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A Randomized Clinical Trial Of *Lekhaniya Kashaya Vasti And Lekhaniya Ghan Vati* In The Management Of *Sthaulya* (Obesity).

Meera Antiwal,[1] Jai Prakash Singh[2]

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1. Department of Kayachikitsa, Faculty of Ayurveda, IMS, Banaras Hindu University-5

2. Department of Panchkarma, Faculty of Ayurveda, IMS, Banaras Hindu University-5

Corresponding Author - Dr. Meera Antiwal Assistant Professor, Department of Kayachikitsa, Faculty of Ayurveda, IMS Banaras Hindu University, Varanasi-5 Email: antiwalmeera@gmail.com

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ABSTRACT: -

Background: Obesity is considering the world's oldest metabolic disorder. It is not a single disease entity but a syndrome with many causes including mixture of genetic, nutritional and sociological factors. The World Health Organization considers obesity as "Insidious, creeping pandemic which is now engulfing the entire world". There are eight body personality in Ayurveda, *Sthaulya* is one of them which deserves special attention. It is result of surfeit, when individual gorges on rich, sweet, cold fatty food, enjoys sleeping during day, refrains from mental work and suffers from genetic disorder. The patient with *Sthaulya* is continually ill and need to be managed. Therefore, diet and life style play a significant role both in development and control of obesity *Sthaulya*(obesity). In *Ayurveda,Acharyas* have mentioned about the use of *Lekhaniya Vasti* to manage the *Sthaulya*. **Objective:** To compare the efficacy of LekhaniyaKashayaVasti and Lekhniya GhanVati in patients of Sthaulya. **Material and Methods**:A total of 80 patients of Sthaulya were registered. Further they were divided into 2 groups each having 40 patients. In group I [LekhaniyaKashayaVasti] out of 40 patients 34 and in group II[LekhaniyaGhanVati] out of 40 patients 35 completed the follow up. **Result:** In Group I, mean change was observed in Body Mass Index (B.M.I.) [$p<0.05$]. Waist Hip Ratio (W.H.R.) [$p<0.01$], weight [$p<0.001$], *Kshudraswas* (Breathlessness) [$p<0.001$],and *Nidraadhikya* (Excessive sleep) [$p<0.001$] which is statistically significant in comparisons with group II .

Key words: *Lekhaniya Vasti*, *Lekhaniya Ghan Vati*, Metabolic disorder, *Pathya* , *Deepan and Pachan.*

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INTRODUCTION

Obesity is a worldwide problem; affecting expected 300 million people worldwide. Its prevalence is increasing in both developed and developing countries throughout the world.[1] Obesity is a worldwide epidemic that is characterized by excess adipose tissue and that contributes to numerous chronic diseases and early mortality. [2,3,4,5] This epidemic has received both national and international attention because of obesity's detrimental impact on health, the enormous economic burden it imposes and its increasing prevalence.[6] The present outbreak of overweight and obesity in the entire world is an inadvertent consequence of the economic, social, and technological advances realized during the past several decades.[7] With the onset of the industrial revolution increase in the average body size of the population is an additional concern to health care expert. Now a day in fast speedy life people are more inclined to food which low in cost, edible and readily available in prepackaged forms but it serves high caloric density resulting in obesity. Labor-saving technologies like electronic devices in home have greatly compact the amount of physical activity that used to be the part of everyday life in olden days, have further promoted a inactive lifestyle, particularly among children. The uplifting body mass index, particularly caused by central or upper-body obesity, has been associated with a number of diseases and metabolic abnormalities, many of which have high morbidity and mortality.

Objectives: To compare the efficacy of *Lekhaniya KashayaVasti* and *Lekhniya GhanVati* in patients of *Sthaulya* on subjective, objective and biochemical parameters.

MATERIAL AND METHODS

The current study was carried out at *Kayachikitsa* Out Patient Department and Indoor Patient Department of Sir Sunder Lal Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi between the periods of June 2008 to July 2010. A total of 80 patients of *Sthaulya* were divided into 2 groups in each group 40 patients were registered, in group I out of 40 patients 34 and in II group out of 40 patients 35 completed the follow up.

Ethical consideration: The institutional ethical review Committee of Banaras Hindu University approved the study (Ref.No. Dean/(Ay.)2008-09/612). Especially informed consent, sensitive issue, confidentiality, the privacy and safety of subjects was protected throughout the trial.

Study design:

This is a randomized controlled, open label Study.

Inclusion criteria:

1. The patients age range between 20 – 60 years.
2. The patients having clinical signs and symptoms of *Sthaulya and obesity.*
3. The patients having B.M.I. in between 25-29.99 kg/m^2

Exclusion criteria:

1. Patients below the age of 20 years and above 60 years.
2. Patients with Hypothyroidism.
3. Patients undergoing long term Steroid therapy.
4. Patients with Diabetes mellitus and malignant Hypertension.
5. Patients with evidence of Renal, Hepatic and Cardiac involvement.
6. Patients with B.M.I. more than 30 kg/m^2 and less than 25 kg/m^2.

FOLLOW UP STUDY:

Every patient was registered after fulfilling the inclusion criteria underwent assessment of symptoms and different components of weight, BMI, anthropometric parameters. A total of three follow ups were done at the interval of one month each and all the subjective and objective parameter were recorded each follow ups.

Study Groups:

TREATMENT SCHEDULE FOR GROUP I (N=34): In this group *Lekhaniya Kashaya Vasti* was given to total 40 registered patient and out of 40 patient 34 completed the course.

Contents and Preparation of the *Lekhaniya Kashaya Vasti* -

It has been formulated from different *Ayurvedic* texts on the basis of their properties which are described under *Medo Roga* and *Sthaulya Chikitsa* and its contents are as follows:-

Chitrak (*Plumbago zeylanica*) 2gm, *Mustak* (*Cyperusrotundus*) 2gm, *Shunthi* (*Zingiber officinale*) 2gm, *Aamalaki* (*Emblica officinalis*) 2gm, *Haritaki* (*Terminalia chebula*) 2gm, *Vibhitaka* (*Termenalia bellirica*) 2gm, *Vidang* (*Embelia ribes*) 2gm, *Guggul* (*Commiphora mukul*)3gm ,*Apamarga tandul* (*Achyranthes aspera*) 2gm, *Amrita*(*Tinospora cordifolia*) 2gm, *Arjun* (*Termenalia arjuna*) 2gm, *Bilwa* (*Aegle marmelos*) 2gm, *Vacha* (*Acorus calamus*) 1gm, *Katuka* (*Picrorhiza kurroa*) 1gm.

In addition to all contents of *Lekhaniya Kashaya* the following drugs were added in the *LekhaniyaKashayaVasti*prepration

- *Saindhavlavana* -10gm,
- *Madhu* (Honey)-10gm,
- *Gomutra* (Cow urine)-100ml,
- *Tila Taila* (Sesame oil)-100ml

Process of administration of *Lekhaniya Kashaya Vasti*:

*Langhan*Therapy – light meal (*Yush, Manda, Krishra*)

*Deepan – Chitrak Churna*1.5 gm two times in day with luke warm water before meal for 3 days.

Pachan – Chitrakadi Vati 2 Table(1gm)Two times in a day with luke warm water after meal for 3 days.

Snehana Karma- Abhyanga with *TilaTail* was followed by *Swedana Karma* (*Sarvanga Nadi Sweda*) starting from day 1st to 16th day.

From 4th day of treatment - *Tila tail AnuvasanVasti* was given

5th -7th day –*Lekhaniya Kashaya Vasti*

8th day – *Tila tail Anuvasan Vasti*

9th -11th day – *Lekhaniya Kashaya Vasti*

12th day – *Tila tail Anuvasan Vasti*

13th -15th day – *Lekhaniya Kashaya Vasti*

16th day - *Tila tail AnuvasanVasti*

Duration: This procedure was repeated once in every month consecutively for period of 3 months.

1. **TREATMENT SCHEDULE FOR GROUP II (N=35)**:

Lekhaniya Kashaya Ghan Vati in dose of 50 mg/kg/ bodyweight in three divided doses with Luke warm water. In this group total 40 patients were registered and out of them 35 completed the course.

Duration: Total duration of therapy was 3 months with 3 follow ups of each month.

***Lekhaniya Kashaya Ghan Vati* contents:** *Chitrak 200gm, Mustak 200gm, Shunthi 200gm, Aamalaki 200gm, Haritaki 200gm, Bibhitaki 200gm, Vidang 200gm, Guggul 300gm, Apamarga tandul 200gm, Guduchi 200gm, Arjun 200gm, Shilajit 50gm, Bilwa 200gm, Vacha 50gm, Kutki 50gm, Lauha bhasma 50gm.*

Bhavana Dravya*:Gomutra*

Method of Preparation:

- All the *dravyas* were broken till *yavkut*, then *Kwath* with *Gomutra* as *bhawna dravya* was prepared. After this *Guggul* was dissolved in *Kwath*, then it was condensed upto *Ghan* form then *Ghan vati* were made of 250 mg by pills making machine**.**

Clinical Assessment of the Disease:

Subjective Criteria:

1. *Anga chalatva*:

- 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

2. *Kshudraswasa :*

No Dyspnoea - 0

Dyspnoea after heavy works but relieved soon and up to tolerance - 1

Dyspnoea after moderate works but relieved later and up to tolerance - 2

Dyspnoea after little works but relieved later and up to tolerance - 3

Dyspnoea after little works but relieved later and beyond tolerance - 4

Dyspnoea in resting condition - 5

3. *Gatrasada:*

- 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

4. *Atikshudha :*

- 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 normal quantity twice in a day - 4
- Person taking food in excessive quantity thrice in a day – 5

The assessment was done before starting the treatment and at each 3 follow ups of 30 days and the improvement was assessed on the basis of percentage relief and statistical evaluations.

CRITERIA FOR ASSESSMENT OF OVERALL EFFECTS

For the gross assessment of the result obtained with the clinical trial, the response of the treatment was determined in terms of:

***Subjective improvement*:** Patients were

specifically asked about growing feeling of wellbeing and improvement in *angachalatva, atishudha, ,kshudrashwasa,* at each follow ups of treatment.

Clinical improvement: Reduction in weight, BMI, arm circumference, Waist Hip ratio was noted at each follow ups.

Hematological and Biochemical assessment: Lipid profile, Liver function test value were recorded before and after the treatment in registered cases to evaluate the nature and extent of change in relation to course of disease. Hemoglobin in gram %, Total Leucocytes Counts, Differential Leucocytes Counts, Erythrocytes sedimentation rate, Serum creatinine, Blood urea and Blood Sugar values were recorded before and after the treatment in registered cases to evaluate the safety profile of the drug.

STATISTICAL ANALYSIS

Statistical Analysis: The data collected were transferred on master chart showing various items/variables in columns and subjects in rows. The analysis of data was done using statistical software SPSS version 16.0.

Intra-group (within the group) comparison:

To test the significance of mean of difference of paired observations (BT versus AT) paired t test was applied.

Inter-group comparison (Between the groups):

In case of more than two independent groups, one-way ANOVA (Analysis of Variance) was applied and value of F test was determined, whenever F test resulted statistically significant, post–hoc test was applied for multiple comparisons, identifying significant pairs of groups.

RESULTS

For an individual, obesity is usually the result of an imbalance between calories consumed and calories expended. For the present study *Lekhaniya Vasti* and *Lekhaniya Kashaya Ghan Vati* was selected to manage the disease *Sthaulya* (obesity).

In whole, with the use of *Lekhaniya Vasti* highly significant mean reduction in Weight ,BMI and WHR were observed in group I as compare to group II while in group II mean Weight, BMI and WHR are remained more or less similar at every follow up and on inter group comparison Group 'I' was better than Group 'II'. [Table. 2,3,4]

In symptoms like *Angachalatva,* significant mean reduction was observed and inter group comparison was not significant where as in *Kshudrashwasa, Gatrasada, Atipipasa* symptoms significant mean reduction was observed and Group I was more effective than Group II and on inter group comparison Group I was significant than Group II. [Table.5,6,7].

In the present clinical study statistically no change was observed in Blood Urea, Blood Sugar, Serum Creatinine and Liver function test after trial therapy. Significant mean reduction was observed in S.LDL, S.Triglycerides, VLDL and Cholesterol level in I group than group II, where as in level of S.HDL no significant change was observed after trial therapy in both the groups. [Table.9,10]]

Safety profile of the drug Serum bilirubin, SGOT, SGPT, Alkaline Phosphate, Serum creatinine and blood urea,there was no significant change in the level of these biochemical parameters within the both Groups.[Table.11 Mean changes in Liver function test in 69 patients of *Sthaulya*:]

[Table.12,13,14]].

DISCUSSION

Probable mode of Action of *Lekhaniya Kashaya Vasti*:

- The complete effect of Vasti is encolinic (action on tissue of colon), endcolonic (action inside colon),and diacolonic (for systemic action). The mean retention time of *Lekhaniya Kashaya Vasti* observed was 30-40 minutes. Thus *Vasti dravyas* when reaches in large and small intestine get absorbed from intestinal mucosa, further, due to *laghu,ushna and tikshna guna of Vasti dravaya*, obstruction of channels are broken down and morbid material from all over the body are expelled out, thus breaks the pathogenesis of disease *Sthaulya* (obesity).[8]
- *Vasti* help in *Vataanulomana* by *Tikta, Katu rasa and Tiksnaguna* properties present in trial drug thus helps in the correction of passage of *apana vayu* and these qualities irritate the intestine leading to increased contraction of intestine hence provides less time for absorption of fat from intestine. *Vasti* therapy may be stimulator for many intra luminal, luminal and whole body function.[9]

Probable mode of action of *Lekhaniya Kashay Ghan Vati*:

- The trial drugs possess cholagogue action, *tikta, katu rasa, tiksna guna* properties of drugs irritate the intestine leading to amplified propulsive movement of intestine. [10] Hence, make available less time for absorption of fat from intestine.
- *Dravya* in the trial drug possess Choleretics action which causes excretion of bile which further leads to reduce absorption of fat from intestine. [10].
- The trial drug has, *Kutki,* have irritant property which damage the structure of villi in intestine hence causes decreased capacity for absorption. [11]
- Sesamum oil has katu *and tikta guna* property. Due to this property it reduces excessive *Meda* of the body. it also have *Agni deepaka and Vatanashak action. Agnideepaka* action enhances the *jathragni* as well as *dhatwagni* .Excessive *abadhameda* will change in *badhameda* due in hancement of *jathragni*.[12]
- The trial drugs have *Katu, Tikta* and *Kashaya rasas.* These rasas have the tendency of reducing *Kapha* and *Medas*. *Katu rasa* eliminates the obstruction of channels and normalizes the flow (*Srothovivarana, Kaphahara* (*A.H.Su.10/17-18*). *Tikta* and *Kashaya rasas* have *Lekhanaguna* (*Ch.Su.26/43*) that scraps out excessive *Kapha* and *Meda* from *srotas*.
- In addition to *Lekhana, Kashaya rasa* also have the action of *Soshana (Ch.Su.26/44),* which absorbs the excessive fluids and lipid substances caused by hyper cholesterolaemia. So, it is apparent that by virtue of *Rasas*, these drugs act as *Kaphahar, Medohara*.
- *Lagu Guna* acts as *Kaphahara,* reduces the tissue weights *(Langhana)* and clears the channels of the body *(Srothoshodhana).* While the *Tiksnaguna* acts on channels immediately and pierces the smallest cells of the vessels and eliminates the obstruction caused by lipids. These *Gunas* also activate the *Jatharagni* and *Dhatvagni* and maintain their status.
- *Guggul* (*Tripathi.S.N et. al*) and *Arjuna* are well recognized drugs for reducing blood lipid level which is present in trial drug and by virtue of properties of other *dravyas* viz; *Amalaki, Bhibhitaki, Haritaki, Apamarga, Vacha, Shilajit, Gomutra* etc.

- *Tiksna guna* acts on *Srotas* (channels) immediately and pierces the smallest cells of the vessels and eliminates the obstacle caused by lipids.[13] These *gunas* also activate the *Jatharagni* and *Dhatvagni* and maintain their status.[14]*Tikta, Katu Rasa, Laghu, Ushan* properties present in trial drug are very useful for *Ama Pachana*, so by means of these properties digestion of *Ama*, restoration of *Agni (Deepana)* at the *dhatu* level, removal of excessive *Kledaka Kapha* takes place. *Tikta&Katu Rasa* are also *Kleda and Meda Nashaka*[15,20]. *Tikta* and *Kashaya rasas* have contain *Lekhana guna* that scraps out excessive *Kapha* and *Meda* from *srotas*.In addition to *Lekhana, Kashaya rasa* also has the action of *Soshana*[16,19] which absorbs the excessive fluids and lipid substances caused by hypercholesterolaemia. *Laghuguna* acts as *kaphahara*, reduces the tissue weights *(Langana)*[17,15] and clears the channels of the body *(Srotoshodhana*). All *dravyas* are *Ushna in Virya*, which oppose any increment of *kapha* and *medas* by the *vilayan property*[18,19].

CONCLUSION

In present clinical study significant reduction in BMI and WHR was seen in Group I as compare to group II. The *Lekhaniya Kashaya Vasti* is effective [p<0.001] for weight reduction, for lightness of body, knee joints pain, and ankle joints pain. Hence, it can be concluded that trial drug is very good combination of *Medoghna*, and *Vedanashaman.*

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REFERENCES

1. Diet, nutrition and the prevention of chronic diseases: Report of a joint WHO/FAO expert consultation, 28 January - 1 February 2002, Geneva, Switzerland (WHO Technical Report Series 916).*accessed on 10.02.2010 at http://www.who.int/nut/obs.htm.*
2. *James PT Leach R, Kalamara E, Shayeghi M. The worldwide obesity epidemic.* ObesRes.2001*; 9*:228*–S233.*
3. *Must A, Spadano J, Coakley EH, et al. The disease burden associated with overweight and obesity.* JAMA.1999 *;*282*:*1523*–1529.*
4. *Kushner RF. Body weight and mortality.* Nutri Rev.1993*; 51:1–10.*
5. *Simopoulous AP, Van Itallie TB. Body weight, health, and longevity.* Ann Intern Med.1984*; 100:285–295.*
6. *Wolf AM, Colditz GA. Current estimates of the economic cost of obesity in the United States.* Obes Res.1998*; 6:97–106.*
7. Finkelstein EA, Ruhm CJ, Kosa KM. Economic causes and consequences of obesity. *Public Health*, 2005;26:239-57.
8. Sharma PV. Dravya Guna Vijnana. Vol. I, Maulik Sidhanta, Edition 1st reprint ,Chaukhambha Bharti Academy, Varanasi(U.P.) India; 2003:140-141
9. Sharma PV. Dravya Guna Vijnana. Vol. I, Maulik Sidhanta, Edition 1streprint ,Chaukhambha Bharti Academy, Varanasi(U.P.) India; 2003:108.
10. Sharma PV. DravyaGunaVijnana. Vol. I, MaulikSidhanta, Edition 1streprint,ChaukhambhaBharti Academy, Varanasi(U.P.) India; 2003:295
11. Tripathi KD. Essentials of medical pharmacology, Chapter 46th5th edition Jaypee Brothers, Medical Publishers(P) limited, New Delhi, India;2003: 611.
12. Chunekar K.C., Bhavaprakash, Bhavaprakash Nighantu, Dhanyavarga, Verse 63-65, edited by

Pandey G.S. ,Chaukhamba Vidyabhavan Varanasi (U.P.) India;2005: 639.

13. Sharma PV. DravyaGunaVijnana. Vol. I, MaulikSidhanta, Edition 1st reprint,ChaukhambhaBharti Academy, Varanasi(U.P.) India; 2003:145
14. Shastri K Agnivaesha, Charaka, Dridhabala, CharakaSamhita, Sutra Sthana, Annapaana vidhiaadhya, chapter 26, verse 47, Hindi Editon 1streprint,ChaukhambhaBharati Academy, Varanasi (U.P.) India; 2003:508
15. Shastri K Agnivaesha, Charaka, Dridhabala, CharakaSamhita, Sutra Sthana, Annapaanavidhiaadhya,chapter 26,verse 44, Editon 1st reprint,ChaukhambhaBharati Academy, Varanasi (U.P.) India; 2003:505
16. Shastri K Agnivaesha, Charaka, Dridhabala, CharakaSamhita, Sutra Sthana, Annapaanavidhiaadhya,chapter 26,verse 45, Editon 1streprint,ChaukhambhaBharati Academy, Varanasi (U.P.) India; 2003:506
17. Srikantha K.R Sharangdhara, Sharangadhara Samhita, chapter-2 Bhaishajyavyakhya,verse-16,Edition 6th, Chowkhambha Orientalia, (U.P.) India; 2006:112
18. Sharma A Vagbhata, Astangahridaya, chapter-1,verse-18, Editon 1st reprint, the commentaries Sarwangasundara of Arundatta &Ayurveda rasayana of Hemadri, Annotated by Chaukhamba Surbharati Prakashan Varanasi(U.P.) India; 2010:112
19. Sharma A Sushruta, *Sushruta Samhita*, Sutra Sthana, Rasavishesha vigyaniyaadhyaya ,chapter 42,verse 8-11, edition 1streprint, Sushruta Vimarshini, Chowkhambha Surbharati Prakashan, Varanasi, India; 2004:328.
20. Gupta A, Vagbhata, Astanga Hridayam, Rasavidhiaadhya, chapter-10,verse-15, edition Chowkhambha Prakashan, Varanasi (U.P.) India; 2006: 83

Table.1 Individual low caloric diet in *both* groups of Patients:

Time	Food stuff	Amount	Weight
7.00 Am. 8.00 Am.	Warm water Tea (Cow's milk without sugar)	1 Glass 1 Cup	200 ml. 150 ml. (75 ml milk+ 75 ml water)
12.00 Pm	Wheat, *jwar* (sorghun), *bazara*(pearl millet), *makka*(miaze) flour roti (without oil and ghee)	4 chapati	30 gm.
.	Vegetables of bottle guard, Brinjal, cabbage, drum-stick, patol (ivy gaurd), ridge guard, Spinach, tori, sahajan(drum-stick) Green gram pulses or Red gram pulses Salad - Cabbage, tomato, cucumber, reddish white	1 Bowl 1 Bowl 1 small plate	100 gm. 30 gm. 25gm
4.00 Pm.	Coconut water/*Yavsattu/Manda* (gruel)	1 Cup	200 ml
7.00pm Or Or Or	*Mudgayush* (green gram water) + *Takra*(Butter milk) Tomato+Spinach soup + *Takra*(Butter milk) Tomato + Drumstick soup + *Takra*(Butter milk) Wheat flour or barely or maize roti and vegetable Wheat flour+*Bajra*(pearl millet) flour *roti* and Vegetable	2 Bowl 2 Bowl 2 Bowl 2 Bowl 2 Bowl 2 Bowl 3 1 Bowl 3 1 Bowl	300 ml. 30 ml. 300 ml. 30 ml. 300 ml. 30 ml. 45 gm. 100 gm. 45 gm. 100 gm.

Table: 2 Mean changes in Weight in 69 patients of *Sthaulya (Obesity)*:

Groups	BT	AT1	AT 2	AT 3	Within the group comparison Paired 't' test BT Vs AT Mean± SD	Between the group comparison on difference of BT & AT One Way ANOVA	Post Hoc Test Significant pairs of group (p< 0.05)
Group I (n=34)	80.22± 14.46	77.06± 13.82	73.03± 13.43	69.06± 12.65	11.16±3.09 t = 15.32 p < 0.01	F = 67.26 P < 0.001	(1)
Group II (n=35)	74.40± 9.16	74.25± 9.30	74.60± 9.25	74.95± 9.16	5.50±2.21 t = 1.11 p > 0.05		

BT-before treatment

AT 1-After Treatment Ist follow up one month
AT2- After Treatment 2ndfollow up two months
AT3- After Treatment 3rdfollow up three months

Table: 3 Mean changes in BMI in 69 patients of *Sthaulya (Obesity)*:

Groups	BT	AT 1	AT 2	AT 3	Within the group comparison Paired 't' test BT Vs AT Mean ± SD	Between the group comparison on difference of BT & AT One Way ANOVA	Post Hoc Test Significant pairs of group (p< 0.05)
Group I (n=34)	29.72± 4.35	27.43± 4.14	25.77± 3.95	24.97± 3.84	2.75±1.12 t = 9.20 p < 0.01	F = 8.38 P < 0.05	(1)
Group II (n=35)	29.43± 3.53	27.20± 3.94	26.57± 3.64	25.63± 3.65	2.7 ±0.94 t = 7.7 p < 0.05		

Table. 4 Mean changes in W.H.R. in 69 patients of *Sthaulya (Obesity)*:

Groups	**BT**	AT **1**	AT **2**	AT **3**	**Within the group comparison Paired 't' test BT Vs AT Mean ± SD**	**Between the group comparison on difference of BT & AT One Way ANOVA**	**Post Hoc Test Significant pairs of group (p< 0.05)**
Group I (n=34)	0.89± 0.04	0.87± 0.05	0.86± 0.05	0.84± 0.05	0.05±0.03 t = 7.47 p < 0.05	F = 12.36 P < 0.01 HS	(1)
Group II (n=35)	0.88± 0.05	0.88± 0.05	0.87± 0.05	0.86± 0.05	0.02±0.02 t = 3.82 p < 0.05		

Table: 5 Mean changes in *Angchalatva* in 69 patients of *Sthaulya (Obesity):*

Groups	**BT**	AT **1**	AT **2**	AT **3**	**Within the group comparison Paired 't' test BT Vs AT Mean± SD**	**Between the group comparison on difference of BT & AT One Way ANOVA**
Group I (n=34)	2.11± 1.13	2.06± 0.98	1.67± 0.84	1.40± 0.78	0.88±0.90 t = 8.90 p < 0.05	F = 2.37 P > 0.005 NS
Group II (n=35)	2.35± 0.91	2.25± 0.97	1.80± 0.83	1.70± 0.66	0.65±0.76 t = 6.18 p < 0.05	

Table: 6 Mean changes in *Kshudrshwas* in 69 patients of *Sthaulya (Obesity)*:

Groups	**BT**	AT **1**	AT **2**	AT **3**	**Within the group comparison Paired 't' test BT Vs AT Mean ± SD**	**Between the group comparison on difference of BT & AT One Way ANOVA**	**Post Hoc Test Significant pairs of group ($p < 0.05$)**
Group I (n=34)	1.83± 1.09	1.44± 1.04	0.72± 0.82	0.33± 0.59	1.50±0.62 t = 10.29 p < 0.05	F = 6.81 P < 0.05 S	(1)
Group II (n=35)	1.80± 1.00	1.30± 0.87	0.65± 0.81	0.66± 0.94	1.25±0.73 t = 5.79 p < 0.05		

Table:7 Mean changes in *Gatrasada* in 69 patients of *Sthaulya (Obesity)*:

Groups	**BT**	AT **1**	AT **2**	AT **3**	**Within the group comparison Paired 't' test BT Vs AT Mean ± SD**	**Between the group comparison on difference of BT & AT One Way ANOVA**	**Post Hoc Test Significant pairs of group ($p< 0.05$)**
Group I (n=34)	2.44± 1.19	1.52± 0.88	1.37± 0.59	1.33± 0.48	1.12±0.82 t = 7.91 p < 0.05	F = 7.65 P < 0.05 S	(1)
Group II (n=35)	2.50± 1.14	2.10± 0.72	1.50± 1.09	1.45± 1.18	1.05±.29 t = 4.67 p < 0.05		

Table.8 Mean changes in *Atishudha* in 69 patients of *Sthaulya (Obesity)*:

Groups	BT	AT 1	AT 2	AT 3	Within the group comparison Paired 't' test BT Vs AT Mean ± SD	Between the group comparison on difference of BT & AT One Way ANOVA
Group I (n=34)	4.11± 1.18	3.67± 0.90	4.06± 0.23	3.69± 0.32	0.22±1.31 t = 0.68 p > 0.05	F = 0.85 P>0.005
Group II (n=35)	4.20± 1.35	3.70± 1.03	3.70± 0.73	3.65± 0.88	0.75±1.46 t = 1.37 p > 0.05	

Table.9 Mean changes in Lipid profile test in 69 patients of *Sthaulya (Obesity)*:

Group	Parameters	BT	AT	AT~BT	Within Group comparison Paired 't'test
I (n=34)	HDL (mg/dl)	39.97±6.65	43.32±7.21	3.35±2.5	t=3.40,p<0.05
	Triglyceride(mg/dl)	192.5±30.72	136.09±23.4	56.39±32.14	t=6.88,p<0.05
	Cholesterol (mg/dl)	200.11±22.73	176.19±14.5	24.62±9.00	t=5.71,p<0.01
	LDL (mg/dl)	126.07±20.74	117.2±15.3	9.28±6.67	t=3.93,p<0.05
	VLDL(mg/dl)	35.38±7.25	33.22±5.64	2.34±4.46	t=1.66,p>0.05
II (n=35)	HDL (mg/dl)	39.78±4.09	44.04±3.86	3.86±0.64	t=4.26, p<0.05
	Triglyceride(mg/dl)	182.41±54.44	140.44±46.9	42.04±32.33	t=6.06, p<0.05
	Cholesterol(mg/dl)	214.59±38.76	191.63±30.1	22.04±23.18	t=4.11, p<0.05
	LDL (mg/dl)	124.49±40.07	117.89±27.0	7.40±12.57	t=1.21, p<0.05
	VLDL(mg/dl)	40.25±13.84	42.92±14.23	2.36±11.00	t=2.49, p>0.05

Table: 10: Between the group comparisons of Lipid profile test in 69 patients of *Sthaulya (Obesity)*:

Parameters	**Between the group comparison on difference of BT& AT** **One Way Anova Test**	**Post Hoc Test significant pairs of group p<0.005**
HDL (mg/dl)	F =0.40, p>0.005	
Triglyceride (mg/dl)	F =6.84, p>0.005	(1,2)
Cholesterol (mg/dl)	F =0.84, p>0.005	
LDL (mg/dl)	F=7.59, p<0.005	(1,2)
VLDL(mg/dl)	F = 3.72, P>0.05	

Table.11 Mean changes in Liver function test in 69 patients of *Sthaulya (Obesity)*:

Group	**Parameters**	**BT**	**AT**	**AT~BT**	**Within Group comparison Paired 't'**
I (n=34)	S.Bilirubin(mg/dl)	0.75±0.17	0.67±0.12	0.07±0.24	t=1.36,p>0.05
	SGOT (U/L)	36.16±3.03	31.81±5.31	4.33±5.13	t=3.30,p<0.05
	SGPT (U/L)	33.61±5.64	32.78±4.02	3.13±3.53	t=1.00,p<0.05
	S.Alk.Phosphate(U/L)	87.33±21.81	84.44±18.32	2.23±3.59	t=4.19,p<0.05
II(n=35)	S.Bilirubin(mg/dl)	0.68±0.22	0.71±0.14	0.02±0.29	t=1..31, p>0.05
	SGOT (U/L)	34.20±7.10	37.45±5.96	3.75±5.38	t=2.11, p>0.05
	SGPT (U/L)	30.40±5.81	32.00±5.09	1.40±2.00	t=3.29, p<0.05
	S.Alk.Phosphate(U/L)	85.11±18.28	82.34±15.72	2.26±5.53	t=1.65, p>0.05

Table.12 Mean changes in Blood Urea (mg/dl) **in 69 patients of *Sthaulya (Obesity)*:**

Groups	**BT**	**AT**	**Within the group comparison Paired 't' test BTvs AT Mean ± SD**	**Between the group comparison on difference of BT & AT One Way ANOVA**
Group I (n=34)	29.78±6.25	28.33±5.31	2.45±6.48 t =0.05 p> 0.05	F = 0.25 p > 0.005 NS
Group II (n=35)	27.50±6.66	27.74±5.42	1.45±9.22 t = 0.71 p > 0.05	

Table.13 Mean changes in Serum creatinine (mg/dl) **in 69 patients of *Sthaulya (Obesity)*:**

Groups	**BT**	**AT**	**Within the group comparison Paired 't' test BT vs AT Mean ± SD**	**Between the group comparison on difference of BT & AT One Way ANOVA**
Group I (n=34)	0.60±0.18	0.65±0.18	0.19±0.17 t =2.32 p> 0.05	F = 0.53 p > 0.005 NS
Group II (n=35)	0.71±0.16	0.60±0.17	0.18±0.15 t = 0.71 p > 0.05	

Table.14 Mean changes in Blood Sugar (mg/dl) **in 69 patients of *Sthaulya (Obesity)*:**

Groups	**BT**	**AT**	**Within the group comparison Paired 't' test BT vs AT Mean ± SD**	**Between the group comparison on difference of BT & AT** **One Way ANOVA**
Group I (n=34)	92.34±11.38	102.72±7.96	10.38±13.89 t =3.17 p< 0.05	F =0.78 p > 0.005 NS
Group II (n=35)	92.55±11.75	100.15±6.93	7.60±12.97 t = 2.62 p < 0.05	