



Research Article

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A COMPARATIVE CLINICAL EVALUATION OF AYURVEDIC DIET PLAN AND STANDARD DIET PLAN IN STHAULYA (OBESITY)

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ABSTRACT

Foods which are mentioned in Ayurvedic textbooks for the management of obesity are aimed to pacify Kapha Dosha and Medodhatu, cause downward movement of Vata, are rich in dietary fiber and have low glycemic index. The aim of the study was to evaluate the efficacy of diet which is mentioned in Ayurvedic textbook in the management of obesity. 50 subjects with features of obesity as per classics and body mass index (BMI) more than 25 kg/m² were included into study, out of which 40 subjects completed the study. In Ayurveda diet group, diet which contains horsegram, barley, greengram and Kokum fruit was advised. In standard diet group, the standard diet menu was followed according to ICMR guidelines. Both groups were given 1100 kcal diet for eight days. With diet control, both groups underwent brisk walking 20 minutes two times, jogging 20 minutes, Yogasana 40 minutes, cycling 15 minutes, Udvartana (powder massage) 20 minutes and Baspasweda (sudation) 10 minutes. Ayurvedic diet plan with physical exercise was found to be more effective in reducing all the anthropometric parameters. There was significant reduction in triglyceride (p value 0.000) and VLDL level (p value 0.013) in Ayurvedic diet group. Ayurveda group showed better relief in most of the subjective parameters among which, the effect on pacifying hunger was statistically significant (p value 0.039).

Keywords: Sthaulya, obesity, diet, exercise, Ayurveda.

INTRODUCTION

Absence of physical activity, sleeping during day, ingestion of more quantity food which is fatty and sweet causes obesity.¹ It has become a major challenge and need for the health authorities across the globe to create an awareness for the control of obesity in order to avert the high risk conditions like dyslipidemia, hypertension, coronary artery disease, type 2 diabetes mellitus, osteoarthritis, infertility, impotency, as well as psychological disorders like stress, anxiety, depression, etc. Even though, there are dozens of treatments modalities to manage obesity but food and life style have major role in managing the problem of obesity. Studies have been conducted in the management of obesity by using single Pathya (congenial diet) which have properties of Kapha Medahara (hypolipidemic) e.g. horsegram, greengram, barley and kokum. Combination of these in diet plan may be more helpful in management of obesity. Hence an effort has been made to assess whether Ayurvedic diet plan is more effective than standard diet plan in the management of obesity.

Methods

Subjects with symptoms of obesity as per classics and body mass index (BMI) more than 25 kg /m² were selected for the study. They were randomly divided into

two groups. In Ayurveda diet group, diet containing Kulattha (horsegram), Yava (barley), Mudga (greengram), Vrikshamla (*Garcini indica*) were given. In standard diet group, the standard diet menu used according to ICMR guidelines. Details are given in Table 1. Both groups were given 1100 kcal diet for eight days.

With diet control both group underwent following procedure:

Brisk walking 20 minutes two times, jogging 20 minutes, Yogasana 40 minutes, cycling 15 minutes, Udvartana 20 minutes and sudation 10 minutes.

Grouping

Ayurveda diet group (ADG): 20

Standard diet group (SDG): 20

RESULT

There was significant reduction in anthropometric parameters and lipid profile except HDL in subjects of ADG, whereas HDL increased significantly. (Table 2) All anthropometric parameter and lipid profile reduced significantly in subjects of SDG except waist-hip ratio whereas HDL increased significantly. (Table 3)

Table 1: Showing Ayurvedic diet plan² and Standard diet plan³

	Ayurvedic diet plan	Standard diet plan
7 am	Kulatha/Mudga (100 g) yusha ⁴ (gruel) Cap Garcini (400 mg) no.2	Sprouted Bengal gram (100 g)
10 am	Butter milk ⁵ (200 ml)	Butter milk (200 ml)
1 pm	Yava chapati (2) -50 g Leafy vegetable- spinach / fenugreek/ amaranth (100 g) Vegetable-beans/ cabbage/ ash gourd/ tomato(100 g) Root and tuber –carrot/ knolkhol (25 g)	Wheat chapatti (2) -50 g Leafy vegetable (100 g) Other vegetable (100 g) Root and tuber (25 g)
4 pm	Mixed salad (100 g) Cap Garcini (400 mg) no.2	Mixed fruits -100 g
7 pm	Yava chapatti (2)-50 g Leafy vegetable- spinach / fenugreek/ amaranth (100 g) Vegetable-beans/ cabbage/ ash gourd/ tomato (100 g) Root and tuber –carrot/ knolkhol (25 g)	Wheat chapatti (2)-50 g Leafy vegetable (100 g) Other vegetable (100 g) Root and tuber (25 g)
8 pm	Skimmed off milk (200 ml)	Skimmed off milk (200 ml)

Table 2: Showing effect of Ayurveda diet group on anthropometric measurement and lipid profile (paired t-test)

Parameters	Mean BT	Mean AT	Mean diff	SD (±)	SE (±)	T	P	Remark
Weight (kg)	83.6	80.3	3.28	1.28	0.28	11.39	0.000	HS
BMI (kg/m ²)	33.9	32.4	1.48	0.85	0.19	7.73	0.000	HS
Abdominal circumference (cm)	106.72	101.58	5.15	3.94	0.88	5.84	0.000	HS
Waist/hip ratio	0.98	0.93	0.054	0.079	0.017	3.08	0.006	S
MUAC (Left) (cm)	33.7	32.4	1.32	1.61	0.362	3.64	0.002	S
MTC (Left) (cm)	56.9	55.95	0.95	0.82	0.18	5.14	0.001	HS
Total Cholesterol (mg/dl)	211.10	201.48	9.62	8.62	1.92	4.98	0.000	HS
Triglycerides (mg/dl)	228.25	204.21	24.04	22.59	5.05	4.76	0.000	HS
HDL (mg/dl)	44.4	48.9	-4.41	5.73	1.28	-3.44	0.003	S
LDL (mg/dl)	122.43	111.85	10.58	5.21	1.16	9.08	0.000	HS
VLDL (mg/dl)	44.1	40.8	3.37	4.69	1.05	3.21	0.005	HS

MUAC-mid upper arm circumference, MTC-mid thigh circumference, HS- highly significant (p < 0.001), Significant at 5 % level
BT: Before Treatment; AT: After Treatment

Table 3: Showing effect of Standard diet group changes in anthropometric measurement and lipid profile (paired t-test)

Parameters	Mean BT	Mean AT	Mean diff	S D	S E	T	P	Remark
Weight (kg)	85.5	82.2	3.23	1.78	0.39	8.1	0.000	HS
BMI (kg/m ²)	32.7	31.5	1.16	0.65	0.14	8.01	0.000	HS
Abdominal circumference (cm)	106.3	102.4	3.9	3.55	0.79	4.9	0.000	HS
Waist/hip ratio	0.94	0.91	0.025	0.028	0.006	3.9	0.333	NS
MUAC(Left) (cm)	32.9	32.2	0.70	0.71	0.15	4.3	0.000	HS
MTC(Left) (cm)	55.7	55	0.77	0.92	0.20	3.7	0.001	HS
Cholesterol (mg/dl)	216.79	204.52	12.26	6.45	1.65	6.05	0.000	HS
Triglycerides (mg/dl)	196.4	186.4	10.1	7.39	1.65	6.056	0.000	HS
HDL (mg/dl)	46.9	50.25	-3.3	3.37	.75	4.15	0.001	HS
LDL (mg/dl)	130.69	117.01	13.68	7.84	1.75	7.79	0.000	HS
VLDL (mg/dl)	39.08	37.28	1.80	1.92	.430	4.186	0.001	HS

MUAC-mid upper arm circumference, MTC-mid thigh circumference, HS- highly significant (p < 0.001), NS- no significant (p > 0.05), Significant at 5 % level BT: Before Treatment; AT: After Treatment

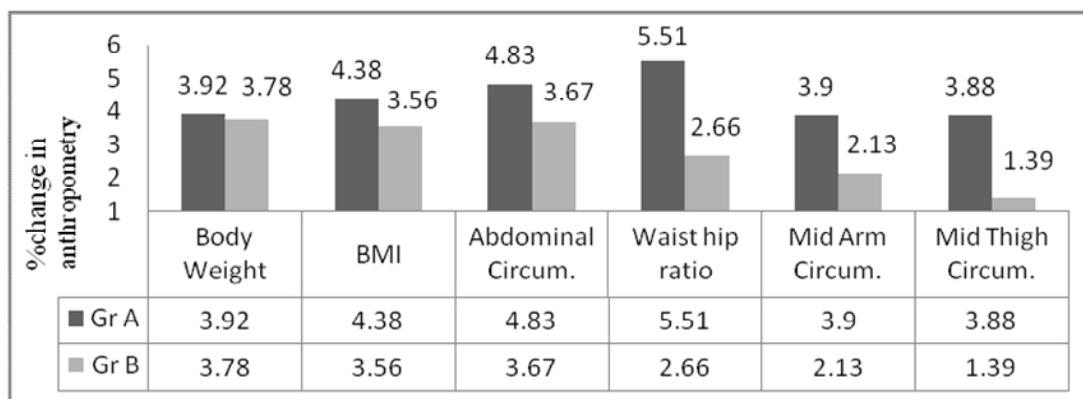


Figure 1: Showing effect of therapies on anthropometric measurement (%)

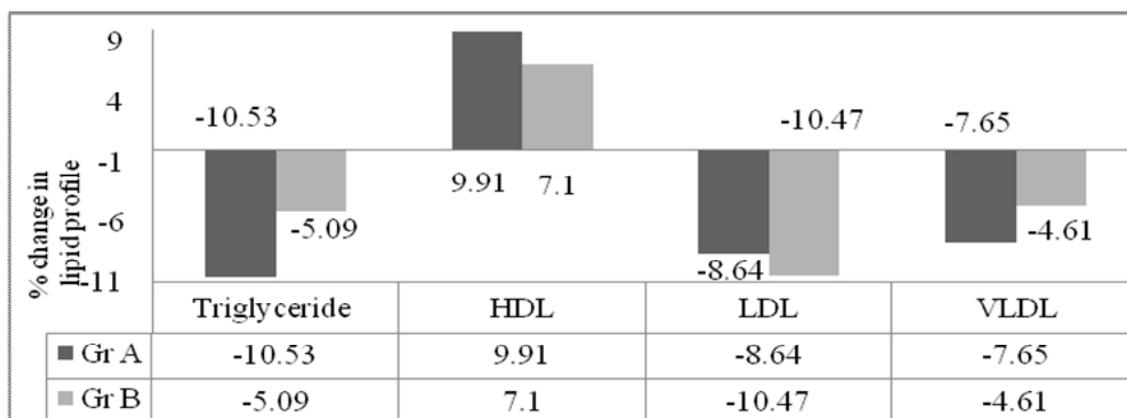


Figure 2: Showing effect of therapies on lipid profile (%)

Table 4: Showing comparison between groups (unpaired t test)

Parameters	Mean (ADG)	Mean (SDG)	Mean diff	S E difference	T	P	Remark
Utsaha (enthusiasm)	1.00	0.80	0.200	0.186	1.073	0.280	NS
Sweda (sweating)	0.65	0.55	0.100	0.201	0.495	0.623	NS
Shrama swasa (exertional dyspnea)	1.05	1	0.050	0.153	0.326	0.746	NS
Kshudha (hunger)	0.45	0.15	0.30	0.015	2.135	0.039	S
Trishna (thirst)	0.6	0.5	0.100	0.203	0.490	0.627	NS
Vyayama sakti (exercise)	1.1	0.9	0.100	0.141	1.414	0.165	NS
Gatra guruta (heaviness of body)	1	1	0.000	0.162	0.000	1.000	NS
Udara lambanam (flabby abdomen)	0.35	0.05	0.300	0.158	1.897	0.065	NS
Dourgandhya (foul smell)	0.2	0.15	0.050	0.123	0.406	0.687	NS
Weight (kg)	3.280	3.232	0.047	.492	.097	.924	NS
Abdominal Circumference (cm)	5.15	3.90	1.25	1.18	1.054	.299	NS
Waist/hip ratio	0.0545	0.0255	0.029	.018	1.548	.130	NS
Total Cholesterol (mg/dl)	9.62	12.26	-2.63	2.409	-1.09	0.281	NS
Triglyceride (mg/dl)	24.045	10.10	14.03	5.315	2.641	0.001	HS
HDL (mg/dl)	4.41	3.33	1.08	1.486	.726	0.472	NS
LDL (mg/dl)	10.582	13.685	-3.10	2.106	-1.473	0.149	NS
VLDL (mg/dl)	3.3	1.8	1.57	1.13	1.388	0.013	S

HS- high significant (p < 0.001), NS-no significant (p > 0.05), S- significant (p < 0.05), Significant at 5 % level

While comparing the effect of therapies in between groups, in relation to clinical features of obesity, there was no statistically significant difference except Kshudha Pravritti (p < 0.05). Kshudha Pravritti reduction was more in ADG. Effect on weight, BMI and other anthropometric parameters were statistically insignificant. Ayurvedic diet plan provided better results on triglycerides and VLDL reduction with difference of statistically significant. (Table 4) Percentage change in anthropometric and lipid profile was more in subjects of ADG. (Figure 1, 2)

DISCUSSION

As per the line of management of obesity, the diet prescribed for obesity should be Guru (heavy to digest) and Atarpana (non-nourishing). By virtue of heavy quality, the food normalizes the aggravated vata and also reduces the teekshnagni (increased hunger). The Atarpana quality of food will help in the reduction of fat in the body. The term guru indicates the qualitative aspect of food. Food should be Katu, tikta and kasaya rasa pradhana which pacify kapha. Virukshana (drying) and Chedaneeya (breaking) dravya are advised in obesity. Virukshana property helps to reduce fat in the body and Chedaneeya property helps to remove obstruction in the channels, particularly from channel related to fat by its

sroto cleansing property. Reducing diet i.e. low calorie diet significantly improved anthropometric and body composition measurements.⁶ Diet have a role to maintain lean body mass, supply energy for physical activity and supply antioxidants for lipid oxidation. Most of the fuel used in exercises done for a longer duration and at higher intensities such as brisk walking, long distance running and cycling is fat.⁷ The more trained a muscle, the greater its ability to use fat as a fuel. After a period of aerobic training, muscle cells contain more and larger mitochondria.⁸ More fatty acids that are released from adipose tissue store in the blood stream, the much fat will be used by the muscle. Due to antioxidant properties in foods there was considerable reduction in LDL oxidation in the blood stream and thus slow LDL uptake into scavenger cells. Fats and oils in foods are mostly in the form of triglycerides.⁹ Although calorific values were similar in both the groups, Ayurvedic diet group contain less fat which might have lead to significant reduction in triglyceride and VLDL levels in subjects. Ayurvedic diet group showed better relief in most of the subjective parameters among which, the effect on pacifying hunger was statistically significant. It may be due to more filling effect in Ayurvedic diet. Kulattha Yusha takes longer time for digestion and gives sense of satiety. The Ruksa

Guna, Kashaya Rasa and Grahi nature of Kulattha are mainly concerned with the Medoshoshan at various sites. Kulattha is also well known for Medahara property and Vatahara. Kashaya Rasa possesses Medohara property. So we can consider that may be Kashayarasa, Ushna and Ruksha Guna act at Dhatvagni level. Mudga is astringent and sweet in taste, unctuous and non slimy.¹⁰ It is dry (causes dryness), easily digestible, water absorbent; mitigate kapha and pitta, cold in potency.¹¹ Green gram, horse gram are the chief sources of protein. Pulse-derived fibre and resistant starch have been shown to alter energy expenditure, substrate trafficking and fat oxidation as well as visceral adipose deposition. Evidence suggests that pulse-derived fibres, trypsin inhibitors and lectins may reduce food intake by inducing satiety via facilitating and prolonging cholecystokinin secretion. Pulses could be useful as functional foods and food ingredients that combat obesity.¹² Yava is having the properties like Ruksha, guru and mrudu gunas which act as medohara. The Sheeta veerya (cold potency) of Yava causes satiation by balancing the aggravated Agni. It increases the bulk of stool. Yava is low in carbohydrate and rich in dietary fiber. Low carbohydrate diet helps to regulate insulin production and decrease circulating insulin. Less insulin may result in less fat storage and fewer food cravings. Dietary fiber prevents absorption of glucose from intestine and helps increase peristalsis movement and reduced blood cholesterol.¹³ Diet plan in both the groups showed efficacy in reducing obesity, as it was fiber rich low calorie diet. Increased intake of fiber leads to a gradual reduction in fasting glucose levels. The findings of all identified studies also suggest that interventions can result in improvements in various dietary outcomes, including a decrease in high fat consumption, increase in fruit and vegetable intake, and decrease in fried foods and snacking. In both groups, diet consisted of low glycemic index foods. Low glycemic index foods may benefit weight control in two ways either by promoting satiety or by promoting fat oxidation at the expense of carbohydrate oxidation.¹⁴

Overweight or obese people on low glycemic index food lost more weight and had more improvement in lipid profiles than those receiving Carbohydrate diets. Body mass, total fat mass, body mass index, total cholesterol and LDL-cholesterol all decreased significantly more in the low glycemic index group. Lowering the glycemic load of the diet appears to be an effective method of promoting weight loss and improving lipid profiles and can be simply incorporated into a person's lifestyle. The Vrikshamla kashaya due to its Laghu, Ruksha, Theekshna Guna and Ushna Veerya may do the Shoshana of the Pritvi and Jala Mahabhuta pradhana Medho Dhatu. Even its Amla rasa acts as Shrotho shodhana. All kind of vegetables are hard to digest, produce dryness, more feces and expel feces and flatus.¹⁵ Fruits and vegetables that are rich sources of antioxidants include orange, musk melon, water melon, spinach, and carrot. Green leaves are rich sources of calcium, and iron. They are also fairly good sources of riboflavin, folic acid, and many other micronutrients. Leaf proteins are good source of lysine.¹⁶ Leafy vegetables are high in water content and dietary fiber. Other vegetable beans, ash gourd, cabbage, tomato

etc are fairly good sources of mineral and vitamin. Salad, salad dressing, and raw vegetable consumption can be effective strategies for enhancing nutritional adequacy.¹⁷ Some nutrients have antioxidant properties. These likely reduce LDL oxidation in the blood stream and thus slow LDL uptake into scavenger cells. Fruits and vegetables are rich in such antioxidants as the various carotenoids, vitamin C and vitamin E. Eating fruits and vegetables regularly is one positive step to reduce cholesterol and slow the progression of cardiovascular disease.¹⁸ Rasa of Takra is kasaya and amla. Kasaya rasa reduces vitiation of Kapha and Amla rasa reduces the vitiation of Vata.¹⁹ One should take milk to maintain nutrition during dieting in obesity. Cow milk has ten properties viz sweetness, coldness, softness, unctuousness, density, smoothness, sliminess, heaviness, slowness and clarity.²⁰ Skimmed off milk is beneficial to maintain nutrition in obesity. Skimmed off milk is a good source of proteins, vitamins, and minerals such as calcium, phosphorus, sodium, potassium, magnesium, cobalt, copper, iodine, etc. Milk is particularly rich in calcium. Research suggests that a calcium rich diet especially one that includes dairy sources (with limitation in total calories) not only helps young women keep weight in check but may reduce overall body fat. Calcium may depress certain hormone which consequently improves the body's ability to break down fat in cells and slow fat production.²¹

CONCLUSION

Ayurvedic diet plan was found to be more effective in reducing all the anthropometrical parameters of obesity but not up to the level of statistical significance. Reduction of triglycerides and VLDL in Ayurvedic diet group was significant. Ayurvedic diet group showed better relief in most of the subjective parameters. Among which, the effect on pacifying hunger was statistically significant. Further research with long term follow-up will determine whether improvement continues long-term and improves quality of life.

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