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Research

EVALUATION OF ANTI HYPERLIPEDIMIC ACTIVITY OF *DESMOSTACHYA BIPPINNATA* EXTRACT IN EXPERIMENTAL ANIMAL MODEL

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Abstract

To investigate the anti diabetic and anti Hyperlipidemic activity of methanol extract of ***Desmostachya Bippinnata*** in male Wistar rats.

Material & method: - In this model of Hyperlipidemia,30 adult male wistar rats (150-200gms) were evenly divided into 5 groups in both groups. Group-1 and Group-2 served as untreated and model controls respectively, while Group-3, 4 and 5 were the treatments groups which were simultaneously treated with standard, 200 and 400 mg/kg extract respectively along with High Fat Diet and Triton x 100. On last day, blood samples for biochemical parameters, were obtained under inhaled diether anaesthesia.

In the model of anti diabetic animals were evenly divided into 5 groups

Group-1 and Group-2 served as untreated and model controls respectively, while Group-3, 4 and 5 were the treatments groups which were simultaneously treated with standard, 200 and 400 mg/kg extract respectively after glucose loading

Keywords: Desmostachya Bippinnata, Hyperlipidemia.

INTRODUCTION

Hyperlipidemia is a condition when abnormally high levels of lipids i.e.the fatty substance are found in the blood.This condition is also called hypercholesterolemia/hyperlipoproteinemia[1]. Human body is complex machinery and for maintaining the homeostasis of various organ and organ system.Any undesirable change will disturb the balance resulting in diseased state[2]. Lipids are fats in the blood stream,commonly divided into cholesterol and triglycerides. Cholesterol circulates in the bloodstream and is involved in the structure and function of cells.Triglycerides(TG) are best viewed as energy that is either used immediately or stored in fat cells.TG are manufactured in the liver from the foods or by being absorbed from the intestine[3]. Virchow in 19thcentury who identified cholesterol crystals in atherosclerotic lesion and stated that endothelial cell injury initiates atherogenesis2. In a modification of this hypothesis it was proposed that the endothelium normally

influences the behaviour of arterial smooth muscle cells by providing a barrier to the passage of plasma proteins,and that the major effect of haemodynamic or other factors that injure endothelium is to reduce the effectiveness of the barrier[4].Arteries are normally smooth and unobstructed on the inside, but in case of increased lipid level, a sticky substance called plaque is formed inside the walls of arteries. This leads to reduced blood flow, leading to stiffening and narrowing of the arteries. It has been proved that elevated plasma levels of cholesterol and of LDL are responsible for atherosclerosis in man, and epidemiological data suggests that elevated plasma levels of HDL have a protective effect[5].

Classification Of Lipid Concentrations

The cholesterol along with some other types of fats cannot be dissolved in the blood. Moreover, in order to be transported to and from cells, they have to be specially carried by certain molecules called lipoproteins, which consist of an outer layer of protein with an inner core of cholesterol and triglycerides [6,7]. In addition, the lipoproteins have been found essential for cholesterol to move around the body. The lipids can be classified as TC, triglycerides, LDL, HDL and very low density lipoprotein (VLDL) cholesterol.

Total cholesterol

According to guidelines of National Cholesterol Education Program (NCEP), TC concentrations below 200 mg/dL have been regarded as desirable, whereas, concentrations greater than 240 mg/dL are referred to as hyperlipidemic. However, epidemiological evidence suggests that the risk of cardiac events decreases as TC levels fall approximately to 150 mg/dL. Moreover, TC should be less than 180 mg/dL for children [8,9].

Triglyceride

Triglycerides are another type of fat that is carried in the blood by VLDL. The excess calories, alcohol or sugar in the body get converted into triglycerides and stored in fat cells throughout the body.The triglyceride concentration less than 150 mg/dL is regarded as normal, wheras, concentrations of 200-499 mg/dL are considered as high. Moreover, concentrations of 500 mg/dL or higher are considered dangerous for the development and progression of various CVDs [10].

LDL cholesterol

LDL is commonly known as the bad cholesterol, which is produced by the liver and carry cholesterol and other lipids from the liver to different areas of the body like muscles, tissues, organs and heart. The high levels of LDL indicate much more cholesterol in the blood stream than necessary and hence, increase the risk of heart disease [11].According to NCEP guidelines, LDL cholesterol concentrations below 100mg/dL are considered optimal, whereas concentrations in the range of 160-189 mg/dL are considered to the higher side.However, increasing evidence supports that normal human LDL cholesterol concentration can be as low as 50 to 70 mg/dL.Moreover, it has been comprehensively seen that the risk of CVDs decreases as LDL cholesterol concentration decreases.

HDL cholesterol

HDL is commonly referred to as the good cholesterol, which is produced by the liver to carry cholesterol and other lipids from tissues back to the liver for degradation [12].High levels of HDL cholesterol have been considered as a good indicator of a healthy heart. The concentrations of 60 mg/dL or higher have been considered as optimal, whereas, HDL concentrations below 40 mg/dL are considered as major risk factor for CVDs. However, HDL is often interpreted in the context of TC and LDL concentrations, and hence may be regarded as less significant when LDL is low.

VLDL Cholesterol

VLDL is similar to LDL cholesterol in the sense that it contains mostly fat and not much protein. VLDL cholesterol is the lipoproteins that carry cholesterol from the liver to organs and tissues in the body. They are formed by a combination of cholesterol and triglycerides. Moreover, VLDLs are heavier than LDL, and are also associated with atherosclerosis and heart disease[13]

MATERIALS AND METHODS:

I. PLAT MATERIAL:

The leaves of plant Desmostachya Bippinnata was collected from hilly region of chittoor district, Tirupathi, A.P, India. The plant was authenticated by Dr. K. Madhav Chetty, Asst. Professor, Dept. of Botany, Sri Venkateshwara University, Tirupathi.

II. EXPERIMENTAL ANIMALS:

Male Wistar rats weighing (180-220g) were provided by animal house of Sigma Institute of Clinical Research and Administration (SICRA Labs), Kukatpally, Hyderabad, India. They were housed in ventilated rooms at a temperature of 24±2ºc with a 12h light/dark cycle and 54±5% relative humidity, maintained on standard pellet and water ad libitum throughout the experimental period. The animals were acclimatized for a period of one week. The experiments were carried out according to the guidelines of the committee for the purpose of control and supervision of experiments on animals (CPCSEA), New Delhi, India and approved by the Institutional Animal Ethical Committee(IAEC) of Sigma Institute of Clinical Research and Administration pvt.ltd. Hyderabad.

III. DRUGS AND CHEMICALS:

Desmostachya Bippinnata, all other chemicals and diagnostic kits were provided by Sigma Institute of Clinical Research and Administration.

IV. PREPARATION OF EXTRACT:

The collected plant was shade dried for 4 weeks and was ground to course powder using mixer grinder. The powdered plant material leaf (250gm) was extracted with methanol, by Maceration process[93]. Finally extracts were air dried at room temperature. 10.2% and 7.2% w/w extract thus obtained was subjected for evaluation of Hypoglycemic activity in alloxan induced diabetic rats. The test samples of extracts were made in appropriate concentrations using distilled water prior to its use for animal studies.

V. PHYTOCHEMICAL SCREENING:

Preliminary phytochemical investigation was carried out on Methanol extract of Desmostachya Bippinnata leaf for detection of various phytochemicals by standard methods[90]

VI. DETERMINATION OF ACUTE ORAL TOXICITY:

Acute toxicity studies were performed according to OECD-423 guidelines category IV substance (acute toxic class method). Albino rats (n=3) of either sex selected by random sampling technique were employed in this study. The animals were fasted for 4 hrs with free access to water only. The plant extracts of ***Desmostachya Bippinnata*** were administered orally with maximum dose of 2000 mg/kg body weight. The mortality was observed for three days. If mortality was observed in 2/3 or 3/3 of animals, then the dose administered was considered as a toxic dose.

RESULTS AND DISCUSSIONS

Table 8. Preliminary phytochemical screening of *Desmostachya Bippinnata* extract:

SLNO.	TEST	RESULT
1.	**ALKALOIDAL TEST**	
	a.Dragondroffs test	Positive
	b.Mayer's test	Positive
	c.Wagner's test	Positive
	d. Hager's test	Positive
2.	**CARBOHYDRATES TEST**	
	a.Molish's test	Positive
	b.Fehling's test	Positive
	c.Benedict's test	Positive
	d. Baeford's test	Positive
3.	**STEROIDS TEST**	

	a.LibermannBuchard test b. Salwoski test	Positive Positive
4.	**GLYCOSIDES TEST** a.Legal test b.Baljet test c.Killerkilaini test d. Borntagers test	 Positive Positive Positive Positive
5.	**SAPONINS TEST** a.Foam test	Positive
6.	**FLAVONOIDS TEST** a.Shinoda test	Positive
7.	**TRITERPINOIDAL TEST**	Negative
8.	**PHENOLICS & TANNINS TEST** a.Ferric chloride test b.Gelatin test c.Lead acetate test	 Negative Negative Negative
9.	**PROTIEN& AMINOACIDS TEST** a.Buret's test b.Ninhydrin test c.Xanthoprotic test	 Positive Positive Positive
10.	**FIXED OIL TEST** a.Spot test	 Positive
11.	**RESIN TEST** a.Acetic anhydride test	 Positive

Table no 9: Percentage yield of crude extract of Barleria longiflora

Sl.No.	Solvent	Color and Consistency	Percentage yield
1	Ethanol Leaf	Dark brown sticky	10.2%

I. Determination of Acute Oral Toxicity of EBG:

The plant leaf extract of Desmostachya Bippinnata didn't shown any mortality and toxicity even at highest dose of 2000 mg/kg body weight employed. The present research study was carried out using dose (400mg/kg body weight) for Hypoglycemic activity

Table no 10: Toxicity record sheet: The toxicity record sheet is as follows:

S.no.	Code	Toxicity		Time Of Dea	Observation										
		Onset	Stop		Skin colour	Eyes	Resp	CNS	Tre	Con	Sali	Diah	Sleep	Leth	
1.	MBG	x	X	x	x	X	x	X	x	x	x	x	X	x	

(TRE-Tremor, CON-Convulsions, SALI- Salivation, Diah - Diarrhea, LET-Lethargy)

× = Negetive Ø = Positive

OGTT on Diabetic rats:

The effect of methanol extract of Desmostachya Bippinnata on glucose tolerance test in Diabetic fasted rats are shown in Table No.

methanol extract of Desmostachya Bippinnata leaf (400 mg/kg) significantly decreased blood glucose level in glucose fed rats at 90 minutes when compared with the control group. It also decreased the elevated blood glucose at 60 minutes after the glucose administration. methanol extract of The control group showed significant increase in blood glucose level when compared with the normal group.

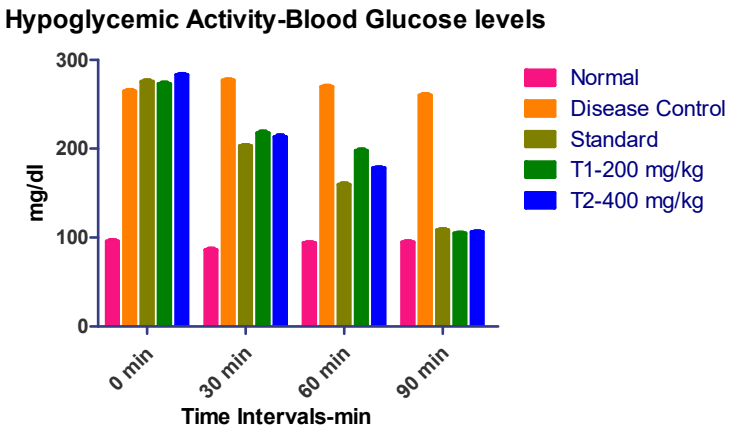
Metformin showed it's potent anti-diabetic activity at 90 minutes. Also the reduction in elevated blood glucose level at 30 and 60 minutes after the administration of glucose was significant when compared to the control group.

These data suggested that treatment with methanol extract of Desmostachya Bippinnata leaf showed better tolerance to exogenously administered glucose.

Table no 11 : Effect of methanol extract of Desmostachya Bippinnata leaf on oral glucose tolerance Test

GROUPS	Blood glucose level mg/dl			
	0 min	30 min	60 min	90 min
Normal	95.69 ± 1.51	85.95 ± 1.37	93.83 ± 0.94	94.51 ± 0.99
Control (ALX 120mg/kg)	264.84 ± 1.26[a]	277.01 ± 1.19[a]	269.86 ± 1.01[a]	260.18 ± 1.12[a]
Standard (MET 150mg/kg)	275.45 ± 1.52	203.01 ± 1.39***	159.72 ± 1.05***	108.39 ± 1.04***
Desmostachya Bippinnata methanol (200mg/kg)	273.02 ± 1.43	217.67 ± 1.60***	197.94 ± 1.22***	104.64 ± 0.89***
Desmostachya Bippinnata methanol 400 mg/kg)	283.03 ± 1.21	213.49 ± 1.34***	178.02 ± 1.18***	106.15 ± 1.03***

All the values are expressed as Mean ± SEM, n=6, One way analysis of variance followed by multiple comparison Dunnet's test, *P< 0.05, **P<0.01 and ***P<0.001 as compared to control and [a]P<0.001, [b]P<0.01 and [c]P<0.001 when compared to normal group.



Graph No 1 Effect of methanol extract of Desmostachya Bippinnata leaf on oral glucose tolerance test

II. Evaluation of Anti Hyperlipidaemic activity of *Desmostachya Bippinnata* In Rats

MEAN AND S.E.M OF PARAMETERS OF THE ANIMALS:

Table 12 TRITON-X-100 INDUCED MODEL:

Triton x-100					
TEST	**NORMAL**	**CONTROL**	**STANDARD**	**T1**	**T2**
ALP	74.59±3.107	162.51±1.34***	125.78±1.52***	126.23±0.92***	78.2±1.423
GPT	35.26±1.275	65.80±1.413***	41.11±3.826	40.79±1.385***	35.71±1.671**
GOT	41.50±3.226	53.70±3.894*	41.68±2.426	42.35±2.310	46.32±2.075
TP	40.31±3.128	32.71±1.751***	19.56±2.321***	16.26±2.315***	22.89±1.483***
HDL	53.48±3.652***	23.82±1.516	41.69±3.971**	51.25±2.153	56.85±2.351
TG	51.12±2.128	81.76±1.621***	79.23±1.619***	81.2±2.210***	61.42±3.126***
TC	66.35±2.328	151.01±2.121***	68.05±1.451	98.52±1.612***	92.21±1.811***
VLDL	10.01±0.233	15.59±0.627***	13.85±0.352***	15.45±0.356***	13.30±1.464***
LDL	11.56±2.692	101.63±5.069***	10.63±3.114	33.83±4.159	21.98±2.700
AI	0.41±0.239	3.29±0.358	0.42±0.189	0.96±0.328	0.51±0.496
CRR	3.12±0.521	7.63±0.491	2.68±0.122	2.23±0.214	2.16±0.161

Table 13 Body Weight

TRITON X100	NORMAL	CONTROL	STANDARD	T1	T2
Before treatment	173.0±0.96	172.66±0.89	174.0±1.12	173.33±0.88	172.0±0.85
After treatment	183.5±0.76	243.0±0.96***	194.33±0.66***	224.33±0.88***	244.83±1.14***

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control

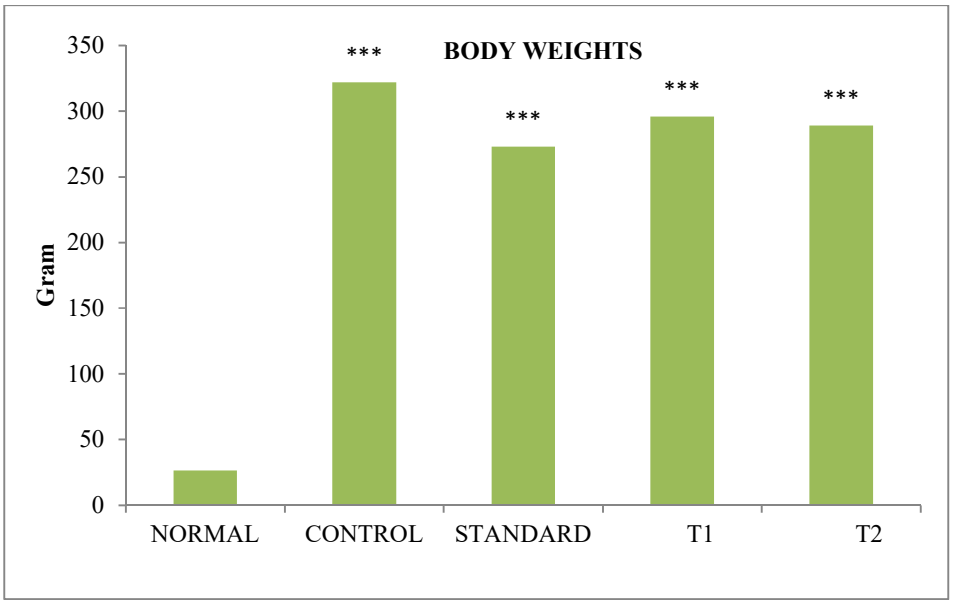
III. HFD DIET INDUCED MODEL

Table no 14: Biochemical Parameters of the Animals

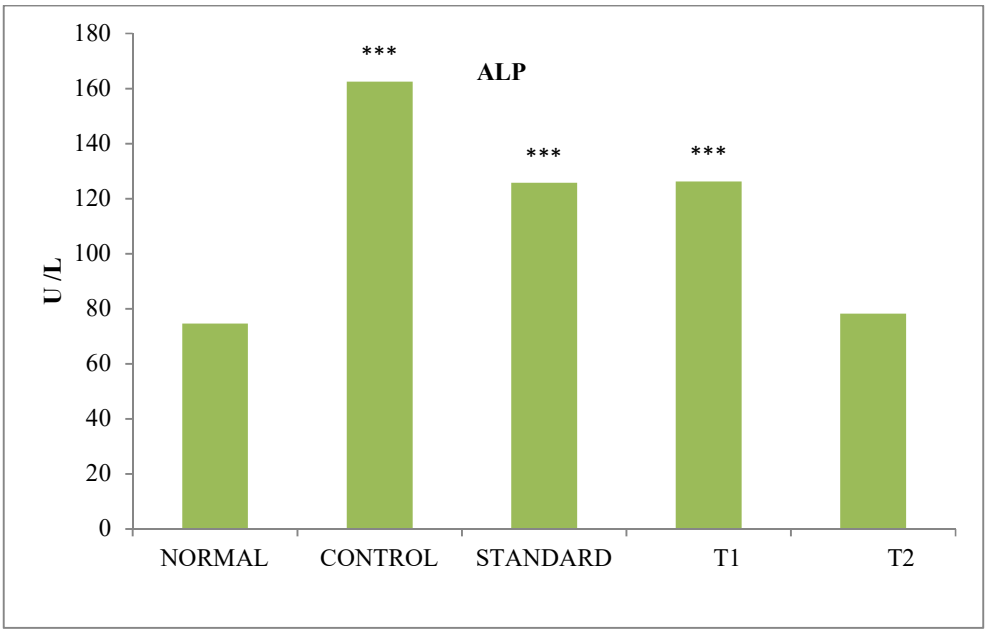
HFD diet	NORMAL	CONTROL	STANDARD	T1	T2
B.w B.T	231.28±0.1	213±1.06	218.59±2	238.7±0.43	231.12±0.61
B.w A.T	25.4±0.15	342.61±2.4***	251.29±0.5***	221.43±2.71***	269±2.75***
HDL	26.12±0.23	21.5±0.83**	33.19±0.54**	32.23±0.47**	36.87±0.10***
LDL	25.19±0.56	56.40±0.10***	35.85±0.26***	41.17±1.43***	26.28±1.69
VLDL	13.10±2.63	20.72±0.58***	14.38±0.59***	13.76±0.48	14.22±0.52
GLUCOSE	72.43±0.81	151.2±0.60***	107.1±0.75***	124.1±0.47***	108.1±0.70***
TC	64.02±0.51	102.0±0.19***	86.1±0.60***	81.25±2.55***	65.43±0.39
TG	52.05±1.15	92.01±0.24***	60.94±2.11***	71.55±2.46***	52.89±0.75
AI	1.41±0.574	3.67±0.529***	1.66±0.619	1.69±0.46	0.77±0.98***
CRR	2.21±0.218	3.57±0.529***	2.98±0.328	2.31±0.85	1.75±0.89***

TRITON-X-100 INDUCED HYPERLIDAEMIA MODEL:

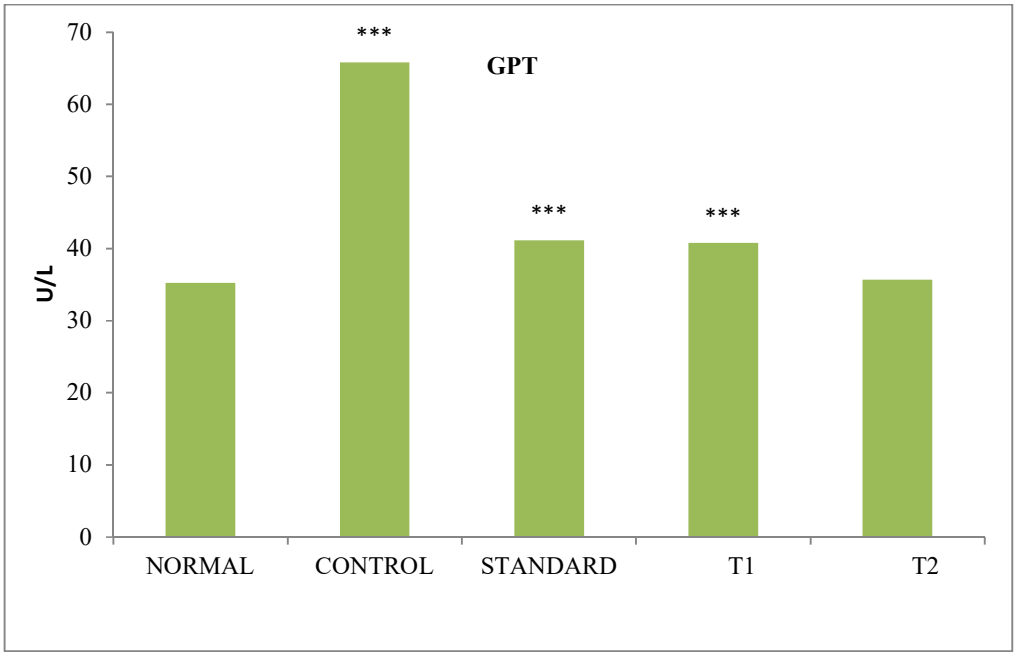
Graph 2 Histogram showing Initial BODY WEIGHT of animals
N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



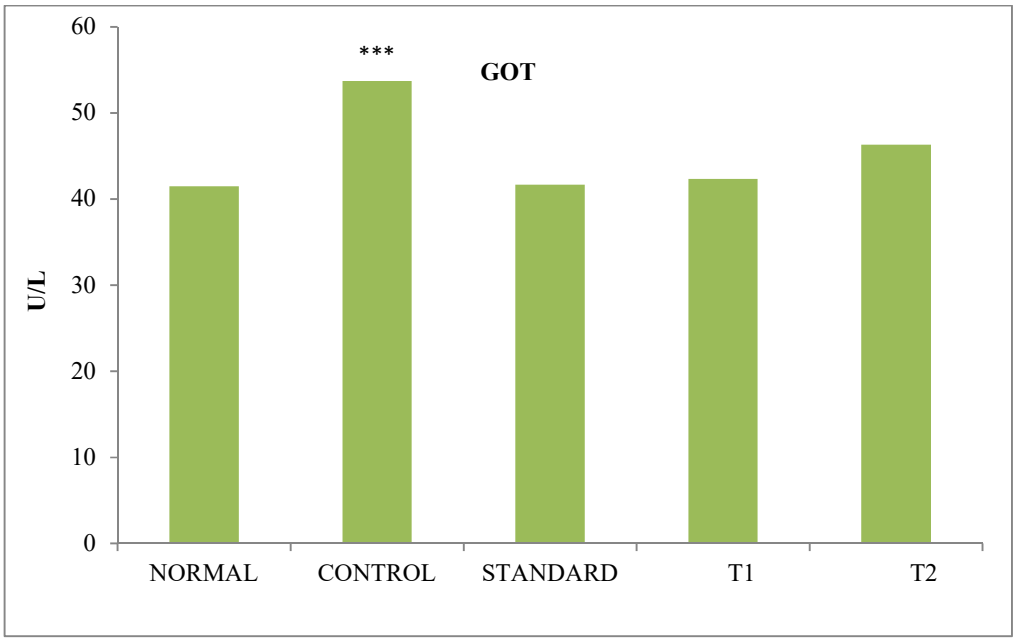
Graph 3 Histogram showing the effect of Desmostachya Bippinnata on BODY WEIGHT of animals
N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



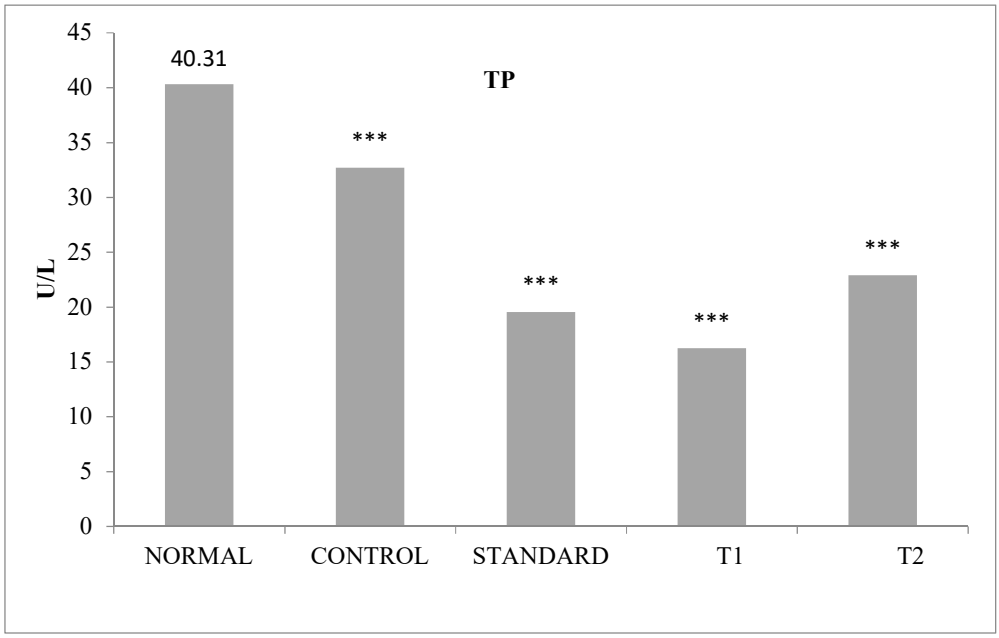
Graph 4 Histogram showing the effect of Desmostachya Bippinnata on ALP of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



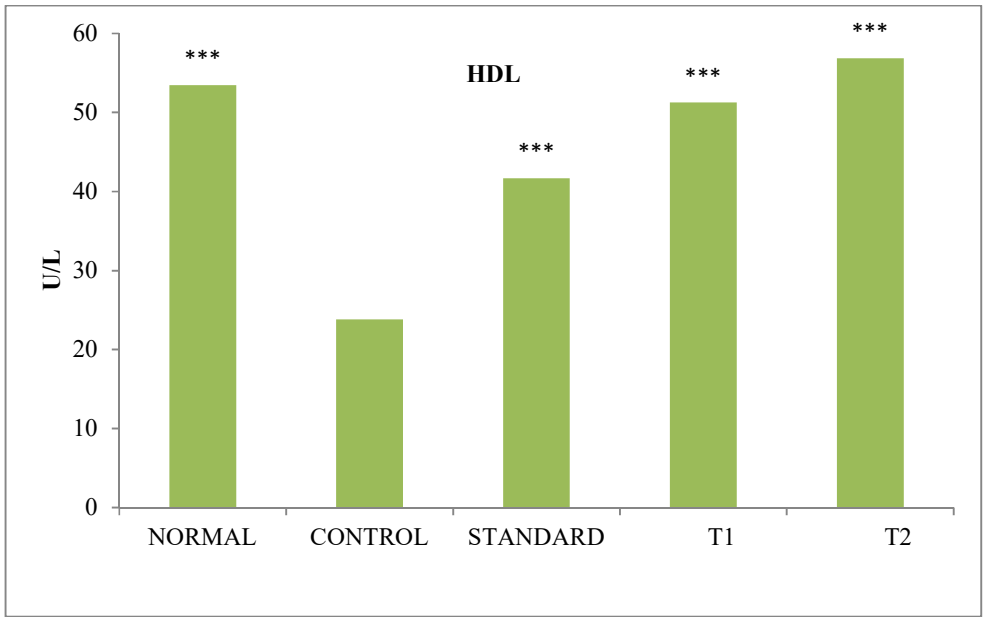
Graph 5 Histogram showing the effect of Desmostachya Bippinnata on SGPT of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



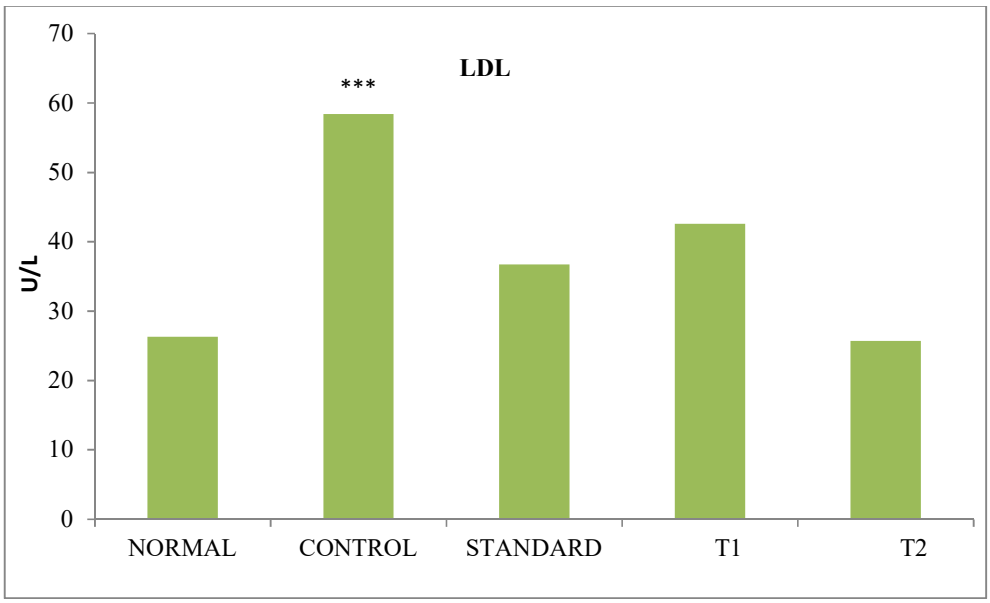
Graph 6 Histogram showing the effect of Desmostachya Bippinnata on SGOT of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



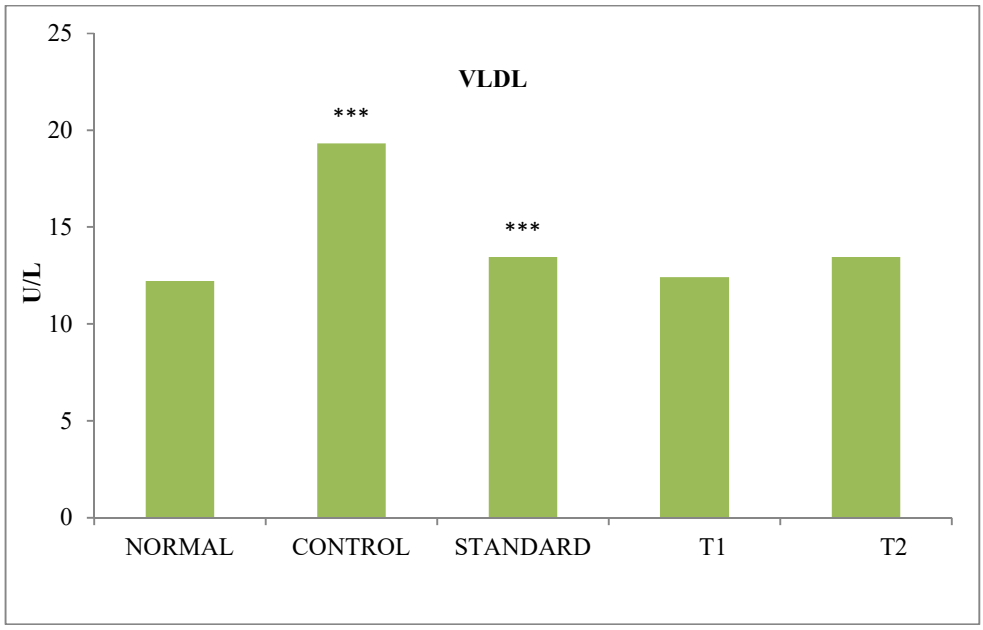
Graph 7 Histogram showing the effect of Desmostachya Bippinnata on Total protein of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



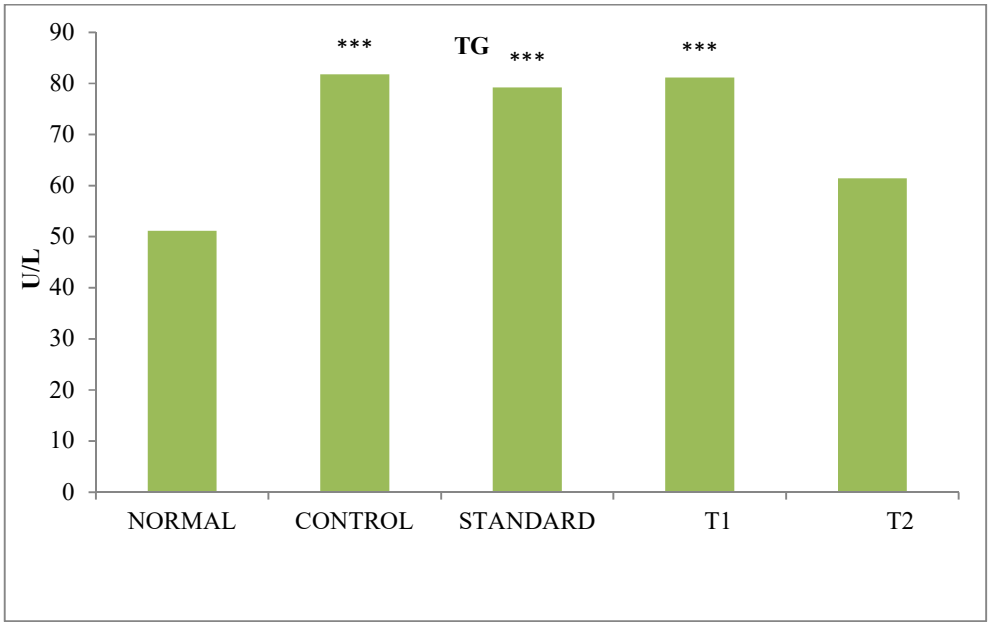
Graph 8 Histogram showing the effect of Desmostachya Bippinnata on HDL of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



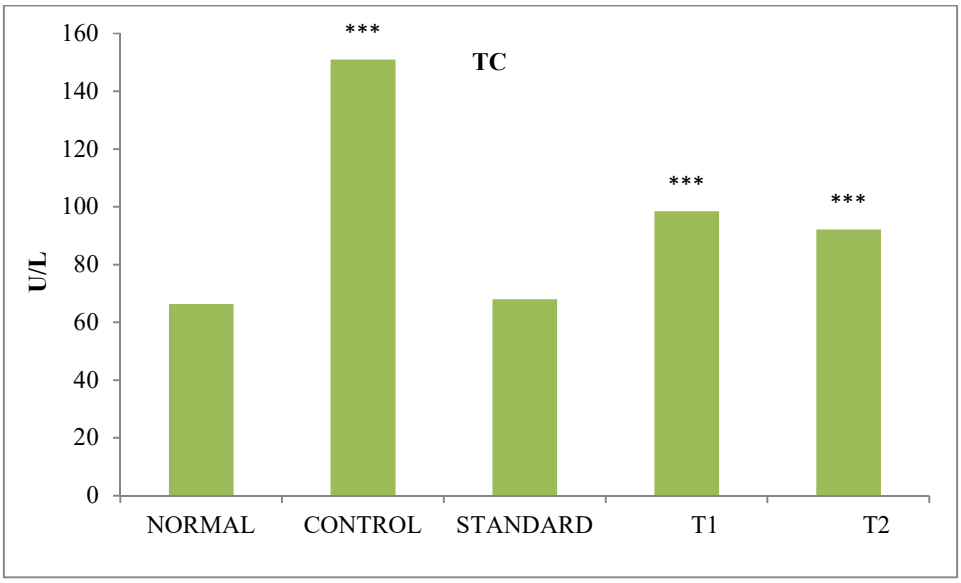
Graph 9 Histogram showing the effect of Desmostachya Bippinnata on LDL of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



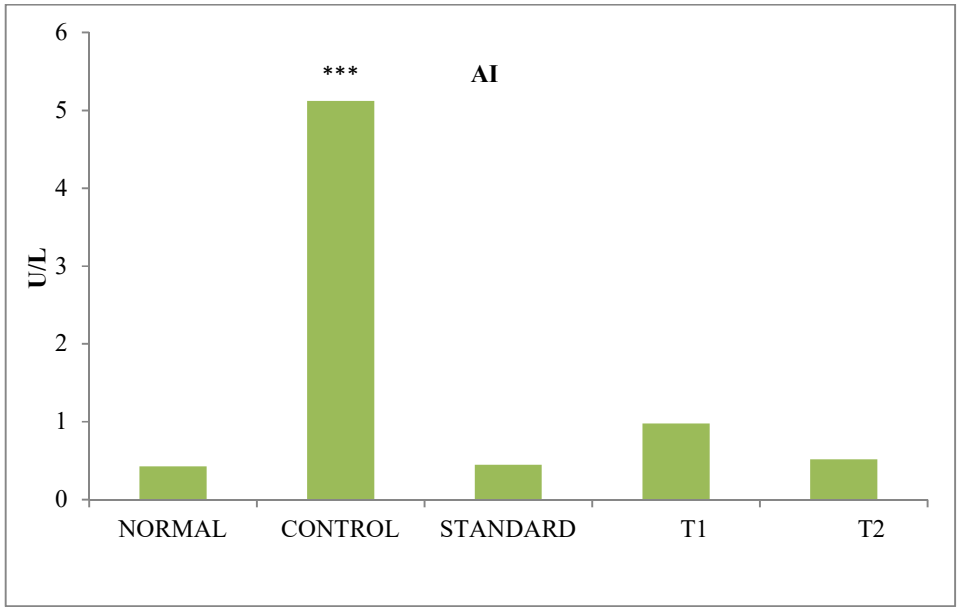
Graph 10 Histogram showing the effect of Desmostachya Bippinnata on VLDL of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



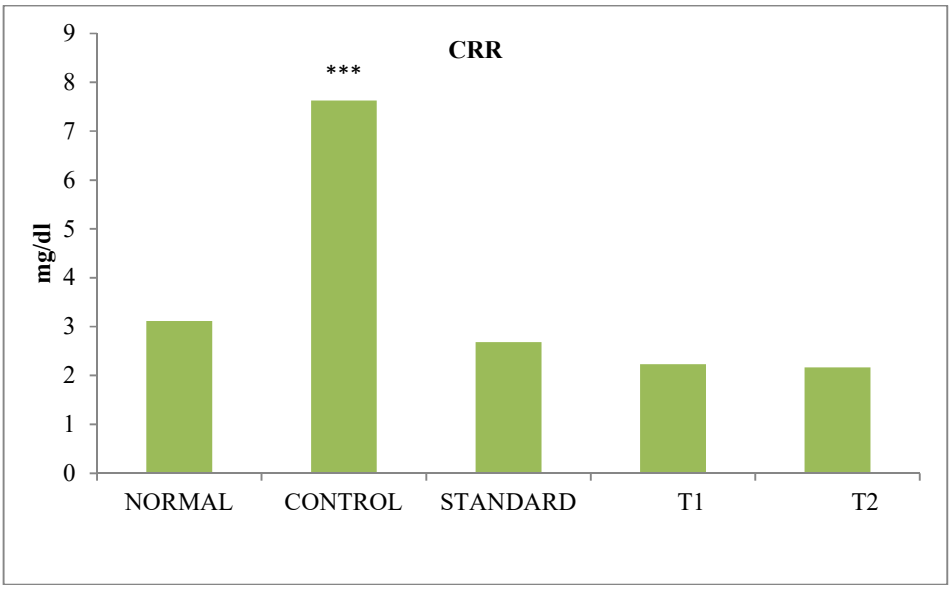
Graph 11 Histogram showing the effect of Desmostachya Bippinnata Triglycerides of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



Graph 12 Histogram showing the effect of Desmostachya Bippinnata on Total Cholesterol of animals
N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control

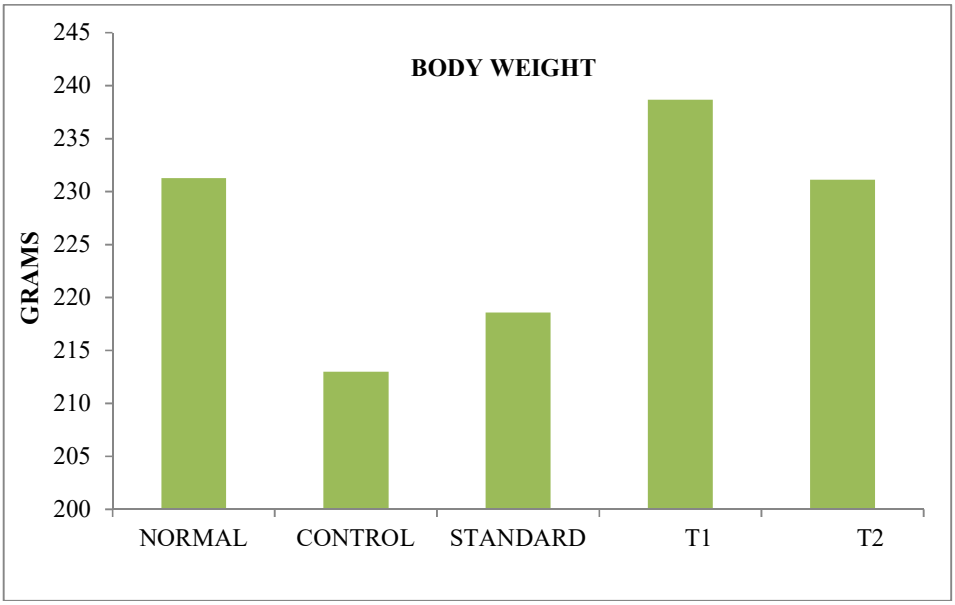


Graph 13 Histogram showing the effect of Desmostachya Bippinnata on Atherogenic Index of Animals



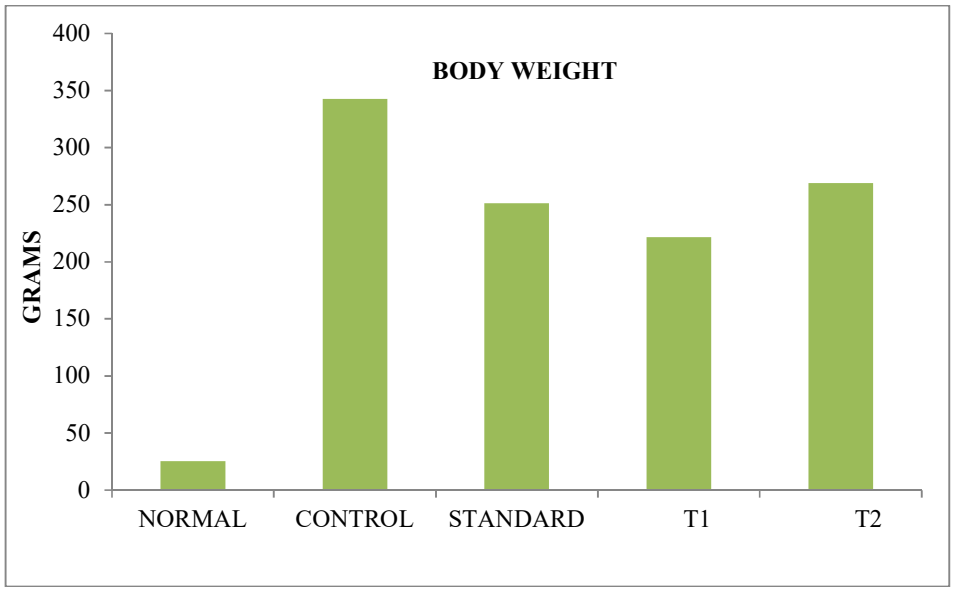
Graph 14 Histogram showing the effect of Desmostachya Bippinnata on Cardiac Risk Ratio of Animals

HIGH FAT DIET MODEL:



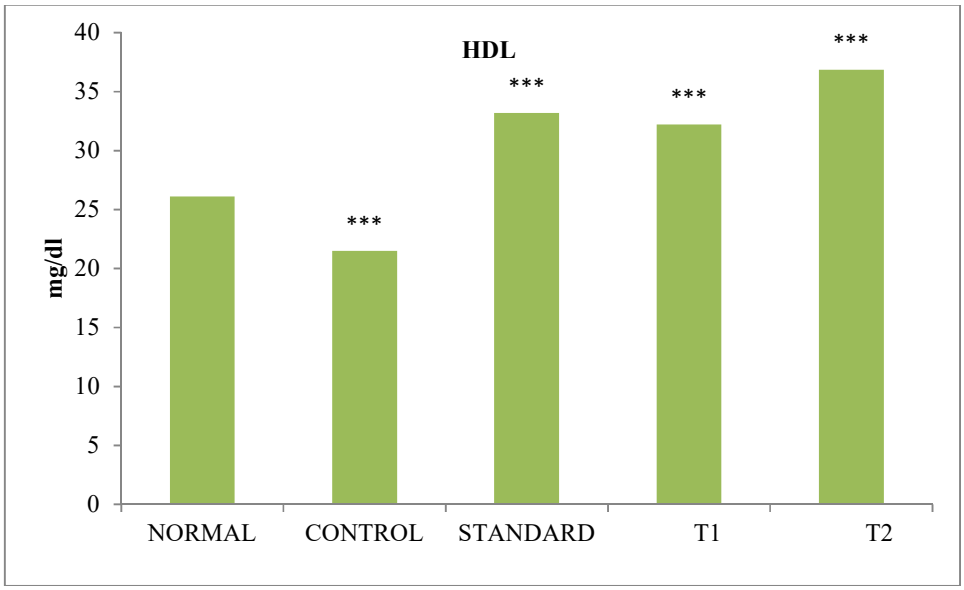
Graph 15 Histogram showing the Intial Body weight of animals

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



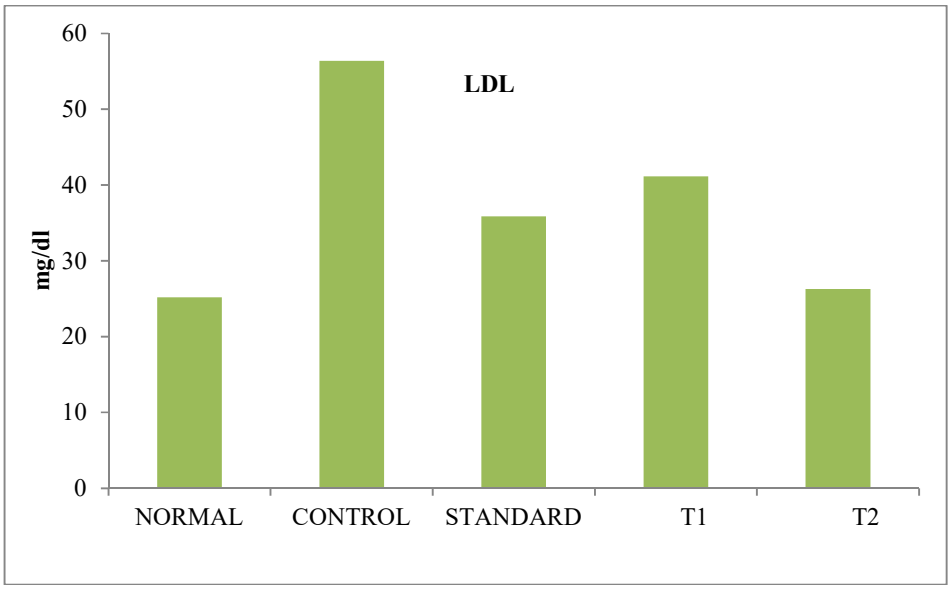
Graph 16 Histogram showing the effect of Desmostachya Bippinnata on Final Body weight of animals

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control

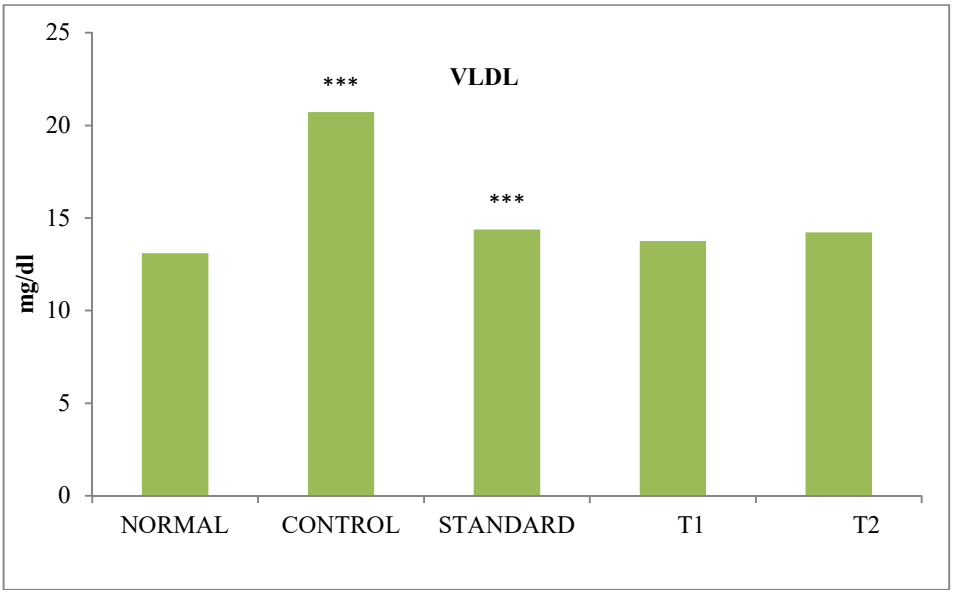


Graph 17 Histogram showing the effect of Desmostachya Bippinnata on HDL of animals

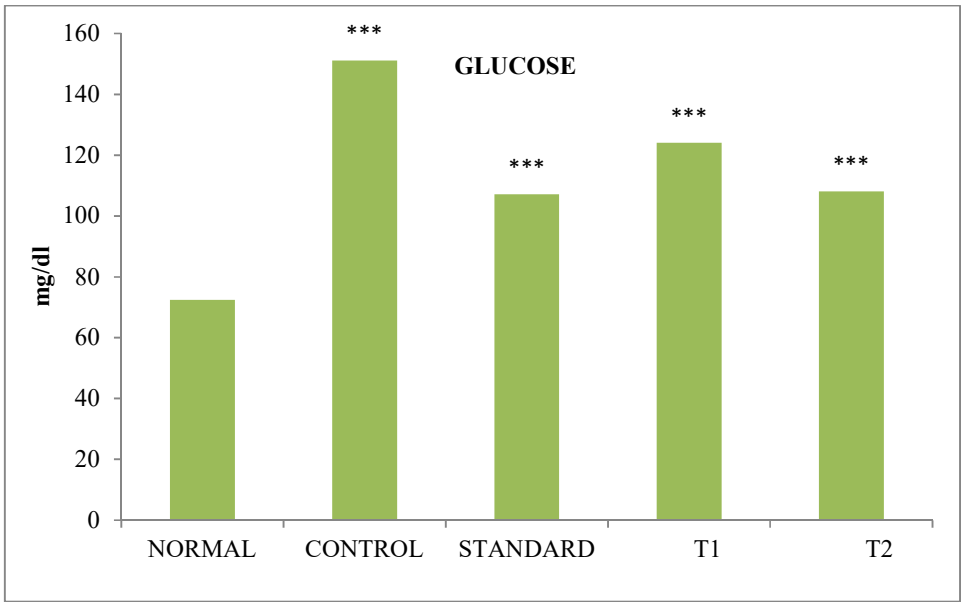
N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



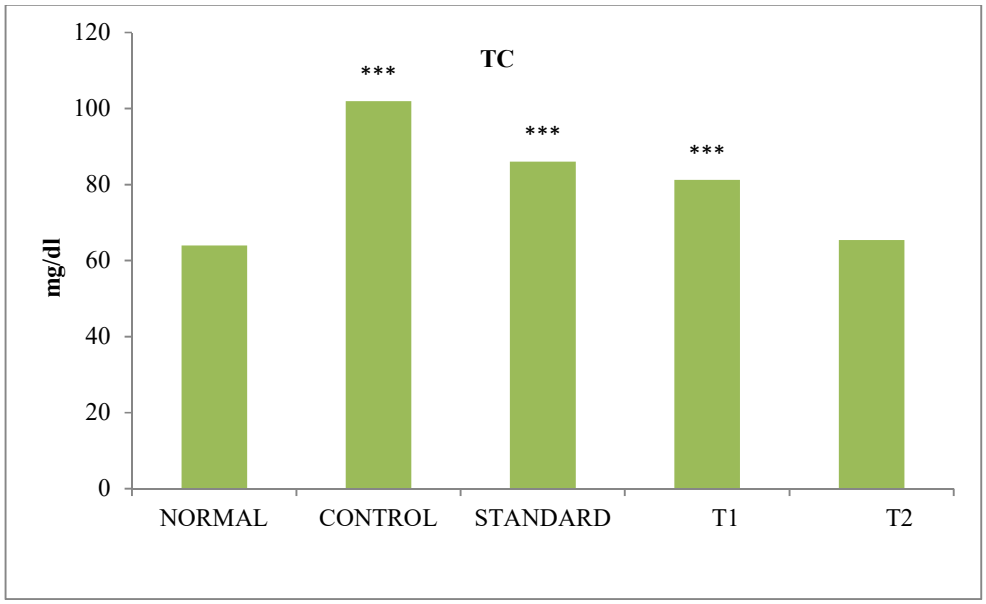
Graph 18 Histogram showing the effect of Desmostachya Bippinnata on LDL of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



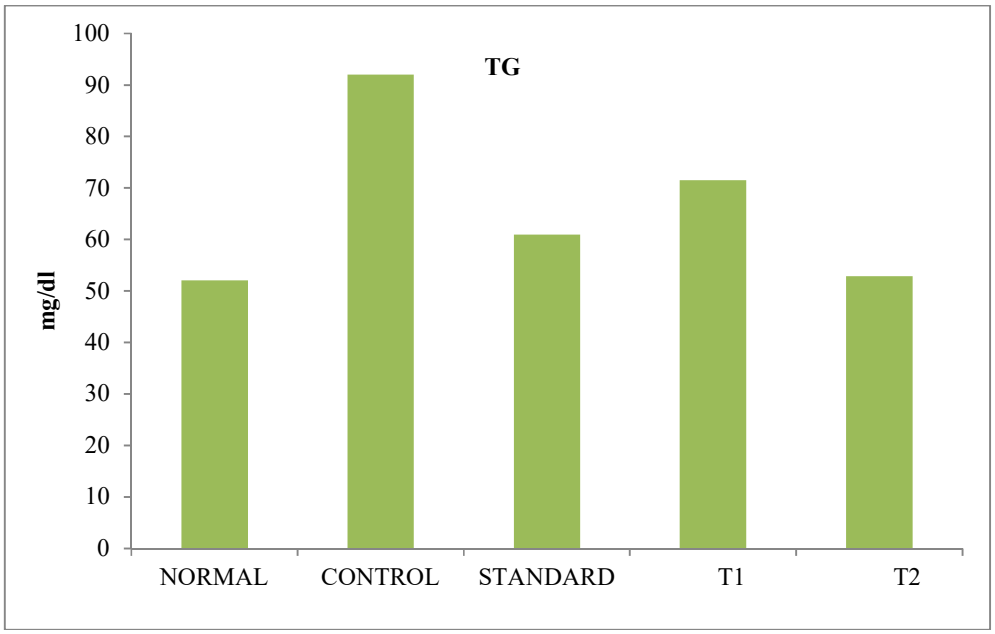
Graph 19 Histogram showing the effect of Desmostachya Bippinnata on VLDL of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control



Graph 20 Histogram showing the effect of Desmostachya Bippinnata on GLUCOSE of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control

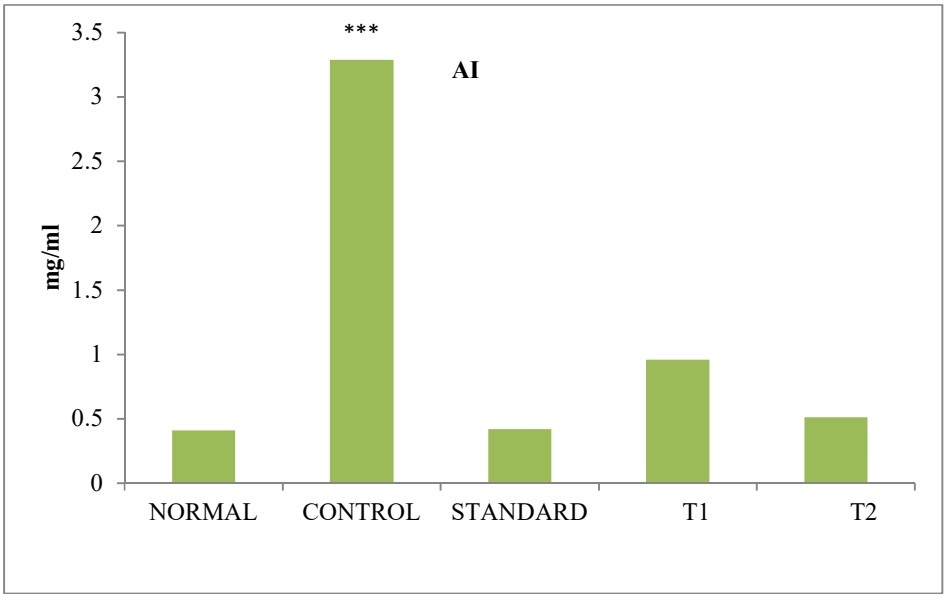


Graph 21 Histogram showing the effect of Desmostachya Bippinnata on TOTAL CHOLESEROL of animals
N = 6; Significance: *** *P*<0.001, ** *P*<0.01, * *P*<0.05 from control

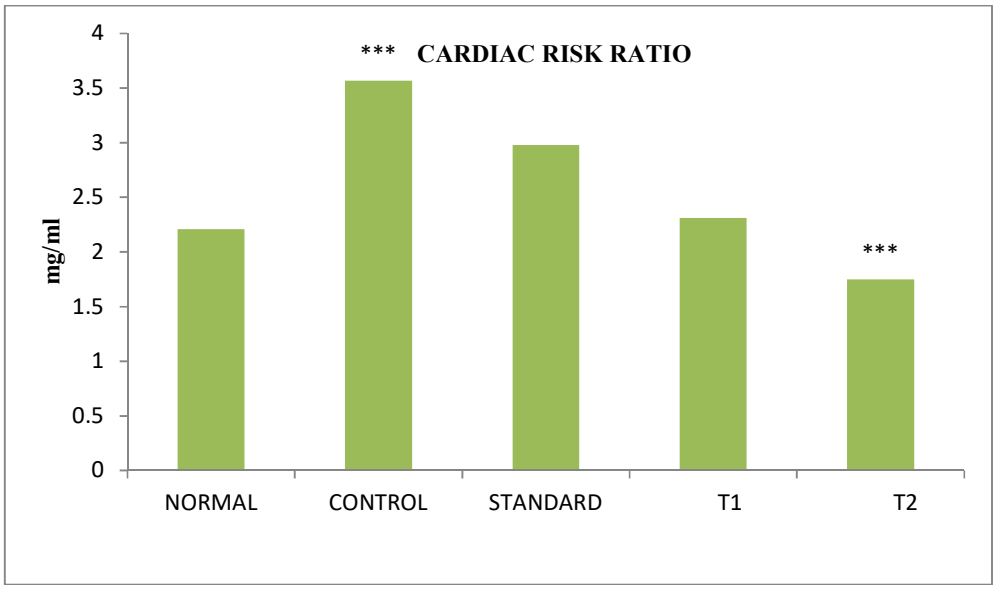


Graph 22 Histogram showing the effect of Desmostachya Bippinnata on TRIGLYCERIDES of animals

N = 6; Significance: *** $P<0.001$, ** $P<0.01$, * $P<0.05$ from control



Graph 23 Histogram showing the effect of Desmostachya Bippinnata on Atherogenic Index of animals



Graph 24 Histogram showing the effect of Desmostachya Bippinnata on Cardiac Risk Ratio of animals

DISCUSSION

The result of this study showed that oral administration Methanol extract of Desmostachya Bippinnata leaf had a beneficial effect on the diabetic state by reducing hyperglycemia. The extract at doses of 400mg/kg body weight caused a statistically significant ($P<0.05$) reduction in blood glucose in alloxan induced diabetic rats hypoglycemic study. Alloxan is an oxidation product of uric acid which is widely used for pharmacological induction of diabetes and more useful in multiple aspects of the disease[115, 116 and 119].

From the results of clinical studies [120], it is evident without any doubt that the reduction of hyperglycemia is the most important factor in the prevention of chronic microvascular complications of diabetes mellitus such as retinopathy, nephropathy, neuropathy, diabetic foot and poor wound healing as well as in the prevention of accelerated atherosclerosis-related condition (myocardial infarction, stroke, etc.).

The exact mechanism involved in the hypoglycaemic action is not clear. The extract may stimulate insulin secretion by the pancreas or/and enhance insulin sensitivity in various organs especially the muscles by promoting glucose uptake and metabolism inhibiting hepatic gluconeogenesis.

Phytochemical screening of methanol extract of the leaf and part of Desmostachya Bippinnata revealed the presence of flavonoids, alkaloids, tannins,. Flavonoids have been shown to exert their antioxidant activity by various mechanisms by scavenging or quenching free radicals or by inhibiting enzymatic systems responsible for free radical generation[121-123].

Apart from being antioxidants, flavonoids have been reported to inhibit sodium-dependent vitamin C transporter 1 and glucose transport Isoform 2 (Glut 2), the intestinal transporter for vitamin C and glucose, leading to a decrease in the intestinal absorption of glucose, hence decrease in the blood glucose concentration[124]. Several researches have also demonstrated that flavonoids act as reducer of hyperglycemia by causing inhibition of renal glucose reabsorption through inhibition of the sodium-glucose symporters located in the proximal renal convulated tubule .[125-127]

Previous studies have reported some of these phytocomponents to elicit a wide range of biological activities which include hypoglycemic, hypolipidemia among others (Oladele et al., 1995). Specifically, saponin is known to elicit serum cholesterol lowering activity by causing resin-like action, thereby reducing the enterohepatic circulation of bile acids (Topping et al., 1980). In the process, the conversion of cholesterol to bile acid is enhanced in the liver resulting in concomitant hypocholesterolemia[128, 129].

Equally literature has reported the hypoglycemic and hypolipidemic effects of flavonoids, alkaloids and tannins[130]. The presence of these phytocomponentsin the extract in high concentrations could account for these observed biological effects, particularly hypoglycemic and hypolipidemic effects. The mechanism by which the extract

exert the hypoglycemic effect may appear to be related to presence of flavonoid among other secondary metabolites or bioactive chemical constituents found in the plant extract which may be an active constituents in a group or an individual responsible for the hypoglycaemic activity of the plant extract [130].

The plant extract of Desmostachya Bippinnata didn't show any mortality and toxicity even at highest dose of 2000mg/kg body weight employed. Hence, present research study was carried out using dose 400mg/kg body weight.

OGTT referred to as the glucose tolerance test, measures the body's ability to metabolize glucose, or clear it out of the blood stream. The test reveals how quickly glucose is metabolized from the blood stream for use by cells as an energy source. The methanol extract of the leaf and fruit part of plant of Desmostachya Bippinnata produced hypoglycemia and improved glucose tolerance in diabetic rat's inspite of counter regulatory factors avoiding reduction in blood glucose levels.

Therefore, hypoglycemic activity of MBG could be mediated by stimulation of surviving beta cells to release more insulin and may be through extra-pancreatic mechanisms. The MBG (400mg/kg) dose showed promising results.

Like the plant extract, Metformin also produced a significant reduction in the blood glucose level of diabetic rats. Metformin exert its action mainly by increasing the secretion of insulin. They only work in diabetics with some remaining beta cells. They bind to the ATP-inhibited K^+channels in the beta cell membranes and inhibit channel activity, depolarizing the beta cell membrane and increasing Ca^{2+} influx and hence insulin release [128-130].

The comparable effect of the plant extract along with Metformin in this study may suggest similar mechanism of action. These findings appear to be in consonance with the earlier suggestion of Jackson and Bressler(1981) that sulfonylureas such as Metformin have extra-pancreatic hypoglycaemic mechanism of action secondary to their causing insulin secretion and the attendant glucose uptake into and utilization by the tissues.

The presence of the steroids reduces the absorption of cholesterol and decreases the cholesterol concentration. Secondary metabolite like the flavonoids, saponins, reduces the cholesterol levels. Saponins will act as anti hyperlipidaemics by binding with the cholesterol and is readily absorbed by the bile acids causing the reduction in extra hepatic circulation and increases the metabolism of cholesterol to sterols through the fecal excretion. Saponins will as reported to increase the lipoprotein lipase activity and helps in the faster removal of free fatty acids from circulation causes decrease in fatal cholesterol.

Elevated cholesterol levels will promotes the atherosclerosis. High cholesterol levels are associated with the increased incidence of coronary heart diseases. Reduction in the cholesterol and the HDL concentration significantly reduces the cholesterol levels.

Atorvastatin is a member of the drug class of statins, it is the first specific inhibitor used for lowering cholesterol (hypo-lipidemic agent) in those with hyper-cholesterolemia and so preventing cardio vascular disease.It is a naturally occuring drug found in food such as oyster mushrooms and red yeast rice.It reduces the levels of "bad" cholesterol (LDL) and Triglycerides in the blood, while increasing levels of "good" cholesterol (HDL). It is an inhibitor of 3-hydroxy-3 methyl glutaryl-CoA reductase (HMG-CoA reductase), an enzyme that catalyses the conversion of HMG-CoA to mevalonate.Mevalonate is a required building block for cholesterol biosynthesis and Atorvastatin interferes with its production by acting as a reversible competitive inhibitor foe HMG-CoA,which binds to the HMG-CoA reductase. It works by slowing the production of cholesterol in the body. Buildup of cholesterol and fats along the walls of the blood vessels (A process known as Atherosclerosis) decreases blood flow and therefore, the oxygen supply to the heart, brain and other parts of the body. Lowering blood levels of cholesterol and fats may help to decrease the risk of heart disease, Angina (chest pain), strokes and Heart attacks. In addition to taking a cholesterol-lowering medication, making certain changes in our daily habits can also lower the blood cholesterol levels.

Effect of different extracts of *Desmostachya Bippinnata* on serum lipid profile and Atherogenic Index, % protection

The serum level of triglycerides and cholesterol and it can be seen

that the HFD group and Triton-x-100 shows significant hyperlipidemia when compared with the normal control group. The extract treated groups and the standard treated group significantly decreased the serum levels of cholesterol and triglycerides when compared with the HFD control group and Triton-x-100 ($p<0.05$). The effect of ethanol extract on serum lipid levels was as better that of the standard treated group, showing the hypolipidemic

potential of the plant. An increase of HDL-cholesterol level was also observed. Decrease in glucose levels are observed in methanolic
extract compared to HFD control group($p<0.001$). Both 200 and 400 mg/kg body wt. 0.obtusata treated animals and 10 mg/kg body wt of Atorvastain treated animals in both models showed decrease in the atherogenic index and increased percentage of protection.

Effect of different extracts of *Desmostachya Bippinnata* on Total protein profile

The serum level of total protein and it can be seen

That the Triton-x-100 group shows significant decrease in total protein levels when compared with the normal control group. The extract treated groups and the standard treated group significantly increased the serum levels of total protein when compared with the Triton-x-100 control group ($p<0.001$). The effect of methanol extract on levels was better as that of the standard treated group, showing the hypolipidemic potential of the plant.

Effect of different extracts of *Desmostachya Bippinnata* on SGOT, SGPT and ALP levels

AST, ALT, SGOT, SGPT, and GGT and Alkaline Phosphatase are abbreviations for proteins called enzymes which help all the chemical activities within cells to take place. Injury to cells releases these enzymes into the blood. They are found in muscles, the liver and heart. Damage from alcohol and a number of diseases are reflected in high values. AST/SGOT, ALT/ SGPT are also liver and muscle enzymes. They may be elevated from liver problems, hepatitis, excess alcohol ingestion, muscle injury and recent heart attack. An atherogenic diet has been reported to induce glomerulosclerosis/nephropathy and mild tubular and hepatic damage experimental rats [101] In case of the effect of methanol extract on enzymes (SGOT, SGPT and ALP), the extract shows significantly lower levels of SGOT, SGPT and ALP in comparison to Triton-x-100 control group ($p<0.05$). Here the maximum reduction was observed for standard followed by methanolic extract.

Therefore, it can be confirmed that, in present investigation significant hypoglycemic potential of Desmostachya Bippinnata shrub may be due to flavonoids, alkaloids, tannins content, which were confirmed by preliminary phytochemical screening.

8. CONCLUSION

Phytochemical screening of the extract shows the presence of chemical constituents like Alkaloids, steroids, fixed oils, cardio tonic aglycones, flavonoids ,saponins ,carbohydrates, proteins, resins. Acute toxicity tests were performed according to the OECD guide line no.423, LD50 value was found to be 200mg/kg and 400mg/kg.

Anti Hyperlipidaemic activity was performed by using the high fat diet and Triton-x-100 induced method. In the present study an increase in plasma HDL-cholesterol with a concomitant percentage decrease from other lipid was observed. It can be concluded from the present data that the levels of total serum cholesterol, triglyceride and MDA which are actually raised in high fat diet, can be lowered significantly with Desmostachya Bippinnata And total proteins which is actually lowered in Triton-x-100 can be raised significantly with **Desmostachya Bippinnata.** Atherogenic index which actually raised in atherogenic diet and Triton-x-100, can be lowered significantly with Desmostachya Bippinnata and a very good % protection was seen with *Desmostachya Bippinnata* and standard drug

The extract also show increase in the glucose tolerance of the rats and decrease in the fasting blood glucose level of diabetic rats, showing the hypoglycaemic activity of the plant which is most pronounced in methanol extract.

In nutshell the extract of *Desmostachya Bippinnata* possesses significant hypoglycaemic activity and anti Hyperlipidaemic activity, which is the first claim in this respect.

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