

EXPERIMENTAL STUDY OF MAMSADHI GHRITA TO EVALUATE THE ANTI-OBESITY ACTIVITY

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ABSTRACT

Mamsadhi ghrita, a classical Ayurvedic formulation, is primarily indicated for disorders related to mamsa dhatu (muscle tissue), and Medo dhatu (adipose tissue). Sthoulya is a disorder of medho dhatu vriddhi caused by imbalance of kapha dosha & medho dhatvagni mandhya, so this ghrita will experiment on wrister – albino rats, to reducing the lipid, cholesterol, LDL, HDL, etc **Methods:** Experimental study on wrister- albino rats models accordingly method of anti- obesity activity **Results:** Showing reducing the level of body weight, other obesity parameters. **Conclusion:** Mamsadhi ghrita exhibits reducing lipid accumulation with experiment & histopathological study.

KEYWORDS: Mamsadhi Ghrita, Experimental Study, Obesity, Wrister – Albino Rats, Histopathological Study.

INTRODUCTION

Rasashastra & Bhaishajya kalpana is a core Ayurvedic branch focused on Preparing, Standardizing, Administering medicines, Blending herbo – metallic preparation. Mamsadhi ghrita, being a ghrita kalpana prepared with Tikta, Katu, Kashaya rasa pradhana dravyas, acts through kapha- medo shamana, deepana & pachana karma, Lekhana actions. Here we already conducting anti- obesity activity on Wrister – Albino rats using Mamsadhi Ghrita.

Obesity is a chronic metabolic disorder characterized by excessive accumulation of body fat to the extent that it adversely affects health. It is one of the most common nutritional disorders worldwide and a major risk factor for several non-communicable diseases such as diabetes, hypertension, and cardiovascular disease.

According to the World Health

Organization (WHO, 2020), obesity is defined as: > Body Mass Index (BMI) ≥ 30 kg/m², while overweight is defined as BMI ≥ 25 kg/m².

Epidemiology

- Obesity has reached epidemic proportions globally. According to WHO estimates, more than 1.9 billion adults are overweight, of which over 650 million are obese.
- The prevalence of obesity is increasing in both developed and developing countries due to changes in dietary habits, reduced physical activity, and urbanization.
- In India, the prevalence of obesity is increasing rapidly, particularly in urban areas and among middle-aged populations, due to sedentary lifestyles and unhealthy dietary patterns.

Experimental review

An experimental study is a type of research design in which the investigator actively manipulates one or more independent variables to observe their effect on one or more dependent variables, under controlled conditions.

- It aims to establish a cause-and-effect relationship between variables.
- In biomedical and pharmaceutical research, this involves testing a drug, formulation, or therapeutic intervention on subjects (animals or humans) to assess its efficacy, safety, and pharmacological effects.

Example

Evaluating the anti-obesity activity of Mamsadhi Ghrita in animal models by administering the formulation and comparing weight changes with control groups.

Significance of Experimental Study

1. Establishes Causality

Helps determine whether the observed effects are directly caused by the tested intervention (e.g., a specific drug or formulation)

2. Scientific Validation

Provides objective and measurable evidence to support traditional or theoretical claims.

3. Reproducibility and Control

Experiments can be repeated under controlled conditions, ensuring reliable and valid results.

4. Evaluation of Efficacy and Safety

Crucial for assessing therapeutic potential and identifying any adverse effects before clinical application.

5. Bridge Between Theory and Practice

Connects Ayurvedic principles or theoretical formulations with modern scientific understanding through laboratory validation.

6. Foundation for Future Research

Experimental results guide further pharmacological, toxicological, or clinical studies.

Anti-Obesity activity in Albino-waster rats:**Species:** Albino-waster rats**Sex:** Male/Female**Groups:** 3 Groups (6 Animals in each group)**No. of animals:** 18 male –Albino waster rats.**Age /weight of animals:** 180g to 200g**Acclimatization**

Male Albino-waster rats weighing from (180g to 200g) will be procured from licensed animal breeder. All the animals will be acclimatized for a week before experimentation, maintained under temperature controlled rooms with 12 hours alternating light and dark cycles and will be given adequate nutrition and water ad labium.

Eighteen Male / female Albino-waster rats are divided into 3 groups i.e. Group No. 1 (Normal control), Group No. 2 (Diseased control) and Group No. 3 (Experimental), Each group having 6 animals (n=6), Control Group will receive normal standard animal chow throughout the experiment. Diseased control and experimental group will receive HFD (provided from genuine source of animal diet) for 12 weeks. In experimental group Mamsadhi Ghrita will be given along with HFD from 9th week to 12th week of the study.

Inclusive criteria

- Albino wister rats of either sex will be taken
- Weighing about 180-200gm
- Healthy rats free from any disease will be used in the study

Exclusive criteria

- Rats with any deformities
- Under weight /dose
- Rats which is under trail for other experiments.
- Unhealthy rats will not be used for the study.

Table no: 36: Interventions in Animal study.

Group	Diet	Days of Intervention	Vehicle	Route
Group 1 (Control Gp.)	Normal diet for 12 weeks	-	Normal saline	Oral
Group 2 (Diseased Gp.)	High fat diet for 12 weeks	-	Water	Oral
Group 3 (Experimental Gp.)	High fat diet for 12 weeks	Mamsadhi Ghrita from 9 th -12 th week	Water	Oral

Body weight and food consumption

Body weight will be initially on 0th day, at the end of every week and terminally prior to necropsy. During the 90th days of administration period food and water consumption by each group will be measured everyday.

Biochemistry

Total cholesterol (CHOL), Triglycerides (TGL), Low Density Lipoprotein(LDL), High Density Lipoprotein (HDL), Blood glucose (RBS).

Other parameters

If possible, at the end of the experiment adipose tissue deposits such as Epididymal, Perirenal, Retroperitoneal and Mesenteric fat pads will be collected after sacrifice and the relative weights will be calculated.

Necropsy and Histopathology findings

At the scheduled termination of the experiment, after blood sample collection, the animals will be sacrificed by ether euthanasia. Complete gross postmortem examinations will be performed on all terminated animals and organs (liver, kidney).

METHODOLOGY**AIM**

The current study was aimed to evaluate the anti- obesity activity of MamsadhiGhrita by Generalised High fat diet (dalda) induced method .

OBJECTIVES: To evaluate the anti-obesity activity of Mamsadhighrita through experimental study.

TEST DRUGS

The samples of Mamsadhi Ghrita were prepared as per standard references in Department of Rasasashtra and Bhaishajya Kalpana, DGM Ayurvedic College and Hospital, Gadag.

Experimental animal

18 Albino – Wister rats were randomly selected and divided into 3groups for High fat diet (dalda) induced anti obesity study Kindling study respectively.

Rat maintenance

Albino – wrister rats were obtained from animal house attached to S.D.M Centre for Research in Ayurveda and Allied Sciences, Udupi, Karnataka. They were maintained on feed of "Sai Durga Feed and Food, Bangalore" and tap water was given and-libitum. The temperature and humidity were kept at optimum and animals were exposed to natural day-night cycles. The experiment were carried out in conformity with guidelines of Institutional Animal Ethical Committee (SDMCRA/IAEC/UD/RS-01) after obtaining its permission.

EQUIPMENTS

1. Physical balance
2. Animal weighing
3. Measuring Jar
4. Syringes
5. Stop watch
6. Animal cages

Dose fixation**Animal dose calculation**

Animal dose (mg/kg) = Human equivalent dose (9mg/kg) x conversion factor (conversion factor for rat =6.1).

Trail drug

Therapeutic Human dose of *Mamsadhi Ghrita* -12gm (14ml), Human dose per kg is $12000 \div 60 = 200\text{mg}$, Rat dose = $200 \times 6.17 = 1.2\text{gm}$ or 1.3ml/kg/day of rat

Rat dose = human dose $\times 0.018 \times 5$

= $48 \times 0.018 \times 5$

= 4.32 kg

= $4.32 \div 1000 = 0.004$

Group B (Test drug)

Rat dose \times per body weight of respective rats of 9th week = Respective rat dose / day

Rat 1 - $0.004 \times 177 = 0.7$ ml

Rat 2 - $0.004 \times 250 = 1$ ml

Rat 3 - $0.004 \times 208 = 0.8$ ml

Rat 4 - $0.004 \times 217 = 0.8$ ml

Rat 5 - $0.004 \times 275 = 1.1$ ml

Total test drug / day 4.4 ml

Drug preparation

Test drug: The samples of *Mamsadhighrita* were prepared as per standard references in Department of *Rasashastra & Bhaishajya kalpana*, DGM Ayurvedic Medical College & Hospital Gadag.

High fat diet - Dalda is brought from the local market with trade mark shop, daily 2 ml was given upto 9th week, then will reduce the dose 1ml of dalda is given as per our knowledge because when were taking medicine will follow some restrict diet, likewise so were reduce the dose.

Route of drug administration

Positive control and Test drug would be administered according to body weight of the animals by oral route.

Methodology

Anti – obesity activity was assessed by different methods

1. Hight fat diet induced method

Drug: The animals were administered test drug and positive control to respective group by oral route for 9th week. After 9th week HFD induced both group as per respective rats, after 3 hours test drug group was induced trail drug i.e *Mamsadhighrita* as per respective body weight for respective rats each as mentioned above.

The effect of drug was assured by:

- Every week weight should be checked of both groups
- Any other abnormal changes in the behaviour.

2. Blood investigation performing

Blood sample will collected from both group of the animal by retro orbital region after 0th week, 9th week & 12th week, further it send for LDL, HDL, Serum Glycerides, Tot. cholesterol, RBS.

Other parameters

If possible, at the end of the experiment adipose tissue deposits such as Epididymal, Perirenal, Retroperitoneal and Mesenteric fat pads will be collected after sacrifice and the relative weights will be calculated.

Necropsy and Histopathology findings

At the scheduled termination of the experiment, after blood sample collection, the animals will be sacrificed by ether euthanasia. Complete gross postmortem examinations will be performed on all terminated animals and organs (liver, kidney).

Organ weights

The weights of the major organs (liver, kidneys) will be measured in all survivors after sacrifice.

Method of disposal: Incineration

Histopathological study

Histopathological study of liver & kidney assessed.

Statistical analysis

Significant level of the proved activity is determined by one way ANOVA with $P < 0.05$ will be considered as statistically significant.

Weight changes in 90th day

Body weight		% change
Normal control	44.894 ± 8.026	--
Positive control	0.982 ± 7.074	- 97.8 ↓ @
Test drug	39.174 ± 11.571	1995.1 ↑ #

Data: MEAN ± SEM, $P < 0.0032$

The data shows there was decrease in body weight in normal control group, when compared with positive control, the observed decrease was found to be statistically non significant.

The data shows there was increase in body weight in test group, when compared with positive control, the observed increase was found to be statistically significant.

CONSOLIDATED STATEMENT

Parameter	Positive control	Test drug
Cholesterol	NSI	NSD
Sugar	NSI	VSI
HDL	VSI	VSD
LDL	SI	VSD
VLDL	SI	VSD
Triglycerides	SI	VSD

Above table shows that according parameter of the study there was decreased in the value of the parameter as compared to the both the group. There was induced HFD in both groups but in the test group induced trail drug i.e *Mamsadhi ghrita*.

Slide No	Necrosis	Inflammatory infiltrate	Degenerated tubules	Dilated tubules	Atrophic tubules	Fibrosis
PC1	-	-	++	-	-	-
PC2	-	-	++	+	++	+
T1	-	-	+	+	+	-
T2	-	-	+	++	-	-

In all the parameter we are mainly concentrating on cholesterol respectively, why cholesterol decreases, Cholesterol levels can mainly decrease due to various factors, including dietary changes, specific interventions like certain medications or supplements, and hormonal or metabolic shifts.

Increasing fiber intake or supplementing with specific compounds like myricitrin can lead to reduced cholesterol levels. Conversely, dietary changes that introduce imbalanced proteins can increase cholesterol, but supplementing with the missing aminoacid can restore normal levels.

How cholesterol level decrease, in mamsadhi ghrita having the ingredients like jatamamsi, kustha, ashwagandha, chitraka, ativisha, shaileya etc. Most of the drugs are laghu, rukshaghna and lekhaniya properties which acts on medhodhatu. And ghrita have best vyavayi, vikasi guna so there was statistically significant.

Histopathological result

Kidney

Table no:- 74 Changes seen in kidney

-Nil, + Mild, ++ Moderate, +++ severe

Report

All the slides show kidney tissue consisting of cortex and medulla. The cortex consists of circular structures called corpuscles. It also contains tubules in various shapes like proximal convoluted tubule and distal convoluted tubule

PC-The slides show nephropathic changes consisting of atrophic tubules with thickened basal lamina & interstitial fibrosis. Few Dilated tubules showing flattened epithelium and dilated lumen are seen in medulla of 1 slide. Degenerated tubules showing pale cytoplasm with sloughing of cell remnants in the lumen is seen in some areas.

T- Small areas of cortex shows dilated, degenerated and atrophic tubules. No fibrosis seen. Compared with PC, there is reduction in degenerated tubules, atrophic tubules and absence of fibrosis.

Compared with PC, there is reduction in histological changes.

Slide No	Necrosis	Inflammatory infiltrate	Degeneration
PC1	-	+	-
PC2	-	++	-
T1	-	+	-
T2	-	+	-

Liver**Table no:- Changes seen in liver**

-Nil, + Mild, ++ Moderate, +++ severe

Report

All slides show liver tissue with lobular arrangement. Each lobule consists of a central vein and portal triads along the periphery of lobules. Numerous sinusoids pass radially from central vein and the spaces between the sinusoids contain liver cells.

PC- Focal Chronic lymphocytic infiltrate is seen in both the slides. No degeneration and necrosis. No changes in tissue architecture.

T- Focal Chronic inflammatory infiltrate is seen in few areas. Degeneration and necrosis are not seen in both the slides. No changes in tissue architecture.

Compared with PC, there is mild reduction of histological changes in 1 slide.

Remark

The above histological features should be correlated with other study parameters for final conclusion.

Symbols**Kidney**

Dilated tubules- blue arrow

Degenerated tubules- green arrow

Fibrosis- Yellow arrow

Atrophic tubules- Black arrow

Liver

Inflammatory infiltrate-Red arrow

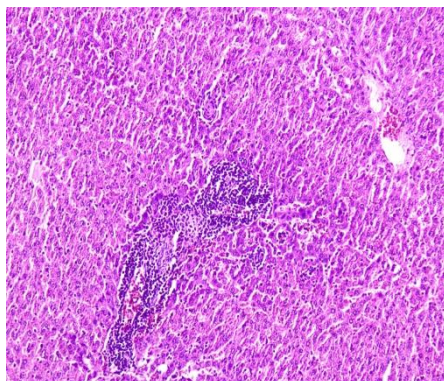


Grouping & marking of rats



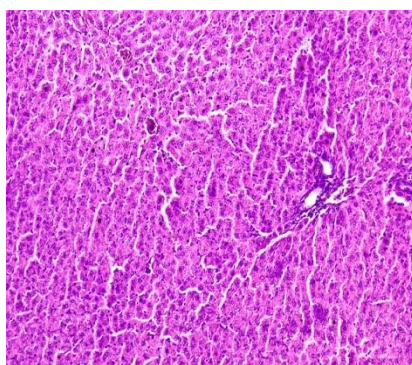
Dissecting animal

Histopathological study liver

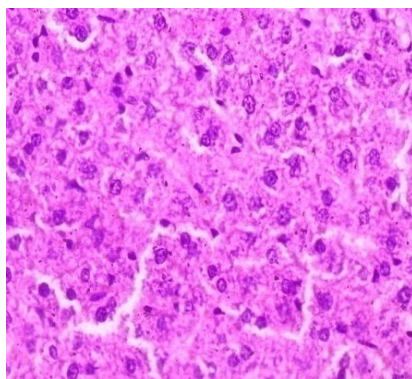


Inflammatory infiltrate around the blood vessel

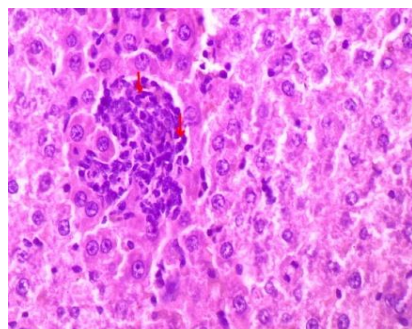
Histopathological study kidney



Areas showing reducing histological changes



Areas showing inflammatory infiltrate 2



Lymphocytic infiltrate

DISCUSSION

In the present study, the effect of *Mamsadhi Ghrita* on body weight was evaluated over a period of 90 days in experimental animals. At the beginning of the experiment, all groups showed normal baseline body weights. After administration of *Mamsadhi Ghrita* for 60 days, a significant change in the body weight of animals was observed. The test group receiving *Mamsadhi Ghrita* exhibited a notable reduction in body weight compared to their initial values, indicating a potential anti-obesity effect of the formulation. The consolidated statement indicates that all the biochemical parameters, including cholesterol, triglycerides, LDL, VLDL, and blood sugar, showed a decrease in the test drug group treated with *Mamsadhi Ghrita*. When compared to the positive control group. This reduction suggests a significant hypolipidemic and anti-obesity effect of the formulation. The decrease in cholesterol and triglyceride levels may be attributed to the ability of *Mamsadhi Ghrita* to enhance lipid metabolism and promote the breakdown and utilization of stored fat.

CONCLUSION

In contrast, the control group (if included in your study) either maintained or slightly increased their body weight, supporting the observation that the observed changes were due to the test formulation rather than normal growth or environmental factors.

Overall, the observed decrease in biochemical parameters supports the anti-obesity potential of *Mamsadhi Ghrita*. It acts by normalizing lipid metabolism, reducing serum cholesterol and triglycerides, and maintaining healthy body weight, thus demonstrating its efficacy as a natural formulation for the management of obesity and related metabolic disorders.