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ANTI OBESITY ACTIVITY OF EMU OIL ON HYPER CHOLESTERIMIC RATS

Gurram. Prasadachowdari[*1], Malempati Ramesh Babu[1], Purnema Devi[1], Dilsad[1], P. Srikanth[1], Suresh Yadav Katam[2]

[1*]Department of Pharmacology, Dr. Samuel George Institute of Pharmaceutical Sciences, Markapur, A. P, India.
[2]Department of Pharmacology, Jaypore College of Pharmacy, A. P, India.

ABSTRACT

Obesity, which is a major cardiovascular risk factor, has now become today. Obesity is most commonly caused by a combination of excessive food energy intake, lack of physical activity, and genetic susceptibility, although a few cases are caused primarily by genes, endocrine disorders, medications or psychiatric illness of *emu oil* is widely employed in treatment of various diseases and also as a part of various ayurvedic formulations. Emu oil is therapeutically used in methods for lowering cholesterol, triglycerides and low density lipoproteins and increasing high density lipoproteins, preventing and treating allergies; preventing scarring, treating headaches, preventing nose bleeds, treating and preventing cold and flu symptoms; and relieving discomfort associated with menstruation. In this work is based on how emu oil showing the anti obesity action.

KEYWORDS

Obesity, Emu oil, Lipoproteins, Triglycerides and Cholesterol.

Author for correspondence:
Gurram. Prasadachowdari,
Department of Pharmacology,
Dr. Samuel George Institute of Pharmaceutical Sciences, Markapur, Andhra Pradesh, India.

Email: prasadachowdrigurram@gmail.com.

INTRODUCTION[1,2]

Obesity is caused by an energy imbalance; when intake of calories exceeds expenditure of calories, the surplus energy is stored as body weight. There are a multitude of 'obesogenic' factors contributing to the increased energy consumption and decreased energy expenditure that are responsible for obesity, including. In most cases obesity is associated with other cardiovascular risk factors, making obese patients high-risk subjects. The epidemiological data on obesity need updating in Togo. The objective of this study was to compare the prevalence of

cardiovascular risk factors in obese patients versus patients of normal weight, seen as cardiology outpatients in Lome. At an individual level, a combination of excessive food energy intake and a lack of physical activity are thought to explain most cases of obesity (Figure No.1). Declining levels of physical labour as populations move from rural to urban settings and abandon walking in favour of driving, labour-saving devices in the home, and the replacement of active sport and play by television and computer games.

The Indian system of medicine is mainly based on usage of oils are used for treatment of various ailments. The oils of *emu oil* are widely employed in treatment of various diseases and also as a part of various ayurvedic formulations. Emu oil is therapeutically used in methods for lowering cholesterol, triglycerides and low density lipoproteins and increasing high density lipoproteins, preventing and treating allergies; preventing scarring, treating headaches, preventing nose bleeds, treating and preventing cold and flu symptoms; and relieving discomfort associated with menstruation. Additionally, emu oil acts as an effective chemical buffer in combination with glycolic acid.

A triglyceride (triacylglycerol, TAG, or triacylglyceride) is an ester derived from glycerol and three fatty acids. Triglycerides are formed by combining glycerol with three molecules of fatty acid. The glycerol molecule has three hydroxyl (HO-) groups. Each fatty acid has a carboxyl group (COOH). In triglycerides, the hydroxyl groups of the glycerol join the carboxyl groups of the fatty acid to form ester bonds.

MATERIALS AND METHODS[3-5]

Determination of Anti Obesity Activity

Atherogenic Diet (AD) Induced Obesity Model in Rats[5-7]

The AD consisted of 1% cholesterol (sigma)), 0.5%cholic acid (sigma) and 5% Lard oil (sigma) in addition to normal pellet chow diet. The treatment protocol for the experiment was given below.

EXPERIMENTAL DESIGN

Animals were divided into **5** groups, **5** animals in each group, and kept in their cages for acclimatization and standardization. Animals were kept for overnight observation to experiment.

Group 1 - Normal control, which received normal pellet chow diet and water (30 days).

Group 2 - AD control, which received AD + normal pellet Chow diet 30 days.

Group 3 - AD+ orlistat (10 mg/kg, p.o for 30 days).

Group 4 - AD+ Lower dose of emu oil (0.5ml) p.o for 30 days.

Group 5 - AD+ Higher dose of emu oil (1ml) p.o for 30 days.

Dosage, Treatment and Sampling

In groups 3-5 administered the emu oil like low dose (0.5ml) and high dose(1ml) of emu oil and administered orlistat(1omg/kg. b. w) in two dividing doses at end of the experiment al i.e., on 30th day, blood was collected from animals by retroarbital puncture under light anesthesia. Serum was separated for the estimation of glucose, triglycerides and on 30^{th} day of the experiment hypercholesterimic was done and after that animal was sacrificed, liver, kidney, spleen and heart were dissected out and weighed. Histopathological studies were done for liver. The animals were weighed at the beginning and ate the end of the experiment.

Estimation of Biochemical Parameters

A 12 hr fasting was maintained in all the groups before testing various biochemical parameters. During fasting animals were provided only with water ad libitum. All the biochemical parameters were analyzed by using semi-auto analyzer Erba.

RESULTS

Phytochemical analysis

Effect of emu oil (o.5ml/kg.1ml/kg. day) and orlistat (10mg/kg./single dose) treated rats on body weight, serum glucose, cholesterol, triglyceride, HDL, LDL, VLDL, after 30 days of treatment. The results are tabulated in the Table No.1 and 2. The comparisons and histological studies are showed in the form of figures.

Table No.1: Anti obesity effect of emu oil on Serum biochemical parameters in hyper cholesterimic rats

S.No	Groups	Dose	Glucose (mg/dl)	Cholesterol (mg/dl)	Triglycerides (mg/dl)	H.D.L. (mg/dl)	L.D.L. (mg/dl)	V.L.D.L. (mg/dl)
1	Normal control	-	71.84±1.86	57.04± 2.01	56.96± 2.07	23.82± 1.49	25.74± 1.46	32.22± 1.49
2	Disease control	-	138.9± 2.31	128.1± 2.46	128.1±2.46	16.00± 1.04	63.02± 1.87	82.06± 1.98
3	Orlistat	10 mg/kg	91.04±2.35	68.72± 2.40	68.72± 2.40	32.10± 1.24	33.62± 1.20	41.78± 1.24
4	Test Low	0.5ml	124.1±2.28	98.62± 1.74	98.66± 1,74	19.20± 0.69	49.24± 0.89	62.08± 1.16
5	Test High	1ml	103.5± 1.50	75.00± 1.80	75.00± 1.80	24.40± 0.68	40.90± 1.52	48.70± 1.50

Values are mean ± S.E.M. (n = 5), P < 0.001 when compared to control groups (one way ANOVA by using Graph pad prism software)

Table No.2: Anti obesity effect of Emu oil on Organs and Fat pad weights in hyper cholesterimic rats

S.No	Groups	Dose	Liver(g)	Heart(g)	Spleen(g)	Left Kidney (g)	Right Kidney (g)	Peri Renal Fat Pad.(g)
1	Normal control	-	4.08± 0.10	0.50± 0.01	0.81± 0.01	0.61± 0.02	0.52± 0.07	0.12± 0.08
2	Disease control	-	7.22± 0.09	1.03± 0.03	1.37± 0.05	0.89± 0.01	0.80± 0.01	0.57± 0.02
3	Orlistat	10 mg/kg	4.80± 0.10	0.56± 0.01	0.89± 0.01	0.59± 0.02	0.52± 0.01	0.21± 0.01
4	Test Low	0.5ml	6.08± 0.05	0.72± 0.01	1.00±0.01	0.76± 0.02	0.71± 0.01	0.40± 0.02
5	Test High	1ml	5.26± 0.10	0.60± 0.01	0.92± 0.01	0.64± 0.02	0.62± 0.06	0.30± 0.01

Values are mean ± S.E.M. (n = 5), P < 0.001 when compared to control groups (one way ANOVA by using Graph pad prism software).

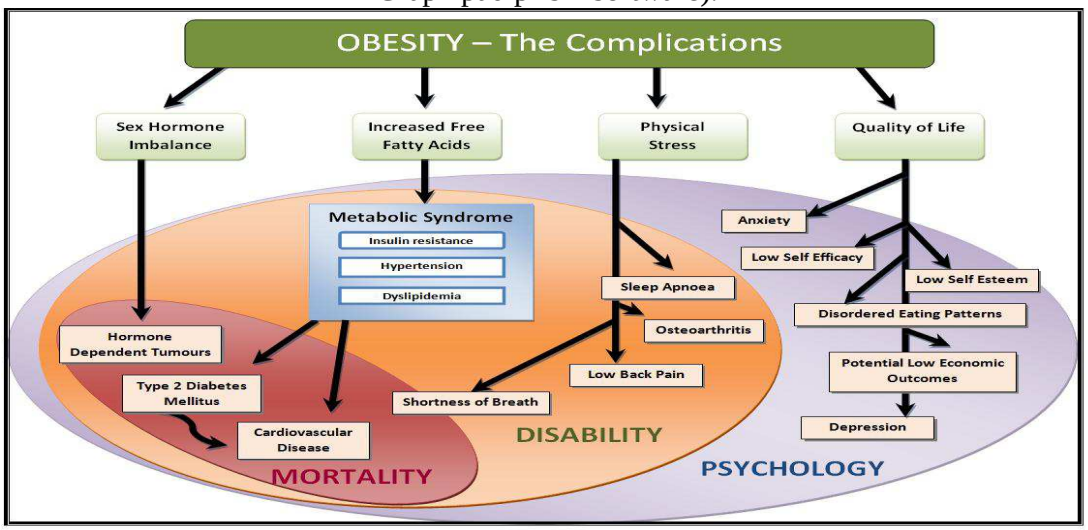


Figure No.1: Obesity and its complications

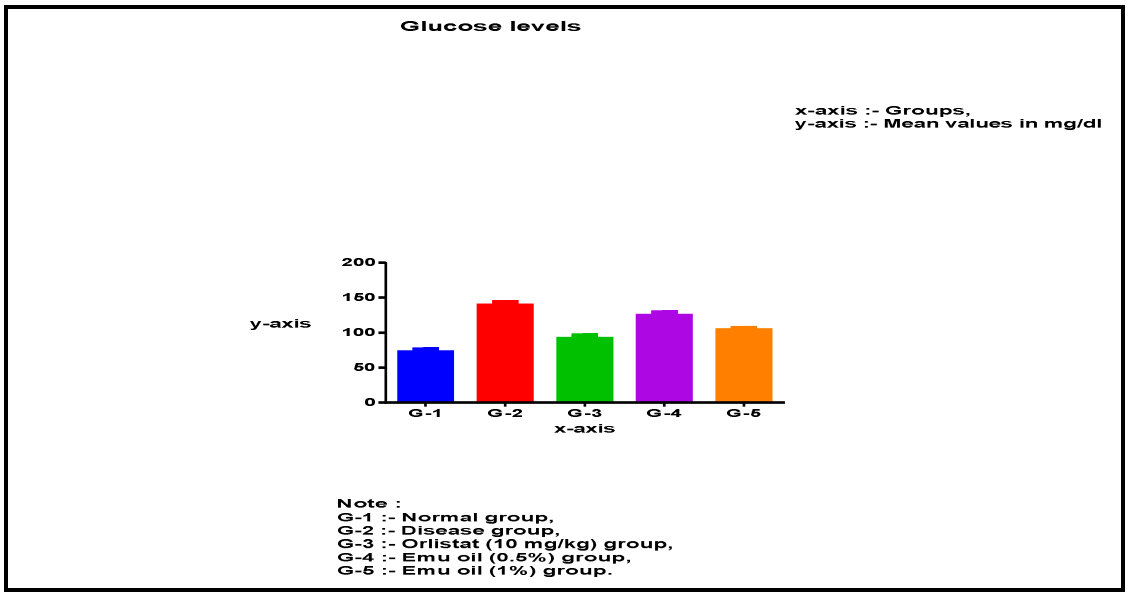


Figure No.2: Glucose levels

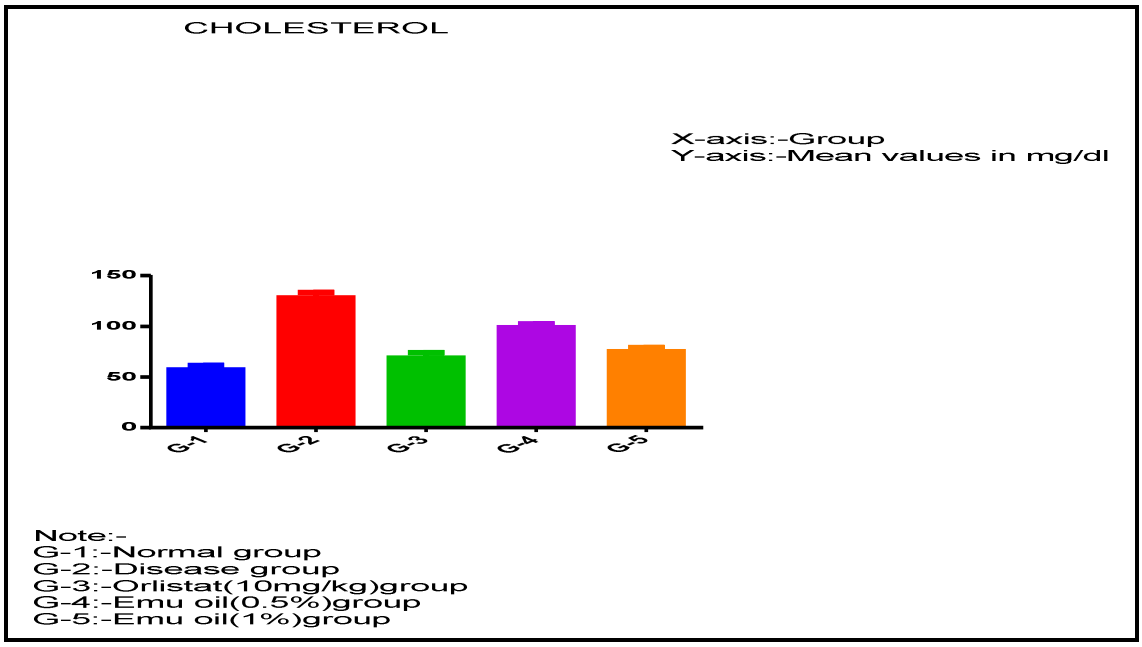


Figure No.3: Cholesterol levels

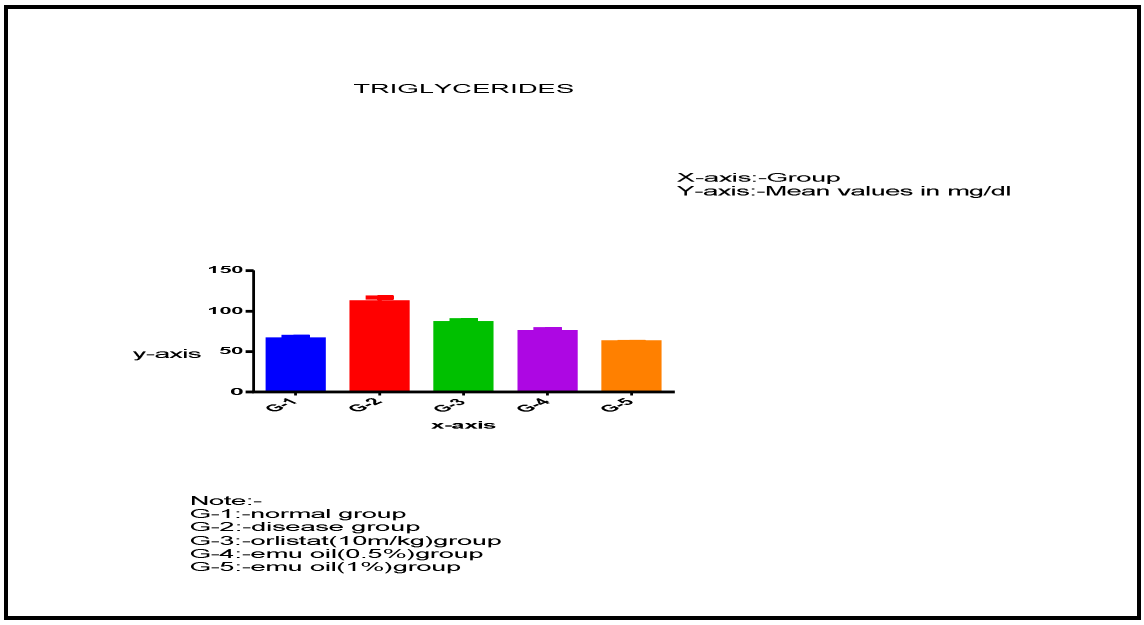


Figure No.4: Triglycerides levels

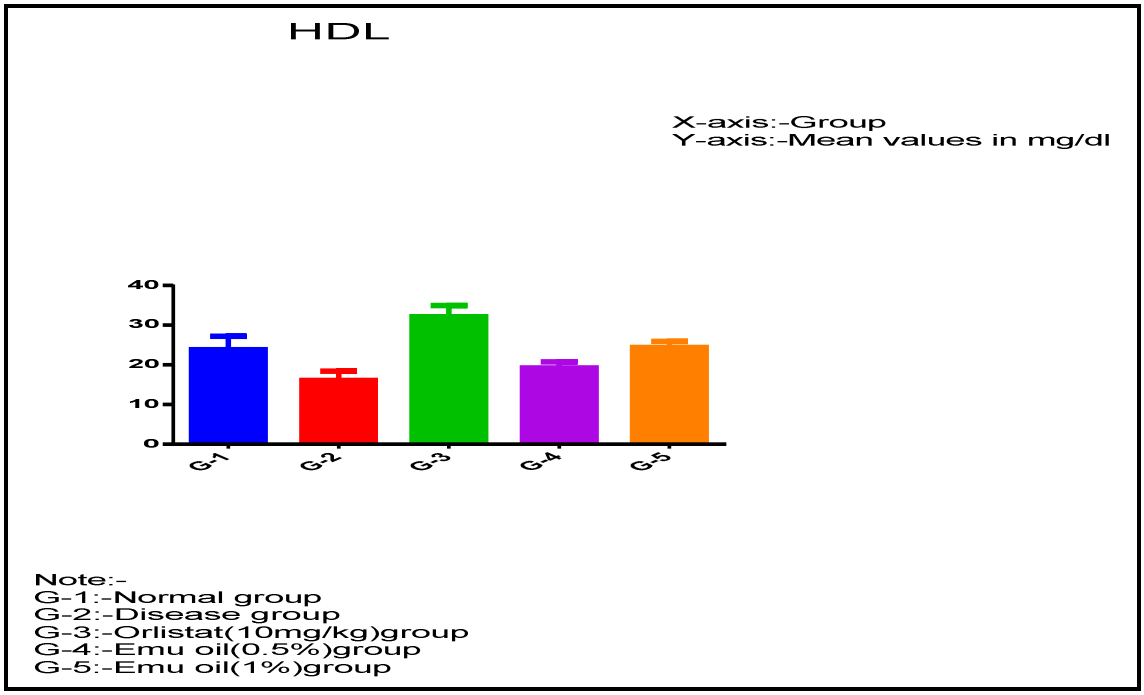


Figure No.5: HDL Levels

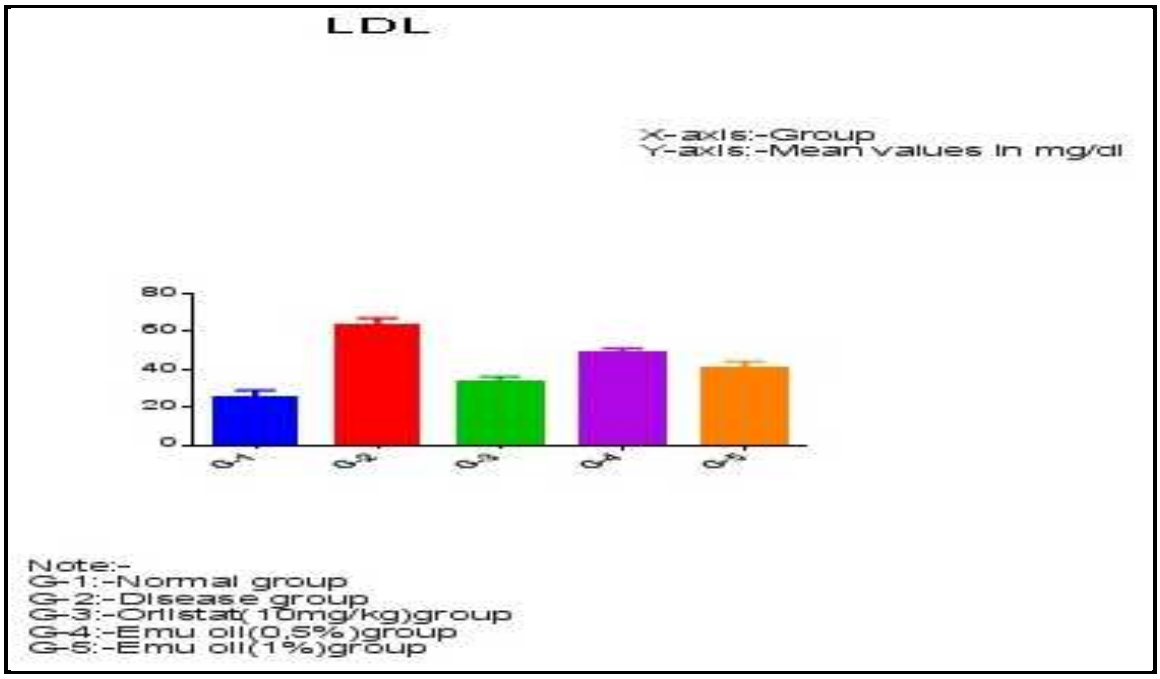


Figure No.6: LDL Levels

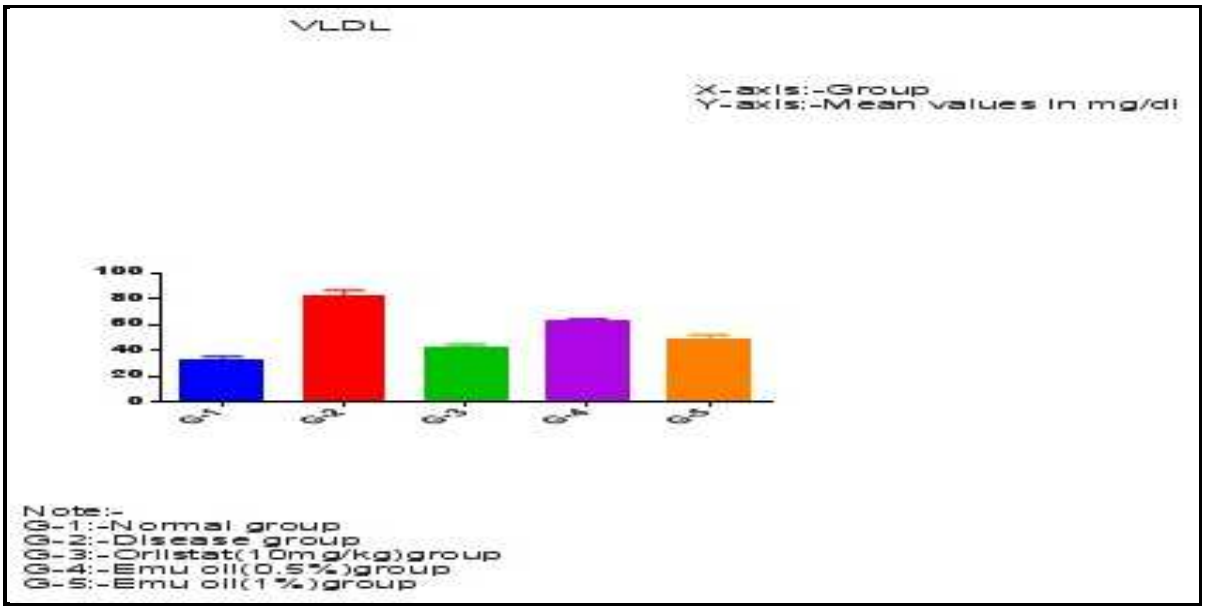


Figure No.7: VLDL Levels

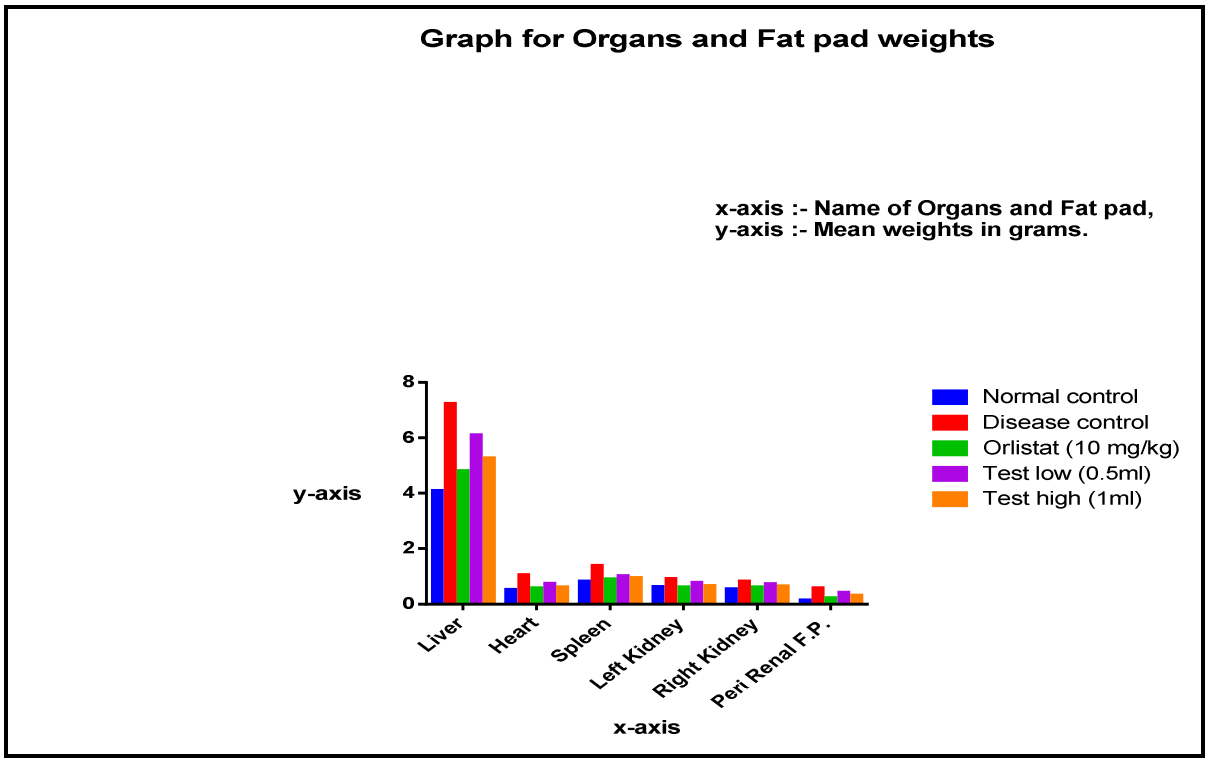


Figure No.8: Graphs for Organs and fat pad weights

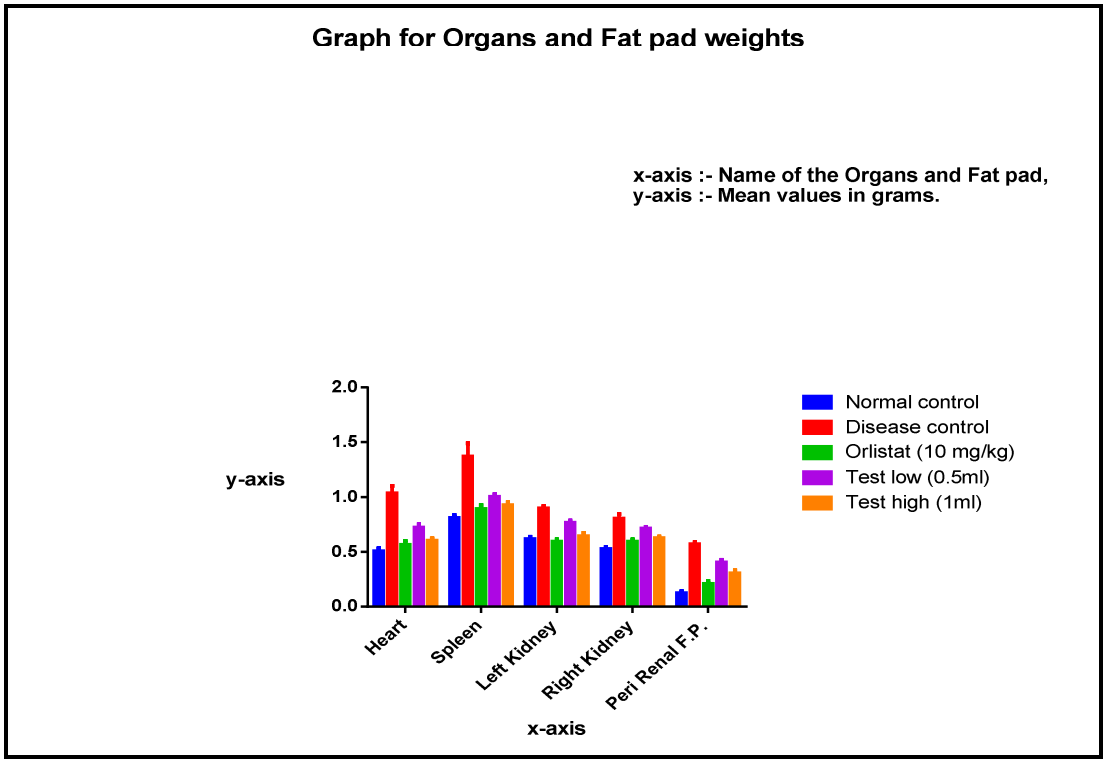
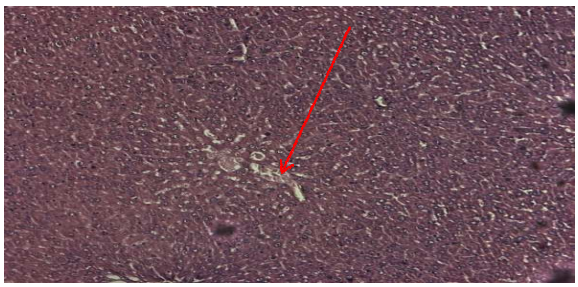
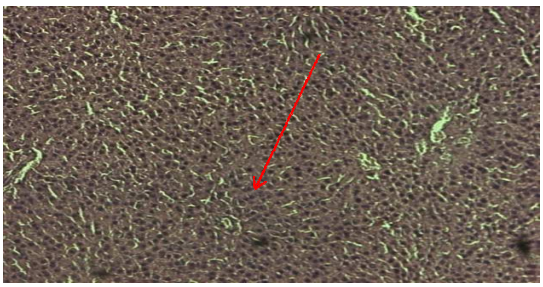


Figure No.9: Graphs for organs and fat pad weights



Normal

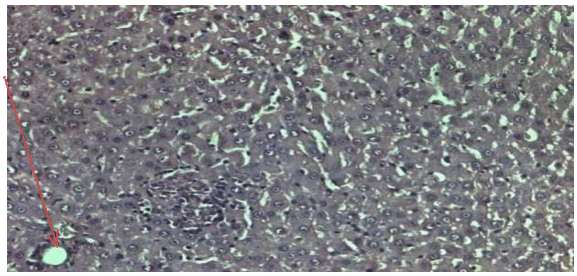
Hepatocytes appeared normal – arrow



Low dose

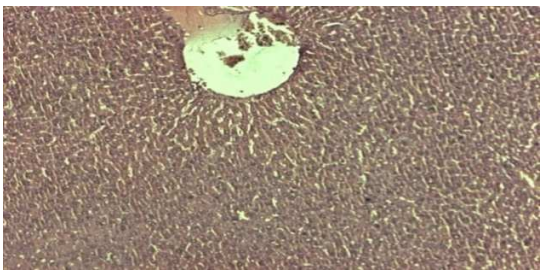
Heptocytes appeared normal – arrow

No degeneration/inflammation and necrosis in the liver



High dose

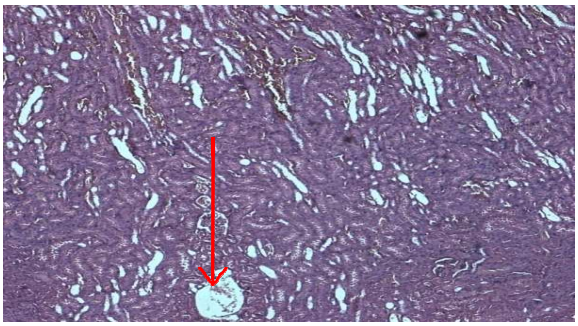
Foci of necrosis and inflammation was observed in the hepatocytes were observed - arrow



STD Liver

Hepatocytes appeared normal

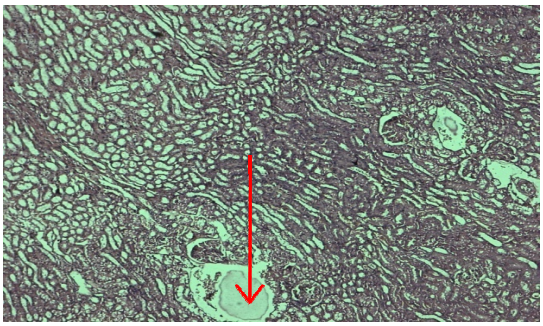
No degeneration/ inflammation noticed



Normal Kidney

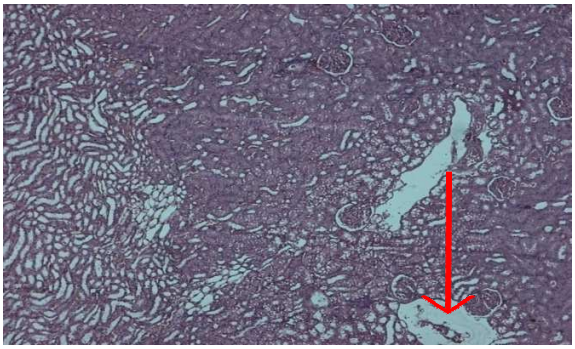
Glomerulosus and tubular structure appeared normal

No degeneration/inflammation noticed

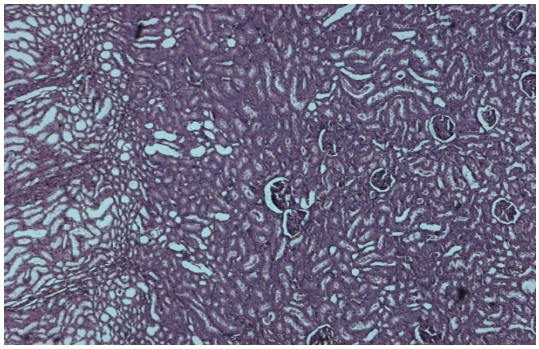


Low dose

Kidney



High dose kidney
Moderate to severe cystic degeneration of tubules were observed - arrow Glomerulosus appeared normal



STD kidney

Dilatation of tubules noticed
No inflammatory/ degeneration of tubular / glomerulosus noticed

Figure No.10: Histopathological Findings

CONCLUSION

Atherogenic diet induced obesity associated with a disturbed lipid profile (TGs, TC, LDL, HDL), organ (liver, kidney, heart, spleen, Peri renal fetal pad) this may have implications for the process of obesity problems. The emu oil- reduced obesity is an effective model which resembles the human obesity. The findings from this study suggest that *emu oil* formulation has an reducing obesity in rats. These activities are due to the presence of omega3 and omega6. The emu oil do not show any side effect compare to standard group (orlistat 10mg/kg).

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