AYU

Access this article online
Website: www.ayujournal.org
DOI: 10.4103/0974-8520.127721
Quick Response Code:

Clinical Research

A clinical study on the role of *Agnimanthadi* compound and *Vashpa Svedana* in the management of *Sthaulya* (obesity)

Ravikant Goyal, Mandip Goyal[1], Hari Mohan Chandola[2]

Reader, PG Department of Panchakarma, SDM College of Ayurveda, Hassan, Karnataka, [1]Assistant Professor, Department of Kayachikitsa, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, Gujarat, [2]Director, Chaudhary Brahm Prakash Ayurved Charak Sansthan, Khera Dabur, Najafgarh, New Delhi, India

Abstract

Currently more than 1 billion adults are overweight (*Sthula*) and at least 300 million of them are clinically obese. Obesity leads to adverse metabolic effects on blood pressure, cholesterol, triglycerides, and insulin resistance. Present study was planned to assess the role of *Agnimanthadi* compound containing *Agnimantha*, *Mustaka*, *Gomutra* (cow's urine), and *Eranda Patra Kshara* and *Vashpa Svedana* (VS) (generalized steaming) in the management of obesity. 80 patients of *Sthaulya* (obesity) were selected out of which 67 completed the treatment and they were treated in two groups. Amongst these, 38 patients were treated with *Agnimanthadi* compound in the dose of 2 gram (four capsules of 500 mg) 3 times a day with lukewarm water before meal and remaining 29 patients were given VS only. The duration of treatment in both groups was 7 weeks with follow-up for 2 months after the completion of treatment. Analysis of the overall effects of both the groups showed that VS provided marked reduction in weight, body mass index, and other signs and symptoms in patients of *Sthaulya* in comparison to the *Agnimanthadi* treated group.

Key words: *Agnimanthadi compound, obesity, Sthaulya, Vashpa Svedana*

Introduction

Following the trend of other developing countries that are steadily becoming more obese, obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population.[1] The main reason behind peak rise in obesity may be change life style and unhealthy food habits. Further, Indians are genetically susceptible to weight accumulation especially around the waist. Obesity according to Ayurveda is included under eight undesirable conditions, and the main causative factor for it is *Ati Santarpana* (high calorie intake).[2] Moreover, Sushruta has emphasized on metabolic disturbances in the etio-pathogenesis of *Sthaulya*.[3] Looking in to the facts of pathogenesis of *Sthaulya* mentioned in classical texts, it can be said that the drugs, which decreases satiety, corrects the functions of *Bhutaagni* and *Dhatvaagni* (metabolism) and at the same time have weight or fat or cholesterol reducing actions (*Medohara*, *Kaphahara*), may be suitable for the management. Considering these facts, *Agnimanthadi* compound was formulated. In clinical practice, it is observed that *Agnimantha* produces burning sensation, hence, *Eranda* (*Ricinus communis* Linn.) *Patra Kshara* was added in the compound, which is reported to have fat reducing with digestion, and metabolism stimulating actions.[4] In the other group, *Vashpa Svedana* (VS) *Karma* was selected to assess its role in the management of obesity. *Svedana* (sudation) possesses both *Vata* and *Kapha* pacifying properties[5] *Medohara* (fat reducing) and *Srotoshodhana* (channel cleaning action).[6] Care has to be taken that the patient may not develop dehydration due to excessive sweating, which might have been one of the reasons for not prescribing *Svedana* in obese patients in classics. Further, if sudation is given in the form of *Vashpa Svedana* then it may provide relief to the patient but may not cause dehydration because moisture of steaming may help in preventing of any complication due to excessive sudation. Taking all these points, the present clinical trial was planned with an aim to evaluate the efficacy of *Agnimanthadi* compound and *Vashpa Svedana* in the management of *Sthaulya* and to compare the effects of the above two therapies and to ascertain which is a better option for the management of *Sthaulya*.

Address for correspondence: Dr. Mandip Goyal, Department of Kayachikitsa, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, Gujarat, India.
E-mail: kaurmandip22@yahoo.com

Materials and Methods

A total of 80 patients of *Sthaulya* attending the outpatient department and inpatient department of PG Hospital, IPGT

and RA, Gujarat Ayurveda University, Jamnagar was registered for this study. Out of these, 13 patients dropped out, and 67 patients completed the prescribed course of treatment.[7]

Plan of study

An open label clinical trial was conducted on patients, where patients were given treatment for seven weeks with 2 months follow-up. Patients were given specific instructions on diet and life style modifications.

Criteria of diagnosis

The preliminary diagnosis was mainly based on the clinical presentation as mentioned in the texts but confirmed by the findings of body mass index (BMI) adopted internationally. BMI was calculated on the basis of height and weight of each patient. Standard range of normal body weight in relation to height mentioned by Life Insurance Corporation of India was adopted. An international criterion for BMI (Bray, 1976)[8] was used to calculate the BMI by the following formula: BMI = weight (kg)/height (meter).

Inclusion criteria

- Patients of both sexes in the age group of 16 to65 years were selected for the present study
- The patients having BMI between 30 to 45.

Exclusion criteria

- Obese patients suffering from hypothyroidism, obesity due to hormonal imbalance, cardiovascular diseases, hemiplegia, associated with severe hypertension and from other such diseases in which the patient cannot do his routine physical activities were excluded
- Very obese patients having BMI more than 45.

Investigations

Lipid profile was carried out in all the patients before initiating the administration of trial drugs and after the completion of course of treatment, while fasting blood sugar was carried out in suspected cases only. Routine investigation of blood and urine were also done to rule out other pathologies and to judge any adverse effect of the drugs.

Criteria of assessment

- Weight and height were recorded before starting the treatment and later on every week of the study. Weight was also recorded of all the patients who had come for the follow-up study
- Circumferences of fatty parts (chest, abdomen, hip, mid arm forearm and mid thigh) were recorded before and thereafter every week, till the completion of the course of treatment, to assess the effect of therapy
- The skin fold thickness was measured by Vernier calipers before and after treatment in fixed areas of middle portions of the biceps and triceps muscles, middle portion of the supra iliac region and the anterior surface of mid thigh region and of abdominal muscle at umbilicus
- Walking time: The time taken to climb fixed number of stairs in seconds was taken as walking time. This was done before and after the completion of full course of treatment.

The symptoms were assigned definite score and were assessed before and after the treatment. Paired "*t*" test was applied for the statistical analysis of the results. Moreover, assessment of *Dosha*, *Dushya*, and *Srotasa* based on their dominant symptoms was also carried out.

For *Vashpa Svedana*

Blood pressure and body temperature were measured by taking readings just before administrating *Vashpa Svedana* and then four readings were taken during administration of *Vashpa Svedana* daily to assess the short term or reversible effects of *Vashpa Svedana*. For this purpose first reading was taken just before starting of *Vashpa Svedana* and thereafter two readings at the interval of about 7 min during the process of *Svedana* and last just before completion of the process.

- Latency of sweating in *Vashpa Svedana* was measured by noting the time taken to wet a blotting paper of 2 cm size kept on forehead
- Body weight was recorded before administration of *Vashpa Svedana* and just after completion of *Vashpa Svedana* every day to know the immediate effect of *Vashpa Svedana*.

Groups division and treatment

The 67 patients were randomly divided into two groups' viz., *Vashpa Svedana* group and *Agnimanthadi* group. The 29 patients of *Sthaulya* were treated in the *Vashpa Svedana* group and 38 patients were treated in *Agnimanthadi* group.

1. *Vashpa Svedana* (VS) group: Patients of this group were given *Vashpa Svedana*, till the appearance of *Samyak Svedana Lakshana* (proper sudation) once a day for 3 weeks. Thereafter, one course of 3 weeks was repeated, with a gap of a week, thus making total duration of treatment of 7 weeks
2. *Agnimanthadi* group: Patients of this group were administered *Agnimanthadi* compound in the dose of 2 g (four capsules of 500 mg) 3 times a day with lukewarm water before meal for a period of 7 weeks.

Method of preparation of drug

Agnimanthadi compound comprises of four drugs namely *Agnimantha*, *Mustaka*, *Eranda Patra Kshara*, and *Gomutra* (cow's urine). First of all, fine powders of *Agnimantha* and *Mustaka* were taken in equal quantity. This mixture was given seven *Bhavanas* (trituration) of *Gomutra*. The 16 parts of *Gomutra Bhavita Agnimantha* and *Mustaka* were then added to one part of *Eranda Patra Kshara*. This compound was filled in the capsules.

Method of *Vashpa Svedana*

Purva Karma

Patients were given *Vashpa Svedana* by using *Vashpa Svedana Yantra* (sudation chamber), a special box type of table having 6.5 feet length, 2.5 feet breath, and 2 feet height, with provision to keep head outside and multiple holes on the top of table so that vapors can easily come out of the box. Under this table, a utensil containing *Dashamula Kvatha* filled up to 3/4th of its capacity was kept on gas hot plate and heated to get continuous vapors.

Approximately 8 liter of water in a vessel was taken and half kg *Dashamula Kvatha Dravya* was put and heated to give vapors. When the steam was produced the door of *Vashpa Svedana Yantra* was closed. *Abhyanga* (massage) prior to the *Vashpa Svedana* was not done in the present study.

Pradhana Karma (main procedure)

The patient was made to lie down on *Vashpa Svedana Yantra* with head kept outside the box and body covered with cloth. Sudation of the whole body was allowed while patient changes four positions by rotating, that is, lying on back, right lateral, lying on chest and left lateral till the sign and symptoms of proper sudation such as perspiration over the forehead and increased body temperature were produced.

Paschat Karma (postoperative procedures)

After *Samyaka Svedana* (proper sudation) patient was covered with a blanket and was allowed to take rest for about 15 minute in a close room. After taking a warm bath, patient was permitted to take meal.

Assessment of overall effect of the therapy

For the overall assessment of the therapy following eight categories were taken into consideration:

1. Complete remission: The 100% relief in the signs and symptoms, along with reduction in body weight up to normal range, for that particular height in comparison of age, was considered as complete remission
2. Marked improvement: More than 75% improvement noted in signs and symptoms, along with more than 75% weight reduction, was considered as markedly improved
3. Moderate improvement: The 50-74% improvement was noted in the sign and symptoms along with more than 50% weight reduction were considered as moderate improvement
4. Improvement: If 25-49% improvement was noted in the sign and symptoms along with more than 25% weight reduction, then it was considered as an improvement
5. Slight improvement: Less than 25% relief in sign and symptoms along with less than 25% weight reduction was considered as slight improvement
6. Unchanged: No effect in sign and symptoms along with no change in weight was considered as unchanged
7. Deterioration: Increase in signs and symptoms or appearance of new symptoms or increase in weight was considered as deterioration
8. Change of score: If improvement was noted in sign and symptoms, but no improvement or mild increase of weight was recorded then one step down improvement was assigned. Same was followed vice-versa.

Follow-up study

After completion of due course of treatment, all the patients were asked to report for follow-up study for the period of 2 months every fortnight. In follow-up study changes in body weight, chest circumference, hip circumference, abdomen circumference, abdomen skin fold measurement (SFM), and hip SFM were observed.

Observations

In the present series of 80 patients of *Sthaulya*, maximum number of patients were in the age group of 21-40 years (55%), females (77.5%), Hindu by religion (72.5%), married (77.5%), belonging to middle socioeconomic class (51.25%), and from urban habitat (97.5%). Further, in this study maximum number of patients were of *Kapha-Vata Prakriti* (50.0%) followed by *Kapha-Pitta Prakriti* (50.0%). 60% patients of this study were vegetarian, 66.25% were having irregular dietetic habits, 93.75% patients were doing sedentary work, 97.5% were not doing any sort of exercise at all, 85% patients were having sound sleep and 69.88% were jolly in nature.

Majority of the patients in this study, that is, 95% were taking *Guru* (heavy to digest) and *Picchila* (slimy articles) *Ahara* and 92.5% were taking *Snigdha* (unctuous) dominant *Ahara*, 83.13% patients were satisfied only after ingestion of 50% more than their routine diet requirement and 51.25% of the patients were taking food 2-3 times in a day.

In this study, *Sphika Chalatva* (slack thighs) was reported in 98.75% patients, *Anga Gaurava* (feeling of heaviness in the body) in 96.25%, *Anga Shaithilya* (flabbiness in the body) in 100% and *Ati Kshudha* (excessive hunger) in 100% of patients. Other signs and symptoms observed in patients were *Atipipasa* (excessive thirst) (92.5%), *Daurbalya* (generalized weakness) (95%), *Ayasena Shvasa* (dyspnea on exertion) (92.5%), *Utsahahani* (lethargy) (91.25%), *Svedabadha* (excessive sweating) (86.25%), *Nindradhikya* (excessive sleep) (85%), *Gatra Saada* (fatigue) (96.25%), and *Udara Chalatva* (slack abdomen) (85%).

Patients having a body weight in the range of 71-90 kg were 45.80% and BMI between 31 and 36 were 53.30%. 37.5% of patients had 11-20 kg more weight than ideal body weight followed by 35% patients having 21-30 kg more weight than ideal body weight and 48.19% patients were obese since 5.1 to 10 year. 50% of patients were having cholesterol in the range of 151-200 mg/100 ml, serum triglyceride in the range of <100 mg/100 ml in 36.25%, high density lipoprotein in the range of 31-40 in 42.5%, low density lipoprotein (LDL) more than 150 in 87.5%, and very low density lipoprotein in the range of 21-30 in 37.5%.

Effect of *Agnimanthadi* compound

Agnimahthadi compound provided statistically highly significant reduction of 2.14% in the body weight and 1.86% in BMI [Table 1]. The compound provided statistically highly significant relief in *Utsaha Hani* (lethargy) (30.58%), *Daurbalyata* (generalized weakness) (28.41%), *Anga Gaurava* (feeling of heaviness in body) (25.67%), *Nindradhikya* (excessive sleep) (23.88%), *Gatra Sada* (fatigue) (22.05%), and *Aayasena Shvasa* (dyspnea on exertion) (19.4%) [Table 2].

The trial drug significantly reduced the circumferences of mid arm by 2.70%, forearm by 2.70%, mid thigh by 1.91%, chest

Table 1: Comparison of the effects of therapies on body weight and BMI of 67 patients of *Sthaulya* (obesity)

Group of treatment	Mean BT	Mean AT	% of change	SD (±)	SE (±)	*t*	*P*
Body weight							
VS-Gr.	85.38	83.77	1.9	1.69	0.31	5.16	<0.001
A-Gr.	80.80	79.07	2.14	1.92	0.31	5.55	<0.001
BMI							
VS-Gr.	33.04	32.42	1.88	0.65	0.12	5.16	<0.001
A-Gr.	32.48	31.77	1.86	0.78	0.13	5.38	<0.001

VS-Gr.: *Vashpa svedana* group, A-Gr.: *Agnimanthadi* compound group, BMI: Body mass index, BT: Before treatment, AT: After treatment, SD: Standard deviation, SE: Standard error

Table 2: Effect of *Vashpa Svedana* (generalized steaming) on the sign and symptoms of 29 patients of *Sthaulya* (obesity)

Symptoms	Mean		% of relief	SD (±)	SE (±)	*t*	*P*
	BT	AT					
Ayasena Shvasa (dyspnoea on exertion)	1.38	0.55	60.14	0.47	0.087	9.54	<0.001
Utsaha Hani (lethargy)	1.10	0.24	78.18	0.51	0.095	9.05	<0.001
Daurbalyata (generalized weakness)	1.14	0.27	76.31	0.58	0.108	7.96	<0.001
Nidra Adhikya (excessive sleep)	0.86	0.31	63.95	0.51	0.095	5.05	<0.001
Sveda Abadha (excessive sweating)	1.03	0.51	50.48	0.51	0.95	5.47	<0.001
Snigdha-angata (unctuous body parts)	0.58	0.24	58.62	0.48	0.089	3.82	<0.001
Angagaurava (feeling of heaviness in body)	1.48	0.62	58.10	0.51	0.095	9.05	<0.001
Atipipasa (excessive thirst)	1.38	1.38	0	0.38	0.071	0	0
Ati-Kshudha (excessive hunger)	4.86	4.86	0	0	0	0	0
Gatra-Sada (fatigue)	1.38	0.62	55.07	0.63	0.12	6.33	<0.001
Anga Shathilaya (flabbiness of body)	1.93	1.93	0	0	0	0	0
Ati Mutrata (excessive urination)	0.79	0.72	8.86	0.26	0.048	1.39	>0.10

BT: Before treatment, AT: After treatment, SD: Standard deviation, SE: Standard error

Table 3: Comparison of the effects of therapies on various circumferences of 67 patients of *Sthaulya* (obesity)

Group of treatment	Mean		% of change	SD (±)	SE (±)	*t*	*P*
	BT	AT					
Chest circumference							
VS-Gr.	41.06	40.60	1.12	0.45	0.084	5.36	<0.001
A-Gr.	41.54	41.08	1.11	0.64	0.104	4.42	<0.001
Abdomen circumference							
VS-Gr.	41.23	40.74	1.19	0.55	0.10	4.9	<0.001
A-Gr.	42.61	42.18	1	0.52	0.084	5.24	<0.001
Hip circumference							
VS-Gr.	46.2	45.74	1	0.51	0.095	4.84	<0.001
A-Gr.	43.88	43.44	1	0.48	0.078	5.64	<0.001
Midarm circumference							
VS-Gr.	12.43	12.14	2.33	0.44	0.082	3.54	<0.01
A-Gr.	11.86	11.54	2.70	0.48	0.078	3.97	<0.001
Forearm circumference							
VS-Gr.	10.72	10.61	1.03	0.31	0.058	2.07	<0.05
A-Gr.	10.74	10.45	2.70	0.46	0.075	3.87	<0.001
Midthigh circumference							
VS-Gr.	22.24	22.02	1	0.58	0.11	1.91	<0.10
A-Gr.	21.47	21.06	1.91	0.58	0.094	4.36	<0.001

VS-Gr.: *Vashpa Svedana* Group, A-Gr.: *Agnimanthadi* compound group, BT: Before treatment, AT: After treatment, SD: Standard deviation, SE: Standard error

by 1.11%, and abdomen by 1% and hip by 1% [Table 3]. The drug provided statistically highly significant relief of 53.61% in *Sroto Dushti* symptoms of *Annavaha* and of 33.80% in *Rasavaha Srotasa* [Figure 1]. It also significantly increased the symptom of *Ati Mutratata* by 25.39%, which showed its diuretic effect. The trial drug also reduced pulse rate (2.43%), Diastolic blood pressure (4.71%), S. cholesterol (9.56%), walking time (4.98%) and skin fold measurements (0.77%) which were statistically highly significant.

The overall effect showed that *Agnimanthadi* compound provided moderate relief in 5.26% patients, Improvement in 13.16% patients and slight improvement in 63.16% patients. In this group 5.26% patients remained unchanged and 5.26% patients were further deteriorated [Figure 2].

In follow-up study, highly significant reduction ($P < 0.001$) in body weight was observed in 1 month follow-up. However, this significant reduction was not sustained in the 2nd month of follow-up study.

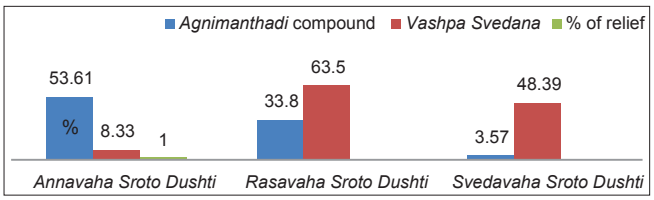

Figure 1: Effect of therapies on *Sroto Dushti*

Effect of *Vashpa Svedana* group

Vashpa Svedana caused a significant reduction in body weight by 1.61 kg (1.9%) and in BMI by 1.88% [Table 1, Figure 3]. It provided significant relief in the symptoms of *Daurbalyata* (76.31%), *Daurgandhyata* (69.62%), *Nindradhikya* (63.95%), *Sandhi Shoola* (62.73%), *Aysena Shvasa* (60.14%), *Snigdha Angata* (58.62%), *Anga Gaurava* (58.10%), *Gatra Sada* (55.07%), and *Svedabadha* (50.48%) [Table 2] and in the symptoms of *Srotodushti* of *Rasavaha Srotasa* (63.50%) and *Svedavaha Srotasa* (48.39%), [Figure 1]. It also significantly reduced the pulse rate by 2.76%, circumferences of midarm (2.33%), abdomen (1.19%), chest (1.12%), and hip (1.0%) [Table 3] and SFM of midthigh SFM (0.55%) [Table 4]. It significantly reduced the eosinophil count (16.3%), serum triglyceride (7.5%), and serum LDL (3.26%) [Table 5, Figure 3]. In total effect, *Vashpa Svedana* provided slight improvement in 34.5% of the patients

Table 4: Comparison of the effects of therapies on various SFM of 67 patients of *Sthaulya* (obesity)

Group of treatment	Mean		% of change	SD (±)	SE (±)	*t*	*P*
	BT	AT					
Waist/hip ratio							
VS-Gr.	0.96	0.96	0	0.001	0.002	2.69	<0.02
A-Gr.	0.95	0.94	1.05	0.01	0.002	1.68	>0.05
Biceps SFM							
VS-Gr.	4.32	4.28	0.92	0.08	0.01	2.06	<0.05
A-Gr.	4.24	4.20	0.94	0.09	0.01	2.8	<0.01
Triceps SFM							
VS-Gr.	4.35	4.33	0.46	0.07	0.01	1.31	>0.10
A-Gr.	4.33	4.28	0.92	0.08	0.01	3.23	<0.01
Abdomen SFM							
VS-Gr.	6.60	6.59	0.15	0.06	0.01	1.16	>0.10
A-Gr.	6.56	6.51	0.76	0.08	0.01	2.23	<0.05
Suprailiac SFM							
VS-Gr.	5.50	5.48	0.36	0.07	0.01	1.75	>0.05
A-Gr.	5.27	5.24	0.57	0.07	0.01	3.25	<0.01
Midthigh SFM							
VS-Gr.	5.48	5.45	0.55	0.07	0.01	2.83	<0.01
A-Gr.	5.55	5.50	0.90	0.01	0.02	2.21	<0.05
Total SFM							
VS-Gr.	26.24	26.14	0.38	0.03	0.05	2.08	<0.05
A-Gr.	25.96	25.76	0.77	0.02	0.03	5.59	<0.001

SFM: Skin fold measurement, VS-Gr.: *Vashpa Svedana* group, A-Gr.: *Agnimanthadi* compound group, BT: Before treatment, AT: Bfter treatment, SD: Standard deviation, SE: Standard error

while 31.03% patients each were reported with moderate improvement and improvement. Marked improvement was found in only 3.45% of the patients [Figure 2]. In follow-up of the treated patient, it was found that there was not statistically significant reduction in body weight and other body part circumferences, Skin Fold Measurement.

Comparative Efficacy

On comparing the results of both the groups, *Vashpa Sveda* (VS) group provided statistically highly significant and better relief than *Agnimanthadi* compound in symptoms such as dyspnea on exertion, lethargy, generalized weakness, excessive sleep, excessive sweating, unctuous body parts, heaviness in the body and fatigue and *Sroto Dushti Lakshana* of *Rasavaha*, and *Svedavaha Srotas* ($P < 0.001$). It also provided statistically highly significant changes on BMI, body weight reduction, chest circumference, and abdomen circumference ($P < 0.001$) and decrease in serum LDL ($P < 0.001$). The therapy provided statistically significant changes in hip circumference, mid arm circumference, waist/hip ratio and mid thigh SFM ($P < 0.01$).

Whereas *Agnimanthadi* compound provided statistically highly significant and comparatively better changes in *Annavaha Sroto Dushti*, mid arm circumference, forearm circumference, mid thigh circumference, total SFM, walking time, serum cholesterol, and serum triglyceride. It also provided significant and better changes in biceps SFM, triceps SFM and suprailiac SFM.

On overall effect, *Vashpa Svedana* provided slight improvement in 34.5% of the patients while 31.03% patients were reported with moderate improvement and improvement. Marked improvement was found in only 3.45% of the patients. Whereas, *Agnimanthadi* compound provided moderate relief in 5.26% patients, Improvement in 13.16% patients and slight improvement in 63.16% patients. In this group, 5.26% patients remained unchanged, and 5.26% patients were further deteriorated [Figure 2].

Table 5: Comparison of the effects of therapies on lipid profile of 67 patients of *Sthaulya* (obesity)

Lipid profile	Group of treatment	Mean		% of change	SD (±)	SE (±)	*t*	*P*
		BT	AT					
Serum cholesterol	VS-Gr.	179.65	177.95	0.94	36.73	6.83	0.25	>0.10
	A-Gr.	182.3	164.9	9.56	27.49	4.46	3.90	<0.001
Serum triglyceride	VS-Gr.	127.43	117.87	7.50	42.30	7.86	29.18	<0.001
	A-Gr.	142.2	108.4	23.78	119.85	19.66	1.72	>0.05
Serum HDL	VS-Gr.	40.86	43.62	–6.75	20.09	3.73	–15.55	>0.10
	A-Gr.	40.67	40.49	0.44	12.07	1.96	0.09	>0.05
Serum LDL	VS-Gr.	109.78	106.20	3.26	41.08	7.63	3.90	<0.001
	A-Gr.	113.2	102.7	9.36	27.35	4.44	2.36	<0.02
Serum VLDL	VS-Gr.	25.49	23.57	7.53	9.67	1.80	1.00	>0.10
	A-Gr.	28.45	21.68	23.80	23.97	3.89	1.74	>0.05
Serum TC/HDLC ratio	VS-Gr.	4.44	4.03	9.23	2.08	0.39	1.38	>0.10
	A-Gr.	4.73	4.20	11.20	1.50	0.24	2.23	<0.02
Serum LDLC/HDLC ratio	VS-Gr.	2.90	2.48	14.48	1.70	0.31	1.35	>0.10
	A-Gr.	2.92	2.65	9.2s5	1.27	0.20	1.4	>0.05

VS-Gr.: *Vashpa svedana* (generalized steaming) group, A-Gr.: *Agnimanthadi* compound group, BT: Before treatment, AT: After treatment, HDL: High density lipoprotein, LDL: Low density lipoprotein, VLDL: Very low density lipoprotein, TC: Total cholesterol, LDLC: Low density lipoprotein cholesterol, HDLC: High density lipoprotein cholesterol, SD: Standard deviation, SE: Standard error

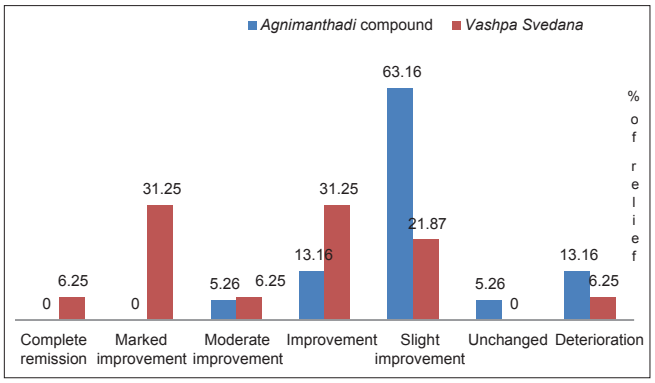

Figure 2: Overall effects of therapies

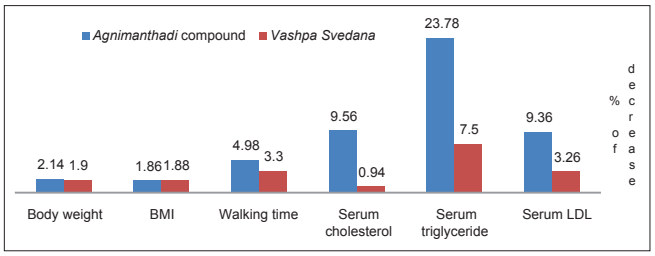

Figure 3: Effect of therapies on various parameters

Discussion

As per the hypothesis of the present trial, *Vashpa svedana* provided statistically significant reduction on BMI and body fat content. It may due to the elimination of excess of water from the body and if this procedure is done properly it may also eliminate fats, as fat become water-soluble starting with 45°C heating.[9] Further, systemic thermal therapy, such as taking a warm water bath and sauna, induces systemic vasodilatation. Recent studies have revealed that vascular endothelial function is impaired in subjects with lifestyle-related diseases, such as hypertension, hyperlipidemia, diabetes mellitus, obesity, and smoking.[10] Giving of generalized steaming improves endothelial dysfunction in these subjects, suggesting its preventive role.[11]

Most of the drugs in *Agnimanthadi* compound are having metabolism stimulating and hypo-lipidemic actions. *Katu* (pungent), *Tikta* (bitter), *Kashaya* (astringent) *Rasa*, *Katu Vipaka* (post-digestion effect), *Ushna Virya* (hot in potency), *Kapha-Vata* Shamaka actions of these drugs may have normalized the state of *Agni* (metabolism); thus, causing a reduction in excessive formation and accumulation of fatty tissue. Further, *Medohara* (hypolipidemic) action of these drugs may have facilitated to remove excess fat from the body.

Conclusions

Results of the study conclude that the administration of VS to the patients of *Sthaulya* (obesity) provided comparatively better effect in almost all the parameters of *Sthaulya*. Further, none of the patients of *Sthaulya* developed any untoward symptoms during this full course of treatment. Hence, it can be concluded that though *Svedana* (sudation) is generally contraindicated in patients of *Sthaulya*, administration of VS in an appropriate manner can be one of the best therapy to such patients. It has been found in this study that when VS *Yantra* is used, it took about four minutes to initiate the sweating in obese persons. During the process of *Vashpa Svedana* significant increase in body temperature (approximately 3-4%) occurs which comes down to the normal limit within few minutes of its completion. During *Vashpa Svedana* process, slight increase (up to 1 mm) or decrease (up to 3 mm) in systolic blood pressure and a slight decrease (up to 3 mm) in diastolic pressure may occur. In obese persons, *Vashpa Svedana* may reduce the body weight ranging from 20 g to 90 g daily.

References

1. India facing obesity epidemic: experts. The Hindu, 2007 Oct 12. Available from: http://hindu.com./2007/10/12/stories/2007101260940600.htm. [Last accessed on 2012 Jun 6]
2. Agnivesha, Charaka, Dridhabala. In: Rajeshvardatta Shastri, editor. Charaka Samhita, Sutrasthana, Samtarpaniyam Adhyaya, 1/23/6. Varanasi: Chaukhambha Bharati Academy; 2005. p. 426.
3. Sushruta. In: Vaidya Yadavji Trikamji Acharaya, Narayan Ram Acharaya, editors. Sushruta Samhita, Sutrasthana, Dosha Dhatu Mala Kshaya Vriddhi Vijnaniyam Adhyaya, 15/32. Varanasi: Chaukhambha Orientalia; 2007. p. 73.
4. Ibidem, Sushruta Samhita (7), Drava Dravya Vijnaniya 45/114. p. 205.
5. Agnivesha, Charaka Samhita, Vidyotini Hindi commentary by Kashiram Shastri and Gorakhnath Chaturvedi, Part I. Sutra Sthana, 14/3-4. Varanasi: Chaukhambha Bharati Academy; Reprint 2005. p. 281.
6. Vagbhatta's Ashtanga Hridyam (text, English translation, notes, appendix, indices). 7th ed., Vol. 1. Translated by Prof. K.R. Shrikanth Murthy, Sutrasthana 17/29. Varanasi: Chaukhambha Krishnadas Academy; 2010. p. 229.
7. Goyal R, Chandola HM. A clinical study on the role of *Vashpa Svedana* with and without *Agnimanthadi* compound in the management of *Sthaulya* (Obesity). Ph.D. Thesis, I.P.G.T. and R.A., Gujrat Ayurved University, Jamnagar, 2005.
8. Bray GA. Obesity in perspective. Vol 2, pt 2. Washington, DC: US Government Printing Office, 1975. [DHEW publication (NIH) 75-708.]
9. Biro S, Masuda A, Kihara T, Tei C. Clinical implications of thermal therapy in lifestyle-related diseases. Exp Biol Med (Maywood) 2003;228:1245-9.
10. Vogel RA. Coronary risk factors, endothelial function, and atherosclerosis: A review. Clin Cardiol 1997;20:426-32.
11. Bonetti PO, Lerman LO, Lerman A. Endothelial dysfunction: A marker of atherosclerotic risk. Arterioscler Thromb Vasc Biol 2003;23:168-75.

हिन्दी सारांश

स्थौल्य प्रबंधन में अग्निमंथादि योग एवं बाष्पस्वेदन की भूमिका का अध्ययन

रविकांत गोयल, मनदिप गोयल, हरिमोहन चन्दोला

वर्तमान समय में १ बिलियन (१० अरब) वयस्क स्थूलता रोग से पीड्ति है । उनमें कम से कम ३०० मिलियन (३ अरब) चिकित्सीय दृष्टि से स्थूल है । स्थूलता के कारण रक्तचाप, कोलेस्ट्रोल, ट्राईग्लिसराईड एवं इन्सुलिन प्रतिरोध पर प्रतिकूल प्रभाव पडता है । प्रस्तुत अध्ययन में अग्निमंथ, मुस्तक, गोमूत्र व एरण्ड पत्र क्षार से निर्मित अग्निमंथादि योग एवं बाष्पस्वेदन की भूमिका का स्थौल्य पर आकलन किया गया । स्थूलता से ग्रसित ८० रोगियों का चयन किया गया, जिनमें से १३ रोगियों ने चिकित्सा क्रम पूर्ण नहीं किया, शेष ६७ रोगियों को दो समूह में बाँटा गया, ३८ स्थूल रोगियों को अग्निमंथादि योग २ ग्राम (४ केप्सूल – ५०० मि.ग्रा.) दिन में तीन बार कोष्ण जल के साथ भोजन पूर्व तथा २९ स्थूल रोगियों को केवल बाष्प स्वेदन दिया गया । दोनों समूहों का चिकित्सा काल ७ सप्ताह एवं २ माह का फोलोअप रखा गया । प्रस्तुत अध्ययन में संपूर्ण चिकित्सीय प्रभाव का आकलन करने पर बाष्प स्वेदन के द्वारा भार में कमी, बॉडी मास इन्डेक्स एवं स्थूलता के लक्षणों में, अग्निमंथादि योग की तुलना में अधिक सार्थक परिणाम प्राप्त हुआ ।