CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

Available online at: http://www.iajps.com Research Article

EVALUATION OF ANTI-DIABETIC ACTIVITY OF SAFOOF-E-ZIABETUS DULABI AGAINST METFORMIN IN STREPTOZOTOCIN INDUCED DIABETIC RATS.

[1*]Sk.Syed Hussain,[2]Amreen Qureshi, [3]Dr. Anupama Koneru

[1]Department Of Pharmacology,Sultan-Ul-Uloom College Of Pharmacy,Road No.3 Banjara Hills, Hyderabad 500034,Telangana, India.

[2]Department Of Pharmacology,Sultan-Ul-Uloom College Of Pharmacy Road No.3 Banjara Hills, Hyderabad 500034,Telangana, India.

[3]Department Of Pharmacology,Sultan-Ul-Uloom College Of Pharmacy Road No.3 Banjara Hills, Hyderabad 500034,Telangana, India.

Article Received: November 2019 **Accepted:** December 2019 **Published:** January 2020

Abstract:

In the present study, the anti-diabetic activity of a polyherbal unani formulation Safoof-e-ziabetusdulabi is evaluated in streptozotocin induced diabetic rats. Diabetes was induced using streptozotocin at a dose of 55mg/kg i.p. The study was carried out for 8 weeks and various biochemical parameters were evaluated. On treatment with SZD 200mg/kg and 400mg/kg effectively showed increased body weight of diabetic rats when compared with disease control group. It was also observed that the blood glucose levels and HbA1c levels were reduced in SZD 200mg/kg and 400mg/kg treated groups when compared with disease control.Liver function test was performed in the study to evaluate the safety profile of SZD. On treatment with SZD at 200mg/kg and 400mg/kg effectively decreased Alkaline phosphatise, SGPT, SGOT and total bilirubin when compared with disease control group. Thus the results suggests that SZD possess antidiabetic activity.

Keywords: HbA1c, Streptozotocin, diabetes, Ficusracemosa, Punicagranatum, Mangiferaindica, Phyllanthus emblica, Coriandrum sativum.

Corresponding author:

Sk. Syed Hussain,

Department Of Pharmacology,
Sultan-Ul-Uloom College Of Pharmacy,
Road No.3 Banjara Hills, Hyderabad 500034,Telangana, India.
E MAIL: sksyednt@gmail.com
Contact no: 9705198981

QR code

Please cite this article in press Sk. Syed Hussain et al., ***Evaluation Of Anti-Diabetic Activity Of Safoof-E-ZiabetusDulabi Against Metformin In Streptozotocin Induced Diabetic Rats,****Indo Am. J. P. Sci, 2020; 07(01).*

INTRODUCTION:

Diabetes mellitus is one of the world's oldest known and most common non-communicable diseases affecting sizeable number of people world over. The prevalence of this disease is rapidly rising all over the globe at an alarming rate and it is leading cause of death in most high-income countries.[1]

Diabetes Mellitus depicts a metabolic disorder of numerous etiologypotrayed by hyperglycemia with fluctuations or disturbances of sugar, fat and protein metabolism from deformities in insulin secretion, insulin action or both.[2]

Diabetes is divided into 3 major types namely Type-1, Type-2 and gestational diabetes. Type-1 diabetes which occurs at any age caused due to absolute deficiency of insulin due to autoimmune destruction of beta cells, Type-2 diabetes which is most commonly occurring type amongst the two is caused due to defective responsiveness of insulin receptor to insulin[2] and Gestational diabetes occurs when pregnant women without any previous history of diabetes develop hyperglycemia.[3]

Although there are a number of medications used widely, they have many drawbacks which include drug resistance, lack of responsiveness, high cost, lesser availability, risk in pregnancy and prominent side effects which are even toxic sometimes. Due to these major challenges there is increased demand for herbal drugs which are safe and possess potential anti-diabetic activity with lesser side effects.

Nature has blessed us with an enormous wealth of herbal plants. According to WHO, 80% of world's population uses herbal medications for their primary health care needs[4]. There are more than 2500 of plant species that are being used as herbal medications in India.[5]

Safoof-e-ziabetusdubali(SZD) is a polyherbal unani formulation which have no documented evidence and widely prescribed forZiabetussadiq (diabetes mellitus). Thisformulation includes six herbal medicinal plant parts consisting of stem bark of Ficusracemosa, seed and flower of Punicagranatum, seed of magiferaindica, pericarp of dried fruit of Phyllanthus emblica, fruit of Coriandrum sativum.[6]

MATERIALS AND METHODS:

Plant material

The stem bark of *Ficusracemosa*, the seeds and flower of *Punicagranatum*, the seed of *Mangiferaindica*, the pericarp of dried fruit of *Phyllanthusembica* and the fruit of *Coriandrum sativum* were collected and authentified from Dr. Shaik Mohammed Aliuddin Secretary; Hyderabad Unani Research Foundation, Hyderabad, Telangana State. The drug obtained was dried and ground into fine powder and utilized for the study.

Animals

30 Wistar male albino rats were used for the study. The rats weighing between 150-200 g were procured from Sainath Animal Agency, Hyderabad. The temperaturewas maintained 22ºC and relative humidity 50-60%. The animals were given pellet dietand drinking water ad libitum. The animal experimental protocol has been approved by our Institutional Animal ethical Committee with reference no: IAEC/SUCP/2019/07.

Induction of Diabetes

The Wistar Albino rats were fasted overnight before inducing diabetes. Diabetes Mellitus in rats was induced by Streptozotocin (55mg/kg) intraperitoneally at a single dose. After 3 days plasma glucose levels will be checked, the animals with blood glucose level more than 250mg/dL were selected for the study.

Experimental design

Division of animals into five groups with six animals each.

Group I (Normal control) will be given pellet diet + vehicle (0.5% w/v CMC).
Group II (Negative control) will be given Streptozotocin (55mg/kg b.w, i.p) + and vehicle (0.5% w/v CMC).
Group III (Standard) will be given Streptozotocin (55mg/kg b.w, i.p) and Metformin (500mg/kg b.w)
Group IV (Test 1) will be given Streptozotocin (55mg/kg b.w, i.p) and the unani formulation (200 mg/kg b.w + 0.5% w/v CMC by p.o)
Group V (Test 2) will be given Streptozotocin (55mg/kg b.w, i.p) and the unani formulation (400 mg/kg b.w + 0.5% w/v CMC by p.o)

Body weight

Body weight is recorded for 8 weeks, weekly once by using Docbel-Braun weighing scale

Collection of blood samples and biochemical parameters estimation

The blood samples were collected from retro orbital plexus of rats under mild ether anaesthesia for 8 weeks, weekly once. These samples were centrifuged at 4000 RPM for 10 min and serum was isolated. This serum was subjected to blood glucose, glycosylated haemoglobin, total bilirubin, SGOT-R, SGPT-R, Alkaline Phosphatase (ALP) using standard kits.

Statistical Analysis

The statistical analysis was carried out using Graph pad prism 8.2.0. All results were expressed as Mean ±SEM. Groups of data were compared with analysis of variance (ANOVA) followed by Dunnett's multiple comparison test to identify significance ($p<0.001$, $p<0.01$, $p<0.05$) among groups.

RESULTS:

Body weigh

There was an increase in body weight of SZD 200mg/kg and 400/kg treated groups(189±3.1) and (201±3.5) respectively which were comparable with metformin (209±3.8).

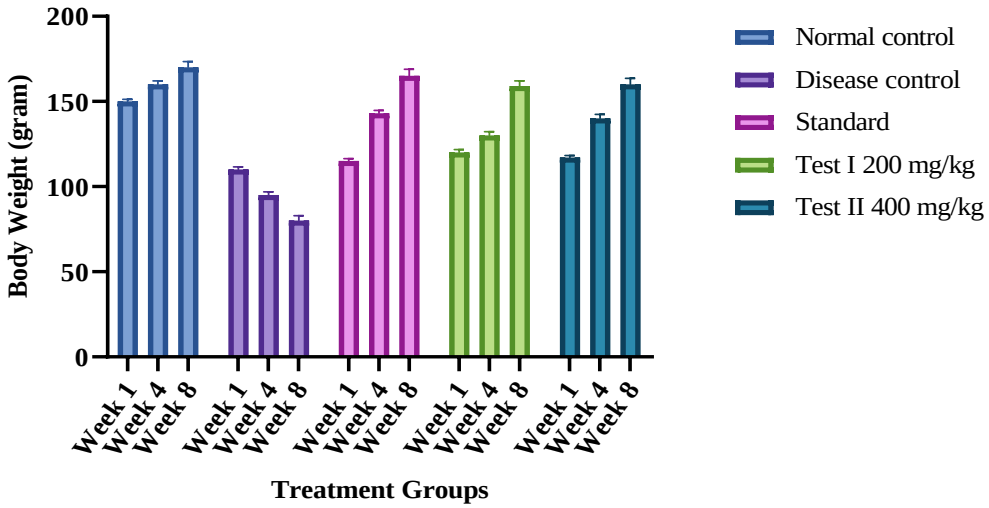

Figure 1: Effect of SZD on body weight of experimental rats. The values are expressed as Mean± SEM (n=6). One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

Blood Glucose

When the animals were treated with SZD 200mg/kg and 400mg/kg, there was a considerable decrease in blood glucose levels (134±2.52) and (130±1.49) respectively which were comparable with that of metformin (124±1.48).

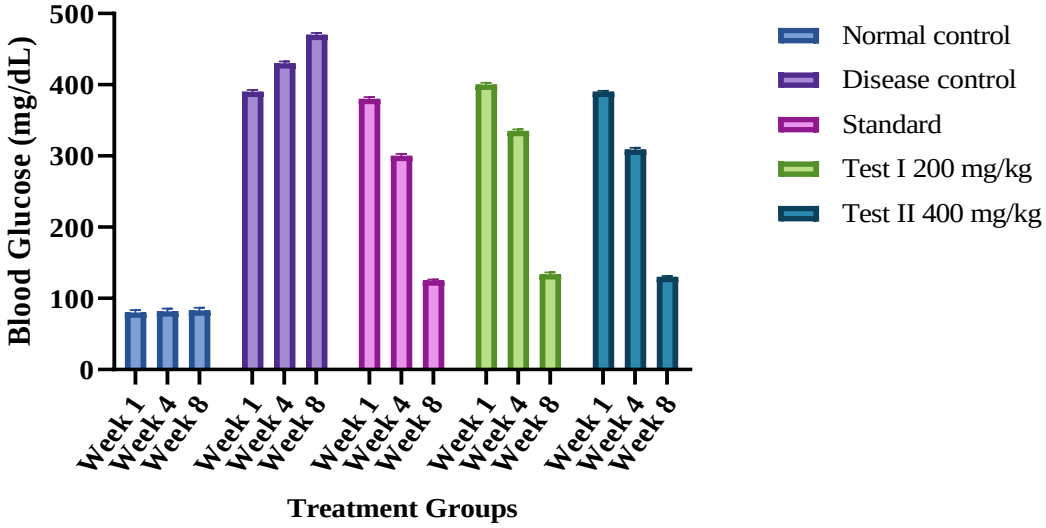

Figure 2: Effect of SZD on blood glucose of experimental rats. The values are expressed as Mean± SEM (n=6). One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

Glycosylated Hemoglobin (HbA1c)

On treatment with SZD 200mg/kg and 400mg/kg the values observed were (7.46±1.06) and (7.06±1.22) respectively which were comparable with metformin (6.52±1.14)

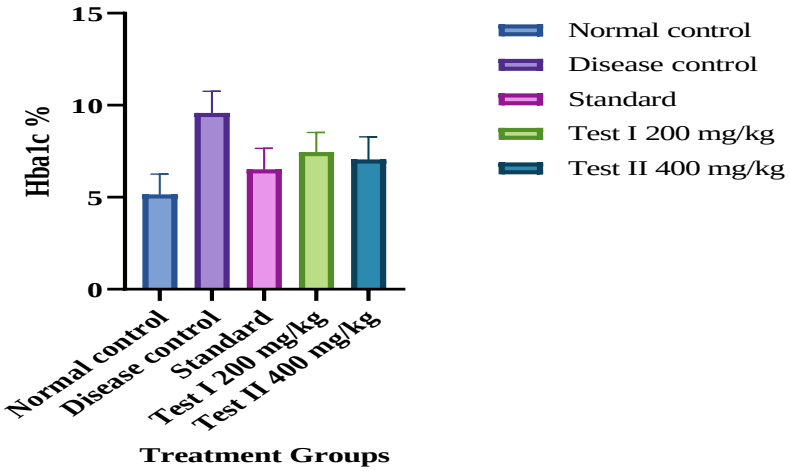

Figure 3: Effect of SZD on HbA1ct of experimental rats. The values are expressed as Mean± SEM (n=6).
One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

Liver Function tests:

Alkaline phosphatise

Alkaline phosphatase levels on treatment with SZD at 200mg/kg and 400mg/kg the results observed were (132.31±2.10) and (126.20±2.78) respectively which were comparable with metformin (16.39±7.9).

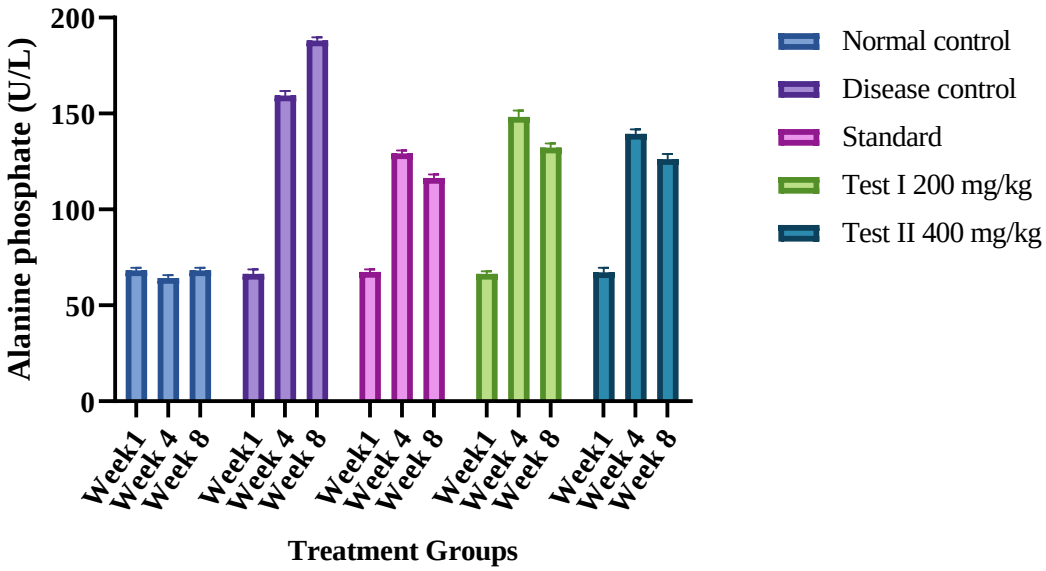

Figure 4: Effect of SZD on Alkaline phosphatase of experimental rats. The values are expressed as Mean± SEM (n=6).
One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

SGPT-R

On treatment with SZD 200mg/kg and 400mg/kg which were observed to be (33.52±2.25) and (29.60±2.18) respectively. This results were similar to that of metformin (25.35±1.84)

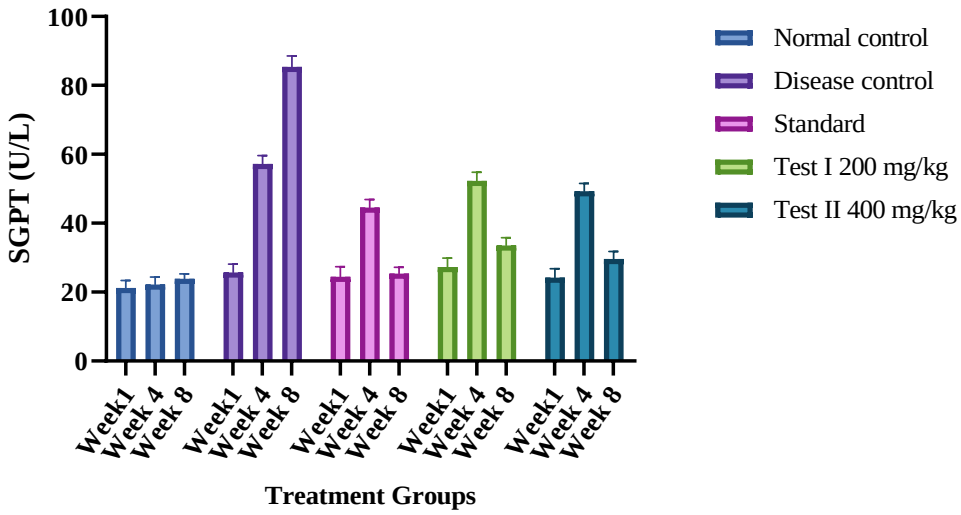

Figure 5: Effect of SZD on SGPT of experimental rats. The values are expressed as Mean± SEM (n=6). One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

SGOT-R

on treatment with SZD 200mg/kg and 400mg/kg the values observed were (66.18±1.42) and (60.42±1.84) respectively which were comparable with the result of metformin (56.03±3.01)

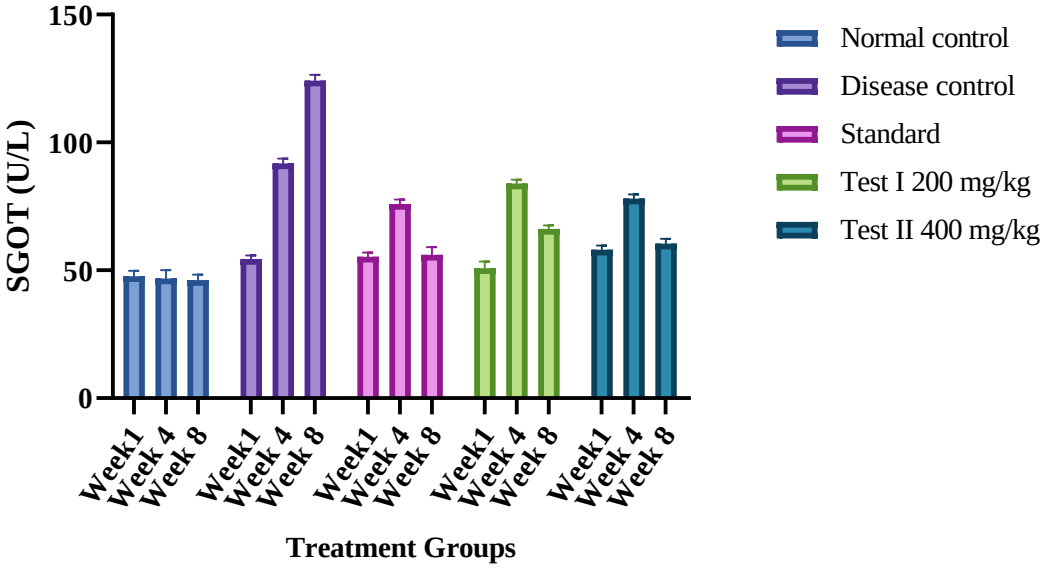

Figure 5: Effect of SZD on SGOT of experimental rats. The values are expressed as Mean± SEM (n=6). One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

TOTAL BILIRUBIN

The total bilirubin values in groups treated with SZD 200mg/kg and 400mg/kg were found to be (0.31±0.05) and (0.35±0.03) respectively. This results were similar to that of metformin (0.36±0.03).

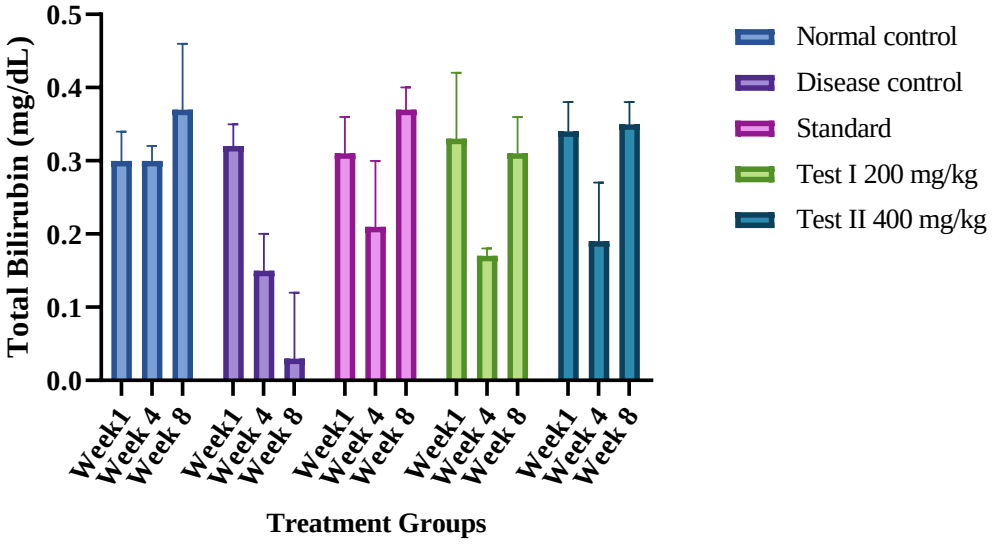

Figure 6: Effect of SZD on Total bilirubin of experimental rats. The values are expressed as Mean± SEM (n=6). One way ANOVA was carried out followed by dunnetts multiple comparison test. ***P<0.001 **P<0.01 *P<0.05 when compared with disease control group. ***P< 0.001 when compared with vehicle control. ns-not significant.

DISCUSSION:

Although a number of synthetic drugs are being used for the symptomatic treatment of diabetes, still they have their own side-effects. Hence plants which have anti-diabetic properties are being constantly explored by researches to provide much needed relief from diabetes.Though the plant materials are reasonably safe, it is still necessary to collect evidences to ensure that they are efficient and safe and hence scientific evaluation and toxicological studies are necessary.

In the present study DM was induced by injecting streptozotocin (55mg/kg) intraperitoneally. The investigations was carried out with a polyherbal unani formulation Safoof-e-ziabetusDulabi at concentration of 200mg/kg and 400mg/kg and various biochemical parameters were evaluated like body weight of animals, estimation of blood glucose, HbA1c, lever function test.

On treatment with SZD 200mg/kg and 400mg/kg there has been increase in body weight (189±3.1) and (201±3.5) respectively which were comparable with metformin (209±3.8).

There was a significant increase in blood glucose levels in streptozotocin induced group (470±2.850). When the animals were treated with SZD 200mg/kg and 400mg/kg, there was a considerable decrease in bloodglucose levels (134±2.52) and (130±1.49) respectively which were comparable with that of metformin (124±1.48).

The mechanism which might have caused reduction in blood glucose level is activation of enzyme AMPK which enhances glucose mechanism by inhibiting gluconeogenesis in liver. Proliferation of beta cells might be the primary cause of recovery with SZD. Among two doses, the SZD at 400mg/kg showed more potent anti diabetic activity.

Glycosylated hemoglobin (HbA1c) is one of the vital parameters in diagnosis of diabetes and also in knowing risk of developing other diabetic related complications.

In the present study, it was observed that there has been increase in HbA1c value (9.58±1.18) in streptozotocin induced group. On treatment with SZD 200mg/kg and 400mg/kg the values observed were (7.46±1.06) and (7.06±1.22) respectively which were comparable with metformin (6.52±1.14)

Liver function test was performed in the study to evaluate the safety profile of SZD. In this study there was an increase in Alkaline phosphatase levels in streptozotocin induced rats (188.08±1.62). On treatment with SZD at 200mg/kg and 400mg/kg the results observed were (132.31±2.10) and

(126.20±2.78) respectively which were comparable with metformin (16.39±7.9).

Similarly, the values for SGPT in streptozotocin induced animals was higher (85.37±3.19) than the values on treatment with SZD 200mg/kg and 400mg/kg which were observed to be (33.52±2.25) and (29.60±2.18) respectively. These results were similar to that of metformin (25.35±1.84)

The results of SGOT in streptozotocin induced group was increased (124.20±2.180) and on treatment with SZD 200mg/kg and 400mg/kg the values observed were (66.18±1.42) and (60.42±1.84) respectively which were comparable with the result of metformin (56.03±3.01).

The total bilirubin values in streptozotocin induced diabetic group was found to be (0.03±0.09) which was higher than the groups treated with SZD 200mg/kg and 400mg/kg which were found to be (0.31±0.05) and (0.35±0.03) respectively. This results were similar to that of metformin (0.36±0.03).

CONCLUSION:

1. The aqueous extract of the unani formulation Safoof-e-ziabetusdulabi consisting of various parts of plants was used to evaluate anti-diabetic activity in Streptozotocin induced diabetic rats.
2. The administration of SZD at a concentration of 200 and 400 mg/kg showed effective increase in body weight when compared with Streptozotocin induced disease group.
3. The blood glucose levels and HbA1c values were found to be decreased in animals treated with SDZ when compared with Streptozotocin induced disease group.
4. The Liver function tests was performed which includes ALP, SGPT, SGOT, Total bilirubin to evaluate safety profile of SZD. The values were found to be under the normal range when compared with Streptozotocin induced disease group which showed elevated values.
5. The Pancreas of animals of all the groups were sent for histopathological examination which showed Normal beta and acinar cells, hypertrophy of islets of pancreas was also noted along with proliferation of beta cells.
6. From the present study we can conclude that the unani formulation SZD has the efficiency to improve diabetes.
7. Thus can be proven to be a cost effective, potent, efficacious herbal unani medicine for treatment of diabetes mellitus after a complete study of clinical trials in humans.

ACKNOWLEDGEMENT:
The authors are grateful to Sultan-ul-uloom educational society for providing us the facility to carry out the research work.

CONFLICT OF INTEREST:
There is no conflict of interest among the authors.

REFERENCES:

1. Huizinga MM., Rothman R.L (2006). Addressing the diabetes pandemic a comprehensive approach. Indian J Med Res,(pp. 124, 481-4)
2. WHO consultation. Diagnosis and classification of Diabetes Mellitus. World Health Organizations, Dept. of non-communicative disease surveillance. Geneva; 2.
3. "Diabetes Fact sheet N°312". WHO October 2013. Archived from the original on 26 August 2013. Retrieved 25 March 2014. https://en.wikipedia.org/wiki/Diabetes#cite_note-WHO2013-2 [Accessed 26 December 2019].
4. Tandon V, Gupta RK. Histomorphological changes induced by Vitex negundo in albino rats.Indian J Pharmacol. 2004;36: 176-7.
5. Tripathy S, Pradhan D, Anjana M. Anti-inflammatory and antiarthritic potential of Ammaniabaccifera Linn. Int J Pharma Bio Sci. 2010;1:1-7.
6. Ajazuddin SS, Evaluation of physicochemical and phytochemical properties of Safoof-e-Sana, a Unani polyherbal formulation, Pharmacognosy Research, 2(5), 2010, 318-322.