



## Research Article

### A CLINICAL STUDY OF *MUSTA* (*CYPERUS ROTUNDUS* LINN.) IN HYPERLIPIDAEMIA

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#### ABSTRACT

Hyperlipidaemia is a metabolic disorder in population diagnosed by altered levels of Lipoproteins, Cholesterol and Triglycerides in plasma. This results deposition of lipids especially esterified cholesterol in the wall of arteries resulting in the narrowing and blockage of the arteries leading to heart diseases and other diseases such as cerebrovascular disease, renal disease, liver disease and peripheral vascular disease. The present work focused on comparative analysis of anti-hyperlipidaemic profile of *Musta* (*Cyperus rotundus* Linn.) in Male and female patients. The patients suffering from Hyperlipidaemia and its related disorders like non-insulin dependent diabetes etc. were divided into two groups, Group A confined to male and Group B confined to female. Each group contains 15 patients. All the patients were advised to take 3 gm powdered *Musta* rhizome in two or three divided doses for a period of 45 days. After treatment, *Musta* rhizome powder showed more significant anti-hyperlipidaemic activity in males than females. The significance in males total cholesterol ( $p < 0.05$ ), HDL ( $p < 0.05$ ), VLDL ( $p < 0.05$ ), triglycerides ( $p < 0.05$ ) is more than that of females VLDL ( $p > 0.05$ ), triglycerides ( $p > 0.05$ ). It is observed that in group A 40% patients got complete relief, 6.67 % patients got marked relief, 33.33% patients got moderate relief and 20 % patients got mild relief. Similarly, in group B patients 06.67% patients got complete relief, 6.67 % patients got marked relief, 53.33% patients got moderate relief and 33.33 % patients got mild relief.

**KEYWORDS:** Hyperlipidaemia, *Musta*, *Cyperus rotundus*, Heart diseases, Non-insulin dependent diabetes.

#### INTRODUCTION

Ayurvedic medicine is existing on the earth for the welfare of the mankind. The worth of Ayurveda is to withstand the health of individual health and to cure the disease of a patient. The health is achieved by following the daily regimen, seasonal regimen, codes for healthy conduct, ethical regimen etc. Refusal to follow this regimen and conduct, individuals may be effected by diseases. Elevated levels of fats in the body is either due to lack of physical activities or some genetic factors or imbalanced diet. Addition of high quantity of fats in the food leads to Hyperlipidaemia or *Abaddha Medo Vridhhi*.

Hyperlipidaemia is a metabolic condition in which the elevated levels of lipoproteins, cholesterol, triglycerides in plasma leads to thinning and obstruction of the arteries and other diseases such as CVD (cerebrovascular disease), cardiovascular disease, renal disease, liver disease peripheral and vascular disease. In Ayurvedic system of medicine, various herbal and mineral drugs such as *Kapha hara* and *Medohara* are useful for balancing dyslipidaemia.

*Musta* has been described in *Vedas* and *Vedic* texts. It is also described in *Atharva parisistagrantha*, *Varaha srotasutra* and *Hiranyakesi srota sutra*.<sup>[1]</sup> *Musta* is used in many simple and compound drug preparations to cure various diseases since time immemorial. *Musta* is having several dosage forms used internally as well as externally. For external application *Musta* can be used in the form of *Taila* and *Ghrita* (medicated vegetable oil and animal fat), *Lepa* (Topical application), *Pradeha* (Thick or Viscid ointment), *Upanaha* (Poultice), *Pragharsha* (Rubbing), *Parisheka* (Sprinkling/Showering of drug), *Dhupana* (fumigation) formulation. *Musta* can also be used

internally using various forms like *Kashaya* (Decoction), *Churna* (Powder), *Swarasa* (fresh juice), *Guti/Vati* (Pills), *Varti* (Suppository), *Kalka* (Paste form), *Lavana* (Salt preparation), *Kshara* (Alkali form) and administered in various *Karmas* like *Vasti* (Enema), *Nasya* (Nasal drop), *Gandusha* (Gargling), *Anjana* (Collyrium). It can be used as food item in the form of *Pramathya* (dough prepared by boiling medicinal substances) and *Paniya*. Number of phytoconstituants such as -cyperone, cyperene,  $\beta$ -selinine, Cyperenone, Luteolin,  $\beta$ - sitosterol, Cyperotundone, Rotundone, Cyperolone, Cyperenone has been isolated and characterization from *Musta* plant.<sup>[2]</sup> Previous studies reported the pharmacological properties on lipid lowering,<sup>[3]</sup> infection diarrhoea,<sup>[4]</sup> antidiabetic & wound healing<sup>[5]</sup> and antioxidant activities<sup>[6]</sup> of *Musta* etc., There is no previous reports on comparative effect of antihyperlipidaemic activity of drug *Musta* (*Cyperus rotundus* Linn.) on male and female patients. Hence, present study evaluate the comparative effect of anti-hyperlipidaemic activity of drug *Musta* (*Cyperus rotundus* Linn.) in male and female patients.

#### MATERIALS AND METHODS

##### Collection and Preparation of medicine

The experiment was conducted at the Department of Dravyaguna, S.V. Ayurvedic College/ Hospital, Tirupati.

*Musta* rhizomes were purchased from Chennai market. These were then thoroughly cleaned with tap water followed by distilled water. The wiry, tough and slender roots were removed. About 10 kg of cleaned dried rhizomes were powdered in Pulverizer. The obtained

powder was sieved with mesh no. 100 to get fine powder. This powder was then tableted, each weighing 500mg.

**Selection of Patients**

The patients of hyperlipidaemia were selected based on following criteria.

**Inclusion criteria**

1. Persons suffering from hyperlipidaemia and its related disorders like non-insulin dependent diabetes in the age group of 30-60 years.
2. Persons suffering from dyspnoea on exertion, weight gain, obesity, diabetes mellitus, hypertension and normal asymptomatic people were screened for hyperlipidaemia.
3. As the hyperlipidaemic state is leading to many of the above said conditions, normal healthy patients were selected for the experimental trial.

**Exclusion criteria**

1. Patients below 30 years and above 60 years of age.
2. Patients suffering from I.D.D.M. (Insulin- Dependent Diabetes Mellitus), severe diabetes mellitus with complications, malignant disorders and renal disorders.
3. Patients who have the history of either cardiac or cerebral stroke and also who underwent by-pass surgery.

**Diagnostic criteria**

Blood test for lipid profile, which includes total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), very low density lipoprotein (VLDL) and triglycerides was carried out before and after treatment for the evolution of hyperlipidaemia. Patients having abnormalities in one or more of the following criteria were considered as Hyperlipidaemia and were selected for the study.

**Table 1: Normal value of lipid profile<sup>(7)</sup>**

<b>Total Cholesterol</b>	<b>LDL</b>
<ul style="list-style-type: none"> <li>• &lt; 200 → Desirable</li> <li>• 200-239 → Borderline</li> <li>• ≥ 240 → High</li> </ul>	<ul style="list-style-type: none"> <li>• &lt; 100 → Optimal</li> <li>• 100-129 → Near optimal</li> <li>• 130-159 → Borderline</li> <li>• 160-189 → High</li> <li>• ≥ 190 → Very High</li> </ul>
<b>VLDL</b>	
<ul style="list-style-type: none"> <li>• &lt; 32 → Desirable</li> </ul>	

**RESULTS**

The Observation of mean lipid profile parameter of 15 patients of each group are tabulated as under

**Table 2: Effect of medicine on lipid profile of group-A patients**

Parameters	Mean (mg/dl)		S.D.	S.E.		‘t’	p	Significance	
	B.T.	A.T		B.T.	A.T.				
T.C.	208.47	173.13	35.33	53.62	38.29	13.85	9.89	2.4166 <0.05	Statistically Significance
L.D.L.	116.28	95.32	20.96	57.07	38.73	14.73	10.0	1.5333 >0.05	Not Statistically Significance
H.D.L.	37.90	42.40	-4.5	6.96	5.60	1.78	1.44	2.5920 <0.05	Statistically Significance
V.L.D.L.	54.22	35.42	18.80	28.18	14.93	7.27	3.85	3.8536 <0.05	Very Statistically Significance
T.G.	274	183	91.0	143.98	86.64	37.17	22.37	3.7136 <0.05	Very Statistically Significance

(n=15, df=14)

The p value of four parameters were below 0.05, hence the result of treatment was significant.

<b>HDL</b>	<b>Serum Triglycerides</b>
<ul style="list-style-type: none"> <li>• &lt; 40 → Low</li> <li>• ≥ 60 → High</li> </ul>	<ul style="list-style-type: none"> <li>• &lt; 150 → normal</li> <li>• 150-199 → Borderline</li> <li>• 200-499 → High</li> <li>• ≥ 500 → Very High</li> </ul>

**Grouping**

30 patients of Hyperlipidaemia were selected and randomly divided into two groups, each consisting of 15 patients based on the sex of the patient.

**1. Group - A:** The patients of group A were confined to Males and advised to take *Musta* tablet.

**2. Group- B:** The patients of group B were confined to Females advised to take *Musta* tablet.

**Duration of treatment**

The course of the treatment was fixed for 45 days. The patients were instructed to avoid diet which alters the lipid profile like oily food, butter, eggs, meat etc. Preliminary data was collected before treatment.

**Dose**

Each patient under experimentation, was administered three grams of powdered *Musta* in a day three divided doses.

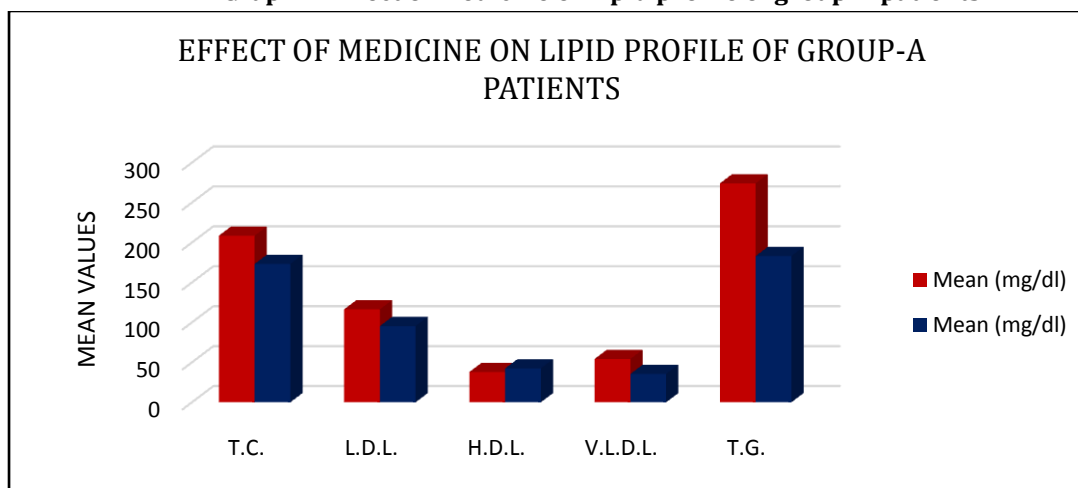
**Follow Up**

After completion of the treatment, the patients of both the groups were examined during follow up at an interval of two weeks for 45 days.

**Statistical analysis**

The data according to parameters (lipid profile) were validated and subjected for statistical evaluation and significance of result is mentioned according to ‘P’ value. The overall result is mentioned according to percentage of relief and changes in number of parameters. If all the five parameters come within normal range, the result is considered as ‘Completely relieved’. If four parameters come within normal range, the result is considered as ‘Markedly relieved’. If three parameters come within normal range, the result is considered as ‘Moderately relieved’. If two or only one parameter are within the normal range, the result is considered as ‘Mildly relieved’. If no parameter comes within the normal range, the result is considered as ‘Unchanged’.

**Graph 1: Effect of medicine on lipid profile of group-A patients**



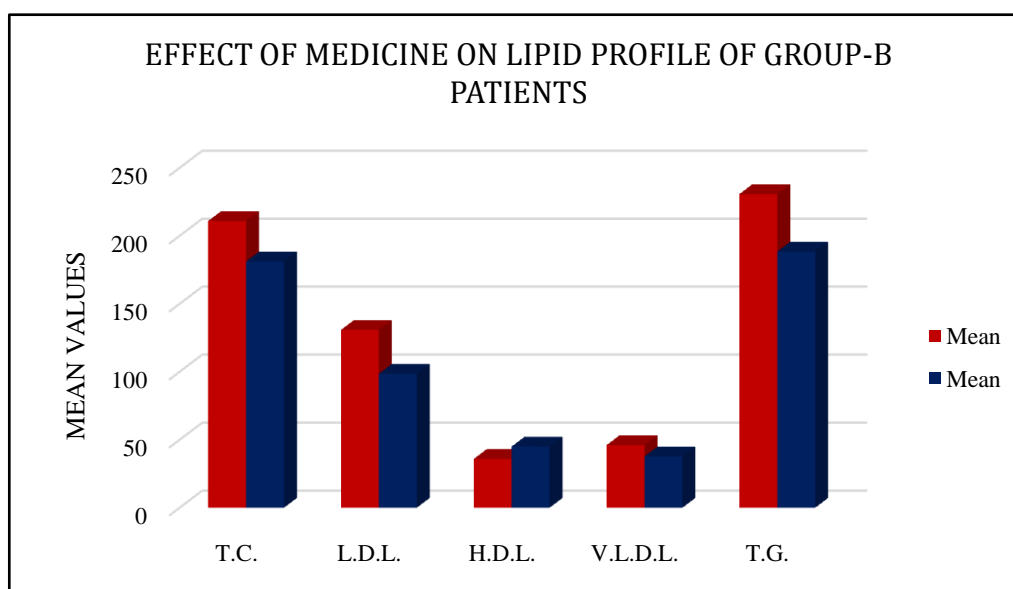
**Table 3: Effect of medicine on lipid profile of group-B patients**

Parameters	Mean (mg/dl)		Mean diff.	S.D.		S.E.		't'	p	Significance
	B.T.	A.T		B.T.	A.T.	B.T.	A.T.			
<b>T.C.</b>	210.87	181.13	29.73	38.63	28.12	9.97	7.26	3.2600	<0.05	Very Statistically Significance
<b>L.D.L.</b>	130.78	98.50	32.28	35.09	16.51	9.06	4.26	4.2636	<0.05	Extremely Statistically Significance
<b>H.D.L.</b>	35.87	45.0	-9.13	6.17	7.84	1.59	2.02	3.9984	<0.05	Very Statistically Significance
<b>V.L.D.L.</b>	46.02	37.69	8.33	24.82	16.36	6.40	4.22	1.3398	>0.05	Not Statistically Significance
<b>T.G.</b>	2230.67	188.40	42.27	124.40	81.10	32.12	20.94	1.3556	>0.05	Not Statistically Significance

(n=15, df=14)

The p value of three parameters were below 0.05, hence the results of treatment was significant.

**Graph 2: Effect of medicine on lipid profile of group-B patients**



The observation of mean lipid profile parameter of all the patients in both groups are tabulated as under.

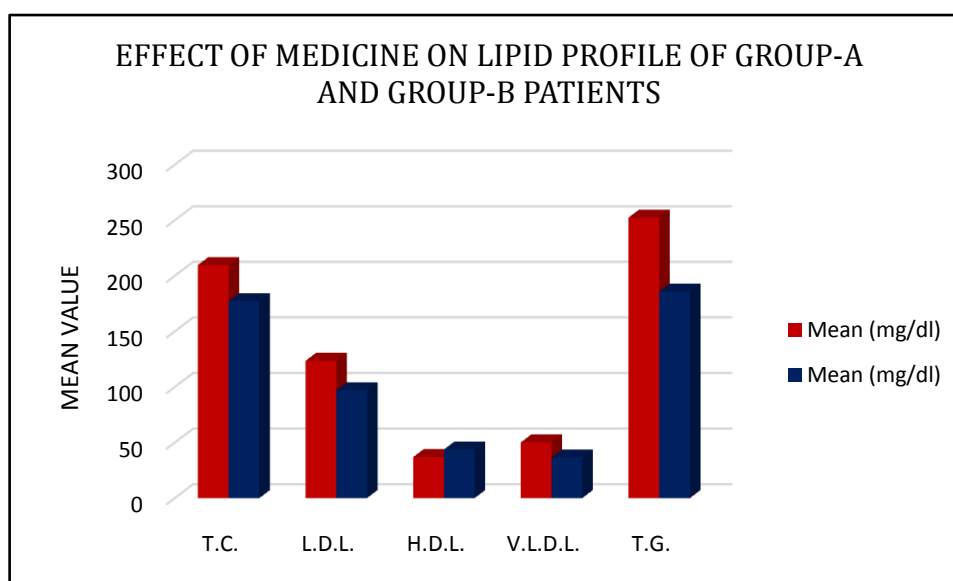
**Table 4: Effect of medicine on lipid profile of group-A and group-B patients**

Parameters	Mean (mg/dl)		Mean diff.	S.D.		S.E.		't'	p	Significance
	B.T.	A.T		B.T.	A.T.	B.T.	A.T.			
<b>T.C.</b>	209.67	177.13	32.53	45.94	33.26	8.39	6.07	3.8355	<0.05	Extremely Statistically Significance
<b>L.D.L.</b>	123.53	96.91	26.62	47.12	29.30	8.60	5.35	3.4350	<0.05	Very Statistically Significance
<b>H.D.L.</b>	36.88	43.70	-6.81	6.54	6.82	1.19	1.24	4.6253	<0.05	Extremely Statistically Significance
<b>V.L.D.L.</b>	50.12	36.56	13.56	26.42	15.43	4.82	2.81	3.3887	<0.05	Very Statistically Significance
<b>T.G.</b>	252.33	185.70	66.63	134.03	82.50	24.47	15.06	3.3314	<0.05	Very Statistically Significance

(n=30, df=28)

The p value of all the parameters were below 0.05, hence the overall result of treatment was very significant.

**Graph 3: Effect of medicine on lipid profile of group-A and group-B patients**



**OVERALL RESULT OF STUDY**

**Table 5: Effect of medicine on group -A patients**

Assessment	No. of Patients	% of patients
Completely Relieved	6	40
Markedly Relieved	1	6.67
Moderately Relieved	5	33.33
Mildly Relieved	3	20
Unchanged	0	0

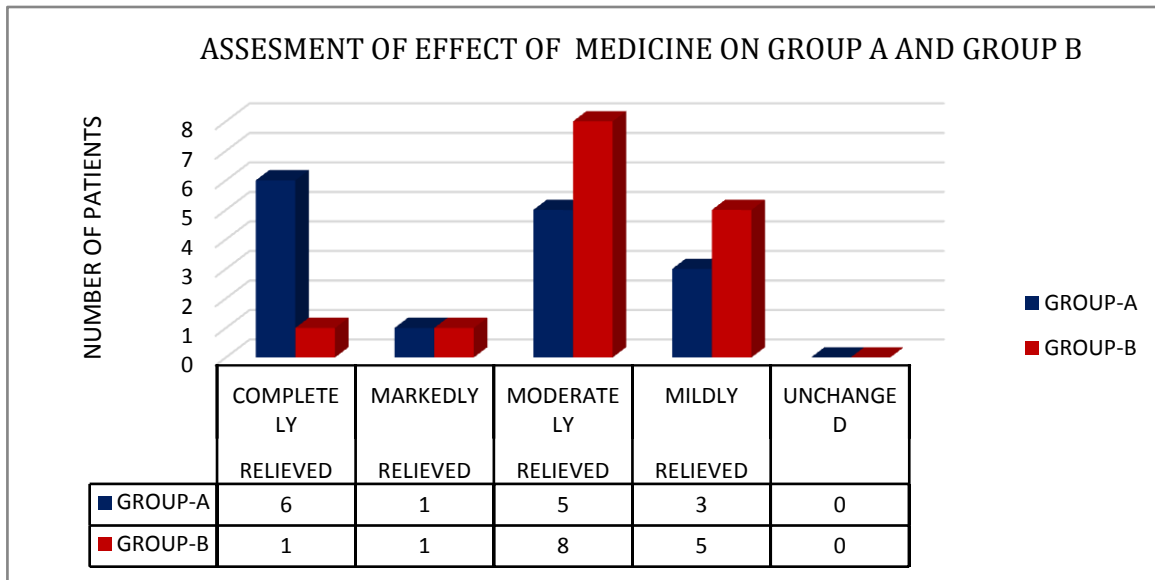
Out of 15 patients 40% patients got completely relief, 6.67 % patients got markedly relief, 33.33% patients got moderately relief and 20% patients got mildly relief.

**Table 6: Effect of medicine on group -B patients**

Assessment	No. of Patients	% of patients
Completely Relieved	1	6.67
Markedly Relieved	1	6.67
Moderately Relieved	8	53.33
Mildly Relieved	5	33.33
Unchanged	0	0

Out of 15 patients 06.67% patients got completely relief, 6.66 % patients got markedly relief, 53.33% patients got moderately relief and 33.33 % patients got mildly relief.

**Graph 4: Assessment of effect of medicine on group -A and group- B**



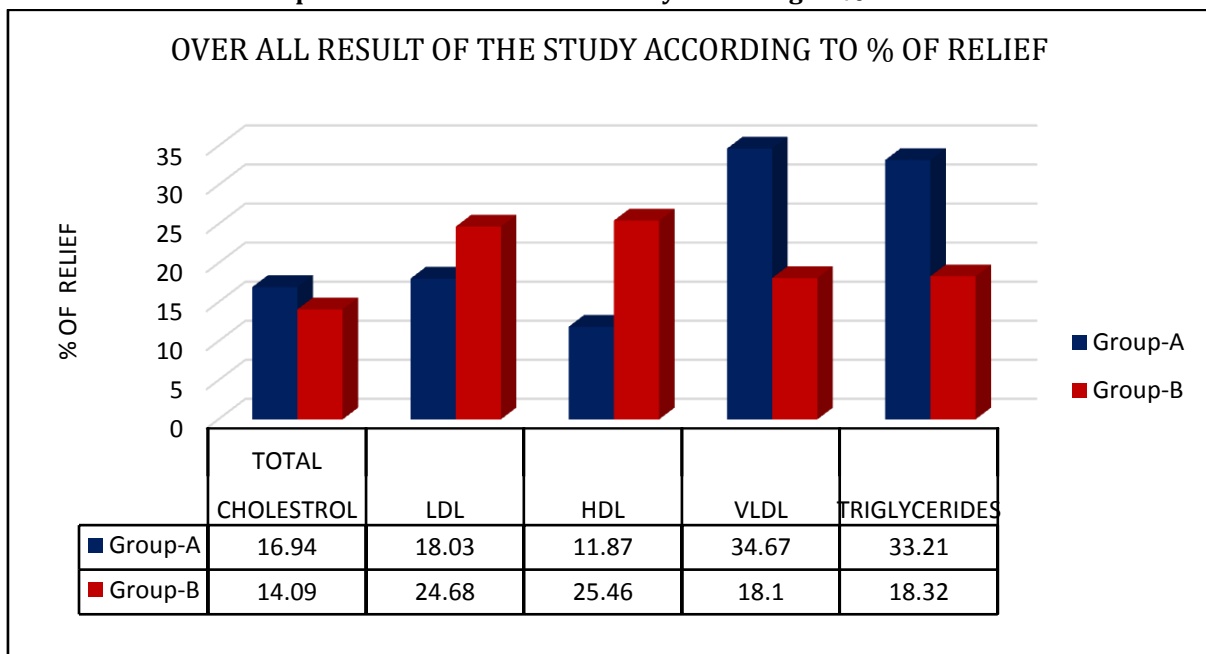
On assessment completely relieved patients (6) are more in Group-A, markedly relieved patients (1) were equivalent in both groups, moderately relieved patients (8) were more in Group-B, mildly relieved patients (5) were more in Group-B and there was no Unchanged patients in both groups.

**Table 7: Overall effect of medicine on group -A and group -B patients**

S.No	Change in parameters	% of relief	
		GROUP A	GROUP B
1	<b>Total cholesterol</b>	16.94	14.09
2	<b>LDL</b>	18.03	24.68
3	<b>HDL</b>	-11.87	-25.46
4	<b>VLDL</b>	34.67	18.10
5	<b>Triglycerides</b>	33.21	18.32

(\* negative sign in % of relief for HDL shows percentage of increase)

**Graph 5: overall result of the study according to % of relief**



The overall result showed that the medicine was effective for group A patients more that for the group B patients.



Altered lipid profile markers particularly total cholesterol, triglycerides and decreased HDL cholesterol are signs for high risk of coronary heart disease. The patients with total mean cholesterol (208.47±13.85), triglycerides (274.0±37.17) and HDL (37.90±1.78) were advised to take 3 gm of powdered *Musta* in a day three divided doses. After 45 days of treatment the decreased level of total mean cholesterol (173.13±9.89), triglycerides 183±22.37 and increased level of HDL (42.40±1.44) were recorded. These results showed that *Musta* is a drug of choice for the treatment of hyperlipidaemic patients. The comparative Observation of mean lipid profile parameter of 15 patients of group A, 15 patients of group B and all patients in both groups are tabulated as under

**Table 8: Comparative effect of medicine on Lipid profile of Group- A, Group- B and Group A & B Patients**

Parameters	Group A		Group B		Group A & B	
	BT	AT	BT	AT	BT	AT
<b>T.C</b>	208.47±13.85	173.13±9.89*	210.87±9.97	181.13±7.26**	209.67±8.39	177.13±6.07***
<b>L.D.L</b>	116.28±14.73	95.32±10.0ns	130.78±9.06	98.50±4.26***	123.53±8.60	96.91±5.35**
<b>H.D.L</b>	37.90±1.78	42.40±1.44*	35.87±1.59	45.0±2.02**	36.88±1.19	43.70±1.24***
<b>V.H.D.L</b>	54.22±7.27	35.42±3.85**	46.02±6.40	37.69±4.22 ns	50.12±4.82	36.56±2.81**
<b>Triglycerides</b>	274.0±37.17	183±22.37**	230.67±32.12	188.40±20.94 ns	252.33±24.47	185.70±15.06**

Values are the mean ± Standard error, (Group A; n – 15), (Group B; n – 15), (Group A and B; n – 30), Symbols represent statistical significance. \*\*\*Extremely significance, \*\*Very significance, \* significance, ns -not significance. BT – Before treatment, AT – After treatment.

## DISCUSSION

A clinical Study of *Musta* (*Cyperus rotundus* Linn.) in hyperlipidaemia patients showed significant result. *Musta* is considered to be effective as it could reduce the increased levels of serum cholesterol in both of the groups of patients. But comparatively the patients belonging to the male group exhibited a better response.

### Probable mode of action of drug

*Musta* is a drug which has got *Sita Virya* and shows an independent action of *Grahi* and acts as *Dipana* and *Pacana*.<sup>[8]</sup> This type of peculiar action has got a significant action upon the *Grahani*, where it reduces the absorption of the fats consumed due to its *Kashaya Rasa*. Thus we can presume that *Musta* controls and regulates the fat metabolism. Due to its *Laghu* and *Ruksha Gunas*, it is balancing *Baddhameda* i.e., circulating lipids. Pharmacologically decoction of this tuber given orally to rats showed inhibition effect on gastric motility and endogenous prostaglandins.<sup>[9]</sup> Whatever the drug that reduces the gastric motility to certain extent also shows its action upon the absorption of fats.

*Musta* which is one of the important drugs of *Vachadi Gana*,<sup>[10]</sup> was taken as a trial drug to evaluate and to compare its anti hyperlipidaemic activity in males and females. Almost all *Acharyas* have mentioned *Katu*, *Tikta*, *Kashaya Rasa*; *Laghu*, *Ruksha Guna*; *Sita Virya*; *Katu Vipaka* for *Musta*.<sup>[2]</sup>

It is observed that in group A 40% patients got complete relief, 6.67 % patients got marked relief, 33.33% patients got moderate relief and 20 % patients got mild relief. Similarly, in group B patients 06.67% patients got complete relief, 6.67 % patients got marked relief, 53.33% patients got moderate relief and 33.33 % patients got mild relief.

The total cholesterol level of group A patients was reduced by 16.94 %, while group B patients showed 14.09 % reduction. The L.D.L. level of group A patients was reduced by 18.03 % while of group B patients was reduced

by 24.68 %. The H.D.L. level of group A patients was increased by 11.87 % while of group B patients was increased by 25.46 %. The V.L.D.L. level of group A patients was reduced by 35.35% while of group B patients was reduced by 18.10%. The triglycerides level of group A patients was reduced by 33.21% while of group B patients was reduced by 18.32%. All the results were statistically significant (P<0.05) except LDL in Group-A, VLDL and Triglycerides in Group-B.

Comparing the result of the both groups, it was observed that group A showed significant response than group B. it was even observed that the overall effects of the therapy showed significant results when both the groups are combined and evaluated statistically.

## CONCLUSION

The results of this clinical study clearly showed that the phytoconstituents present in *Cyperus rotundus* rhizome have anti-hypolipidemic potentials.

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