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Research Article

EFFECT OF *CHAVYADI MASTHU* AND SELECTED YOGA TECHNIQUES IN OBESITY

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ABSTRACT

Obesity is a complex multi-factorial disease and a major risk factor for many non-communicable diseases which invites several pathological complications. Obesity is defined as abnormal or excessive fat accumulation that may impair health. The prevalence of obesity is now rapidly increasing worldwide due to increased sedentary lifestyles, physical inactivity, and unhealthy diets. Eating more calories than one burn in daily activity on a long-term basis causes the extra calories to add up and cause obesity. By proper Ayurvedic management which includes lifestyle modification in the form of a healthy diet and regular exercises like *Yoga*, the burden of obesity can be reduced. In this study, an Ayurvedic dietary formulation, *Chavyadi Masthu* and practice of selected *Yogasanas* were taken as interventions. 31 obese participants between the age group of 25 and 50 were selected and administered *Chavyadi Masthu* preparation with regular practice of selected *Yoga* techniques for 3 months. BMI, waist circumference, hip circumference, waist hip ratio and skin-fold thickness were assessed on 0th, 31st, 61st, 91st days along with lipid profile and FBS on 0th and 91st day. Analysis of data revealed that the interventions were effective in reducing body mass index, waist-hip ratio, waist circumference, hip circumference, skin-fold thickness, total cholesterol, serum triglyceride, LDL and VLDL and FBS levels and improvement in HDL with a significant level $p<0.05$.

INTRODUCTION

Non-communicable diseases (NCDs) are one of the major challenges to public health in the 21st century, causing human suffering and impeding the socioeconomic development of the country. NCDs are estimated to account for around 60% of all deaths. Obesity, a complex condition marked by excessive body fat, has severe health impacts. It is commonly measured by Body Mass Index (BMI), with a BMI of 30 or higher classified as obesity. This condition is more than a cosmetic issue; it is a major risk factor for non-communicable diseases, such as type 2 diabetes, cardiovascular diseases, hypertension, and some cancers.[1] The World Health Organization (WHO) recognizes obesity as a chronic disorder due to its high risks of morbidity and mortality.

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Obesity can also have psychological effects, including depression and low self-esteem, often due to social stigma and discrimination. The global prevalence of obesity has increased dramatically over the past few decades. The global obesity epidemic is driven by several factors, including lifestyle changes, poor dietary habits, and genetic predispositions. Urbanization, increased access to high-calorie, nutrient-poor foods, and a reduction in physical activity due to sedentary work and modern transportation have also contributed to this.

Although pharmacotherapy for obesity has made significant progress in recent decades, its prevalence continues to rise. As obesity is a chronic condition, long-term medication often leads to additional side effects, making treatment a persistent challenge. Surgical treatment of obesity also has its demerits. This alarming health issue needs to be addressed in a less invasive, cost-effective, patient-friendly method with minimal or no side effects intervention. Preventing and treating obesity requires a comprehensive approach, which includes individual lifestyle modifications.

In Ayurveda, obesity has been described as *Sthoulya* or *Medoroga* and is explained as *Santarpanotha vikara* (disease due to over nutrition). Acharya Charaka mentioned that a person with excessive accumulation of *Meda* (fat) and *Mamsa* (muscle) *Dhathus* with bulky *Sphik* (buttocks), *Udara* (abdomen), *Sthana* (breast) and suffers from deficient metabolism and energy are considered as *Sthoulya.*[2] *Apatarpana* is the line of treatment adopted for this disease. So a dietary formulation with *Kapha medo hara* drugs to induce *Rukshana* and regular exercises like yoga are selected. A therapeutic combination, *Chavyadi masthu* from the *Medorogaadhikara* chapter of *Bhavaprakasha*[3] and *Bhaishajya Ratnavali*,[4] having *Kapha medohara* action was chosen for this study. Along with dietary regulation, physical activity is also recommended in NCD guidelines as an important therapeutic option in non-morbid obesity. Yoga is a holistic mind-body practice to enhance physical, mental, emotional, and spiritual well-being.

OBJECTIVES

Primary Objective: To study the effect of *Chavyadi Masthu* and selected yoga techniques on BMI in obesity

Secondary Objectives: To study the effect of *Chavyadi Masthu* and selected yoga techniques on 1) Waist-Hip Ratio and skin fold thickness 2) Lipid profile and FBS level.

MATERIALS AND METHODS

Study Design: Single group Interventional pre and post-clinical study

Study Setting

Subjects in the outpatient department of Govt Ayurveda College Hospital, Tripunithura.

Sample Size

31 subjects with obesity as per the inclusion and exclusion criteria reported in OPD, Govt. Ayurveda College, Tripunithura.

Criteria of Selection of Subjects

Inclusion Criteria

- Subject within the age group of 25 to 50 years.
- Body Mass Index between 30-34.99 kg/m^2
- Waist-Hip Ratio: $\geq$0.90 (in male), $\geq$0.85 (in female)

Exclusion Criteria

Known cases of

A. Thyroid disorders or other chronic systemic disorders
B. Musculoskeletal disorders like IVDP
C. Bleeding disorders
D. Acid peptic disorders
E. Liver disorders

- Subjects under steroid therapy
- Pregnancy and lactation.
- Subjects who have allergy to drugs
- Subjects who have done any surgeries within the last 6 months.
- Subjects who are unable to do *Yoga* properly.

Data to assess each subject's health status and symptoms, history, daily diet and physical activity was collected with the help of case proforma.

Interventions

The participants were advised to take *Chavyadi Masthu* preparation along with regular practice of selected *Yoga* techniques for 45 minutes daily for 3 months.

Dietary Formulation - *Chavyadi Masthu*

10gm of *Lajasaktu* (powdered puffed rice), and 5gm of powdered drugs– *Chavya* (wild pepper), *Jeeraka* (cumin), *Vyosha (Sundi* (dried ginger), *Maricha* (black pepper), *Pippali* (long pepper)), *Hingu* (asaphoetida), *Souvarchala lavana* (black salt*)* and *Chitraka* (leadwort root) were administrated in a medium of 60ml *Masthu* (liquid portion of curd).

Dose: 120ml/day

Dosing schedule: 60ml at 7am and 7pm half an hour before food

Selected Yoga Techniques

Loosening exercises, *Asanas, Pranayamas* and deep relaxation technique.

Table 1: Yoga Schedule

Training Period	***Yoga asanas* and *Pranayama***	Time duration
1st day	Loosening exercise + Deep relaxation	10 minutes
2nd day	Day 1*+ Ardhakati chakrasanam, Ardha Chakrasanam, Padahasthasanam, Savasana + Nadisudhi pranayama*	15 minutes
3rd day	Day 2 *+ Vakrasanam, Ardha Matsyendrasana + Brahmari pranayama*	20 minutes
4th day	Day 3 *+ Bhujangasanam, Shalabhasanam, + Suryanuloma pranayama*	25 minutes
5th day	Day 4 *+ Paschimothanasanam, Dhanurasanam*	30 minutes
6th day	Day 5 *+ Pavanamukthasana, Sethubandhasana*	35 minutes
7th day	Repeat the full *Yoga* schedule	40 minutes

Study Period 1st to 90th day	Repeat the full *Yoga* schedule	45 minutes

Assessment

Assessment of weight, BMI, waist-hip ratio, waist circumference, hip circumference and skin fold thickness were done on the 0th day, 31st day, 61st day and 91st day of the study period. Lipid profile and FBS were accessed on 0th day and 91st day. The chief complaints associated with obesity were assessed on 0th day and 91st days of study period. Changes in the variables were compared and were statistically analysed. According to the distribution of data, repeated measure ANOVA and Paired t-test were used for the statistical analysis.

OBSERVATIONS AND RESULTS

The statistical analysis of the data showed a significant difference in the outcome variables such as weight, BMI, waist-hip ratio, and skin fold thickness after completing the study period. Also, there was a significant difference in the associated symptoms. This study noticed a significant reduction in total cholesterol, S. triglyceride, VLDL, and LDL and an improvement in HDL levels.

Results of Objective Parameters

Table 2: Difference in Weight with time

Weight (Kg)	Mean	Std. Deviation	Std. Error	F value	P value
0th Day (BT)	83.10	7.713	1.385	321.2	<0.0001
31st day (AT-1)	80.05	7.510	1.349		
61st day (AT-2)	77.90	7.318	1.314		
91st Day (AT-3)	75.84	7.061	1.268		

An average of 7.26kg loss was observed in the body weight of the subjects.

Table 3: Difference of BMI with time

BMI (Kg/m²)	Mean	Std. Deviation	Std. Error	F value	P value
0th Day (BT)	32.90	1.328	0.238	382.1	<0.0001
31st day (AT-1)	31.70	1.460	0.262		
61st day (AT-2)	30.85	1.507	0.271		
91st Day (AT-3)	30.04	1.562	0.281		

An average of 2.858 kg/m² reduction was observed in BMI.

Table 4: Difference in Waist Hip ratio with Time

WHR	Mean	Std. Deviation	Std. Error	F Value	P value
0th Day (BT)	0.94	0.049	0.009	67.91	<0.0001
31st day (AT-1)	0.93	0.048	0.009		
61st day (AT-2)	0.92	0.049	0.009		
91st Day (AT-3)	0.91	0.049	0.009		

Waist hip ratio showed a significant reduction of 0.03 between the treatment stages.

Table 5: Difference of Skin-fold Thickness with time

Skin-fold Thickness	Mean	Std. Deviation	Std. Error	F value	P value
0th Day (BT)	30.42	4.855	0.872	189.5	<0.0001
31st day (AT-1)	29.03	4.681	0.841		
61st day (AT-2)	27.85	4.471	0.803		
91st Day (AT-3)	26.67	4.428	0.795		

There is a significant difference in skin-fold thickness with mean difference of 3.748.

Table 5: Analysis on Total Cholesterol

Total Cholesterol	Mean	Std. Deviation	Std. Error	Paired Mean Difference	T value	P value
0th day (BT)	200.13	24.047	4.319	12.74	5.567	<0.0001
91st day (AT)	187.39	19.110	3.432			

Table 6: Analysis on Serum Triglyceride

S. Triglyceride	Mean	Std. Deviation	Std. Error	Paired Mean Difference	T value	P value
0th day (BT)	143.55	33.574	6.030	-8.677	2.881	0.0072
91st day (AT)	134.87	31.150	5.595			

Table 7: Analysis on High Density Lipoprotein

HDL	Mean	Std. Deviation	Std. Error	Paired Mean Difference	T value	P value
0th day (BT)	45.16	8.638	1.551	2.129	2.064	0.0478
91st day (AT)	47.29	8.451	1.518			

Table 8: Analysis on Low Density Lipoprotein

LDL	Mean	Std. Deviation	Std. Error	Paired Mean Difference	T value	P value
0th day (BT)	127.23	20.000	3.592	12.97	4.617	<0.0001
91st day (AT)	114.26	14.713	2.642			

Table 9: Analysis on Very Low-Density Lipoprotein

VLDL	Mean	Std. Deviation	Std. Error	Paired Mean Difference	T value	P value
0th day (BT)	27.74	8.952	1.608	1.742	2.221	0.0340
91st day (AT)	26.00	9.041	1.624			

Table 10: Analysis on Fasting Blood Sugar

FBS	Mean	Std. Deviation	Std. Error	Paired Mean Difference	t value	P value
0th day (BT)	92.35	12.656	2.273	7.097	3.584	0.0012
91st day (AT)	85.26	10.050	1.805			

Results of Subjective Parameters

Table 11: Distribution of subjects according to associated symptoms

Symptoms	Before Treatment		After Treatment	
	No of subjects	%	No of subjects	%
Palpitation	16	52%	4	13%
Heaviness of body	27	87%	13	42%
Breathlessness	6	19%	1	3%
Lethargy	17	55%	2	6%
Excessive sweating	10	32%	4	13%
Joint pain	7	23%	2	6%
Excessive thirst	9	29%	3	10%

DISCUSSION

In Ayurveda, *Sthoulya* is a *Santharpanotha vikara* and is caused by the intake of *Ahara dravyas* having *Madhura, Snigdha, Guru gunas* which are considered as a high-calorie diet and *Viharas* like *Avyayama, Achintha, Divaswapna* etc which are *Kaphamedo vardhaka* in nature. *Kapha medo dushti*, *Dhatwagni mandya* and *Srodhorodha* are the main features in *Samprapthi* of *Sthoulya*. So, for the management of *Sthoulya*, the major factors considered are correcting *Medodhatwagni mandhya,* clearing *Srotorodha,* reducing *Kapha* and *Medas and* pacifying *Vata. Masthu* and *Saktu* are included in *Aharavarga so that* they can be included in a diet without any complications.

Probable mode of action of *Chavyadi Masthu*

The formulation *Chavyadi Masthu* includes *Chavya, Jeeraka, Vyosha, Hingu, Souvarchala, Anala, Lajasaktu* and *Masthu* which have *Laghu, Rooksha guna* in common, *Kaphamedohara* and *Agni Deepana* in nature, effective in increasing the *Dhatwagni,* clearing *Srotorodha,* and reducing *Meda* accumulation in body.

Chavya, Jeeraka, Vyosha, Hingu, and *Anala,* are *Katurasa pradhana, Ushna veerya, Laghu guna,* and *Kapha vata samana.* These cause depletion of *Kapha* and *Meda. Deepana* and *Laghurooksha* properties of all these drugs alleviate the *Agnimandya* which occurred in the pathogenesis*. The Pachana* property of these drugs helps to digest *Amatwa* present at the *Medodhatu level. Saurchala lavana* is *Kapha vatahara, Deepana, Pachana* and has *Visada, Sookshma guna*, which helps correct *Agni*. Its *Vibandha hara* property helps clear *Srotas,* relieving constipation and pacifying the vitiated *Vata dosha.*[5] *Laja saktu* helps to correct *Agni* owing to its *Laghu rooksha* and *Deepana* property. Its *Kapha cheda* and *Meda mehahara* properties help to reduce the accumulated *Kleda* and *Medas* from the body[6]. It is easily digestible and acts as an immediate source of energy. It also relieves thirst associated with obesity due to its *Trit hara* property. *Masthu* has *Srotosodhana, Vishtambhahara*, *Malabhedana* and *Anulomana* property by which it clears the channels, corrects the *Vata* vitiation and prevents constipation. It has *Kapha vata samana* property, but at the same time, it will not provoke *Pitta* due to its *Swadu kashaya rasa*. It relieves fatigue associated with obesity due to its *Klamahara*, *Balya* and *Hladana* properties.[7] Individual drugs will exert synergistic action when coming in combination form. The *Ushnateekshna* and *Deepanapachana* property of *Chavya, Jeeraka, Vyosha, Hingu, Anala* and *Souvarchala,* the *Srotoshodhana* property of *Masthu* and *Kaphacheda mehamedahara* property of *Lajasaktu* justify its usage in *Medakapha* vitiation and *Agnimandya* and thereby causing the *Samprapthi Vighatana* of *Sthoulya*.

Thymoquinone, present in *Jeera* has been studied for its potential effects on fat metabolism. Antioxidants and anti-inflammatory properties of cumin support metabolic processes and regulate blood sugar levels, which can indirectly influence fat reduction. [8] Piperine from black pepper and wild pepper (*Chavya*) enhances nutrient bioavailability, stimulates thermogenesis, and improves lipid metabolism, promoting fat loss. Gingerol and Shogaol from ginger offer anti-inflammatory and antioxidant benefits, enhance digestion and metabolism and help regulate appetite[9]. Piperlongumine from long pepper may inhibit fat cell formation and promote fat burning. Abundance of alkaloids and flavonoids in the *Trikatu (Vyosha)* helps the body shed excess weight faster by improving metabolic transformation and preventing further accumulation of fats.[10] *Ferula asafoetida* extract has anti-obesity, abnormal fat and epididymal adipocyte lowering effects and can prevent liver steatosis in a study in type 2 diabetic rats. This may be due to the phenolic acids such as ferula, tannins and umbelliprenin that present in the ferula gum.[11] Plumbagin present in *Chitraka* enhances thermogenesis, which can contribute to an increased metabolic rate, energy expenditure and, consequently, weight loss. Plumbagin inhibits pro-inflammatory cytokines, potentially lowering inflammation in adipose tissue and improving insulin sensitivity, thus preventing excess fat storage. Plumbagin causes inhibition of pancreatic lipase which suppresses the differentiation of pre-adipocytes into mature fat cells, reducing fat accumulation.[12] Whey water (*Masthu)* contains beta lactoglobulin, alpha lactoglobulin, serum albumin, immunoglobulins, lactoferrin and protease peptone fractions which can promote weight loss, by increasing satiety, influencing glucose homeostasis, and maintaining lean body mass. Whey milk is prebiotic, stimulating beneficial bacteria and improving gut health. The human microbiome plays a huge role in treating obesity, aiding energy metabolism and carbohydrate and lipid digestion.[13]

Probable mode of action of selected *Yoga* techniques

Yoga provides natural and effective remedies without harmful side effects for both physical and mental well-being. Various *Asanas* stimulate specific internal organs, endocrine glands, and the brain to regulate metabolic functions. A daily 45-minute *Yoga* practice helps with energy expenditure by reducing fat in the body. Loosening exercises help improve the flexibility of muscles and joints. *Ardakatichakrasana* and *Ardachakrasana* help in flexibility of the spine and strengthen the neck, back and lateral muscles. Expands chest and shoulders and improves breathing. Various studies show yoga

postures such as *Padahasthasana, Paschimottanasana, Ardhamatsyendryasana* and *Pavanamukthasana* having positive results on enhancing metabolism and digestion by stimulating digestive organs and reducing excess fat from the abdomen and waist. It improves functions of the liver, pancreas and adrenal gland. *Setu Bandhasana, Dhanurasana, Salabhasana,* and *Bhujangasana* has beneficiary effect on thyroid gland and also helps to regulate metabolism and reduce excess fat in our body. *Pranayama* and DRT enhance mindfulness, improve mood, and reduce stress, consequently helping to reduce food intake and modify eating disorders.[14] They allow individuals to feel more connected to their bodies, leading to enhanced awareness of satiety and the discomfort of overeating. As a result, yoga has been shown as a means to assist with behavioural change, weight loss, and weight maintenance.

CONCLUSION

Chavya, *Jeeraka*, *Vyosha*, *Hingu, Souvarchala anala, Saktu* and *Masthu* are the ingredients of *Chavyadi Masthu* with the indications as *Medohara* and *Agnideepana.* Selected yoga techniques included *Yogasanas*, *Pranayama* and deep relaxation technique which helped in energy expenditure and reducing stress. *Chavyadi Masthu* along with selected yoga techniques was significant in reducing the weight, BMI, waist-hip ratio and skin-fold thickness of the subjects and were also significant in reducing total cholesterol, serum triglyceride, LDL and VLDL and improving HDL level. The interventions reduced associated symptoms of obesity in participants like breathlessness on exertion, fatigue, joint pain etc and improved their quality of life. The study can be further conducted as a multicentric study and with a specific diet regimen and with control group.

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