

Antiobesity Values of Methanolic Extract of *Sapindus emarginatus* on Monosodium Glutamate Induced Model in Rats

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ABSTRACT

Now a day's Obesity is considered to be a great disorder in many of the individuals in the world. Regulated energy levels are no longer found in the people those who have been suffering with the obesity. There aetiology of obesity is complex. There are lot of factors influence in the development of obesity like dietary, lack of exercise etc. Along with various factors those who have been influencing obesity particularly the consumption of monosodium glutamate, is considered a risk factor for its development. "*Sapindus emarginatus*" is a medicinal plant which exerts multiple health benefits. Hence present study was undertaken to evaluate anti-obesity effect of methanolic extract of leaves "*Sapindus emarginatus*" on monosodium glutamate induced obesity in wistar albino rats. Here in the present study of Evaluation of Anti-obesity activity in wistar albino rats by inducing mono sodium glutamate duration of study is 28 days. There are two doses of test drug had been used till the completion of 28 days of study. Monosodium glutamate is used to induce obesity for 7 days along with normal diet and Physical parameters such as body weight, and various biochemical parameters were estimated after the completion of evaluation.

Keywords: AntiObesity, *Sapindus emarginatus*, monosodiumglutamate, Biochemical parameters, Body weight.

INTRODUCTION

From the ancient day's world has been facing a challenge that is none other than Obesity. The prevalence of obesity increasing day by day worldwide. It is now a common disorder which is caused due the excessive fat deposition in the adipose tissue, blood vessels and other major organs due to the carbohydrate and lipid metabolism. Fat in the regulated levels supports the organism to describe external structure. Body mass index is the major parameter to estimate the mass index of organism by using height to the weight of the organism. There are lot of complications exerted due to the deposition of excessive fat in the adipose tissue and kidney, liver, heart and other major organs. In order to prevent this kind of process there is a great need of diet control, physical exercise, and in some cases therapy too. For last two decades revolutionary changes takes place in the medicine to treat obesity. These changes are welcoming to protect the man kind from not only obesity but also the several malfunctions caused due to obesity. Along with traditional herbal medicine allopathy also plays a vital role in the treatment of obesity. Here in the present study of evaluation of anti-obesity activity of herbal we employed a proper protocol to screen the activity. From the literature normally the plant *Sapindus emarginatus* is used to treat anti microbial¹, CNS activity², anti oxidant³, anti-fertility and anti-androgenic activity⁴, anti diabetic⁵ and anti larvicidal activity^{6, 7}. So, the present study, *Sapindus emarginatus* selected leaves of

for evaluation of anti-obesity activity by using monosodium glutamate induced obesity in rats. Orlistat was used as the reference standard drug. Two test doses had been used till the end of screening. Acute toxicity studies were conducted.

MATERIALS AND METHODS

Plant and Plant Material: *Sapindus emarginatus* whole plants materials were collected from Tirupathi. The plant authentication was done by Department of Botany, Sri Venkateshwara University, Tirupathi dist. Chittoor, Andhra Pradesh, and the voucher was preserved.

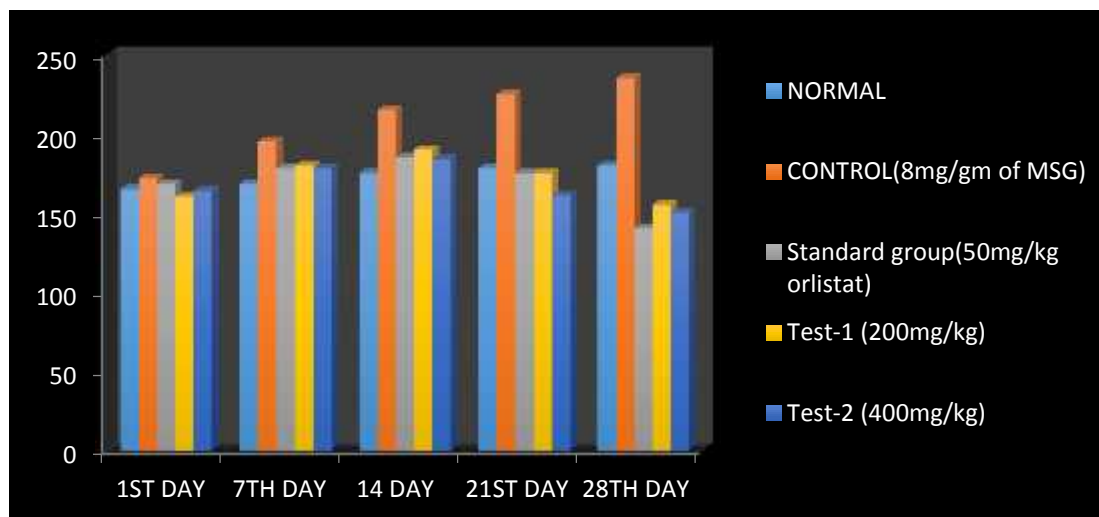
Preparation of the extract: Pericarp of the flowers of *Sapindus emarginatus* were taken and fine pericarp of flowers were undergone shade drying at room temperature for 2-3 days. The dried pericarps of flowers were then powdered in a mixture. The powder was taken and weighed. From the obtained fine powder 100grams powder was taken and it was suspended in 200 ml of methanol and continued for extraction process for 24 hours by using soxhlet extractor at 72 degrees temp. After the extraction the solvent was evaporated by using rotary evaporator and the residue was dried⁸.

Animals: Healthy adult albino rats of Wistar strain of either sex between the age of 2-3 months and weighing 150-200 grams were used for the present study. The animals were housed individually in polypropylene cages, maintained under standard conditions (12 hours light

Table No 1: Effect of methanolic extract of pericarp of flowers of *Sapindus emarginatus* on Body Weight in MSG induced Obesity Rats.

S.NO	GROUP	1 ST DAY	7 TH DAY	14 DAY	21 ST DAY	28 TH DAY
1.	NORMAL	165±4.2	168±3.1	175±2.5	178±3.0	180±3.2
2.	CONTROL(8mg/gm of MSG)	172±3.1	195±2.5	215±3.3	225±1.8	235±1.4
3.	Standard group(50mg/kg orlistat)	168±3.3	178±2.0	185±4.1	175±2.4	140±3.0
4.	Test-1 (200mg/kg)	160±2.9	180±3.3	190±2.6	175±2.6	155±2.8
5.	Test-2 (400mg/kg)	164±3.6	178±3.7	184±2.4	161±2.8	150±1.5

Values are Mean ± SEM (n=6) one way ANOVA followed by Dunnett's test. Where, *** P<0.001, ** P<0.01 and * P<0.05.

Graph-1. Effect of methanolic extract of pericarp of flowers of *Sapindus emarginatus* on Body Weight in MSG induced Obesity RatsTable No 2: Effect of methanolic extract of pericarp of flowers of *Sapindus emarginatus* on organ weight and BMI in MSG induced Obesity Rats.

S.NO	GROUP	LIVER(gm)	Kidney(gm)	Spleen(gm)	BMI(g/cm ²)
1.	NORMAL	6.658 ± 1.38*	1.30 ± 0.71*	0.577 ± 0.40*	0.692 ± 0.3*
2.	CONTROL (8mg/gm of MSG)	9.5 ± 1.20*,**	1.643 ± 0.15*,**	0.840 ± 0.38*,**	0.723 ± 1.33*,**
3.	Standard group (50mg/kg orlistat)	6.42 ± 1.25	1.225 ± 0.07	0.560 ± 0.1	0.701 ± 1.88
4.	Test-1 (200mg/kg)	7.238 ± 1.0	1.551 ± 0.51	0.681 ± 1.12	0.695 ± 1.1
5.	Test-2 (400mg/kg)	6.873 ± 1.5**	1.495 ± 1.0	0.620 ± 1.2	0.652 ± 1.05

Values are Mean ± SEM (n=6) one way ANOVA followed by Dunnett's test. Where, *** P<0.001, ** P<0.01 and * P<0.05.

and 12 hours dark cycle, 23±5°C and 40-60% humidity). They were fed with standard rat pellet diet (National Institute for Nutrition, Hyderabad) and provided water ad libitum. All the animals are collected from central animal house SICRA LABS PVT.LTD, IDA-KUKATPALLY, HYDERABAD and all experiments were conducted according to the ethical norms approved by CPCSEA, Ethical committee IAEC reg. no. (769/2011/CPCSEA). Preliminary Phytochemical Screening: The methanolic extract of Pericarps of the flower found to contain large percentage of saponin⁹. Normally the plant *Sapindus emarginatus* consists of various phytochemical constituents such as flavonoids, Triterpenoids, glycosides, carbohydrates, fatty acids, phenols, fixed oil, and saponins¹⁰.

Experimental:

Induction of monosodium glutamate to produce obesity: There are five groups were taken for the anti-obesity screening. Among the entire five groups group -I is considered to be normal. Group-II is considered to be obesity control, group-III is standard group, and finally group 4 and group-5 were the test groups. For the Group I normal diet and water were given and for the group- II, III, IV and V, in addition to normal diet and water, prepared monosodium glutamate (SRL Pvt.LTD, Mumbai) solution was administered to induce obesity by 8mg/g body weight to each animal orally daily up to 7 days¹¹.

Experimental Procedure: The rats were divided into six groups with six rats each:

Group I: Normal Diet Fed or Normal

Table-3. Effect of methanolic extract of pericarp of flowers of *Sapindus emarginatus* on serum lipid in MSG induced Obesity Rats.

Treatment	Glucose(mg/dl)	TC(mg/dl)	HDL-C	LDL-C	TG(mg/dl)	SGOT(U/L)	SGPT(U/L)	ALP(U/L)
NORMAL CONTROL (8mg/gm of MSG)	81.21±1.6	110.6±2.3	49.61±2.00	39.24±0.84	72.30±1.30	94.54±1.25	32.04±0.5	115.4±0.24
Standard group(50mg/kg orlistat)	226.0±5.3	145.6±1.5	25.65±0.9	64.04±1.42	172.9±0.92	290.0±0.7	93.91±0.45	284.8±0.33
Test-1 (200mg/kg)	110.8±3.4***	125.6±.98***	55.83±1.62**	45.35±1.8***	122.6±1.9***	184.7±1.65***	42.04±0.9***	126.7±1.33***
Test-2 (400mg/kg)	120.0±2.0***	152.9±1.73***	43.10±0.4	50.4±1.08***	135.2±1.4***	200.5±4.15***	63.9±0.91***	160.4±1.84**
	119.3±1.6***	132.6±1.13***	50.97±1.09**	45.32±1.81***	130.9±1.45***	182.8±2.20***	50.4±1.0***	151.6±3.24**

Values are Mean ± SEM (n=6) one way ANOVA followed by Dunnett's test. Where, *** P<0.001, ** P<0.01 and * P<0.05.

Group II: Obesity control (8mg/gm monosodium glutamate)

Group III (standard): Monosodium glutamate + Standard Drug Orlistat (50mg/kg b.w.).

Group IV (test-1): 8mg/gm monosodium glutamate+200mg/kg test drug

Group V (test-2): 8mg/gm monosodium glutamate+400mg/kg test drug.

All the drugs were given through oral route. All the five groups were equally given with 6 rats in each group either sex. The total time period for the evaluation of anti-obesity activity was 28days after the induction of monosodium glutamate for 7days.Daily body weight and behavioural changes were examined and recorded. After completion of 28 studies the animals were sacrificed and before that the blood is collected from each rat from all the five groups for biochemical estimation. The liver, kidney and spleen were dissected out, washed in ice cold saline and weighed.

Biochemical Analysis: Along with the body weight of all the animals, 29th day the blood is collected from all the rats and subjected for centrifugation at 3000 rpm. The serum samples of all the blood samples were carefully collected and preserved for bio chemical estimation. Blood glucose levels, total cholesterol¹², LDL-C, HDL-C, Triglycerides¹³, SGOT, and SGPT were estimated by using standard chemicals and ROBONIK biochemical analyser.

STATISTICAL ANALYSIS

The results were expressed as mean±SEM. Comparisons between the treatment groups and control groups were performed by one-way analysis of variance (ANOVA) followed by Dennett's test. In all the tests the criterion for statistical significance was P<0.05 (95% level). P value<0.05 is considered as significant (*P<0.05, **P<0.01).

RESULTS AND DISCUSSION

The body weights of all animals were recorded from the first day to 28th day. From the obtained results we could find the increased body MSG control group, standard and test groups when compared to normal group in the beginning days of the drug treatment. After completion of the drug treatment the body weights had shown the gradual decrease in the body weights of rats in standard and test groups. The values of these weights were given in Table No 1. Weights of different organs like liver, kidney, spleen, parametrical adipose tissues were observed in

MSG induced Obesity rats. After completion of the drug treatment the organ weights had shown the significant decrease in the organ weights of rats in standard and test groups .The readings were tabulated in Table No 2. Blood glucose levels, total cholesterol, LDL-C, VLDL-C, HDL-C, Triglycerides, SGOT, and SGPT were estimated by using biochemical analyser. After the estimation has completed the results of each group were tabulated in the table no.3 and the results shown that the significant decrease of all parameters when compared with normal control group. There was a significant increase in the BMI of MSG group animals when compared to the normal group. The increased BMI shown had shown the efficacy of MSG to induce obesity in the animals. The BMI of control group is compared with the standard and test groups and showed significant decrease. Orlistat of 50mg/kg body weight was used as a standard drug in the present study. The obtained results had shown the significant results and minimised side effects. Hence Orlistat is the standard allopathic drug which had shown the satisfactory medical property in the treatment of obesity.

CONCLUSION

The present study is the evaluation of anti-obesity activity of *Sapindus emarginatus*. In the present study two doses of test drug 200mg/kg and 400mg/kg had shown the significant anti-obesity activity in MSG induced obesity rats. The methanolic extract of pericarp of flower of *Sapindus emarginatus* had shown the significant decrease in the body weight, BMI,Blood glucose levels, total cholesterol, LDL-C, HDL-C, Triglycerides, SGOT, and SGPT. The results clearly indicated that at a dose of 200mg/kg shows less effect than the 400mg/kg in reducing the body weights.

Hence these observations finally concluded that the pericarp of flowers of *Sapindus emarginatus* shows anti-obesity activity

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