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Research Article

A CLINICAL STUDY ON ETIOPATHOGENESIS OF STHAULYA AND ITS MANAGEMENT WITH MEDOHAR COMPOUND

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ABSTRACT

Objective: A clinical study on etiopathogenesis of *Sthaulya* and its management with Medohar compound.

Methods: In this study, single and compound drugs are used for the clinical trial. In the present study, total 75 patients of *Sthaulya* were registered; out of which, 15 patients left against medical advice. Remaining 60 patients were treated in three therapeutic groups. For this present study, Medohar Vati (Group A), Iesabgol Husk (Group B), and Navaka Guggulu (Group C) have been selected. These drugs have Medohar property. Medohar Vati is made up of Charakokt Medohar Dravyas recommended in Sutra sthan (Ch. Su. 21/24). Iesabgol Husk has been selected on the basis of its Medohar property narrated by Acharya Priyavritta Sharma in Dravyaguna Vigyan. In Group A, 25 patients treated with Medohar Vati in a dose of 1 g 3 times a day, with lukewarm water before meal for 60 days. Whereas in Group B, 13 patients were treated with Iesabgol Husk in a dose of 15 g 2 times a day, with lukewarm water before meal for 60 days. Whereas, in Group C, 22 patients were treated with Navaka Guggulu in a dose of 1 g 3 times a day, with lukewarm water before meal for 60 days.

Results: On general symptoms, Group A 56.47%, Group B 58.18%, and in Group C 48.46% relief was observed. On associated symptoms, Group A 44.20%, Group B 47.19%, and in Group C 35.14% relief was observed. On weight and body mass index (BMI), Group A 3.39%, Group B 5.07%, and in Group C 2.28% relief was observed. On body circumference, Group A 3.51%, Group B 2.87%, and in Group C 2.72% relief was observed. On skinfold thickness, Group A 17.16%, Group B 18.82%, and in Group C 10.63% relief was observed. On walking time and respiratory rate, Group A 17.13%, Group B 20.13%, and in Group C 14.84% relief was observed. If we see the overall effect of all three groups in total average improvement, then we found that Group A 23.64%, Group B 25.38%, and in Group C 19.01% relief was observed.

Conclusion: On general symptoms, Group A 56.47%, Group B 58.18%, and in Group C 48.46% relief was observed. On associated symptoms, Group A 44.20%, Group B 47.19%, and in Group C 35.14% relief was observed. On weight and BMI, Group A 3.39%, Group B 5.07%, and in Group C 2.28% relief was observed. On body circumference, Group A 3.51%, Group B 2.87%, and in Group C 2.72% relief was observed. On skinfold thickness, Group A 17.16%, Group B 18.82%, and in Group C 10.63% relief was observed. On walking time and respiratory rate, Group A 17.13%, Group B 20.13%, and in Group C 14.84% relief was observed. If we see the overall effect of all three groups in total average improvement, then we found that Group A 23.64%, Group B 25.38%, and in Group C 19.01% relief was observed. Thus, in this way, overall comparison of all the parameter showed that effect of Group B was better than Group A, but Group A was better than Group C.

Keywords: *Sthaulya*, Obesity, Medoroga.

INTRODUCTION

Sthaulya the disease may be compared to obesity in modern medicine, wherein the lipid metabolism is chiefly altered. Obesity (*Sthaulya*) is one among the major diseases of modern era. In modern era with continuous changing lifestyles and environment and changed diet habits, man has become the victim of many diseases caused by unwholesome dietary habits; the "obesity" is one of them. A recent world health study reports that obesity is included among the top 10 selected risks to health. Obesity is a blessing of the modern age of machines and materialism. It occurs as a result of lack of physical activity with increased intake of food. Everybody is busy and living fast and stressful life. High caloric, fast food consumption is also increasing. The industrialization, stress during the work, dietary habits, lack of exercise, and various varieties among the daily diet, e.g., fast food, freezed fruits, increased amount of soft drinks and beverages, canned foods result into the clinical entity, which we can call as obesity. In the recent years, obesity attracted the attention of the medical fraternity. It is the most common and adverse nutritional problem in the industrialized world. Moreover, now obesity has become a global problem. Recently (January 2009), Indian Airlines sacked 9 air hostesses reportedly for overweight. Because they were unable to get back into shape and had been declared permanently medically unfit. Obesity is such a disease, which provides the platform for so many hazards such as hypertension, coronary heart disease, diabetes mellitus, osteoarthritis, infertility, and impotency as psychological disorders such as stress, anxiety, and depression. These indicate the weakening of the various body systems which, in turn, affects the physiological equilibrium. Thus, the mortality and morbidity rates are more in an obese person. The aim of Ayurveda Shastra is to maintain swasthya of swastha purusha and to cure the disease of pathological condition of the patient. In other words, Ayurveda guides the masses to overcome the diseased condition by preventive methods.

According to modern, obesity is:

- An excessive deposition of adipose tissue in the body. Body weight is 20% above ideal body weight.

- Body mass index (BMI) >25 kg/m^2 (National Institute of Health Consensus Conference) [1]. An abnormal growth of adipose tissue due to an enlargement of fat cell size or an increase in fat cell number or a combination of both.

DEFINITION OF OBESITY

Obesity is a condition, in which there is an excessive amount of body fat [2]. According to Dorland, "obesity is an increase in body weight beyond the limitation of skeletal and physical requirements as the result of excessive accumulation of body fat [3]." Obesity is defined by most authorities as occurring when a person weight is at least 10% in excess of the normal or required weight [4]. "Parks" has given views as obesity may be defined as an abnormal growth of the adipose tissue due to an enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity) or a combination of both [5]. Hence, the modern terminology obesity can be used satisfactorily for the disease *Sthaulya*. A body weight 20% or more above desirable weight for age, sex, and height is regarded as obese. Obesity has also been defined as body content >25% of total body weight for male and >30% for female. Obesity can be defined as an "Excessive deposition or distribution of fat in the body." A recent National Institute of Health Consensus Conference defined obesity as BMI >27 kg/m^2. Now a days, obesity is defined at or >25 kg/m^2 BMI. In general, it is a chronic condition defined by an excess amount body fat, but the meaning of excess is hard to define. A certain amount of body fat is necessary for storing energy, heat insulation, shock absorption, and other functions. Obesity is best defined as any degree of excess adiposity that imparts a health risk. Visual inspection of a patient can give a subjective but fairly accurate estimate of the degree of obesity.

METHODS

In this study, single and compound drugs are used for the clinical trial. In the present study, total 75 patients of *Sthaulya* were registered; out of which, 15 patients left against medical advice. Remaining 60 patients were treated in three therapeutic groups. For this present study, Medohar Vati (Group A), Iesabgol Husk (Group B), and Navaka Guggulu (Group C) have been selected. These drugs have Medohar property. Medohar Vati is made up of Charakokt Medohar Dravyas [6] recommended in Sutra sthan (Ch.Su. 21/24). Iesabgol Husk has been selected on the basis of its Medohar property narrated by Acharya Priyavritta Sharma in Dravyaguna Vigyan [7]. In Group A, 25 patients treated with Medohar Vati in a dose of 1 g 3 times a day, with lukewarm water before meal for 60 days. Whereas in Group B, 13 patients were treated with Iesabgol Husk in a dose of 15 g 2 times a day, with lukewarm water before meal for 60 days. Whereas in Group C, 22 patients were treated with Navaka Guggulu in a dose of 1 g 3 times a day, with lukewarm water before meal for 60 days.

Selection of drugs

For this present study, Medohar Vati (Group A), Iesabgol Husk (Group B), and Navaka Guggulu (Group C) have been selected. These drugs have Medohar property. Medohar Vati is made up of Charakokt Medohar Dravyas [6] recommended in Sutra sthan (Ch. Su. 21/24). Iesabgol Husk has been selected on the basis of its Medohar property narrated by Acharya Priyavritta Sharma in Dravyaguna Vigyan [7]. Navaka Guggulu has been selected on the basis of recommendation by the author of Bhaishajya Ratnavali (39/43) [8].

Drug, doses, and duration

Group A: Medohar Vati. Ingrédients of Medohar Vati: (1) Haritaki 1 part, (2) Vibhitki 1 part, (3) Aamalaki 1 part, (4) Vidang 1 part, (5) Yavakshar 1 par, (6) Agnimantha Q. S. (Bark kwath), (7) Madhu Q.S. Doses: Medohar Vati 1 g/T.D.S, with lukewarm water before breakfast, lunch, and dinner (Nirannakala). Duration: 2 months. Anupan: Lukewarm water.

Group B: Iesabgol Husk. Ingrédients: Iesabgol seed husk. Doses: Iesabgol husk 15 g/B.D. Duration: 2 months. Anupan: Lukewarm water.

Group C: Navaka Guggulu. Ingrédients of Navaka Guggulu: (1) Sunthi, (2) Marich, (3) Pippali, (4) Chitraka, (5) Haritaki, (6) Bibhitaka, (7) Amalaki, (8) Musta, (9) Vidanga, (10) Shudha Guggulu. Duration: 2 months Anupan: Luke warm water.

Criteria of assessment

These methods are unsuitable for routine use. Thus, indirect methods of measuring body fat are more commonly utilized in clinical and field practice, and they have the advantage of the use of less sophisticated equipment.

Subjective parameter

"Purvarupa" of *Sthaulya*

Purvarupas of *Sthaulya* are not mentioned in any of ayurvedic texts. According to Charaka, wherever Purvarupa of disease are not mentioned, the weak manifestation of Rupa should be considered as Purvarupa of the concerned diseases (Ch. Chi. 28/19; Ch. Chi. 11/12). Keeping the views of Acharya Charaka in mind, Lakshana of Kapha vriddhi such as *Alasya, Angashaithilya, Madhurasyata, Atinidra,* and *Atipipasa* may be considered as Purvarupa.

"Rupa" of *Sthaulya*

Disease is known by its interrogation; observation, and inference. Rupa serves as an instrument in all these three. On the completion of Dosha-Dushya Sammurchana, the features of the manifested disease are Rupas. Different Acaryas have presented the symptoms of *Sthaulya* in their texts. Sage Charaka has described cardinal or Pratyatma Laksana of *Sthaulya* in Sutra sthan (21/9) as:

> *MedoMamsa Ativriddhitva ch chalasphikudarastanah*
> *Ayathoupachayaanutsahonaroatisthulauchayate* - (Charaka Su.21/9)

Which means the inordinate increase of fat and flesh is disfigured by pendulous buttocks, abdomen, and breast and that increased bulk reduces the corresponding increase in energy. So, the person has less enthusiasm in his physical activity. Charaka has enlisted the following symptoms as Pratyatma Laksana of *Sthaulya* in his shloka:

1. *MedoMamsa Ativriddhi,*
2. *Chalasphik,*
3. *Chala Udara,*
4. *Chala stana,*
5. *Ayatho-Upachaya,*
6. *Anutsaha.*

Ashta-dosha of *Sthaulya*

Besides above-mentioned cardinal symptoms, eight disabilities are the most prominent clinical features of *Sthaulya* narrated by Acharya Charaka (Su. 21/4), i.e.,

1. *Ayushohrasa (diminution of life span),*
2. *Javoparodha (lack of agility),*
3. *Krcchra Vyavaya (difficulty in sexual act),*
4. *Daurbalya (debility),*
5. *Daurgandhya (Foul smelling of body),*
6. *Swedabadha (Distressful sweating),*
7. *Ksudha Atimatra (Excessive hunger),*
8. *Pipasa Atiyoga (excessive thirst).*

Susruta (Su. Su. 15/32) and Vagbhata (AS. Su 24/23-26) also described these.

Symptoms

All the symptoms of *Sthaulya* described in various ayurvedic texts are summarized in the following points:

1. *Daurgandhya,*
2. *Ayase-shwas,*
3. *Angagauravata,*
4. *Atikshudha,*
5. *Atipipasa,*

6. *Chalasphika,*
7. *Chalauadara,*
8. *Chalastana,*
9. *Utsahahani,*
10. *Daurbalya,*
11. *Nidraadhikya,*
12. *Snigdhagatrata,*
13. *Sandhishool,*
14. *Atimutrata,*
15. *Angashaithilya.*

Visual inspection of a patient can give a subjective but fairly accurate estimate of the degree of obesity. "If a person looks fat, the person is fat [9]."

Obesity can be assessed in several ways. The direct methods of measuring body fat include underwater weighing (densitometry), estimation of total body water, estimation of total body potassium, and estimation of fat cell mass by isotope dilution method. Both "computed tomography" and "nuclear magnetic resonance imaging" can be used to distinguish between the fat and lean tissue of the body.

Objective parameters

I. Age-specific weight for height table.
II. Ponderal index: Height (Cm)/3√body weight (kg)
III. BMI (BMI or Quetelet's Index)

$$\text{BMI} = \frac{\text{Weight (in kg)}}{\text{Height}^2\text{ (in meter)}} \text{ or BMI} = \frac{\text{Weight (lb)} \times 703.1}{\text{Height (inches)}^2}$$

According to the BMI, patients can be divided into different degrees of obesity as below:

BMI classification:

1. Overweight: 25-29.9 kg/m^2
2. Obesity (Class I): 30-34.9 kg/m^2
3. Obesity (Class II): 35-39.9 kg/m^2
4. Obesity (Class III or morbid obesity): >40 kg/m^2.

Regional fat distribution:

1. Abdominal obesity is defined by measurement of waist circumference >102 cm (40 in) in men and >88 cm (35 in) in women.

Grading scale:

Obesity:

1. Grade 0 = <25
2. Grade 1 = 25-29.9
3. Grade 2 = 30-40
4. Grade 3 = >40.

Correlation between ayurved and modern classification based on BMI:

Type	BMI
Heena Sthaulya (overweight)	25-34.99 kg/m^2
Madhyam Sthaulya (obesity Grade 1st and 2nd)	30-30.99 kg/m^2
AtiSthaulya (severe or morbid obese)	>40 kg/m^2

Assessment criteria of therapy

In this part, percentage improvement was taken to assess the overall effect of therapy. Thus, the total effect of the Therapies was marked as following:

- Complete remission: 75-100% relief
- Markedly improved: 50-75% relief
- Moderately improved: 25-50% relief
- Improved: 10-25% relief
- Unchanged: 0-10% relief.

Health risks increase as BMI increases above 25. The National Institute of Health Consensus Panel on obesity agreed with the definition and concluded that a 20% increase in relative weight for young adults constitutes a health risk, by the use of these criteria, 20-30% of adult men, and 30-40% of adult women are obese, with the highest rates among the poor and minority groups.

The qualifier "morbid" is applied to the condition when the amount of overweight is 49.5 kg or more or when the patient is more than twice ideal weight.

The use of height weight tables based on averages to assess the severity of a given patient over weight does not take into account the distribution of body fat, which as will be explained below, influences the morbidity from excess weight, as well as other important factors such as age and social, economic, and ethnic status.

A simple but fairly good index of obesity consists in grasping the skin on the side of the body just below the ribs between the thumb and index finger. If the thickness of the fold exceeds one inch, a person is obese. Assessment of skinfold thickness over various areas of body together with height, weight, and age can be used to assess the degree of adiposity.

More precise assessment of obesity can be made with measurements of body density or with isotopic dilution methods, but these are unsuitable for routine use.

To estimate ideal body weight, simple way is assuming a base line of 49.5 kg (110 lb) for 150 cm (5 ft) individual and adding 2 kg (5 lb) for each 2.5 cm (1 inch) over 150 cm. Plus 2 kg for a medium frame or 4.5 kg (10 lb) for heavy frame.

The normal amount of body fat (expressed as percentage of body fat) is between 25% and 30% in women and 18-23% in men. Women with over 30% body fat and men with over 25% body fat are considered obese.

Effect on biochemical parameters

During the study, maximum biochemical parameters before and after treatment were found within normal limit. In all three groups, no apparent changes were observed in biochemical investigations because it may be due to the short duration of the thesis work

OBSERVATION AND RESULT

Observation is based on 75 registered patients of *Sthaulya* for study (Tables 1-19).

Adverse drug reaction (ADR)

No ADRs attributable to the trial drugs observed during the study.

Effect on functional assessment

Chief complaints

Around 100% patient shows that were having *Bharavrridhi*, whereas 94.67% patients were having *Daurgandhyata*, 90.67% *Ayaseswaskastata*, 98.67% Angagauravata, 97.33% Angachalatva, again 97.33% Atikshudha, 76% Atinidra, and 20% patients were having complain of Atipipasa.

In obese person, fatty mass is increased and lean body mass is decreased as fat is bulkier than muscle. 1 kg of fat requires approximately 1.5 times more space than 1 kg of muscles. Therefore, Bharavriddhi and Angachalatva take place. Moreover, due to obstruction (Avarna) of Vyana Vayu by Meda, it gets vitiated. Thus, it could not transport nutrient to the next Dhatu. Hence, it causes Dhatu Kshaya, which results into Daurbalya and Kshudra Shwasa. Modern science has also accepted obesity as one of the causes for Dyspnea.

Although Vyavayakashtata is an important symptom, there is no reporting found of this ailment among these patients? My all patients

Table 1: Improvement difference between groups

Difference between groups	For Group A	For Group B	For Group C
	n=25	n=13	n=22
	D.F.=24	D.F.=12	D.F.=21
Symptoms	% of improvement	% of improvement	% of improvement
Daurgandhya	55.17	62.50	54.90
Ayase-shwas	55.17	61.90	47.73
Angagauravata	45.28	36.00	27.27
Atikshudha	63.49	65.96	51.43
Atipipasa	73.68	50.00	60.00
Chalasphika	31.43	18.18	10.71
Chalauadara	31.88	12.50	15.00
Chalastana	30.30	34.62	10.71
Utsahahani	64.62	65.38	56.00
Daurbalya	62.86	53.13	50.88
Nidraadhikya	71.79	69.23	65.71
Snigdhagatrata	55.38	52.17	45.10
Sandhishool	60.98	68.42	54.55
Atimutrata	88.89	100.00	71.43
Angashaithilya	2.78	13.64	1.79

Table 2: Effect on weight and BMI by Medohar Vati

Weight and BMI	For Group A	For Group B	For Group C
Symptoms	% of improvement	% of improvement	% of improvement
Weight	3.37	4.93	2.16
BMI	3.37	5.01	2.21

Table 3: Effect on circumference by Medohar Vati

Circumference (cm)	For Group A	For Group B	For Group C
Symptoms	% of improvement	% of improvement	% of improvement
Chest	3.23	2.44	2.73
Abdomen	3.65	2.96	3.47
Hip	3.40	2.41	2.30
Thigh	5.61	4.58	2.52
Leg	3.37	2.86	2.44
Arm	1.25	3.42	3.91
Forearm	1.28	1.57	1.16

Table 4: Effect on skinfold thickness by Medohar Vati

Symptoms	For Group A	For Group B	For Group C
	% of improvement	% of improvement	% of improvement
Skinfold thickness (cm)			
Biceps	17.97	25.62	12.12
Triceps	15.43	12.19	9.40
Walking time in seconds and respiratory rate/m			
Walking time	18.05	23.44	12.12
Respiration rate	16.42	16.71	9.40

are below 40 kg/m^2 BMI. That might be the reason for this. Because above 40 kg/m^2, BMI is my exclusion criteria.

Effect of therapies

The sample of 60 patients was selected and subdivided according to drug availability into three groups, 25 patients in Group A, 13 patients in Group B, and 22 patients in Group C.

In Group A, Medohar Vati; in Group B, Iesabgol Husk; and in Group C, Navaka Guggulu tab were administered. Medohar Vati and Navaka Guggulu were administered in the dose of 1 g thrice a day for 60 days with lukewarm water before meal, whereas, in Group B, 15 g Iesabgol Husk 2 times with lukewarm water before meal was administered in the same duration (60 days).

Treatment was observed according to the plan of study. The results were derived after execution of statistical techniques. The effect of therapy has been presented as follow.

Effect on symptomatology

In Group A, 55.17% in Daurgandhya and Ayase-shwas, 45.28% Angagauravata, 63.49% Atikshudha, 73.68% Atipipasa, 31.43% Chalasphika, 31.88% Chalauadara, 30.30% Chalastana, 64.62% Utsahahani, 62.86% Daurbalya, 71.79% Nidraadhikya, 55.38%

Table 5: Medohar Vati

Effect of drug	For Group A	t value		
Group A	n=25 D.F.=24	0.05 2.06	0.01 2.80	0.001 3.76

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Daurgandhya	2.32	1.04	55.17	0.46	0.09	13.97	<0.001
Ayaseswas	2.32	1.04	55.17	0.46	0.09	13.97	<0.001
Angagauravata	2.12	1.16	45.28	0.61	0.12	7.86	<0.001
Atikshudha	2.52	0.92	63.49	0.76	0.15	10.47	<0.001
Atipipasa	0.76	0.20	73.68	0.65	0.13	4.30	<0.001
Chalasphika	2.80	1.92	31.43	0.67	0.13	6.61	<0.001
Chalauadara	2.76	1.88	31.88	0.73	0.15	6.06	<0.001
Chalastana	2.64	1.84	30.30	0.65	0.13	6.20	<0.001
Utsahahani	2.60	0.92	64.62	0.56	0.11	15.09	<0.001
Daurbalya	2.80	1.04	62.86	0.52	0.10	16.83	<0.001
Nidraadhikya	1.56	0.44	71.79	0.73	0.15	7.72	<0.001
Snigdhagatrata	2.60	1.16	55.38	0.58	0.12	12.35	<0.001
Sandhishool	1.64	0.64	60.98	0.58	0.12	8.66	<0.001
Atimutrata	0.36	0.04	88.89	0.48	0.10	3.36	<0.01
Angashaithilya	2.84	2.80	2.78	0.35	0.07	0.57	>0.05

SD: Standard deviation, SE: Standard error

Table 6: Effect on weight and BMI by Medohar Vati

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Weight	80.23	77.53	3.37	1.38	0.28	9.79	<0.001
BMI	31.41	30.35	3.37	0.53	0.11	9.97	<0.001

BMI: Body mass index, SD: Standard deviation, SE: Standard error

Table 7: Effect on circumference by Medohar Vati

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Chest	102.68	99.36	3.23	1.49	0.30	11.12	>0.001
Abdomen	106.24	102.36	3.65	2.32	0.46	8.38	>0.001
Hip	114.00	110.12	3.40	1.59	0.32	12.20	>0.001
Thigh	62.08	58.60	5.61	2.82	0.56	6.18	>0.001
Leg	39.76	38.42	3.37	1.36	0.27	4.93	>0.001
Arm	32.12	31.72	1.25	0.50	0.10	4.00	>0.001
Forearm	26.58	26.24	1.28	1.18	0.24	1.44	<0.05

SD: Standard deviation, SE: Standard error

Table 8: Effect on skinfold thickness (cm) by Medohar Vati

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Biceps	2.40	1.97	17.97	0.31	0.06	7.08	>0.001
Triceps	2.85	2.41	15.43	0.21	0.04	10.28	>0.001

SD: Standard deviation, SE: Standard error

Table 9: Effect on walking time in seconds and respiratory rate/m by Medohar Vati

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Walking time	27.04	22.16	18.05	1.83	0.37	13.31	<0.001
Respiration rate	24.12	20.16	16.42	1.51	0.30	13.08	<0.001

SD: Standard deviation, SE: Standard error

Table 10: Iesabgol Husk

Effect of drug	For Group B	t value		
Group B	n=13 D.F.=12	0.05 2.179	0.01 3.06	0.001 4.32

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Daurgandhya	1.23	0.46	62.50	0.60	0.17	4.63	<0.001
Ayaseswas	1.62	0.62	61.90	0.58	0.16	6.24	<0.001
Angagauravata	1.92	1.23	36.00	0.48	0.13	5.20	<0.001
Atikshudha	3.62	1.23	65.96	0.51	0.14	16.98	<0.001
Atipipasa	1.23	0.62	50.00	0.77	0.21	2.89	>0.01
Chalasphika	1.69	1.38	18.18	0.48	0.13	2.31	>0.01
Chalauadara	1.85	1.62	12.50	0.44	0.12	1.90	>0.05
Chalastana	2.00	1.31	34.62	0.75	0.21	3.32	<0.01
Utsahahani	2.00	0.69	65.38	0.48	0.13	9.81	<0.001
Daurbalya	2.46	1.15	53.13	0.48	0.13	9.81	<0.001
Nidraadhikya	1.00	0.31	69.23	0.63	0.17	3.96	<0.01
Snigdhagatrata	1.77	0.85	52.17	1.04	0.29	3.21	<0.01
Sandhishool	1.46	0.54	68.42	0.82	0.23	4.42	<0.001
Atimutrata	0.31	0.00	100.00	0.48	0.13	2.31	>0.01
Angashaithilya	3	3	13.64	0.44	0.12	1.90	>0.05

SD: Standard deviation, SE: Standard error

Table 11: Effect on weight and BMI by Iesabgol Husk

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Weight	76.25	72.49	4.93	1.80	0.50	7.54	<0.001
BMI	30.55	29.02	5.01	0.77	0.21	7.13	<0.001

BMI: Body mass index, SD: Standard deviation, SE: Standard error

Table 12: Effect on circumference by Iesabgol Husk

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Chest	101.08	98.62	2.44	1.66	0.46	5.33	<0.001
Abdomen	97.42	94.54	2.96	2.89	0.80	3.60	<0.01
Hip	111.69	109.00	2.41	1.97	0.55	4.92	<0.001
Thigh	57.08	54.46	4.58	2.53	0.70	3.72	<0.01
Leg	38.96	37.85	2.86	1.08	0.30	3.71	<0.01
Arm	31.46	30.38	3.42	1.38	0.38	2.81	>0.01
Forearm	26.88	26.46	1.57	0.49	0.14	3.09	<0.01

SD: Standard deviation, SE: Standard error

Table 13: Effect on skinfold thickness (cm) by Iesabgol Husk

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Biceps	2.16	1.61	25.62	0.36	0.10	5.55	<0.001
Triceps	2.46	2.16	12.19	0.16	0.04	6.84	<0.001

SD: Standard deviation, SE: Standard error

Table 14: Effect on walking time in seconds and respiration rate/m by Iesabgol Husk

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Walking time	30.85	23.62	23.44	3.22	0.89	8.10	<0.001
Respiration rate	28.54	23.77	16.71	2.24	0.62	7.67	<0.001

SD: Standard deviation, SE: Standard error

Table 15: Navaka Guggulu

Effect of drug	For Group C	t value		
Group C	n=22 D.F.=21	0.05 2.08	0.01 2.83	0.001 3.12

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Daurgandhya	2.32	1.05	54.90	0.55	0.12	10.84	<0.001
Ayaseswas	2.00	1.05	47.73	0.58	0.12	7.78	<0.001
Angagauravata	2.00	1.45	27.27	0.51	0.11	5.02	<0.001
Atikshudha	3.18	1.55	51.43	0.90	0.19	8.51	<0.001
Atipipasa	0.91	0.36	60.00	0.51	0.11	5.02	<0.001
Chalasphika	2.55	2.27	10.71	0.46	0.10	2.81	>0.01
Chalauadara	2.73	2.32	15.00	0.50	0.11	3.81	<0.001
Chalastana	2.55	2.27	10.71	0.46	0.10	2.81	>0.01
Utsahahani	2.27	1.00	56.00	0.55	0.12	10.84	<0.001
Daurbalya	2.59	1.27	50.88	0.65	0.14	9.57	<0.001
Nidraadhikya	1.59	0.55	65.71	0.58	0.12	8.52	<0.001
Snigdhagatrata	2.32	1.27	45.10	0.72	0.15	6.79	<0.001
Sandhishool	1.50	0.68	54.55	0.59	0.13	6.52	<0.001
Atimutrata	0.32	0.09	71.43	0.43	0.09	2.49	>0.01
Angashaithilya	2.55	2.50	1.79	0.21	0.05	1.00	>0.05

SD: Standard deviation, SE: Standard error

Table 16: Effect on weight and BMI by Navaka Guggulu

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Weight	78.64	76.94	2.16	1.18	0.25	6.74	<0.001
BMI	31.89	31.19	2.21	0.50	0.11	6.67	<0.001

BMI: Body mass index, SD: Standard deviation, SE: Standard error

Table 17: Effect on circumference by Navaka Guggulu

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Chest	101.45	98.68	2.73	1.34	0.29	9.69	<0.001
Abdomen	106.00	102.32	3.47	4.43	0.95	3.90	<0.001
Hip	114.86	112.23	2.30	1.62	0.35	7.63	<0.001
Thigh	61.36	59.82	2.52	1.84	0.39	3.93	<0.001
Leg	41.00	40.00	2.44	1.07	0.23	4.39	<0.001
Arm	32.55	31.27	3.91	1.16	0.25	5.14	<0.001
Forearm	27.34	27.02	1.16	0.72	0.15	2.08	>0.01

SD: Standard deviation, SE: Standard error

Table 18: Effect on skinfold thickness (cm) by Navaka Guggulu

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Biceps	2.36	2.08	12.12	0.32	0.07	4.14	<0.001
Triceps	2.95	2.67	9.40	0.23	0.05	5.63	<0.001

SD: Standard deviation, SE: Standard error

Table 19: Effect on walking time in seconds and respiration rate/m by Navaka Guggulu

Symptoms	Mean		% of improvement	SD	SE	"t"	p
	B.T.	A.T.					
Walking time	26.41	21.91	17.04	2.86	0.61	7.39	<0.001
Respiration rate	25.64	22.32	12.94	1.91	0.41	8.14	<0.001

SD: Standard deviation, SE: Standard error

Group A: Individual symptom-wise improvement of patients

Group A	Improvement in percentage							
Patient	**In general symptom**	**Associated symptoms**	**Weight and BMI**	**Body circumference**	**Skinfold thickness**	**Time and respiratory rate**	**Total**	**Over all**
1	68.75	63.64	5.21	2.66	6.25	16.33	162.84	27.14
2	62.50	54.84	2.41	3.70	14.58	13.56	151.60	25.27
3	69.23	47.62	3.71	4.44	25.00	21.67	171.67	28.61
4	57.14	46.67	0.92	2.32	16.67	17.74	141.46	23.58
5	62.50	47.06	2.64	2.80	17.78	15.69	148.47	24.74
6	50.00	28.57	2.31	2.59	8.82	25.00	117.30	19.55
7	40.00	37.50	3.46	2.64	13.56	17.02	114.18	19.03
8	50.00	33.33	1.54	2.10	8.11	25.00	120.08	20.01
9	71.43	56.25	1.26	2.34	13.79	15.22	160.29	26.71
10	58.33	37.50	5.69	4.26	17.81	17.31	140.90	23.48
11	53.85	48.28	4.88	2.45	7.69	20.69	137.83	22.97
12	44.44	47.37	7.79	4.56	28.57	22.22	154.95	25.83
13	50.00	36.00	2.10	2.42	25.49	16.00	132.01	22.00
14	55.56	30.43	1.75	3.38	11.76	11.54	114.42	19.07
15	60.00	40.91	2.00	5.85	38.18	14.29	161.23	26.87
16	60.00	39.13	2.87	4.89	28.85	18.87	154.60	25.77
17	50.00	66.67	4.37	3.13	30.00	15.91	170.07	28.34
18	55.56	34.62	1.89	3.08	15.38	14.29	124.81	20.80
19	61.54	42.86	3.35	4.88	14.75	13.73	141.10	23.52
20	62.50	50.00	3.86	4.83	18.60	15.56	155.35	25.89
21	50.00	46.67	6.04	4.45	25.00	17.78	149.93	24.99
22	58.33	41.67	2.83	3.35	15.09	14.00	135.28	22.55
23	50.00	40.00	3.49	3.57	13.21	17.31	127.58	21.26
24	60.00	41.67	5.01	3.64	6.90	15.91	133.12	22.19
25	50.00	45.83	3.51	3.51	7.02	15.56	125.42	20.90
Total (%)	1411.66 (56.47)	1105.07 (44.20)	84.87 (3.39)	87.86 (3.51)	428.88 (17.16)	428.16 (17.13)	3546.48 (141.86)	591.08 (23.64)

BMI: Body mass index

Group B: Individual symptom-wise improvement of patients

Group B	Improvement in percentage							
Patient	**In general symptom**	**Associated symptoms**	**Weight and BMI**	**Body circumference**	**Skinfold thickness**	**Walking time and respiratory rate**	**Total**	**Over all**
1	50.00	38.89	7.94	2.40	27.91	20.00	147.14	24.52
2	53.85	43.75	6.25	1.74	12.82	16.13	134.53	22.42
3	60.00	53.85	2.38	1.88	15.56	22.73	156.38	26.06
4	54.55	44.44	3.71	3.37	29.27	19.67	155.00	25.83
5	66.67	55.56	8.57	4.83	28.57	27.27	191.46	31.91
6	62.50	38.46	5.73	5.08	14.63	22.81	149.22	24.87
7	44.44	34.78	1.13	1.38	3.92	15.52	101.18	16.86
8	33.33	40.00	2.67	3.28	18.52	19.12	116.92	19.49
9	71.43	71.43	5.75	2.13	32.43	19.64	202.81	33.80
10	70.00	75.00	4.61	1.18	20.00	24.00	194.79	32.46
11	75.00	47.62	4.21	3.90	6.52	13.73	150.97	25.16
12	54.55	41.67	10.06	3.55	24.19	23.08	157.09	26.18
13	60.00	28.00	2.97	2.60	10.34	18.00	121.91	20.32
Total (%)	756.31 (8.18)	613.44 (47.19)	65.96 (5.07)	37.31 (2.87)	244.69 (18.82)	261.69 (20.13)	1979.40 (152.26)	329.90 (25.38)

BMI: Body mass index

Snigdhagatrata, 60.98% Sandhishool, 88.89% Atimutrata, and 2.78% relief were observed in Angashaithilya.

Whereas in Group B, 62.50% in Daurgandhya, 61.90% in Ayaseshwas, 36.00% Angagauravata, 65.96% Atikshudha, 50.00% Atipipasa, 18.18% Chalasphika, 12.50% Chalauadara, 34.62% Chalastana, 65.38% Utsahahani, 53.13% Daurbalya, 69.23% Nidraadhikya, 52.17% Snigdhagatrata, 68.42% Sandhishool, 100% Atimutrata, and 13.64% relief was observed in Angashaithilya.

Whereas In Group C, 54.90% in Daurgandhya, 47.73% in Ayaseshwas, 27.27% Angagauravata, 51.43% Atikshudha, 60.00 Atipipasa, 10.71% Chalasphika, 15.00% Chalauadara, 10.71% Chalastana, 56.00% Utsahahani, 50.88% Daurbalya, 65.71% Nidraadhikya, 45.10% Snigdhagatrata, 54.55% Sandhishool, 71.43% Atimutrata, and 1.79% relief was observed in Angashaithilya.

DISCUSSION

Discussion is a process of re-examining oneself. It forms a base for conclusion. This is the most important part of any research work. According to ancient research, methodology before establishing any theory, Upanayana (Discussion) is the prior step to Nigamana (conclusion). Discussion is nothing but the logical reasoning

Group C: Individual symptom-wise improvement of patients

Group C	Improvement in percentage							
Patient	In general symptom	Associated symptoms	Weight and BMI	Body circumference	Skinfold thickness	Walking time and respiratory rate	Total	Over all
1	54.55	71.43	2.01	2.74	3.33	11.90	145.96	24.33
2	22.22	17.39	1.70	3.30	14.29	6.78	65.67	10.95
3	60.00	28.57	4.38	3.87	15.79	19.64	132.26	22.04
4	71.43	40.00	5.68	2.81	23.40	18.52	161.84	26.97
5	66.67	83.33	3.30	4.16	13.89	32.00	203.35	33.89
6	54.55	35.29	4.09	2.91	13.24	21.15	131.23	21.87
7	44.44	33.33	4.91	2.44	21.15	18.37	124.65	20.78
8	42.86	27.59	1.44	1.82	18.46	22.03	114.20	19.03
9	37.50	28.57	−1.01	−0.20	4.76	10.00	79.62	13.27
10	38.46	30.77	2.03	2.55	6.45	15.79	96.05	16.01
11	63.64	41.67	2.36	2.53	9.52	21.57	141.28	23.55
12	66.67	56.25	1.58	2.78	9.76	20.00	157.03	26.17
13	57.14	31.58	1.18	1.31	8.70	4.88	104.78	17.46
14	60.00	22.58	0.52	1.67	0.00	11.29	96.06	16.01
15	63.64	32.00	1.44	4.55	19.23	15.38	136.24	22.71
16	35.71	33.33	1.41	7.40	20.00	24.19	122.05	20.34
17	21.43	16.67	−0.84	1.57	−11.67	7.69	34.85	5.81
18	50.00	37.50	3.55	2.45	17.39	16.33	127.22	21.20
19	41.67	22.73	3.02	3.08	6.25	3.51	80.25	13.38
20	37.50	29.41	2.55	2.54	10.71	6.67	89.38	14.90
21	38.46	26.09	1.32	2.30	9.21	12.50	89.88	14.98
22	37.50	26.92	3.48	1.30	0.00	6.25	75.45	12.57
Total (%)	1066.02 (48.46)	773.00 (35.14)	50.10 (2.28)	59.88 (2.72)	233.87 (10.63)	326.45 (14.84)	2509.33 (114.06)	418.22 (19.01)

BMI: Body mass index

of observations. It is a bridge which connects the findings with conclusions. Hence, the discussion is very much crucial part of any scientific research. The title of study was:

> *Sthaulya* has been mentioned by Acharya Charaka in Ashtaunindita Adhyaya (Charaka Sutra. 21). It means that it is a well-recognized disease since the *Samhita* period [10]. Madhavakara has described Medoroga as an individual entity in 34th chapter of Madhava-nidana. Medoroga Medosvina, Atisthula, and Sthula are synonymous to *Sthaulya* [11].

In allopathic literature, it is considered as a metabolic disorder named as obesity.

Sthaulya or obesity is a burning problem in the world. It is a dreadful disease with its hazardous complications such as Hyperlipidemia, Atherosclerosis Degenerative Heart Disease, and Diabetes Mellitus. These are major causes for mortality and morbidity, not only in western countries but also in India [12] (World Health Report – 2002).

Now a day, Obesity is emerging as an important health problem in India. The Nutrition Foundation of India study showed that 32.3% of middle-class male and 50% of middle-class female in Delhi were obese [13] (API Textbook of medicine, 7th Edition).

Sushruta has narrated the etiopathogenesis of *Sthaulya* Roga on the basis of an endogenous entity being caused due to "Dhatvagni Mandya" (Sushruta Samhita, Sutra 15) [14]. In *Sthaulya*, Tikshnagni occurs. As per the references of Sushruta and further clarified by Dalhana, it is more logical to accept that after passing, Rakta and Mamsa Dhatu from Rasa excessive Medo Dhatu is produced. Jatharagni is found to be excessive, but Medodhatvagni is found to be in Manda condition. It is due to Avarana of Vayu in Koshtha. Therefore, person indulges in more food consumption, which produces excessive Meda and this vitiated cycle goes on. Due to obstruction by Meda, Vyana Vayu cannot transport nutrient to other Dhatu, so Medadhatu increases and Uttardhatu decreases.

Medohar Vati

Haritaki, Bibhitaki, Vidanga, Yavakshar, Agnimantha, and Madhu have Tikshna, Laghu, Gunas, and Ushna Veerya, which helps in the clearing the obstruction in the channels.

These Tikta drugs possess the Lekhana, Karshana, and Meda-Kleda Upashoshana properties. Bibhitaki has Chhedan property; Yavakshar has lekhan property which helped in curing the various symptoms of Medoroga. Medohar Vati has katu-ras and Ushna-veerya-drvayas, which act on kapha and vayu to break the samprapti of *Sthaulya*.

In pathogenesis, Avarna of Vata is there. Most of the drugs (5 drugs) having Ushna Veerya which is effective against Vata.

Iesabgol Husk

It has sheet veerya property, and it acts on teekshna-agni to suppress increased appetite to reduce calorie intake. It also acts on vitiated Pachak–Pitta and normalizes the state of Agni.

It decreases serum cholesterol through proper excretion of bile acids. It is also beneficial in appetite and helps in weight control through its ability to lower the rate of glucose absorption and bulk-forming properties which may enhance the feeling of satiety.

It is well-studied lipid-lowering agent with generally modest reductions seen in blood levels of total cholesterol and low-density lipoprotein (bad cholesterol).

Navaka Guggulu

In Navaka Guggulu, maximum ingredients have Laghu, Ruksha Guna, Katu Rasa, Ushna Virya, Katu Vipaka, and Vata-Kapha-shamaka properties. Therefore, it is effective to control *Sthaulya*.

Acharya Shri Govind Das has mentioned "Navaka Guggulu" in Medoroga Chikitsa (Bhaishajya Ratnawali 39/43).

Rasapanchaka is very well indicated in Kapha predominant pathologies [Cha. Su. 21/23]. Due to this property, it breaks the Samprapti of Sthulya.

As it is Dipana and Pachana, it can do very well in certain Vata-Kapha condition like *Sthaulya*. It has efficacy to correct the function of Medodhatvagnimandya.

Iesabgol Husk has sheet veerya property, and it acts on teekshna-agni to suppress increased appetite to reduce calorie intake. It also acts on

Group and symptom-wise improvement

Group wise	Improvement in percentage						
	In general symptom	Associated symptoms	Weight and BMI	Body circumference	Skinfold thickness	Walking time and respiratory rate	Over all
Group A	56.47	44.20	3.39	3.51	17.16	17.13	23.64
Group B	58.18	47.19	5.07	2.87	18.82	20.13	25.38
Group C	48.46	35.14	2.28	2.72	10.63	14.84	19.01

Group-wise overall effect

Effect	Range (%)	Group A	Group B	Group C	Total number of patients
Unchanged	0-10	0	0	1	1
Mild improved	10-25	16	6	18	40
Moderate improved	25-50	9	7	3	19
Mark. improved	50-75	0	0	0	0
Complete remission	75-100	0	0	0	0
	Total patient	25	13	22	60

Number of patients in group-wise improvement

Effect	Range (%)	Group A - Number of patients	Group B - Number of patients	Group C - Number of patients	Total number of patients
Unchanged	0-10	0	0	1	1
Mild improved	10-25	16	6	18	40
Moderate improved	25-50	9	7	3	19
Marked improved	50-75	0	0	0	0
Complete remission	75-100	0	0	0	0
Total patients (n)		25	13	22	60

Percentage of patients in group-wise improvement

Result	Range	Group A - Percentage of patient	Group B - Percentage of patient	Group C - Percentage of patient
Unchanged	0-10	0	0	4.55
Mild improved	10-25	64	46.15	81.82
Moderate improved	25-50	36	53.85	13.64
Marked improved	50-75	0	0	0
Complete remission	75-100	0	0	0

vitiated Pachak–Pitta and normalizes the state of Agni. It is also beneficial in weight control through its ability to lower the rate of glucose absorption and bulk-forming properties which may enhance the feeling of satiety.

Navaka Guggulu encounters Vata and Kapha Dosha by virtue of its Katu Rasa dominance and Ushna Virya. Vatahara action is also achieved by Laghu and Snigdha property.

Effect on dushya

Meda and Kleda are the chief culprits in *Sthaulya*. Katu Rasa performs Medo-kledo-upashoshana action. Ushna Virya also helps in Kleda and Medavilayana action.

Due to katu Rasa, all the involved channels are dilated. Katu Rasa and Ushna Virya acts over Medovaha and Mamsavaha Srotodushti.

Medohar Vati and Navaka Guggulu both act on above principle.

Iesabgol Husk has Medohar and Mutral properties. It makes sroto-vishodhan and removes toxic substances from the gut.

Effect on body weight

Medohar Vati provided 3.37% improvement in reduction of body Weight. It may be due its Ushna dravyas dominancy and Lekhan property of the drug.

However, Iesabgol Husk provided 4.93% reduction. It may be due to its Pitta-shamaka property which acts on vitiated Pachak–Pitta and normalize the state of Agni.

Navaka Guggulu gives only 2.16% Weight reduction which is less than other two drugs. It may also act on the base of its Katu Rasa, Ushna Virya, and Vata–Kapha-shamaka properties.

Effect of therapy on symptoms

Medohar Vati shows the better result on Daurbalya (62.86), Nidraadhikya (71.79), and Snigdhagatrata (55.38).

However, Iesabgol Husk shows the better result on atikshudha, i.e., 65.96%. Which may be due to its bulk-forming properties, this enhances the feeling of fullness and gives satiety to the patient.

CONCLUSION

Effect on body weight

In Group A, weight of patients was reduced to 3.37%. In Group B, weight reduction is 4.93%, whereas in Group C, Weight reduction is only 2.16%. In comparative study, Group B (Iesabgol Husk) gives a better result than Group A and Group C. Whereas Group A drug (Medohar Vati) is comparatively better than Group C (Navaka Guggulu).

Effect on body circumference

In Group A, chest 3.23%, abdomen 3.65%, hip 3.40%, thigh 5.61%, leg 3.37%, arm 1.25%, and forearm 1.28% relief was observed. Whereas in Group B, chest 2.44%, abdomen 2.96%, Hip 2.41%, thigh 4.58%, leg 2.86%, arm 3.42%, and forearm 1.57% relief was observed. Whereas in Group C, chest 2.73%, abdomen 3.47%, hip 2.30%, thigh 2.52%, leg 2.44%, arm 3.91%, and forearm 1.16% relief was observed.

Effect on skinfold thickness
In Group A, biceps 17.97% and triceps 15.43% relief was observed. Whereas in Group B, biceps 25.62% and triceps 12.19% relief was observed. Whereas in Group C, biceps 12.12% and triceps 9.40% relief was observed.

Effect on walking time and respiration rate
In Group A, walking time 18.05% and respiration rate 16.42% relief was observed. Whereas in Group B, walking time 23.44% and respiration rate 16.71% relief was observed. Whereas in Group C, walking time 12.12% and respiration rate 9.40% relief was observed.

Overall effect of therapies
Group-wise improvement
On general symptoms, Group A 56.47%, Group B 58.18%, and in Group C 48.46% relief was observed. On associated symptoms, Group A 44.20%, Group B 47.19%, and in Group C 35.14% relief was observed. On weight and BMI Group, A 3.39%, Group B 5.07%, and in Group C 2.28% relief was observed. On body circumference, Group A 3.51%, Group B 2.87%, and in Group C 2.72% relief was observed. On skinfold thickness, Group A 17.16%, Group B 18.82%, and in Group C 10.63% relief was observed. On walking time and respiratory rate, Group A 17.13%, Group B 20.13%, and in Group C 14.84% relief was observed. If we see the overall effect of all three groups in total average improvement, then we found that Group A 23.64%, Group B 25.38%, and in Group C 19.01% relief was observed. Thus, in this way, overall comparison of all the parameter showed that effect of Group B was better than Group A. However, Group A was better than Group C.

Total effect of therapy
Overall percentage of improvement was calculated on the average of total improvements find in all groups.

Table shows following percentage of improvements:
Group A - Mild improvement was found in 64% patients; moderate improvement was found in 36% patients (total number of patient n=25).

Group B - Mild improvement was found in 46.15% patients; moderate improvement was found in 53.85% patients (total number of patient n=13).

Group C - Unchanged 4.55% patient, mild improvement was found in 81.82% patients, moderate improvement was found in 13.64% patients (total number of patient n=22).

There is no marked improvement, or complete remission was found in any group.

In this study, the considerable effect was not achieved to some patients. This may be due to the short duration of the study. Charaka Samhita also described long-term of the treatment for the disease of *Jirna* and *Atisthulata* which was consider under *Krichhrasadhya Vyadhi*.

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