 rats
		Group III: Test drug (Low dose), Received *Syzygiu mcumini* X mg/kg/b.w P.O + STZ 65mg/kg/b.w I.P	6 rats
		Group IV: Test drug (High dose), Received *Syzygium cumini* Y mg/kg/b.w P.O + STZ 65mg/kg/b.w I.P	6 rats

- At last, Animals were finally anesthetized with high dose of Phenobarbital. Blood was collected by Cardiac puncture and tissues were collected and then examined. The parameters.
- Blood Glucose Level (Using Digital Glucometer, One touch select, Life Scan Scotland Ltd, UK), Serum Insulin, Pancreatic Insulin (Sandwich ELISA Assay), C-peptide, Hb1Ac (Span Diagnostic) and Lipid Profile (DELTA LABS Kit, Bangalore, India).
- Measurement of Pro-Inflammatory Cytokines, Markers of disease severity; Il-6, IL-1beta, and TNF-alpha by Sandwich ELISA Assay (Commercial Available kit, Mercodia, Sweden) [16-20].
- Antioxidant Enzyme Studies: Lipid Peroxidation (LPO), [21, 22] Reduced Glutathione (GSH), [23, 24] Superoxide dismutase (SOD) [25] and Catalase (CAT) [26].
- Histopathology Study: Pancreas [27]

Histology of Pancreas Tissue – H & E Staining: The animals were euthanized using a high dose of Pentobarbital and then sacrificed and the pancreas of each animal was isolated and was cut into small pieces, preserved and fixed in 10% formalin for two days, dehydrated with alcohol, embedded in paraffin, cut into 4-5 m thick sections and stained with Haematoxylin-Eosin dye for photo-microscopic observation. The microscopic features of the organs of rats were compared with the control group.

Statistical Analysis: The results are expressed as Mean ± S.E.M. from N=6 rats in each group. Data were analyzed using statistical software Microsoft Excel worksheet.

The difference among the groups was assessed using a Student t-test compared between Normal control (Untreated) *vs.* all groups $p<0.05$ was considered significant.

RESULTS: The yield of methanolic extract of Seeds of *Syzygium cumini* was calculated, and the % Yield was 16.29. Mortality was not seen in the acute toxicity up to a dose of 5000mg/kg.

Dose: The dose was selected based on acute toxicity OCED guideline 425. 5000 mg/kg body weight was tolerated dose, and no signs of toxicity have been found after performing the acute oral toxicity studies.

1/20th and 1/10th of the same dose were selected; 250mg/kg and 500mg/kg, respectively, and further studies were carried out.

Toxicity Reports of Acute Toxicity on 5000 mg/kg/B.W. of Dose of *Syzygium cumini (SC)*:

TABLE 2: BODYWEIGHT AND BLOOD GLUCOSE LEVEL

Parameters	Results			
	Normal Control	± SEM.	Test Drug (*Syzygium cumini* 5000mg/kg)	± SEM
Bodyweight in gm.	26.33	0.194	27.18	0.365
Normal Control Vs. Test Drug	t-Test: Paired Two Sample for Means (T<=t) one-tail - 0.063^{ns}			
Blood Glucose Level (mg/dl)	82.67	0.667	89.17	3.842
Normal Control Vs. Test Drug (*Syzygium cumini* 5000mg/kg)	t-Test: Paired Two Sample for Means P(T<=t) one-tail - 0.051^{ws}			
ns: non-significant, ws: weakly-significant				

Values are expressed as Mean ± S.E.M; (n =6/group).

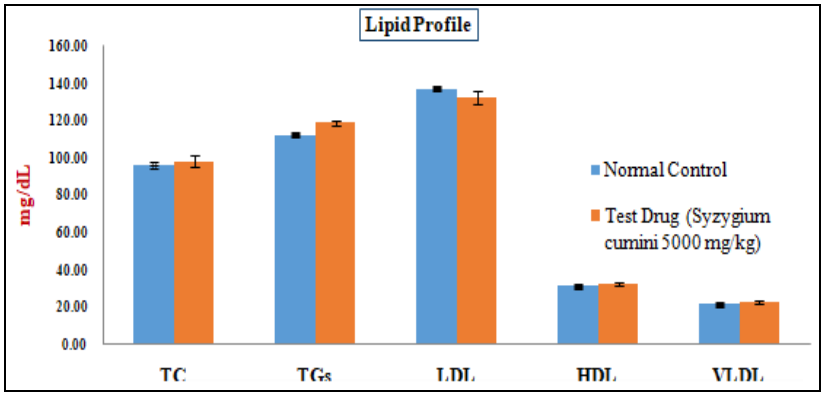

FIG. 1: LIPID PROFILE (mg/dl). Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 3: INTERPRETATION OF THE GROUPS

Lipid Profile	TC	TGs	LDL	HDL	VLDL
Normal Control Vs. Test Drug (*Syzygium cumini* 5000mg/kg)	0.296^{ns}	0.001^{ms*}	0.145^{ns}	0.11^{ns}	0.06^{ns}
t-Test: Paired Two Sample for Means P(T<=t) one-tail					
ns: non-significant, ms*: moderately-significant					

TABLE 4: SERUM ELECTROLYTES

Serum Electrolytes	Normal Control ± S.E.M.	Test Drug (*Syzygium cumini* 5000mg/kg) ± S.E.M.	P(T<=t) one-tail
t-Test: Paired Two Samples for Means (Normal Control Vs. Test Drug)			
Sodium (m mol/L)	136.00 ± 0.632	140.17 ± 0.307	0.00047^{ss}
Potassium (m mol/L)	3.72 ± 0.060	3.97 ± 0.042	0.0088^{ms}
Chloride (m mol/L)	107.50 ± 0.764	103.83 ± 5.029	0.261^{ns}
Urea (mg/dl)	24.83 ± 0.401	27.50 ± 0.885	0.0287^{ws}
Creatinine (mg/dl)	0.20 ± 0.052	0.63 ± 0.115	0.011^{ws}
Uric acid (mg/dl)	2.60 ± 0.052	2.73 ± 0.067	0.087^{ns}
ss: strongly-significant, ms: mildly-significant, ws: weakly-significant, ns: non-significant,			

Values are expressed as Mean ± S.E.M; (n =6/group).

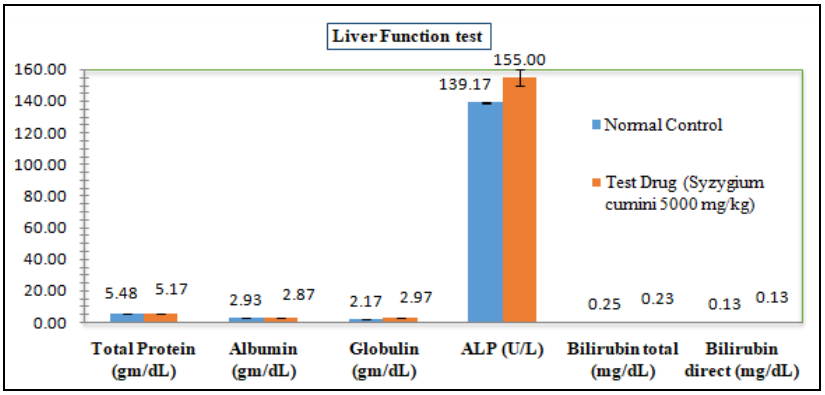

FIG. 2: LIVER FUNCTION PROFILE. Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 5: INTERPRETATION BETWEEN THE GROUPS

Liver Function Profile	TP	Alb	Glb	ALP	BT	BD
Normal Control Vs. Test Drug (*Syzygium cumini* 5000mg/kg)	0.002^{ms*}	0.25^{ns}	0.019^{ws}	0.011^{ws}	0.305^{ns}	0.5^{ns}
t-Test: Paired Two Sample for Means P(T<=t) one-tail						
ms*: moderately-significantly, ws: weakly-significant, ns: non-significant						

TABLE 6: HAEMATOLOGICAL PARAMETERS

Haematological Test	Normal Control ± S.E.M.	Test Drug (*Syzygium cumini 5000mg/kg)* ± S.E.M.	P(T<=t) one-tail
t-Test: Paired Two Samples for Means (Normal Control *vs.* Test Drug)			
Hb gm/dL)	13.98 ± 0.060	12.81± 0.516	0.042^{ws}
WBC (c/cmm)	7905.17 ± 25.060	8866.66± 42.164	1.27^{-05} $(<0.001)^{ss}$
RBC (m/cmm)	8.23 ± 0.088	8.84± 0.147	0.018^{ws}
Neutrophil (%)	56.83 ± 0.601	58.833± 1.327	0.111^{ms}
Lymphocyte (%)	33.00 ± 0.365	32.50± 0.992	0.305^{ns}
Platelet (lakh/cmm)	3.23 ± 0.009	2.34 ± 0.142	0.0006^{ss}
NLR	1.72 ± 0.029	1.817 ± 0.058	0.072^{ms}
PLR	97.83 ± 1.069	72.33± 4.949	0.0008^{ss}
ws: weakly-significant, ss: strongly-significant, ms: mildly-significant, ns: non-significant			

Values are expressed as Mean ± S.E.M; (n =6/group).

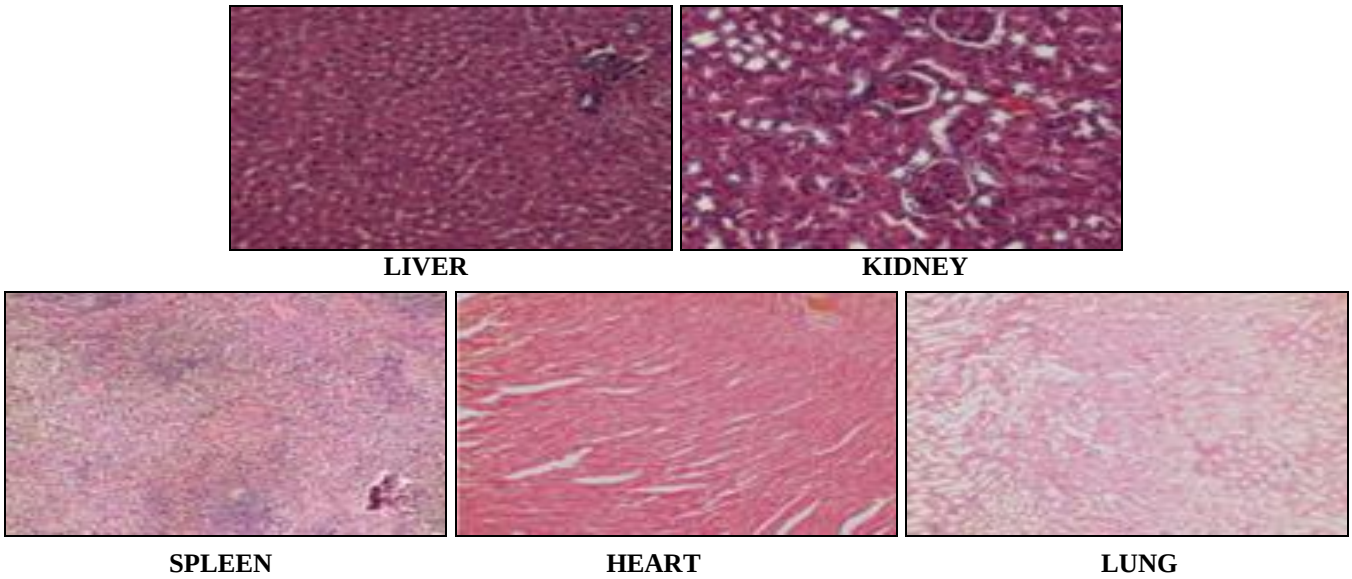

FIG. 3: HISTOPATHOLOGICAL FINDINGS. *All tissues are showing normal shape, size and architecture H& E stain, scar bar = 100µm.

Effect of *Syzygium cumini*on Type I Diabetes Mellitus Rat:

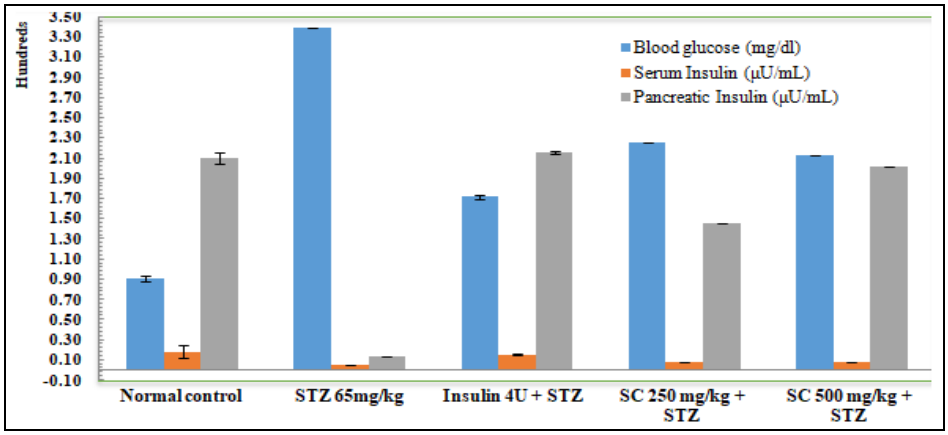

FIG. 4: EFFECT OF BLOOD GLUCOSE, SERUM INSULIN, AND PANCREATIC INSULIN WITH THE TREATMENT OF *SYZYGIUM CUMINI (SC)* IN DIABETIC RATS. Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 7: INTERPRETATION BETWEEN THE GROUPS

Comparisons Between The Group	BGL	S. Insulin	P. Insulin
NC Vs. DC	2.8^{-12} (<0.001)^{ss}	3.4^{-11} (<0.001)^{ss}	9.1^{-16} (<0.001)^{ss}
DC Vs. STD	1.0^{-09} (<0.001)^{ss}	4.1^{-11} (<0.001)^{ss}	1.9^{-17} (<0.001)^{ss}
STD Vs. SC 250mg/kg	3.7^{-06}(<0.001)^{ss}	1.6^{-06}(<0.001)^{ss}	4.8^{-06}(<0.001)^{ss}
STD Vs. SC 500mg/kg	0.005^{ms*}	1.9^{-07}(<0.001)^{ss}	0.13^{ns}

t-Test: Two-Sample Assuming Equal Variances P(T<=t) one-tail

ss: strongly-significant, ms*: moderately-significant, ns: non-significant

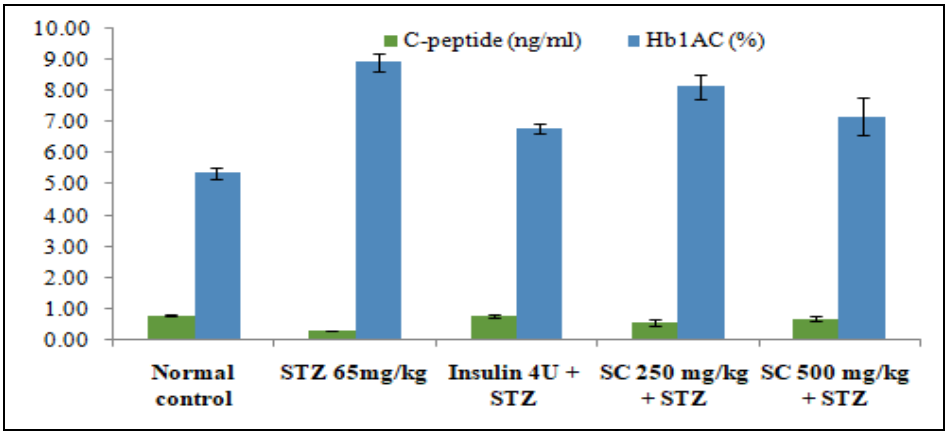

FIG. 5: EFFECT OF C-PEPTIDE AND HB1AC WITH THE TREATMENT OF *SYZYGIUM CUMINI* (SC) IN DIABETIC RATS. Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 8: INTERPRETATION BETWEEN THE GROUPS

Comparisons Between The Group	C-Peptide	Hb1AC
NC Vs. DC	1.7^{-07}(<0.001)^{ss}	4.9^{-07}(<0.001)^{ss}
DC Vs. STD	3.1^{-08}(<0.001)^{ss}	3.9^{-05}(<0.001)^{ss}
STD Vs. SC 250mg/kg	0.04^{ws}	0.004^{ms}
STD Vs. SC 500mg/kg	0.18^{ns}	0.26^{ns}

t-Test: Two-Sample Assuming Equal Variances P(T<=t) one-tail

ss: strongly-significant, ws: weakly-significant, ms: mildly-significant, ns: non-significant

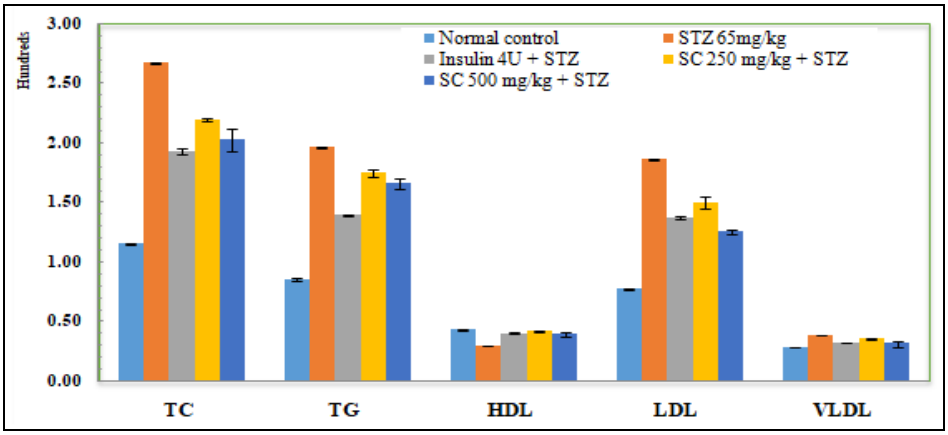

FIG. 6: EFFECT OF LIPID PROFILE WITH THE TREATMENT OF *SYZYGIUM CUMINI* (SC) IN DIABETIC RATS. Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 9: INTERPRETATION BETWEEN THE GROUPS

Comparisons Between The Group	TC	TG	HDL	LDL	VLDL
NC Vs. DC	1.1^{-18}(<0.001)^{ss}	3.19^{-16}(<0.001)^{ss}	1.9^{-09}(<0.001)^{ss}	1.4^{-15}(<0.001)^{ss}	9.2^{-09}(<0.001)^{ss}
DC Vs. STD	1.02^{-11}(<0.001)^{ss}	6.5^{-13}(<0.001)^{ss}	7.4^{-11}(<0.001)^{ss}	3.12^{-12}(<0.001)^{ss}	7.3^{-08}(<0.001)^{ss}
STD Vs. SC 250mg/kg	6.1^{-07} (<0.001)^{ss}	8.0^{-07} (<0.001)^{ss}	0.04^{ws}	0.02^{ws}	0.014^{ws}
STD Vs. SC 500mg/kg	0.17^{ns}	6.08^{-05}(<0.001)^{ss}	0.4^{ns}	0.004^{ms}	0.37^{ns}

t-Test: Two-Sample Assuming Equal Variances P(T<=t) one-tail

ss: strongly-significant, ws: weakly-significant, ms: mildly-significant, ns: non-significant

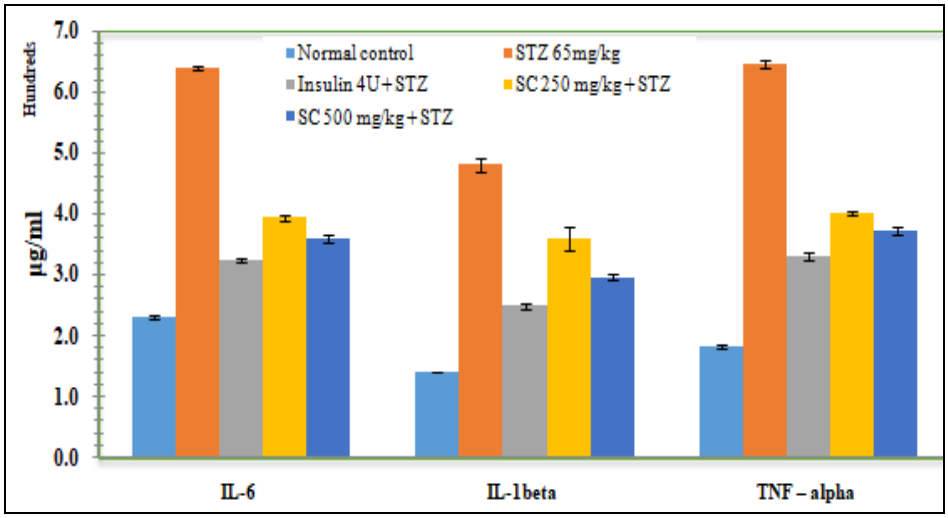

FIG. 7: EFFECT OF PRO-INFLAMMATORY CYTOKINES WITH THE TREATMENT OF *SYZYGIUM CUMINI* (SC) IN DIABETIC RATS. Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 10: INTERPRETATION BETWEEN THE GROUPS

Comparisons Between The Group	IL-6	IL-1Beta	TNF-Alpha
NC Vs. DC	8.07^{-16}(<0.001)^{ss}	1.02^{-11}(<0.001)^{ss}	8.3^{-15}(<0.001)^{ss}
DC Vs. STD	3.05^{-15}(<0.001)^{ss}	1.2^{-09}(<0.001)^{ss}	9.1^{-12}(<0.001)^{ss}
STD Vs. SC 250mg/kg	2.9^{-07}(<0.001)^{ss}	0.0001^{ss}	2.2^{-06}(<0.001)^{ss}
STD Vs. SC 500mg/kg	0.0003^{ss}	1.8^{-05}(<0.001)^{ss}	0.0007^{ss}

t-Test: Two-Sample Assuming Equal Variances P(T<=t) one-tail

ss: strongly-significant

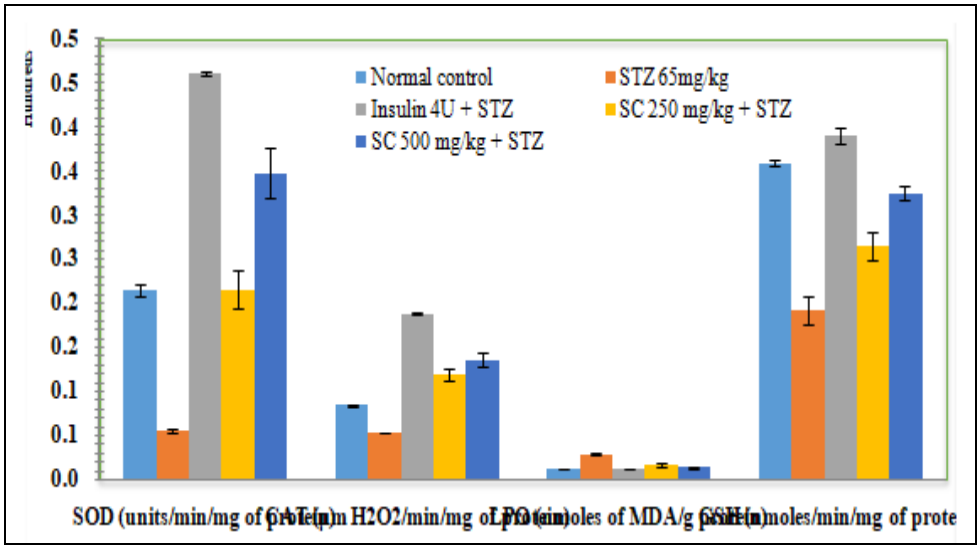

FIG. 8: EFFECT OF ANTIOXIDANT ENZYME WITH THE TREATMENT OF *SYZYGIUM CUMINI* (SC) IN DIABETIC RATS. Values are expressed as Mean ± S.E.M; (n =6/group).

TABLE 11: INTERPRETATION BETWEEN THE GROUPS

Comparisons Between The Group	SOD	CAT	LPO	GSH
NC Vs. DC	1.7^{-10}(<0.001)^{ss}	3.5^{-11}(<0.001)^{ss}	3.6^{-07}(<0.001)^{ss}	5.22^{-07}(<0.001)^{ss}
DC Vs. STD	3.5^{-18}(<0.001)^{ss}	3.08^{-16}(<0.001)^{ss}	7.3^{-07}(<0.001)^{ss}	4.09^{-07}(<0.001)^{ss}
STD Vs. SC 250mg/kg	3.2^{-07}(<0.001)^{ss}	5.6^{-07}(<0.001)^{ss}	0.012^{ws}	2.2^{-05}(<0.001)^{ss}
STD Vs. SC 500mg/kg	0.001^{ms*}	7.0^{-05}(<0.001)^{ss}	0.16^{ns}	0.0002^{ss}

t-Test: Two-Sample Assuming Equal Variances P(T<=t) one-tail

ss: strongly-significant, ws: weakly-significant, ms*: moderately-significant, ns: non-significant

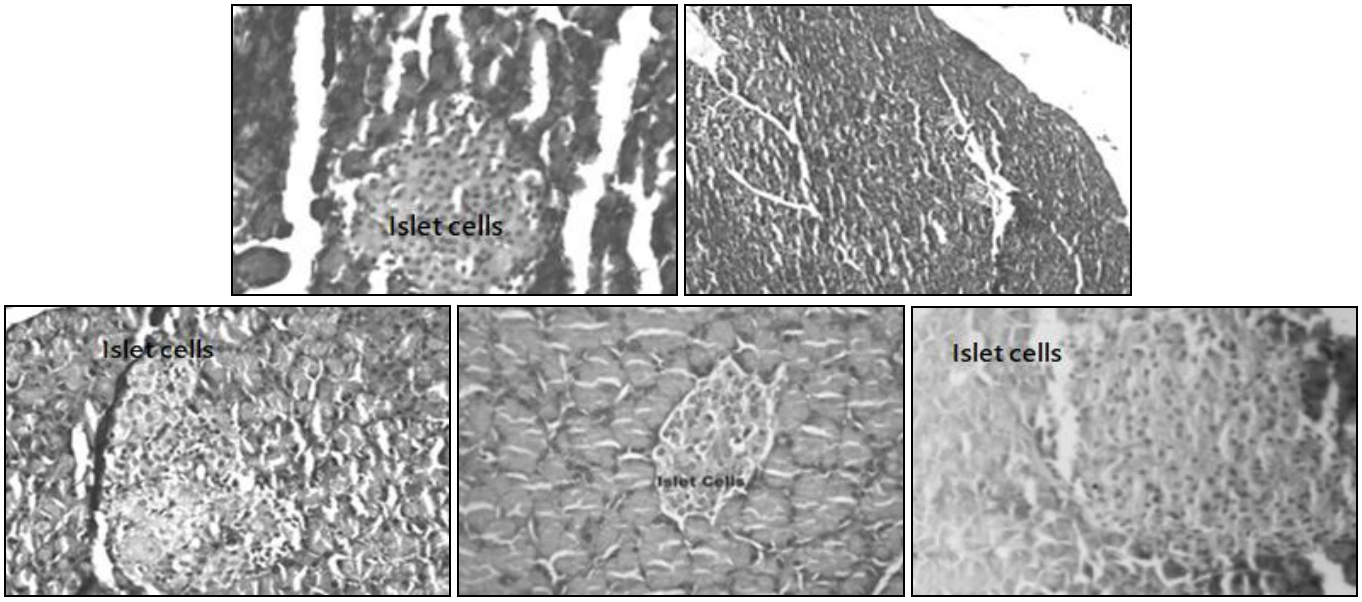

FIG. 9: HISTOPATHOLOGY STUDY: PANCREAS

Normal Control 40x: High Power photo-micrograph of an islet showing normal beta cells with abundant basophilic cytoplasm. H&E stain, scar bar = 100µm.

Disease Control, STZ 65mg/kg/b.w40x: High Power photomicrograph of an islet of Langerhans, showing atrophy of the beta cells. The beta-cell cytoplasm is scanty and inflammatory cells are seen. H & E stain, scar bar = 100µm.

Standard drug, Insulin 4U/kg/b.wi.p40x: High Power photomicrograph of an islet, showing numerous beta cells with abundant basophilic cytoplasm. No Inflammatory cells are seen. H & E stain, scar bar = 100µm.

***Syzygium cumini* 250mg/kg/b.w 40x:** High Power photomicrograph of an islet showing atrophied beta cells with scanty basophilic cytoplasm. No inflammatory cells are seen. H & E stain, scar bar = 100µm.

***Syzygium cumini* 500mg/kg/b.w40x:** High Power photomicrograph of an islet, showing normal beta cells with basophilic cytoplasm. No inflammatory cells are seen. H & E stain, scar bar = 100µm.

DISCUSSION: Nature usually stands as a gold-colored remark to give an instance of the remarkable phenomena of symbiosis. In the world, as human beings are becoming aware of the potency and aspect effects of synthetic drugs, like is an increasing activity within the herbal product treatments, including basic approach toward the nature [28]. Nowadays, many remedies are available, such as insulin therapy, pharmacotherapies, and vitamin therapy, which are accessible to control diabetes. Different kinds of glucose-lowering medicinal drugs exist to have anti-diabetic action via various mechanisms. The drive consists of glycosides, terpenoids, flavonoids, carotenoids, and alkaloids and may often have anti-diabetic effects. An absolutely well-recognized herb is *Syzygium cumini* (Jamun or Java plum) and special parts of *Syzygium cumini* plant are being used for a variety of therapeutic purposes. It has stood out in alternative medical therapies, displaying benefits for monitoring several diseases. Different components of the Jamun were also noted for its anti-inflammatory, anti-leishmanialneuropsycho-pharmacological, antioxidant, anti-bacterial, anti-HIV or anti-fungal, nitric oxide scavenging, anti-microbial, anti-fertility, free radicals scavenging, gastro-protective then anti-ulcerogenic or radio-protective activities [29].

Java plum seed was a source on profound antioxidant polyphenols. The plant is wealthy of compounds containing anthocyanins, glucoside, ellagic acid, isoquercetin, kaemferol, and myrecetin. The seeds are claimed according to alkaloid, jambosine, glycoside jambolin then antimellin, halting the diastatic conversion of starch into sugar. In screening over the toxic concerns, a natural extract was observed to be safe, and no have an effect on the test in rats after 14 days of

observation. This study presents statistics on the remedy of diabetic markers, which had been proven to be comparable in working efficiency to the standard one as insulin. If phytoconstituents of the herbs were found to have promising effects and lowered the symptoms and consequences of diabetes, they would have been able to be further exploited for the betterment of humankind. *Syzygium cumini* has shown a marked decrease in the serum glucose level, Total cholesterol, triglycerides, LDL, VLDL and glycosylated hemoglobin were additionally observed to be in a constrained range. The HDL cholesterol, serum insulin, and pancreatic insulin accelerated along with the test drug, increase in islet area was pretty considerable. Similarly, mediator on inflammation was once assessed, and analysis showed *Syzygium cumini* inhibited moderately STZ stimulated rats.

Free radical concentrations were screened in terms of SOD, CAT, MDA, & GSH. And data raised to that amount there were notable adjustments in the treated groups as in contrast with STZ rats. The data suggests, it has a strong choice and sustainable source for Ayurveda drugs

CONCLUSION: In drawing the end of the research, the analysis is mostly focused on the toxicity and diabetic markers. *Syzygiumcumini* has sizeable anti-diabetic activity executed in the current investigation on lower blood glucose levels, improved body mass, improved lipid profile, and extremely good occurrence of beta-cell mass in histopathology studies.

The treated diabetic group was proven to have quite decreased the HbA1c levels. Similarly, the increase into serum insulin and pancreatic insulin controlled pro-inflammatory cytokines, and the anti-oxidant enzyme may also facilitate the prevention of diabetic complications.

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