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A STUDY OF MEDOHAR EFFECT OF MUSTA GHANAVATI IN HYPERLIPIDEMIA

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ABSTRACT

Hyperlipidemia is an overgrowing problem in the present era. The major reasons being lifestyle changes including increased consumption of fatty foods, sedentary lifestyle, etc. It is a major risk factor for coronary artery disease, cerebro-vascular disease, etc. Various allopathic medicines are being used to treat hyperlipidemia. In Ayurveda, there is no such term as hyperlipidemia but '*Medoroga*' is closely correlated with lipid disorders. India has rich heritage of diversified flora with more than ten thousand medicinal species. One such medicinal plant is *musta* i.e. Cyperus rotundus which has beneficial effect on *medoroga*. We carried out the study to find out the *medohar* effect of *musta* on patients with hyperlipidemia.
Keywords: Hyperlipidemia, *Medoroga*, Cyperus rotundus, *musta.*

INTRODUCTION

Ayurveda is a way of life rather than simply a system of Ancient Indian Medicine. Even in this modern world, not all the diseases are curable by modern medicines. In addition, modern medicines also carries with them significant side effects related to the use of drugs. Ayurvedic medicines and the way of life is still playing an important role in this era of modernization and urbanization; and is also being increasingly accepted throughout the world. Hyperlipidemia is a condition wherein levels of lipids (cholesterol, triglycerides or both) are raised in plasma. It results from abnormalities in lipid metabolism or plasma lipid transport or a disorder in the synthesis and degradation of plasma lipoproteins.

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Rapid urbanization of the present world with its associated lifestyle changes, changing dietary habits, changing wake-sleep cycle, stress, etc. are the major reasons behind the increasing problem of hyperlipidemia.

According to Centers for Disease Control data from a survey, hyperlipidemia is second only to hypertension in the list of the 10 most common chronic conditions that were seen (1). It is an important risk factor for cardiovascular and cerebrovascular diseases i.e. ischemic heart disease, stroke, peripheral vascular disease, etc. In patients with hyperlipidemia, it has been postulated that cholesterol gets deposited in the arterial walls, leading to stenosis and *atheroma* formation. Hyperlipidemia appear to activate the inflammatory response in the arterial wall (2). This leads to recruitment of inflammatory cells within the arterial wall that slowly progress to form stenosis resulting in vascular diseases. Sudden rupture and thrombus formation of these atheromat-

ous plaque results in acute events like stroke and myocardial infarction.

Hyperlipidemia as such has not been described in the Ayurveda. Yet, the lipids which are described in modern medical science have properties which are closely related with the properties of *meda.* Hyperlipidemia may be correlated with *medovriddhi* on the basis of their properties. As long as they are within their normal physiological state they are considered as "*Dhatu*". Due to excessive indulgence in *shleshma vardhaka ahara vihara, agnimandya* results which lead to *aama dosha* formation eventually result in *medadhatuvriddhi* which ultimately leads to lifestyle disorders.

India has rich flora of herbs due its unique climatic and geographical condition. One such plant is *Musta* (Cyperus rotundus) and is found throughout India. It belongs to the family Cyperacea. The major chemical constituents of *Musta* are Cineol (+) copadiene, Copaene, Cyperol, Cyperolone, a- Cyperone,(+) epoxyguaiene, isocyperol, isokobusone, Kodusone, Mustakone, Patchilene, (+) rotundone, a- & b- selinene, Sugenol, b- sitosterol etc (3). It possesses various pharmacological activities such as diuretic, carminative, emmenagogue, anthelminthic, analgesic, anti-inflammatory, anti-dysenteric, anti-rheumatic activities. *Musta* is easily available and cheap which is effective in the management of *aama dosha* and is important *lekhniya dravya* (4).

Material and Methods:

Preparation of Drug: Raw *Musta* roots were procured from the local market of the city. Samples were sent to the department of *Dravyaguna* for identification, verification and certification. After the verification report, *Musta Ghanavati* of 500mg was prepared in the *rasashala* of our college. It was analyzed for quality control from GMP certified FDA approved analytical lab. After obtaining acceptable report of various test of standardization procedure, *Musta Ghanavati* was considered for administration to the subjects.

Selection of Patients: In this study, 30 patients of hyperlipidemia were randomly selected from IPD and OPD of our hospital according to the prespecified inclusion and exclusion criteria.

- **Inclusion Criteria:** Patients fulfilling the following general and diagnostic criteria were selected for the study.

Patients having:

a. Age more than 30 years and below 60 years
b. Body Mass Index (BMI) < 40
c. Patients having cholesterol >160mg/dl or triglyceride >150mg/dl or LDL >100mg/dl

- **Exclusion criteria :**

Patients having any of the following criteria were excluded from the study.

a. History of serious cardiac disorders like myocardial infarction, Cardiac failure etc.
b. Any major illness, insulin-dependent diabetes mellitus, diabetes mellitus which was poorly controlled or newly diagnosed
c. If the patient was on some new therapy or recently adjusted therapy
d. Thyroid disorder
e. Patients on corticosteroids
f. Renal insufficiency
g. Pregnant females and lactating mothers

Conduct of the Study:

Patients included in the study according to above inclusion and exclusion criteria were explained details of the study and informed consent obtained. Baseline data – height, weight, BMI, Physical examination, Symptoms of *Aama*, Lipid profile, complete blood counts, blood sugar levels, liver function test and renal function test were recorded. The '*Musta Ghanavati'* was then prescribed with the dose of two tablets thrice a day (each tablet = 500mg). Patients were advised to report immediately in case any side effects noted. Patients were followed at monthly interval for the duration of three months. During each follow up period any untoward effects related to the use of tablets was asked. *Aama symtoms* and weight of the patient were noted every month. At the end of three months, all baseline tests including lipid profile were repeated and recorded.

Assessment Criteria:

i) Subjective Criteria:

Symptoms of *aama* (5):

Classical symptoms of Aama	Present Or Absent
1) *Angagauravata* (body heaviness)	P/A
2) *Mandata* (Slowness in physical activity)	P/A
3) *Aalasya* (Lethargy)	P/A
4) *Apakti* (Indigestion)	P/A
5) *Prasek* (Excess of Sputum and Saliva)	P/A
6) *Malasanga* (Constipation)	P/A
7) *Aruchi*	P/A
8) *Klama* (Fatigue)	P/A

They were recorded at the beginning of the study and later at 1 month, 2 month and 3 months of follow-up.

ii) Objective Criteria:

Observations were noted and recorded at the beginning and at the end of the study duration.

1) Weight and height of the patient

2) Body mass index (BMI)

BMI values were used according to Indian Standards (6). They categorize BMI as follows:

Less than 18.5	Underweight
18.5 – 22.9	Normal
23 – 24.9	Overweight
25 and above	Obese

3) Lipid profile

- Total cholesterol (mg/dl)
- Triglycerides (mg/dl)
- LDL (mg/dl)
- HDL (mg/dl)

4) Other Investigations:

1. Complete Blood Count
2. Liver Function Test
3. Renal Function Test
4. Blood sugar levels

Statistical Analysis:

All the observations keenly recorded and collected during the study were subjected to statistical analysis to reach the final results and conclusions. Statistical parameters and methods were applied to the data wherever possible to find the significance of the drug. Statistical analysis was done by using descriptive and inferential statistics using Chi square test and student's paired t test and software used in the analysis were SPSS 17.0 version and Graph Pad Prism 5.0 version. P value of less than 0.05 is considered as level of significance.

Observations of the study:

A total of thirty patients were included in the study. Patients included in the study ranged from 30 to 60 years. Mean age is 48 years. Maximum number of patients was in age group of 51-60 years i.e 46.6%. 67% of patients were males and 33% females. Among females 60% had attained menopause. 87% patients were married.

21 patients (70%) belonged to upper socio-economic status. 5 patients (16.7%) were in the middle socio-economic status. And 4 patients (i.e. 13.3%) were from lower socio-economic class.

History of hypertension was present in 16.7% of the included patients. Family history of dyslipidemia among the relations of the patients was present in 26.67% of the cases.

The *Dashavidha Pariksha* revealed that 50% of the study population had *kapha-pitta pradhan prakriti*, 16.67% patients had *kapha-vata* and *pitta-kaphatmak prakriti. Vata-pitta prakriti* was seen in 13.33% patients and *vata-kaphatmak* in 3.33% patients. 60% patients had *tamasik manas prakriti*, 33.33% patients had *rajasik manas prakriti* and 6.67% patients had *satvik manas prakriti*.

Dietary Habits: 80% of our patients were consuming mixed diet, 60% were consuming diet three times a day and 60% were frequently having food in hotels. Most of the patient in the study were taking *Madhur rasatmak aahar* ie.73.33%, 20% of the patient were taking *katu rasatmak* aahar.6.67% of the patient were taking *amla rasatmak aahar*. 80% of the study population was taking *snigdha*, guru *aahar*. 36.67% patients were taking *ushna gu-*

natmak aahar. 33.33% patients were taking sheet *gunatmak aahar*. 20% patients were consuming *ruksha, laghu gunatmak aahar.*

5 of the study patients were addicted to smoking accounting for 16.7% of the cases. 11 patients had addiction of chewing tobacco accounting for 36.7% of the study subjects. 4 patients had addiction of alcohol.

Ashtavidha pariksha revealed that 56.67% patients had regular mal *pravruti*, 46.67% patients had *samyaka* mal *pravruti*. 73.33% patients had *samyaka mutra pravruti.* 53.33% patients had *sama jivha.* 50% of the study population had *sheeta sparsha*. 56.67% patients had *madhyama akriti* and 43.33% had sthul aakruti.

Effect of Therapy: The clinical assessment of the patient was done before, in between and after the study. On the basis of these criteria, the statistical analysis of improvement in the patients was done.

Effect of therapy on Symptoms of Aama:

Table 1: Showing effect of *musta ghanavati* on symptoms of aama before and after 1, 2 and 3 months of therapy

Symptoms of Aama	Before t/t		1 month		2 months		3 months		⌧2-value
	f	%	f	%	F	%	f	%	
Angagaurav (Heaviness)	14	46.67	14	46.67	3	10.00	2	6.67	22.19 P=0.0001,S
Mandata(Slowness in physical activity)	16	53.33	9	30.00	5	16.67	3	10.00	16.51 P=0.0009,S
Aalasya (Lethargy)	17	56.67	8	26.67	2	6.67	1	3.33	31.17 P=0.0001,S
Prasek (Excess of sputum and saliva)	0	0.00	0	0.00	0	0.00	0	0.00	-
Apakti(Indigestion)	6	20.00	6	20.00	2	6.67	2	6.67	4.61 P=0.20,NS
Malabaddhata (constipation)	9	30.00	8	26.67	4	13.33	3	10.00	5.41 P=0.14,NS
Aruchi (Loss of interest)	4	13.33	2	6.67	1	3.33	0	0.00	5.31 P=0.15,NS
Klam (Fatigue)	15	50.00	10	33.33	3	10.00	2	6.67	20.09 P=0.0002,S

The above table shows symptoms of aama before starting the therapy and then at follow up after 1 month, 2 months and 3 months duration. Heaviness was present in 14 patients (46.6%) before therapy and then 14, 3 and 2 patients at 1, 2 and 3 months follow up; thus showing highly significant reduction after 3 months of therapy. There was also highly significant decrease in slowness from 53.3% to 10% after 3 months of therapy ($p<0.001$). Similarly, lethargy also showed highly significant reduction after therapy from 56.6% to 3.3% ($p<0.001$). Excess of sputum and saliva was not present in any patient from the beginning of study. Indigestion and constipation was improved from 20% to 6.6% and 30% to 10% respectively; however the difference was not statistically significant ($p=0.20$ and $p=0.14$ respectively). Similarly, *aruchi* also did not showed statistically significant reduction ($p=0.15$). Fatigue on the other hand, improved significantly from 50% of patients at baseline to 33.3%, 10% and 3.3% at 1, 2 and 3 months after therapy ($p<0.001$).

Effect of therapy on Lipid Profile:

Table 2: Showing lipid profile levels before and after 3 months of Musta ghanavati therapy. (S = significant)

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
TC	Baseline	221.33	30	26.17	4.77	7.660	0.0001,**S**
	Endline	188.10	30	17.28	3.15		
TG	Baseline	164.56	30	55.92	10.21	5.817	0.0001,**S**
	Endline	134.36	30	33.72	6.15		
LDL	Baseline	158.80	30	24.56	4.48	7.168	0.0001,**S**
	Endline	132.03	30	16.78	3.06		
HDL	Baseline	37.63	30	5.43	0.99	3.299	0.003,**S**
	Endline	40.56	30	5.56	1.01		

The above table shows lipid profile test before and after 3 months of *musta* therapy. Mean total cholesterol (TC) was 221.3 ± 26.17 mg/dl at baseline and 188.1 ± 17.28 mg/dl after 3 months. The p-value of TC is 0.0001 which is significant. Mean triglycerides (TG) level was 164.56 ± 55.92 mg/dl at baseline and 134.36 ± 33.72 mg/dl after 3 months of therapy. The p-value is 0.0001 which is significant. LDL at baseline was 158.8 ± 24.56 mg/dl and after 3 months was 132.03 ± 16.78 mg/dl. The p-value of LDL is 0.0001, which is significant. HDL at baseline was 37.63 ± 5.43 mg/dl and after 3 months was 40.56± 5.56 mg/dl. The p-value of HDL is 0.003 which is significant.

Effect of therapy on other blood parameters:

Table 3: Showing CBC before and after 3 months of musta ghanavati therapy

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
Hb%	Baseline	12.77	30	0.98	0.18	0.353	0.726,**NS**
	Endline	12.80	30	0.78	0.14		
WBC	Baseline	8300.00	30	1513.38	276.30	0.243	0.810,**NS**
	Endline	8336.66	30	1136.08	207.41		
PLT	Baseline	2.80	30	0.60	0.10	0.812	0.423,**NS**
	Endline	2.87	30	0.55	0.10		

Table 4: Showing Liver function tests before and after 3 months of musta ghanavati therapy

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
SGOT	Baseline	24.20	30	6.33	1.15	0.999	0.326,**NS**
	Endline	23.26	30	3.97	0.72		
SGPT	Baseline	25.83	30	6.88	1.25	0.159	0.875,**NS**
	Endline	25.63	30	5.86	1.07		
Total Bilirubin	Baseline	0.76	30	0.16	0.03	2.463	0.020,**S**
	Endline	0.83	30	0.11	0.02		

Table 5: Showing renal functions and blood sugar levels before and after 3 months of musta ghanavati therapy

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
Creatinine	Baseline	0.92	30	0.23	0.04	0.646	0.523,**NS**
	Endline	0.90	30	0.19	0.03		
Urea	Baseline	24.03	30	3.99	0.72	1.308	0.201,**NS**
	Endline	25.00	30	4.29	0.78		
FBS	Baseline	89.43	30	5.67	1.03	0.000	1.000,**NS**
	Endline	89.43	30	4.72	0.86		
PMBS	Baseline	130.46	30	7.27	1.32	0.806	0.427,**NS**
	Endline	129.10	30	7.32	1.33		

The above tables (3,4 and 5) shows that there was no any adverse effect of *Musta ghanavati* on routine blood parameters which includes complete blood picture, renal and liver function tests and blood sugar levels.

Effect on BMI:

The mean height and weight in the study population was 166 cm and 68.7 kg respectively. Mean body mass index (BMI) in our study population at baseline was 24.86 ± 2.94 kg/ sq.m. After completion of treatment for 3 months duration mean BMI was 24.41 ± 3.01 kg/sq.m.

Adverse Effects:

Only one young female had adverse effect in the form of headache during the study. No major adverse effects noted during the study which required discontinuation of the therapy. No any adverse effects noted on routine blood parameters monitored during the study.

DISCUSSION

The present study was conducted to assess the impact of *Musta Ghanavati* on hyperlipidemia. Hyperlipidemia is a growing problem of the present era and carries along with it risk of many serious and life threatening diseases like heart attack and stroke, etc. Many allopathic medications are being used for the treatment of hyperlipidemia, the most important being statins. Hyperlipidemia as such is not described in Ayurveda, but carries similarity with *Medoroga*. *Musta ghanavati* has many beneficial effects on *medoroga* and hence we studied the drug on patients with hyperlipidemia.

The study included 30 patients; 20 males and 10 females in our study. Most of the patients were in the age group of 50-60 years and most of the females had attained menopause suggesting hyperlipidemia being an important disease of growing age. Also, most of the patients were from urban areas and upper socio-economic status again suggesting that urbanization is an important causative factor.

In the present study 50% patients were of *Kapha Pitta pradhan Prakriti* and 16.67% patients were of *Kapha Vata pradhan Prakriti*. It shows the dominance of *Kapha dosha in Prakriti*, which are more prone to *medoroga* (hyperlipidemia). Kapha *dosha* and *meda* resembles in their composition, *meda* is *kapha* predominant *dhatu* and properties attributed to both are similar. As both are having similar properties it increases the *Vyadhibala* and makes the disease difficult one to treat. This observation is supportive to the "*Samanya Vishesh Siddhant*" of *Charak samhita* in "*Dirghajivitiya Adhyaya*" (7). 70% patients were found to have Tama dominance in their *Manas prakrti* which means that person's life style sedentary and makes him / her prone to *medoroga*. Maximum number of patients i.e. 73.33% was taking *Madhura rasa* predominant aahar followed by 60% of patients *Katu rasa* in their routine diet, while *Guru*, *Snigdha* and *Tikshna Guna pradhana* diet was found in 73.33%, 60% and 60%

respectively. All these (*Madhura rasa* and *Snigdha, Guru guna*) ultimately vitiated *Kapha dosha*, which leads to *Medoroga* (8, 9). '*Avyayam*' is one of most *viharaj hetu in medoroga* which is found in 70% of study population in this study. *Charaka Samhita* and *Madhav Nidan* has explained the same (8,9,10).

Symptoms of *aama* also reduced markedly after *the treatment with medoroga. Highly significant improvement is seen in Angagauravata* (46.6% to 6.67%), symtoms of *mandata* (53.3% to 10%) and *aalasya* after three months of therapy. *Apakti* and *Malasangha* were also improved though the difference did not reach statistical significant. Similarly, *aruchi* also did not show statistically significant reduction. *Klam* on the other hand, improved significantly from 50% of patients at baseline to 33.3%, 10% and 3.3% at 1, 2 and 3 months after therapy ($p<0.001$).

Body mass index (BMI) is an important marker of nutritional status of the body. Overweight and obesity are defined on the basis of BMI; and these have emerged as an important risk factor for cardiovascular and cerebrovascular diseases. In our study, BMI also showed improvement after therapy with *musta ghanavati*.

Lipid profile was done before and after three months of therapy with *musta ghanavati*. All the parameters of lipid profile showed statistically significant improvement before and after the therapy. Total cholesterol, serum triglycerides and low density lipoproteins (LDL) which are considered as a bad form of lipids were significantly reduced. On the other hand high density lipoproteins (HDL) which is considered as a good form of serum lipid showed significant increase after the administration of *musta*. HDL is known to have protective action against atherosclerosis and to reduce the risk for cardiovascular disease.

Moreover, *musta ghanavati* did not show any significant adverse effects. There was no major side effect which required discontinuation of the therapy. Also, all the other blood parameters monitored for side effects which include complete blood counts, blood sugars, renal and liver function tests did not show any deterioration. This suggest that *musta ghanavati* is a safe drug.

CONCLUSION

Musta ghanavati is an effective ayurvedic medicine in the management of hyperlipidemia. It not only reduces lipid parameters objectively but also leads to subjective improvement in the symptoms of *aama*. More ever, it is devoid of any serious adverse reactions.

Limitations of the Study:

The following limitations were observed in the study:

1. This study not compare *musta ghanavati* with other drug or placebo. None the less, significant improvement in both subjective and objective criteria were seen in our study before and after the administration of *musta.*
2. Number of patients included in the study is less. However, the study has shown that *musta* is largely free of adverse effects at the dose of 3 grams per day. Hence, larger studies can be undertaken in future safely with this drug.

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