

A CLINICAL STUDY OF AN AYURVEDIC FORMULATION FOR THE MANAGEMENT OF OBESITY

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ABSTRACT

The incidence of obesity is increasing at alarming rates worldwide and India is no exception. Obesity has now become an important health problem in developing countries particularly in India, which is currently experiencing a rapid epidemiological transition. Obesity has reached epidemic proportions in India in the 21st century, affecting 5% of the country's population. In India 12.1% of males and 16% of females are obese. Obesity is gaining more and more attention at globally. In Ayurveda literature many medicines were indicated and one of the medicine is referred by the Sushrut Samhita (Sutra Sthan 15/38) which contains Tri-phala, Guggulu, Rasanjan, Loha-bhasma, Shilajit, Madhu and Gomutra and advised to mix in equal ratio to prepare the vati (pill), for the treatment of obesity.. The 60 obesity patients between 14-50 yrs were selected and the prepared pill was administered for 90 days. The result shows that 53.33% improved and 46.67% moderately improved.

Key words: Obesity; Vati, Ayurveda, Sushruta Samhita

INTRODUCTION

Obesity is a global problem and more prevalent in developing countries. Overweight and obesity is the fifth leading risk for global health. At least, 2.8 million adults die each year as a result of being overweight or obese. The International Obesity Task Force (IOTF-2005) stated that more than 300 million people worldwide classified as clinically obese; having a BMI >30.¹ Obesity and overweight occurs due to imbalance between calories consumed and calories utilized. Globally, there have been two reasons for overweight and obesity:

1) An increased intake of energy-dense foods that is high in fat, salt and sugars

but low in vitamins, minerals and other micronutrients.

2) A decrease in physical activity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization.²

Changes in dietary and physical activity patterns are often results from sedentary lifestyle, not sleeping enough, endocrine disruptors, such as some foods that interfere with lipid metabolism, medications that make patients put on weight.³

Morbid obesity has reached epidemic proportions in India in the 21st century; affecting 5% of the country's population and 12.1% males and 16.0% females are

obese or overweight. A large number of medical conditions have been associated with obesity. Obesity is a state in which there is generalized accumulation of excess fat in the body leading to a body weight of more than 20% of the required weight. A recent National Institute of Health Consensus Conference defined obesity as Body Mass Index greater than 27 kg/m². Now a days obesity is defined at or greater than 25 Kg/m² BMI.⁴

Obesity (sthaulya / medoroga) is defined among the Ashta Nindatiya Purusha (eight despised or undesirable physiques)

and categorized this problem under Santarpanajanita Vyadhi in Charak Samhita.⁵ Sushrut Samhita also refers the Obesity (sthaulya / medoroga) treatment in the sutra sthan under the heading “Rasa-nimittamev Stholyam Karshyam Cha....” In the chapter 15 and verse 32.⁶

MATERIAL AND METHODS This study was conducted in the Department of Dravyaguna, Dr. S. R. Rajasthan Ayurved University, Jodhpur. For the present study 60 patients were selected from O.P.D. of its associated hospital.

S	criteria	assessment Criteria	Scoring
1.	Chalaspika (pendulous buttock)	Absence of chalatva	0
		Little visible movement after fast movement.	1
		Little visible movement even after moderate movement.	2
		Movement after mild movement.	3
		Movement even after changing posture	4
		Absence of chalatva	0
2	Chalaudarastana (pendulous abdomen)	Absence of chalatva	0
		Little visible movement after fast movement.	1
		Little visible movement even after moderate movement.	2
		Movement after mild movement.	3
		Movement even after changing posture	4
		Absence of Alasya	0
3	Javoparodha / alasya (laziness)	Doing work satisfactory with initiation late in time	1
		Doing work unsatisfactory with lot of mental pressure & late in time	2
		Not starting any work in his own responsibility, doing little work very slow	3
		Does not have any initiation & not wants to work even after pressure	4
4	Krchchhrvyavayata (loss of libido)	Unimpaired libido and sexual performance	0
		Decrease in libido but can perform sexual act	1
		Decrease in libido but can perform sexual act with dif-	2

		ficulty	
		Loss of libido and can't perform sexual act	3
5	Nindradhikya (<i>excessive sleep</i>)	Normal sleep 6-7 hrs/ day	0
		Sleep up to 8hrs / day with Anga Gaurava	1
		Sleep up to 8hrs / day with Anga Gaurava & Jrimbha	2
		Sleep up to 10hrs / day with tandra	3
		Sleep up to 10hrs / day with Tandra & Klama	4
6	Daurgandhya (<i>bad smell</i>)	Absence of bad smell	0
		Occasionally bad smell limited to close areas difficult to suppress with deodorants	1
		Persistent bad smell felt from long distance is not suppressed by deodorant	2
		Persistent bad smell felt from long distance even intolerable to the patient himself	3
7	Swedadhikya (<i>excessive sweating</i>)	Sweating after heavy work	0
		Sweating after little work	1
		Profuse sweating after heavy work	2
		Profuse sweating after minimum work	3
		Sweating even in resting condition	4
8	Kshudadhikya (<i>excessive hunger</i>)	Person not at all taking food	0
		Person taking food in less quantity once a day	1
		Person taking food in less quantity twice in a day	2
		Person taking food in moderate quantity twice in a day	3
		Person taking food in excessive quantity twice or thrice in a day	4
9	Trishadhikya (<i>excessive thirst</i>)	Normal thirst	0
		Up to 1 lit. excess intake of water	1
		1 to 2 lit. excess intake of water	2
		2 to 3 lit. excess intake of water	3
		More than 3 lit. intake of water	4
10	Shaithilya (<i>fatigue</i>)	No fatigue	0
		Little fatigue in doing hard work	1
		Moderate fatigue in doing routine work	2
		Excessive fatigue in doing routine work	3
		Excessive fatigue even in doing little work	4
11	Guruta / Anga gaurava (<i>heaviness</i>)	No heaviness in the body	0
		Feels heaviness in the body but it does not hamper routine work	1
		Feels heaviness in the body which hamper daily routine work	2

		Feels heaviness in the body which hamper movement of the body	3
		Feels heaviness with flabbiness in all over body which cause distress to the person	4
12	Kshudra Svasa (dyspnoea)	Dyspnoea after heavy work (movement) but relieved soon and up to tolerance	0
		Dyspnoea after moderate work but relived later and up to tolerance	1
		Dyspnoea after little work but relieved later and up to tolerance	2
		Dyspnoea after little work but relieved later and beyond tolerance	3
		Dyspnoea in resting condition	4
13	Snigdha Gatra (oiliness)	Normal snigdhatta	0
		Oily luster of body in summer season	1
		Oily luster of body in dry season	2
		Excessive oily luster of body in dry season which can be removed with difficulty	3
		Persistence and profuse stickiness all over body	4
14	Vyayama Asahatva (intolerance)	Can do routine exercise	0
		Can do moderate exercise without difficulty	1
		Can do only mild exercise	2
		Can do only mild exercise with very difficulty	3
		Can do even mild exercise	4

Drug material For the study the drug, Sushrut Samhita referred in the sutra sthan under the chapter 15 and verse 32 was selected from the Ayurvedic literature which contains Tri-phala (Terminalia chebula, Terminalia bellerica, Embelica officinalis), Guggulu (Commiphora wightii), Rasanjan (Berberis aristata), Loha-bhasma, Shilajit (Ashphaltum punjabinum), Madhu (honey) and Gomutra (cow urine).

The ingredients of this preparation were procured from open market with authentication and identification. It has been transferred the University college of Ayurveda pharmacy under job card number 184/18-01-08. All these drugs were taken in same quantity of 1.2 kg each. In

accordance to 'Vati' kalpana preparation methodology the pills were made.

Selection of patients The patients of obesity were selected according to the following criteria.

A. Inclusion criteria:

1. The patients of age group 14-50yrs were selected.
2. The patients having clinical signs and symptoms of obesity according to Ayurveda and modern science.
3. Patients whose B.M.I. >25 but <45 were considered for the study.

B. Exclusion criteria:

1. Patients below the age of 14 years and above 50 years.
2. Patients with Hypothyroidism.
3. Patients with long term Steroid treatment.

4. Patients having CHD, IHD and highly obese and evidence of Renal, Hepatic involvement.
5. Patients with Diabetes mellitus.
6. Patients having history of hereditary.
7. The patients having B.M.I.>45 were also excluded.

C. Assessment criteria: Assessment includes both objective and subjective criteria –

(I) Objective criteria:

The assessment criteria were B.M.I., girth measurement of Chest – Abdomen - Hip - Mid thigh - Mid arm & Biochemical test i.e. S. cholesterol and S. triglycerides. In case of all circumference measurements, the mean values were taken before and after treatment. The body wt. was also taken before and after treatment.

(II) Subjective criteria:

Most of the symptoms and signs of obesity (sthaulya), described in Ayurveda, are subjective in nature and to give results objectively and for statistical analysis, multidimensional scoring system was adopted. This score was obtained before and after treatment through statistical analysis and percentage relief was taken to assess the efficacy of medicine. The scores were given 0-4 according to severity of signs and symptoms. (Table 1) Scoring was adopted from the previous study Rajput et al.⁷

Dose schedule The human dose of VATI is : one-two pills.

Diet and exercise Patients were advised to –

Do's- to take normal diet with increased amount of vegetable salad such as cucumber, cabbage etc and do some exercise like walking, running.

Don'ts – avoid fatty diet i.e. fried spicy food, cold drinks, ice creams, chocolate and day sleeping is strictly avoided.

Total effect of the therapy Total effect of the therapy was assessed in terms of cured, markedly improved, moderately improved, moderately improved, improved and unchanged with the following accounts.

1. Cured – 100% relief in signs and symptoms.
2. Markedly improved – more than 75% reduction in the score of assessment rating scale.
3. Moderately improved – 50% to 75% reduction in the score of assessment rating scale.
4. Improved – 25% to 50% reduction in the score of assessment rating scale.
5. Unchanged – Less than 25% reduction in the score of assessment rating scale.

Statistical test Unpaired t test was used to analyze the results.

Table 1: Subjective Criteria for Assessment

Observation:

Table: - 2 Observation of Sushrut Samhita referenced preparation as a pill – Group A

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
<i>Chalaspika (pendulous buttock)</i>	20	2.40	1.45	0.95	39.58	0.22	0.05	19.00	<0.001
<i>Javoparodha / alasya (laziness)</i>	20	1.50	0.55	0.95	63.33	0.39	0.09	10.78	<0.001
<i>Krchchhrvayavayata (loss of libido)</i>	20	1.25	0.60	0.65	52.00	0.59	0.13	4.95	<0.001
<i>Nindradhikya (excessive sleep)</i>	20	2.35	1.05	1.30	55.32	0.66	0.15	8.85	<0.001
<i>Daugandhya (bad</i>	20	1.60	0.50	1.10	68.75	0.72	0.16	6.85	<0.001

smell)									
Swedadhikya (excessive sweating)	20	2.35	0.95	1.40	59.57	0.60	0.13	10.47	<0.001
Kshudadhikya (excessive hunger)	20	2.70	1.10	1.60	59.26	0.75	0.17	9.49	<0.001
Trishadhikya (excessive thirst)	20	2.45	1.15	1.30	53.06	0.47	0.11	12.37	<0.001
Shaithilya (fatigue)	20	1.70	0.65	1.05	61.76	0.39	0.09	11.92	<0.001
Guruta / Anga gaurava (heaviness)	20	1.75	0.35	1.40	80.00	0.82	0.18	7.63	<0.001
Sukumarata (Softness)	20	1.80	0.90	0.90	50.00	0.55	0.12	7.28	<0.001
Ayathopachaya (Irregular Metabolism)	20	1.05	0.60	0.45	42.86	0.60	0.14	3.33	<0.001
Udar vriddhee (Abdomen increase)	20	2.55	1.05	1.50	58.82	0.51	0.11	13.08	<0.001
Vyayam Asahatv (Intolerance to Physical Exercise)	20	1.55	0.65	0.90	58.06	0.55	0.12	7.28	<0.001
Krinthan (Spasm)	20	1.05	0.55	0.50	47.62	0.51	0.11	4.36	<0.001
Kshudra Svasa (dyspnoea)	20	2.15	0.95	1.20	55.81	0.52	0.12	10.26	<0.001

Table: - 3 Observation of Sushrut Samhita referenced preparation as a pill Group B

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Chalaspika (pendulous buttock)	20	2.35	1.95	0.40	17.02	0.50	0.11	3.56	<0.05
Javoparodha / alasya (laziness)	20	1.90	1.60	0.30	15.79	0.47	0.11	2.85	<0.05
Krchchhryavayata (loss of libido)	20	1.30	0.95	0.35	26.92	0.49	0.11	3.20	<0.05
Nindradhikya (excessive sleep)	20	2.50	2.05	0.45	18.00	0.51	0.11	3.94	<0.05
Daurgandhya (bad smell)	20	1.80	1.40	0.40	22.22	0.50	0.11	3.56	<0.05
Swedadhikya (excessive sweating)	20	1.90	1.55	0.35	18.42	0.49	0.11	3.20	<0.05
Kshudadhikya (excessive hunger)	20	2.00	1.55	0.45	22.50	0.51	0.11	3.94	<0.05
Trishadhikya (excessive thirst)	20	2.70	2.35	0.35	12.96	0.49	0.11	3.20	<0.05
Shaithilya (fatigue)	20	2.20	1.65	0.55	25.00	0.60	0.14	4.07	<0.05
Guruta / Anga gaurava (heaviness)	20	1.95	1.55	0.40	20.51	0.50	0.11	3.56	<0.05
Sukumarata (Softness)	20	2.10	1.65	0.45	21.43	0.51	0.11	3.94	<0.05
Ayathopachaya (Irregu-	20	1.50	1.15	0.35	23.33	0.49	0.11	3.20	<0.05

lar Metabolism)									
Udar vriddhee (Abdomen increase)	20	2.30	1.90	0.40	17.39	0.50	0.11	3.56	<0.05
Vyayam Asahatv (Intolerance to Physical Exercise)	20	2.50	2.05	0.45	18.00	0.51	0.11	3.94	<0.05
Krinthan (Spasm)	20	1.60	1.20	0.40	25.00	0.60	0.13	2.99	<0.05
Kshudra Svasa (dyspnoea)	20	1.95	1.45	0.50	25.64	0.51	0.11	4.36	<0.001

Table - 4 Observation of Sushrut Samhita referenced preparation as a pill Group C

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Chalaspika (pendulous buttock)	20	1.95	1.80	0.15	7.69	0.37	0.08	1.83	>0.10
Javoparodha / alasya (laziness)	20	1.90	1.70	0.20	10.53	0.41	0.09	2.18	>0.10
Krchchrvyavayata (loss of libido)	20	1.00	0.90	0.10	10.00	0.45	0.10	1.00	>0.10
Nindradhikya (excessive sleep)	20	2.35	2.20	0.15	6.38	0.37	0.08	1.83	>0.10
Daurgandhya (bad smell)	20	1.60	1.25	0.35	21.88	0.49	0.11	3.20	<0.05
Swedadhikya (excessive sweating)	20	2.25	1.95	0.30	13.33	0.47	0.11	2.85	<0.05
Kshudadhikya (excessive hunger)	20	2.15	1.95	0.20	9.30	0.41	0.09	2.18	>0.10
Trishadhikya (excessive thirst)	20	2.45	2.10	0.35	14.29	0.49	0.11	3.20	<0.05
Shaithilya (fatigue)	20	2.20	1.90	0.30	13.64	0.47	0.11	2.85	>0.10
Guruta / Anga gaurava (heaviness)	20	1.65	1.30	0.35	21.21	0.49	0.11	3.20	<0.05
Sukumarata (Softness)	20	1.70	1.55	0.15	8.82	0.37	0.08	1.83	>0.10
Ayathopachaya (Irregular Metabolism)	20	1.40	1.15	0.25	17.86	0.44	0.10	2.52	>0.10
Udar vriddhee (Abdomen increase)	20	2.30	2.00	0.30	13.04	0.57	0.13	2.35	>0.10
Vyayam Asahatv (Intolerance to Physical Exercise)	20	1.70	1.50	0.20	11.76	0.41	0.09	2.18	>0.10
Krinthan (Spasm)	20	1.25	1.10	0.15	12.00	0.37	0.08	1.83	>0.10
Kshudra Svasa (dyspnoea)	20	2.15	1.80	0.35	16.28	0.49	0.11	3.20	<0.05

Table :- 5 Observation of Sushrut Samhita referenced preparation as a pill on the basis of BMI changes – Group – A

BMI Observa-	N	Mean	Dif.	% of	SD	SE	t	p
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tion on		BT	AT		Change				
Body Weight	20	76.95	72.53	4.43	5.75	1.73	0.39	11.46	<0.001
BMI	20	31.56	29.50	2.05	6.51	0.96	0.21	9.61	<0.001
Neck	20	36.08	34.08	2.00	5.54	0.74	0.17	12.03	<0.001
Arm	20	32.35	29.85	2.50	7.73	0.99	0.22	11.33	<0.001
Back	20	104.60	101.25	3.35	3.20	1.88	0.42	7.98	<0.001
Abdomen	20	100.50	95.10	5.40	5.37	2.95	0.66	8.19	<0.001
Hips	20	109.20	104.35	4.85	4.44	2.82	0.63	7.68	<0.001
Thai	20	60.30	57.80	2.50	4.15	0.79	0.18	14.07	<0.001

Table: - 6 Observation of Sushrut Samhita referenced preparation as a pill on the basis of BMI changes – Group – B

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Body Weight	20	77.60	74.20	3.40	4.38	5.36	1.20	2.83	<0.05
BMI	20	31.25	28.86	2.39	7.63	3.27	0.73	3.27	<0.05
Neck	20	34.50	33.88	0.63	1.81	0.72	0.16	3.86	<0.05
Arm	20	31.20	29.58	1.63	5.21	2.18	0.49	3.34	<0.05
Back	20	102.63	101.75	0.88	0.85	1.05	0.23	3.73	<0.05
Abdomen	20	97.75	95.65	2.10	2.15	1.73	0.39	5.43	<0.05
Hips	20	108.95	105.48	3.48	3.19	4.21	0.94	3.69	<0.05
Thai	20	56.95	54.13	2.83	4.96	2.99	0.67	4.23	<0.05

Table :- 7 Observation of Sushrut Samhita referenced preparation as a pill on the basis of BMI changes – Group – C

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Body Weight	20	76.85	76.15	0.70	0.91	1.44	0.32	2.18	>0.10
BMI	20	30.92	30.59	0.33	1.07	0.61	0.14	2.41	<0.05
Neck	20	35.08	34.93	0.15	0.43	0.40	0.09	1.67	>0.10
Arm	20	31.60	30.58	1.03	3.24	2.65	0.59	1.73	>0.10
Back	20	102.28	100.25	2.03	1.98	3.85	0.86	2.35	<0.05
Abdomen	20	95.55	94.75	0.80	0.84	2.86	0.64	1.25	>0.10
Hips	20	107.50	105.00	2.50	2.33	5.75	1.29	1.94	>0.10
Thai	20	59.48	57.78	1.70	2.86	3.99	0.89	1.90	>0.10

Table: - 7 Observation of Sushrut Samhita referenced preparation as a pill on the basis of Biochemical changes – Group – A

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Hb _{gm} %	20	12.63	13.03	0.40	3.17	0.45	0.10	3.99	<0.05
Triglesride	20	168.37	163.90	4.47	2.65	27.25	6.09	0.73	>0.01
TLC	20	161.93	149.95	11.97	7.39	15.45	3.45	3.47	<0.05

HDL	20	53.53	60.46	6.92	12.93	5.29	1.18	5.85	<0.001
LDL	20	98.54	86.54	12.00	12.18	7.84	1.75	6.84	<0.001
VLDL	20	28.21	26.81	1.40	4.96	2.40	0.54	2.61	<0.05

Table: - 8 Observation of Sushrut Samhita referenced preparation as a pill on the basis of Biochemical changes – Group – B

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Hb gm%	20	12.85	13.18	0.33	2.53	0.40	0.09	3.61	<0.05
Triglesride	20	170.63	164.43	6.20	3.63	17.52	3.92	1.58	>0.10
TLC	20	160.89	149.74	11.15	6.93	12.94	2.89	3.85	<0.05
HDL	20	54.53	59.28	4.74	8.69	5.72	1.28	3.71	<0.05
LDL	20	92.47	87.80	4.66	5.04	9.40	2.10	2.22	<0.05
VLDL	20	28.12	26.69	1.44	5.10	2.66	0.59	2.41	<0.05

Table: - 9 Observation of Sushrut Samhita referenced preparation as a pill on the basis of Biochemical changes – Group – C

Symptoms	N	Mean		Dif.	% of Change	SD	SE	t	p
		BT	AT						
Hb gm%	20	12.64	12.73	0.09	0.71	0.24	0.05	1.66	>0.10
Triglesride	20	169.09	166.35	2.75	1.62	4.15	0.93	2.96	<0.05
TLC	20	159.42	157.90	1.52	0.95	6.18	1.38	1.10	>0.10
HDL	20	52.20	53.25	1.05	2.01	1.51	0.34	3.11	<0.05
LDL	20	93.54	90.63	2.91	3.11	3.47	0.77	3.75	<0.05
VLDL	20	27.99	26.42	1.58	5.63	2.85	0.64	2.47	<0.05

RESULTS: Totally 60 patients were treated with study drug and completed the full course of three month of treatment duration. The data related to the improvement in the signs and symptoms were individually summarized in the Table 1,2,3,4. The analysis of objective measurements of BMI is shown in Table - 5,6,7. and biochemical test are shown in Table 8-10.

Results of therapy were assessed mainly on the basis of adopted score. Statistically highly significant improvement can be noticed in excessive sleep (62.27%), heaviness in body (61.25%), fatigue (60.80%) and excessive hunger (58.06%). Reduction in weight is statistically highly

significant ($P < 0.001$). The effect of trialed drug was 53.33% of patients improved and 46.67% of moderately improved.

DISCUSSION

In the present study, the anti-obesity (Medohara) effect of group of a drugs which is reffered in Sushrut Samhita the - Tri-phala (Terminalia chebula, Terminalia belerica, Embelica officinalis), Guggulu (Commiphora wightii), Rasanjan (Berberis aristata), Lohabhasma, Shilajit (Ashphaltum punjabinum), Madhu (honey) and Gomutra (cow urine) was studied.

Obesity is considered to be a disorder of energy balance, occurring when energy expenditure is no longer in equilibrium with daily energy intake, so as to ensure body weight homeostasis. Although the etiology of obesity is complex, dietary factors, particularly the consumption of an atherogenic diet, is considered a risk factor for its development.⁸ It is well known that obesity is associate with increased adipose tissues accumulation in the body. In Ayurveda the role of Agni (digestive fire) is quite relevant to life and responsible factor for maintenance of health, digestion and metabolism from gross to subtle level. Diminished function of Agni is responsible for formation of Ama, i.e. an unwanted metabolic waste product at respective level. Ama has tendency to block the micro-channels (srotorodha), i.e. Medovaha srotasa, and increases Ama Meda resulting to obesity.⁹

The action of Ayurvedic drugs is proportionate to the Panchabhautika composition which in turn is responsible for Rasa (taste), Guna (properties), Virya (potency), Vipaka (post digestive) and Prabhava (specific action) of the respective drugs. Vachadi Churna consists of six drugs. Properties of this formulation in combined form is bitter and pungent in Rasa, Ushna Virya (hot potency), Katu Vipaka, Laghu (light), Tikshana (penetrating nature) and Ruksha Guna (dryness) and Medohara properties¹⁰ and exhibit the Kapha-Vata shamaka, Lekhaniya (scraping), Amapachana, Dhatushoshana properties which decrease the excessive Kapha, improves the digestion and clears the obstruction in fat deposition and reduces the excessive fat.¹¹

The efficacy of most herbal remedies is attributed to the combination of various active principles. Here it may be due to

the presence of phytochemicals Ascorbic acid, Limonene, Pectine, Zinc, Shogaol.

A study shows that pectin delays gastric emptying and induces satiety in obese patients and it may be useful adjuvant in the treatment of obesity¹² and an animal study shows that Pectin inhibits lipids accumulation in the adipocytes.¹³

REFERENCES

1. Paul P, Thomas D, Giles, George AB, Yuline H, Judith, et al. Obesity and cardiovascular disease: Pathophysiology, evaluation and effect of weight loss. American Heart Association 2006; 113: 898-918.
2. Anonymous. Obesity – Preventing and Managing the Global Epidemic, Report of a WHO Consultation (WHO Technical Report Series 894). World Health Organization; 2000.
3. Worldwide Obesity Trends – Globesity. [Retrieved from: <http://www.annecollins.com/obesity/causes-of-obesity.htm> on: 02/10/2012]
4. Buchake Aanand, et al. An assessment of the activities of Ruksha Guna w.s.r. to Sthaulya. (PG Dissertation). Jamnagar: I.P.G.T.&R.A.; 2002.
5. Caraka. Carak Samhita. Shastri KN, Chaturvedi GN, editor. 13th ed. Varanasi: Chaukhamba Sanskrit series; 1986.p.407.
6. Sushrut. Sushrut Samhita, 'Nibandha Sangraha Commentary' by Dullhan, editor Priyavrat Sharma, Chokhamba Orientalia, Varanasi, 2009, p 73
7. Rajput AS, et al. A pharmaceutico-pharmaco-clinical study on Guggulu w.s.r. to Medohar effect. (PG dissertation). Jamnagar: I.P.G.T.&R.A.;2003.
8. Dhyani SC. Dravya Guna Siddhanta, 1st ed. Varanasi: Krishna Das Academy; 1986. p. 54.

9. Charaka. Charak Samhita. Shastri KN, Chaturvedi GN, editors. 1st ed. Varanasi: Chaukhamba Bharati Academy; 1998.p.411.
10. Vagbhata. Astanga Hridayam. Tripathi B, editor. 1st ed. Delhi: Chaukhamba Sanskrit Pratishthan; 2007. p.201.
11. Sharma P.V. Dravyaguna Vigyana, Vol.I. 1st ed. Varanasi: Chaukhamba Bharati Academy; 1998.p.184-185.
12. Williams CM, Hajnal F, Di Lorenzo C, Valenzuela JE. Pectin delays gastric emptying and increases satiety in obese subjects. Gastroenterology 1988; 95(5): 1211-5.
13. Kwon JY, Park KY, Cheigh HS, Song YO, et al. The beneficial effects of pectin on obesity in vitro and in vivo. Journal of the Korean Society of Food Science and Nutrition 2005; 34(1): 13-20.

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