IJPSR (2011), Vol. 2, Issue 3 **(Research Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 30 November, 2010; received in revised form 27 January, 2011; accepted 16 February, 2011

ASSESSMENT OF ANTIDIABETIC POTENTIAL OF *CAESALPINIA DIGYNA* ROTTLER ROOT EXTRACT IN STREPTOZOTOCIN INDUCED DIABETIC RATS

S. Mohamed Farook*, W. Clement Atlee, Shaik. Karimulla and Mrunal S Davey

Department of Pharmacology, C. L. Baid Metha College of Pharmacy, Thuraipakam, Chennai Tamil Nadu, India

Keywords:

Antidiabetic activity, *Caesalpinia digyna* (CD), streptozotocin, Hypolipidemic, CDM

Correspondence to Author:

S. Mohamed Farook

Department of Pharmacology, C. L. Baid Metha College of Pharmacy, Thuraipakam, Chennai Tamil Nadu, India

ABSTRACT

This study was undertaken to investigate the antidiabetic activity effect of repeated oral administration of the methanolic extract of *Caesalpinia digyna* (Family: Leguminosae) in normal and streptozotocin induced diabetic rats, respectively. The effect of repeated oral administration of methanolic extract on serum lipid profile in diabetic rats was also examined. The doses, viz. 250 and 500mg/kg bw of methanolic extract of *Caesalpinia digyna* (CD) were evaluated and the dose of 500 mg /kg was found to be the most effective dose. The same dose of 500 mg/kg produce significant fall in blood glucose level after 1h during glucose tolerance test. The dose has almost similar effect as similar to that of glibenclamide (0.4 mg/kg bw). The diabetic rats treated daily with 500mg/kg bw for 15 days produced a significant reduction in the fasting blood glucose level and increase in body weight of diabetic rats was additional corroborating factors for its antidiabetic potential. Total cholesterol (TC), low density lipoprotein (LDL) and triglycerides (TG) levels were significantly ($p<0.01$) decreased when compared to control diabetic rats. Were as, cardioprotective, high density lipoprotein (HDL) was significantly ($p<0.01$) increased when compared to control diabetic rats. These results clearly indicate that methanolic extract of CD has high antidiabetic potential along with significant hypolipidemic effects.

INTRODUCTION: Diabetes mellitus is a metabolic disorder characterized by hyperglycemia and alternation in carbohydrates, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion or insulin action. It is considered as one of the five leading causes of death in the world [1]. About 150 million or 1.3% people are suffering from diabetes worldwide which is almost five times more than the estimates 10 years ago and this may double by the year 2030 [2].

Different types of oral anti hyperglycaemic agents are available along with insulin for the treatment of diabetes mellitus but their long-term use produces undesirable side effects such as skin rashes, transient leucopenia**,** thrombocytopenia, severe hypoglycaemia, and increase chances of cardiovascular death of unknown mechanism [3]. In the view of undesirable side effect of synthetic drugs [4]., WHO has recommended evaluation of plants effective in different diseases, Many Indian medicinal plants have been found to be useful in successfully managing diabetes and from some of them active principles have been isolated [5]. Thus it will be useful to look for new and if possible more efficacious drug and the vast reserves of phytotherapy may be an ideal target [6].

Caesalpinia digyna, Rottl (Family: Leguminosae) is found in the scrub forests of the eastern Himalayas in Assam and West Bengal, the Eastern Ghats in Andhra Pradesh, Madhya Pradesh [7]. The traditional users of Chhattisgarh use all parts of this herb both externally and internally in the treatment of many common as well as complicated diseases. They also use this herb in treatment of jaundice, tuberculosis and syphilis. In the treatment of diabetes, the leachates of roots are used [8]. The objective of this investigation was to ascertain the scientific basis of its use in the treatment of diabetes. The present investigation reports the hypoglycaemic, hypolipidemic and antihyperglycemic activity of the methanolic extract of *Caesalpinia digyna* on which there is no previous data available.

MATERIALS AND METHODS:

Collection of plant materials: The root of *caesalpinia digyna rottl* was purchased from Abirami botanicals, tuticuorin, Tamil Nadu. The plant material was identified and authenticated by resident botanist, Prof. Dr. S. Jayaraman, Plant Anatomy Research Centre (PARC), Chennai. A voucher specimen was submitted at C. L. Baid Metha College of Pharmacy, Chennai.

Preliminary phytochemical screening[9]: Preliminary phytochemical screening revealed the presence of alkaloids, protein, phenols, tannins, flavonoids, sterols and saponins in the root.

Preparation of CD roots extract: The root was chopped to small pieces and shed dried. The dried root was powdered and a weighed quantity of the powder (890g) was passed through sieve number 20 and subjected to hot solvent extraction in a soxlet apparatus using methanol at a temperature of 60°-70°c. The extract was concentrated to dryness at 40°C under reduced pressure in a rotary vacuum evaporator (yield- 7.0g) and the residue stored in a refrigerator at 2-8°c for use in subsequent experiments.

Experimental animals: Healthy inbred wistar Albino rats (150-280g) of either sex were obtained from animal house of C. L. Baid Metha College of Pharmacy, Chennai. The animals were housed individually in polypropylene cages, maintained under standard conditions (12:12 hour light/dark cycle; 25±30°C; 35-60% humidity); the animals were fed with standard rat pellet diet (Hindustan Lever Ltd., Mumbai, India) and water *ad libitum*. The study was approved by the Institutional Animal Ethical Committee of Committee for the Purpose of

Control and Supervision of Experimentation on Animals (IAEC/XIII/02/CLBMCP/2007-2008).

Acute toxicity studies: Healthy adult wistar albino rats of either sex, starved overnight were divided into five groups (n=6) and were orally fed the methanolic extract of CD (CDM) in increasing dose levels of 5, 50,300 and 2000mg/kg body weight [10]. The animals were observed continuously for 2 hour under the following profiles [11]:

1. Behavioral profile: Alertness, restlessness, irritability and fearfulness.
2. Neurological profile: Spontaneous activities, reactivity, touch response and pain.
3. Autonomic profile: defecation and urination.

After a period of 24 and 74 hours they were observed for any lethality or death.

Oral glucose tolerance test (OGTT): The oral glucose tolerance test [12] was performed in overnight fasted (18 h) normal rats. Rats divided into four groups (*n* = 6) were administered drinking water, glibenclamide 0.4mg/kg, methanolic extract of CD 250 and500 mg/kg, respectively. Glucose (2 g/kg) was fed 30 min prior to the administration of extracts. Blood was withdrawn from the tail vein at 0, 60, 120, 150 and 270 min and change in blood glucose levels were estimated for each group.

Induction of Experimental Diabetes [13-16]: Diabetes was induced by a single intraperitoneal injection of freshly prepared streptozotocin (45mg/kg bw) in 0.1M citrate buffer (PH 4.5) to overnight fasted rats. The development of diabetes was confirmed after 48 hours of STZ injection, the animals with fasting blood glucose level more than 200mg/dl were selected for the experimentation.

Estimation: Blood glucose level (BGL), total cholesterol (TC), high density lipoprotein (HDL)-cholesterol, triglycerides (TG) [17-20] were estimated using standard kits of Bayers diagnostic Pvt. Ltd., India. Low density lipoprotein (LDL)-cholesterol was calculated from the measurement by Friedwald formula [21]. Glycosylated haemoglobin was estimated using Excel diagnostics Pvt. Ltd., India. Body weight was determined gravimetrically.

Experimental design for antidiabetic study [22-24]: The animals were divided into 5groups. Group 1 consists of normoglycemic rats. The remaining 4 groups consist of 6 STZ induced diabetic rats.

- Group I – Normal control rats administered 0.5% CMC 5ml/kg b.w./p.o. for 14 days.
- Group II – Diabetic control rats administered 0.5% CMC 5ml/kg b.w./p.o. for 14 days.
- Group III - Diabetic rats administered the standard drug glibenclamide 0.4mg/kg b.w./p.o. for 14 days.
- Group IV - Diabetic rats administered the methanolic extract of CD 250mg/kg b.w./p.o. for 14 days.
- Group V - Diabetic rats administered the methanolic extract of CD 500mg/kg b.w./p.o. for 14 days.

The blood samples were collected from overnight fasted animals on 0^{th}, 10^{th}, and 15^{th} day to estimate blood glucose level using glucometer. The change in body weight was also measured on 0^{th}, 10^{th}, and 15^{th} day of treatment.

On 15^{th} day the animals were sacrificed, the pancreas of one animal from each group was excised and stored in 10% formalin after washing with normal saline. Histopathological parameter was studied Madras University, Chennai, India. The tissue was washed, dehydrated with alcohol, cleared with xylene and paraffin blocks were made. Serial sections of 5µm thickness were cut using a rotary microtome. The sections were then deparaffinised with xylene and hydrated in

descending grades of alcohol. The slides were then transferred to haematoxylin for 10 min, followed by rinsing with water. These were examined and later counterstained with esion, rinsed with water, dehydrated with ascending grades of alcohol, cleared with xylene and mounted.

Statistical analysis: The data are expressed as mean±SEM. statistical significance test for comparison was performed using one-way analysis of variance (ANOVA) followed by Dunnet's test. The results were considered statistically significant if the *p*- values were 0.05 or less.

RESULTS:

Effect of methanolic extract of CD on acute toxicity studies: Acute toxicity studies revealed the non-toxic nature of the methanolic extract of CD. There was no lethality or any toxic reaction found at any of the doses selected until the end of the study period.

Effect of methanolic extract of CD on blood glucose level in glucose induced hyperglycaemic rats (OGTT): The methanolic extract of CD at a dose level 250 and 500mg/kg b.w./p.o. did not exhibit significant hypoglycaemic effect in the rats which are loaded with glucose (2mg/kg b.w./p.o.). But after 60 min of drug administration a low dose of 250mg/kg b.w./p.o. reduced blood glucose level with less significance (p<0.05) but a high dose of 500mg/kg b.w./p.o. reduced blood glucose significantly (p<0.01). The standard glibenclamide (0.4mg/kg b.w./p.o.) treatment showed significant reduction in blood glucose levels in glucose induced hyperglycaemic rats (p<0.01) (**Table 1**).

TABLE 1: EFFECT OF CDM EXTRACT OF ROOT ON BLOOD GLUCOSE IN STZ INDUCED DIABETIC RATS [OGTT]

Groups	Test Sample (mg/kg)	Blood glucose levels (mg/dl)				
		0 min (glucose load)	60 min	120 min	150 min	270 min
I	Control	76.5±2.4	126.8±4.3	100.6±5.4	78.5±2.5	72.3±2.3
II	Std-0.4	42.0±3.4**	90.1±5.2**	71.0±4.8**	56.0±3.6**	52.4±3.1**
III	CDM-250	62.6±4.5*	122.9±3.9^{ns}	82.1±3.8*	62.8±5.0*	57.3±4.2*
IV	CDM-500	59.2±2.5**	110.0±4.2*	75.2±5.1**	60.3±4.7**	54.6±5**

The blood glucose values of group II, III and IV are compared with control animal values. *-p< 0.05, **-p< 0.01, ns-non significant

Effect of methanolic extract of CD on body weight change in diabetic rats: The methanolic extract of CD at a dose level 250mg/kg b.w./p.o. did not show significant improvement in the body weight of diabetic rats on 10th day of treatment and show a slight significance in the body weight improvement on 15th day (p<0.05). An oral dose of 500mg/kg b.w./p.o. shows significant improvement in the body weight of diabetic rats on 10th day and 15th day of treatment (p<0.01). The standard glibenclamide (0.4mg/kg b.w./p.o.) treatment showed significant improvement in the body weight of diabetic rats (p<0.01) (**Table 2, Fig. 1**).

TABLE 2: EFFECT OF SUB-ACUTE TREATMENT OF CDM ROOT EXTRACT ON BODY WEIGHT CHANGES IN STZ INDUCED DIABETIC RATS

Group	Treatment	Dose (Kg^{-1} Body Weight)	Body weight (gm)		
			O Day	10th Day	15th Day
I	Control(0.5% SCMC)	5 ml	192.45 ± 1.24	196.92 ± 1.2	201.5 ±1.5
II	Disease control (STZ)	45mg	210.24 ±0.99	167.89 ±1.4**	153.5 ±0.7**
III	Standard (Glibenclamide+STZ)	0.4mg	183.13 ± 2.64	185.47±3.2*	187.9 ±1.5**
IV	Test I (CDM+STZ)	250mg	197.62 ± 4.3	166.6±5.4^{ns}	173.2± 4.2*
V	Test II (CDM+STZ)	500mg	189.92 ± 1.7	175.6 ±1.3*	187.6± 4.1**

The body weights of group II, III and IV are compared with control. *-p< 0.05, **-p<0.001, ns-non significant.

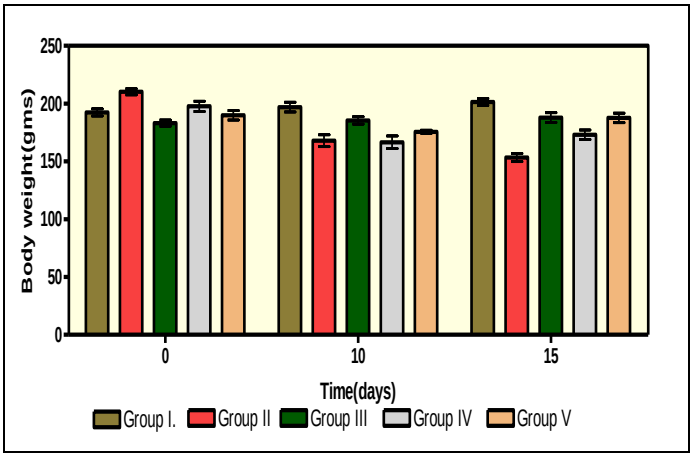

FIG. 1: EFFECT OF SUB-ACUTE TREATMENT OF CDM ROOT EXTRACT ON BODY WEIGHT CHANGES IN STZ INDUCED DIABETIC RATS

Effect of methanolic extract of CD on blood glucose level in diabetic rats: In the sub-acute study, the treatment with methanolic extract of CD 250mg/kg significantly (p<0.01) decreased the blood glucose level after 14th day onwards. But a high dose of 500mg/kg b.w/p.o reduced blood glucose significantly (p<0.01) after 10th day onwards and thereafter. The standard glibenclamide (0.4mg/kg b.w/p.o) treatment showed significant reduction in blood glucose levels in glucose induced hyperglycaemic rats (p<0.01) after 10th day onwards and thereafter (**Table 3, Fig. 2**).

TABLE 3: EFFECT OF CDM ROOT EXTRACT ON BLOOD GLUCOSE IN STZ INDUCED DIABETIC RATS

Group	Treatment	Dose (Kg $^{-1}$ Body Weight)	Blood Glucose (mg/dl)		
			0th Day	10th Day	15th Day
I	Control (0.5% SCMC)	5ml	77.37 ± 1.6	79.43 ± 2.5	82.5 ± 11.5
II	Disease control (STZ)	45mg	245.83 ± 5.1	267.0 ± 6.9**	288.3 ± 5.3**
III	Standard (Glibenclamide+STZ)	0.4mg	230.0 ± 5.2	167.30 ± 4.5**	107.60 ± 3.2**
IV	Test I (CDM+STZ)	250mg	231.43 ± 4.3	180.16 ± 3.78*	133.16 ± 4.7**
V	Test II (CDM+STZ)	500mg	229.36 ± 3.1	170.33 ±4.6**	117.17 ± 5.3**

a- Group II is compared with Group I; b- groups III, IV, V are compared with group. **P<0.01, *P<0.05

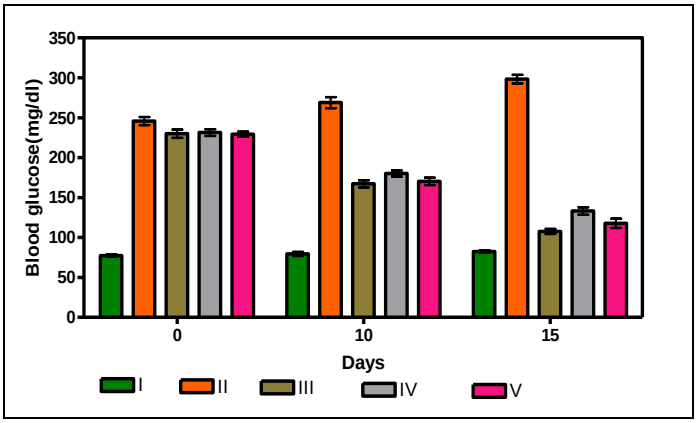

FIG. 2: EFFECT OF CDM ROOT EXTRACT ON BLOOD GLUCOSE IN STZ INDUCED DIABETIC RATS

Biochemical Estimations:

Glycosylated haemoglobin: The diabetic control animals showed significant increase in the glycosylated haemoglobin (GHb %) when compared to control animals. GHb% level in methanolic extract of CD (250 and 500 mg/kg b.w/p.o) treated diabetic rats showed significant decrease (p<0.05) respectively. Treatment with glibenclamide (0.4mg/kg b.w/p.o) produced a significant decrease when compared with diabetic rats (p<0.01) (**Table 4, Fig. 3**).

TABLE 4: EFFECT OF CDM ROOT EXTRACT ON GLYCOSYLATED HEMOGLOBIN IN STZ INDUCED DIABETIC RATS

Groups	Treatment	Dose (Kg $^{-1}$ Body Weight)	Glycosylated Haemoglobin (GHb %)
I	Control (0.5% SCMC)	5 ml	7.217 ± 0.7575
II	Disease control (STZ)	45mg	12.950 ± 0.393**
III	Standard (Glibenclamide+STZ)	0.4mg	7.980 ± 0.6566**
IV	Test I (CDM+STZ)	250mg	8.645 ± 0.5022*
V	Test II (CDM+STZ)	500mg	8.222 ± 0.5910*

a- Group II is compared with Group I .b-groups III, IV, V are compared with group. **P<0.01,*P<0.05.

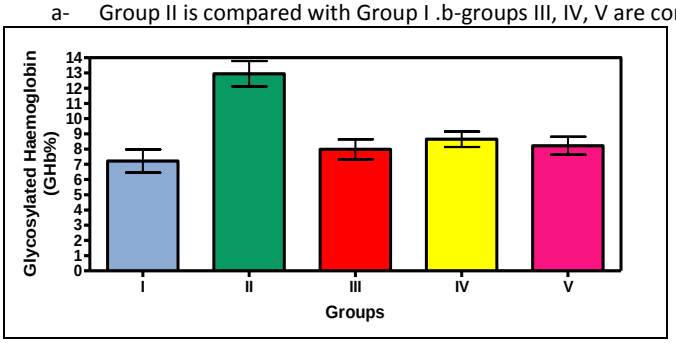

FIG. 3: EFFECT OF CDM ROOT EXTRACT ON GLYCOSYLATED HEMOGLOBIN IN STZ INDUCED DIABETIC RATS

Total cholesterol: The total cholesterol level significantly (p<0.01) increased in diabetic rats when compared to control rats. And the diabetic animals treated with methanolic extract of CD (250 and 500 mg/kg b.w/p.o) showed significant (p<0.01) decrease in total cholesterol level when compared to diabetic animals (**Table 5, fig. 4**).

TABLE 5: EFFECT OF CDM ROOT EXTRACT ON TOTAL CHOLESTEROL IN STZ INDUCED DIABETIC RATS

Group	Treatment	Dose(Kg $^{-1}$ Body Weight)	Total Cholesterol (mg/dl)
I	Control (0.5% SCMC)	5 ml	118.9 ± 5.4
II	Disease control (STZ)	45mg	167.4 ± 3.61**
III	Standard (Glibenclamide+STZ)	0.4mg	120.7 ± 3.80**
IV	Test I (CDM+STZ)	250mg	126.3 ± 3.46**
V	Test II (CDM+STZ)	500mg	140.8 ± 4.167**

a- Group II is compared with Group I .b-groups III, IV, V are compared with group II **P<0.01,*P<0.05

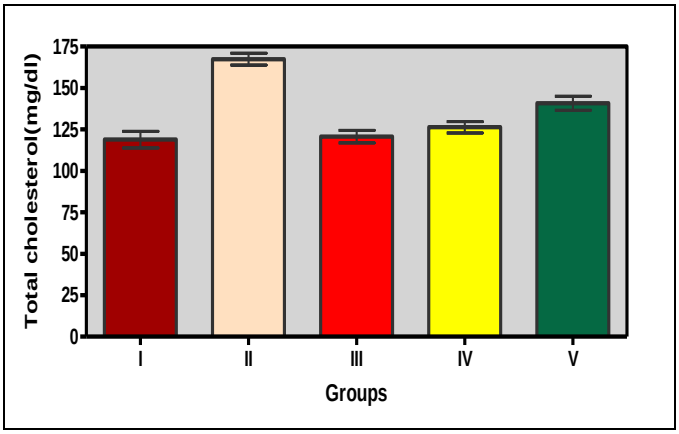

FIG. 4: EFFECT OF CDM ROOT EXTRACT ON TOTAL CHOLESTEROL IN STZ INDUCED DIABETIC RATS

Serum LDL-cholesterol: The serum LDL-cholesterol level was significantly (p<0.01) increased in diabetic rats when compared to control rats. And the diabetic animals treated with methanolic extract of CD (250 and 500mg/kg b.w./p.o.) showed significant (p<0.05) and (p<0.01) decrease in serum LDL-cholesterol level respectively when compared to diabetic animals. However, Treatment with glibenclamide (0.4mg/kg b.w/p.o) produced a significant decrease in serum LDL-cholesterol when compared with diabetic rats (p<0.01) (**Table 6, fig. 5**).

TABLE 6: EFFECT OF CDM ROOT EXTRACT ON LDL-CHOLESTEROL IN STZ INDUCED DIABETIC RATS

Group	Treatment	Dose (Kg $^{-1}$ Body Weight)	LDL (mg/dl)
I	Control (0.5% SCMC)	5 ml	48.52 ± 5.0
II	Disease control (STZ)	45mg	102.50 ± 5.3**
III	Standard (Glibenclamide+STZ)	0.4mg	55.54 ± 5.2**
IV	Test I (CDM+STZ)	250mg	83.36 ± 3.5*
V	Test II (CDM+STZ)	500mg	55.87 ± 3.0**

a- Group II is compared with group I values, b-Group III, IV and V are compared with Group II. **P<0.01 *-P<0.05

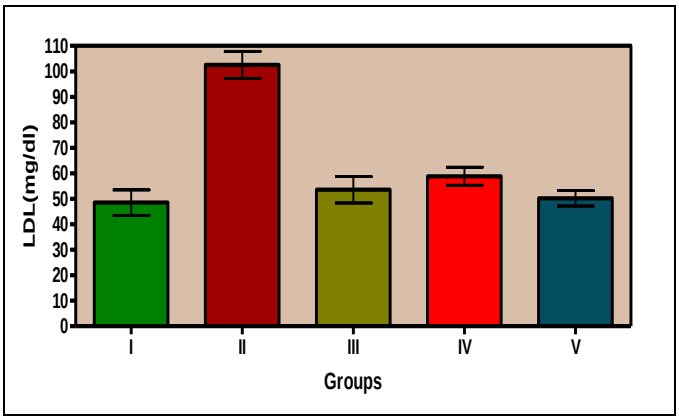

FIG. 5: EFFECT OF CDM ROOT EXTRACT ON LDL-CHOLESTEROL IN STZ INDUCED DIABETIC RATS

Serum triglycerides: The serum triglyceride level was significantly (p<0.01) increased in diabetic rats when compared to control rats. And the diabetic animals treated with methanolic extract of CD (250 and 500 mg/kg b.w/p.o) showed significant (p<0.05) and (p<0.01) decrease in serum triglyceride level respectively when compared to diabetic animals. However, Treatment with glibenclamide (0.4mg/kg b.w/p.o) produced a significant decrease in serum triglyceride when compared with diabetic rats (p<0.01) (**Table 7, fig. 6**).

TABLE 7: EFFECT OF CDM ROOT EXTRACT ON TRIGLYCERIDES IN STZ INDUCED DIABETIC RATS

Group	Treatment	Dose (Kg^{-1} Body Weight)	Triglycerides (mg/dl)
I	Control (0.5% SCMC)	5 ml	142.0 ± 3.5
II	Disease control (STZ)	45mg	188.0 ± 3.9**
III	Standard (Glibenclamide+STZ)	0.4mg	152.0 ± 2.9**
IV	Test I (CDM+STZ)	250mg	168.6 ± 3.2*
V	Test II (CDM+STZ)	500mg	150.6 ± 3.0**

a- Group II is compared with group I values, b-Group III, IV and V are compared with Group II. **P<0.01 *-p<0.05

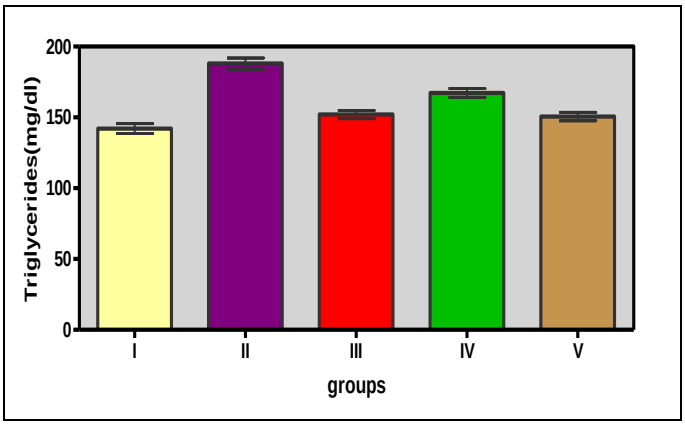

FIG. 6: EFFECT OF CDM ROOT EXTRACT ON TRIGLYCERIDES IN STZ INDUCED DIABETIC RATS

Serum HDL- cholesterol: The serum HDL-cholesterol level was significantly (p<0.01) decreased in diabetic rats when compared to control rats. And the diabetic animals treated with methanolic extract of CD (250 and 500 mg/kg b.w/p.o) showed significant (p<0.05) and (p<0.01) increase in HDL-cholesterol level respectively when compared to diabetic animals. However, Treatment with glibenclamide (0.4mg/kg b.w/p.o) produced a significant increase in HDL- cholesterol when compared with diabetic rats (p<0.01) (**Table 8, fig. 7**).

TABLE 8: EFFECT OF CDM ROOT EXTRACT ON HDL CHOLESTEROL IN STZ INDUCED DIABETIC RATS

Group	Treatment	Dose(Kg^{-1} Body Weight)	HDL-Cholesterol (mg/dl)
I	Control (0.5% SCMC)	5 ml	41.99 ± 2.6
II	Disease control (STZ)	45mg	27.37 ± 1.9**
III	Standard (Glibenclamide+STZ)	0.4mg	36.75 ± 3.0*
IV	Test I (CDM+STZ)	250mg	33.74 ± 3.3*
V	Test II (CDM+STZ)	500mg	38.03 ± 2.4**

a- Group II is compared with group I values, b-Group III, IV and V are compared with Group II. **P<0.01 *-p<0.05

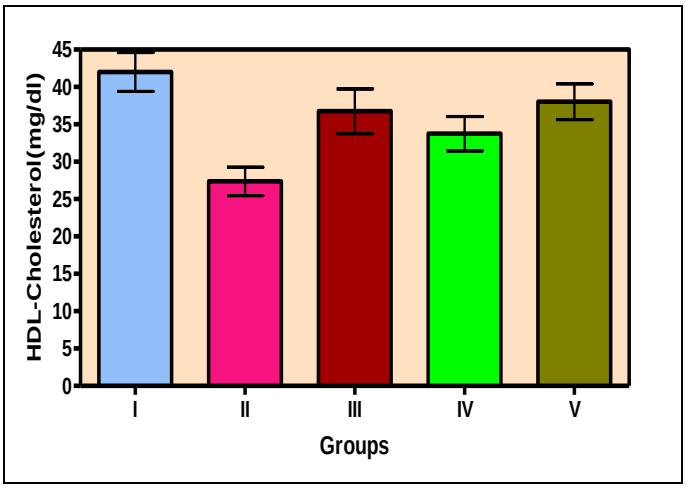

FIG. 7: EFFECT OF CDM ROOT EXTRACT ON HDL CHOLESTEROL IN STZ INDUCED DIABETIC RATS

Histopathological studies:

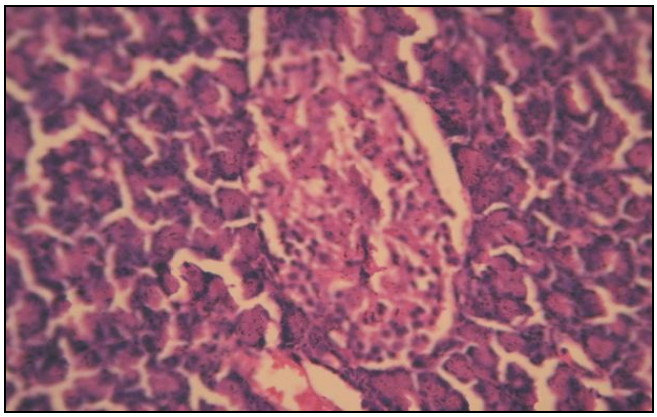

FIG.1: (NORMAL CONTROL) 400X

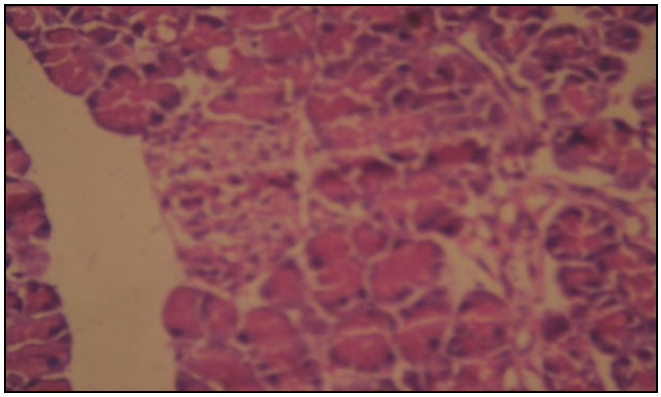

FIG.2: (DIABETIC CONTROL) 400X

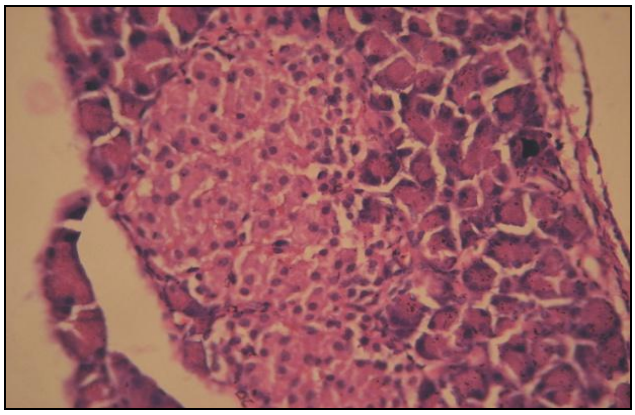

FIG.3: (GLIBENCLAMIDE TREATED) 400X

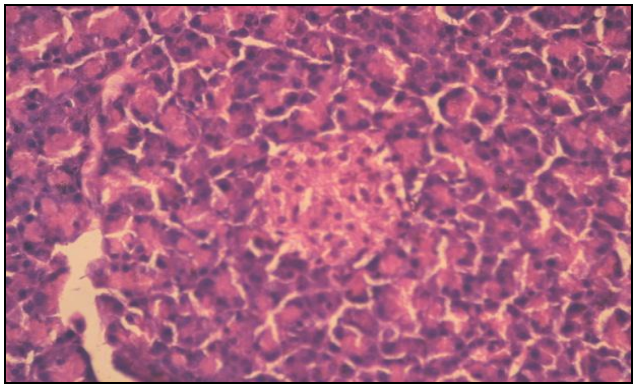

FIG.4: (CDM 250 MG TREATED) 400X

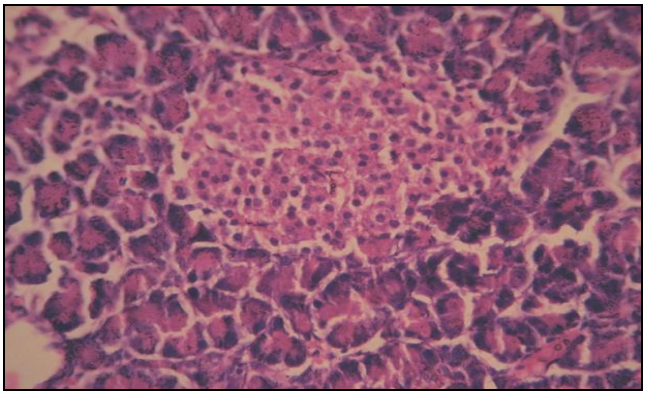

FIG.5: (CDM 500 MG TREATED) 400X

DISCUSSION: The finding of this study indicates that the methanolic extract of *Caesalpinia digyna* root had a significant anti-hyperglycaemic effect in the streptozotocin induced diabetic rats. Preliminary phytochemical analysis of the CDM extract of root showed that the plant has a rich possession of phytochemicals like alkaloids,

reducing sugars, tannins and phenols. Terpenoids, steroids, gums and mucilage were absent in the extracts. Acute oral toxicity studies reveal that CDM root extract did not produce any mortality or signs of toxicity at the dose of 2000 mg/kg b.w. p.o, in experimental rats.

The CDM roots extract at doses 250 and 500 mg/kg b.w./p.o. Showed significant improvement in glucose tolerance in glucose fed hyperglycaemic normal rats. Such an effect may be accounted for, in part, by a decrease in rate of intestinal glucose absorption, achieved by an extra pancreatic action including stimulation of peripheral glucose utilization or enhancing glycolytic and glycogenic process.

In the sub-acute study, glibenclamide treatment brought down the sugar levels from the first day of the treatment. CDM 250 mg and 500mg treatment produces significant reduction in blood glucose levels from 10th of treatment and a steady decrease was observed there after. Another possibility for the activity may be due to presence of phytochemicals like flavonoids, phenolics and alkaloids etc [25]. Histopathological studies that showed prominent islets cell hyperplasia and regeneration of islet cell show a proof for the possible antidiabetic property of the root extract of *caesalpinia digyna*.

Increased non-enzymatic and auto-oxidative glycosylation is one of the possible mechanisms linking hyperglycaemia and vascular complications of diabetes. In the present study diabetic rats had shown higher levels of HbA1 compared to those in normal rats indicating their poor glycaemic control. Treatment with CDM, showed a significant decrease in HbA1 levels in diabetic rats. This property provides a practical and objective means of assessing average blood glucose levels over a time frame of about 2 months and has proven to be a very useful adjunct to serum blood glucose level [26]. Lipids play an important role in the pathogenesis of diabetes mellitus. The level of serum lipids is usually raised in diabetic condition and such an elevation poses to be a risk factor for cardiovascular diseases like coronary heart disease and two to four fold risk for Atherosclerosis which constitutes the main cause of morbidity and mortality in diabetes mellitus [27]. In the present study elevated serum total cholesterol and reduced HDL-cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol, creatinine was observed in STZ-induced diabetic rats. The glibenclamide treatment, CDM 250mg and CDM 500mg treatment in diabetic animals produced beneficial improvement in the lipid profile.

CONCLUSION: From this study we can conclusively state that *Caesalpinia digyna* methanolic extract has shown remarkable effects on blood glucose level and marked improvement on hyperlipidemia due to diabetes. Its specific effect on HDL has additional advantage in checking coronary risks. The extract seems to have no toxicity as no death is reported upto 10 times of the effective dose. Further pharmacological and biochemical investigations are underway to elucidate the mechanism of the antidiabetic and hypolipidemic effect in *Caesalpinia digyna*.

ACKNOWLEDGEMENT: Authors are very much thankful to Department of Pharmacology, C. L. Baid Metha College of Pharmacy, Chennai, India, for providing financial assistance and for the encouragement throughout the present study.

REFERENCES:

1. Kumar GP, Kumar SD, Subremanian PS: Anti-diabetic activity of fruits of *Terminalia Chebula* on streptozotocin induced diabetic rats. J Health Sci 2006, 52:283-91.
2. Ghosh R, Sharatchandra KH, Rita S, Thokchom IS: Hypoglycemic activity of Ficus hispida (bark) in normal and diabetic albino rats. Indian J Pharmacol 2004, 36:222-5.

3. Bhupesh Chander Semwal, Jitendra Gupta, Sonia Singh: Antihyperglycemic activity of root of *Berberis aristata* D.C. in alloxan-induced diabetic rats. International J of green pharmacy 2009, 3: 259-262.
4. Momin A, Role of indigenous medicine in primary health care, in proceedings of first International seminar on Unani medicine, New Delhi, India, 1987, 54.
5. Shukla R, Sharma S B, Puri D, Prabhu K M, Murthy P S, Medicinal plants for treatment of diabetes mellitus, Indian J clin Biochem 2000, 15: 169.
6. Kaleem M, Kirmani D, Asif M, Ahmed Q, Bilqees Bano, Biochemical effects of *Nigella sativa* L. seeds in diabetic rats 2006, Indian J of Exp Biology 44: 745-748.
7. Anon, the wealth of India, 3rd Edition, CSIR, New Delhi, India, 12-13.
8. PankajO,Caesalpiniadigynahttp:/www.Medicinalherbs.com /public/trees/chattisgarh/html
9. Kokate Ck, Practical Pharmacognosy, 1991, 5th Edition, Vallabh Prakashan, Delhi,107-121
10. Ghosh M N., Fundamentals of experimental pharmacology, Scientific Book Agency 1984, Calcutta, p. 153.
11. Turner, M.A., screening methods in pharmacology 1965, Academic Press, New York, p. 26.
12. Bonner-Weir, S., Morphological evidence of pancreatic polarity of beta cells within islets of Langerhans 1988, Diabetes 37: 616-621.
13. Latha M, Pari L, Sandhya S, Ramesh B, Insulin secretagogue activity and cytoprotective role of the traditional antidiabetic plant *Scoparia dulcis*, Life sciences, 2004;75:2007-2014.
14. Somani R, Sanjay K, Singhai AK, Antidiabetic potential of *Butea monosperma*, in rats, Fitoterapia, 2006;77:80-90.
15. Mustafa A, Didem D, Orhan N. *In vivo* antidiabetic and antioxidant potential of *Helichrysum plicatum* ssp. *plicatum capitulums* in streptozotocin-induced-diabetic rats, Journal of Ethanopharmacology, 2007; 109:54-59.
16. Annie S, Rajendran K, Rakesh B, Effect of aqueous bark extract of *Garuga pinnata* Roxb. In streptozotocin nicotinamide induced type-II diabetic mellitus, Journal of Ethanopharmacology, 2006; 107:285-290.
17. Santosh kumar Singh, Achyut Narayan Kesari, Rajesh Kumar Gupta, Geeta Watal, Antidiabetic potential of *Cynodon dactylon* extract in streptozotocin induced diabetic rats, Journal of Ethanopharmacology, 2007; 114: 174-179.
18. Bergymeyer, H.U., Benut, E., 1963. Colorimetric methods with glucose oxidase and peroxidase. In: Kunst, A., Draeger, B., Ziegenhorn, J., Bergymeyer, H. (Eds.), Methods of Enzymatic Analysis, Verlag Chemie GMBH Welhheim Berostr, 3rd ed. Academic Press, New York, pp. 179–185.
19. Burstein, M., Scholnick, H.R., Morfui, R.J. Rapid method for the isolation of lipoproteins from human serum by precipitation. Journal of Lipid Research 1970: 2: 583.
20. Zlatkis, A., Zak, B., Boyle, A.J. A new method for the direct determination of serum cholesterol. Journal of Laboratory and Clinical Medicine 1953: 41: 486–492.
21. Friedwald, J., Levy, Y R Friedrickson S D, Estimation of concentration of low density lipoprotein cholesterol in plasma without use of preparative ultracentrifuge, Clinical chemistry 1972: 18: 499-502.
22. Jouad H, Eddouks M, Lacaille-Dubois M A, Lyoussi B. Hypoglycaemic effect of *Spergularia purpurea* in normal and streptozotocin-induced diabetic rats. Journal of Ethnopharmacology, 2000:71: 169–177.
23. Hassan Jouad, Mohamed Maghrani, Mohamed Eddouks. Hypoglycaemic effect of *Rubus fructicosis* L. and Globularia alypum L. in normal and streptozotocin-induced Diabetic rats. Journal of Ethnopharmacology 2002:81: 351-/356.
24. Maiti R, Jana D, Das U K, Gosh D. Antidiabetic effect of aqueous extract of seed *Tarmarindus indica* in streptozotocin-induced diabetic rats. Journal of Ethnopharmacology, 2002: 92:85-91.
25. Kameswararao B, Kesavalu MM, Apparao C, Evaluation of antidiabetic effect of *Momordica cymbalaria* fruit in alloxan diabetic rats, 2003; 74:7-13.
26. Ronald k, George K, Allas N, Elisiver Publication, 14th Edition, 12.
27. Al- shamaony, Shabba M, Hypoglycemic effect of arteminissia herba aba, Journal of Ethanopharmacology, 1994; 2:167-171.

****