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LAUHA RASAYANA AND VIDANGADI CHURNA: A COMPARATIVE EFFECTIVENESS CLINICAL TRIAL IN THE MANAGEMENT OF OBESITY

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ABSTRACT

Purpose of study:- Obesity is the condition marked by an abnormal and excessive fat accumulation, associated with various health risks, affecting over one billion individuals worldwide according to WHO. In Ayurveda, it is linked with *Sthoulya*, and provides a range of therapeutic interventions for managing *Sthoulya*, beyond dietary and exercise adjustments. Among various formulations described in the classical texts *Lauha Rasayana* (LR) and *Vidangadi Churna* (VC) were selected for the study. LR and VC are quoted in *Sthoulyarogadikara* of *Chakradatta* and *Dwidhopakramaneeya Adhyaya* of *Ashtanga Hridaya* respectively. The present study was conducted to assess the clinical efficacy of LR and VC in the management of *Sthoulya*. **Methodology:-** An interventional, randomized, open-labelled clinical trial was conducted in 90 patients having classical symptoms of *Sthoulya* was divided in two group. The Group-A & Group B were orally administered with 6g of LR and 3g of VC twice a day after meals

respectively for a period of 60 days. The assessment was done based on subjective parameters, i.e., *Atikshudha* (Excessive hunger), *Daurgandhya* (Unpleasant body odour), *Swedadhikya* (Excessive sweating), *Daurbalya* (Weakness), *Gaurava* (Heaviness of body), *Alasya* (Lethargy), *Atinidra* (Excessive sleep), *Ayase Swasakastata* (Breathing Difficulty during exertion) and objective parameters includes haematological and biochemical parameters. The results were statistically analysed by using Wilcoxon matched-pair signed ranks test, 't' Test, Mann-Whitney tests. **Result:-** Analysis of overall effect of therapies on blood parameters shows a percentage relief of 12.22 and 13.69 in group A and group B respectively whereas in subjective parameters shows a percentage relief of 57.76 and 80.66 in Group A and Group B respectively. Statistically extremely significant relief was noted in subjective parameters of Group B after treatment when compared to Group A. **Conclusion:-** VC is considered as more effective in the management of *Sthoulya* when compared with LR.

KEYWORDS: *Ayurveda, Lauha Rasayan*, Obesity, *Sthoulya*, *Vidangadi Churna*.

INTRODUCTION

Sthoulya represents an abnormal and excessive accumulation of *Medo Dhatu* (Fat tissues). Obesity is the most common nutritional disorder in the present situation. The most commonly used definition established by World Health Organization Obesity as a common chronic disorder of excessive body fat and has become a global epidemic which is present not only in the industrialized world but also in many developing and even in under developed countries.

Who global estimates suggest that in 2016, more than 1.9 billion adults aged 18 years and above were overweight. Of these over 650 million adults were obese. The worldwide prevalence of obesity nearly tripled between 1975 and 2016.[1] Obesity has become a widespread epidemic in India during the 21st century, impacting 5% of the nation's population.

Obesity is acknowledged as a complex metabolic disorder in traditional medicine, often arising from factors such as a high-calorie diet, sedentary lifestyle, and genetic predisposition. Interestingly, throughout history, obesity has been viewed differently, with some societies considering it a symbol of prosperity and fertility. In contemporary times, the primary approach to address obesity involves dietary modifications and regular physical activity. If these measures prove ineffective, secondary interventions such as anti-obesity

medications, intragastric balloon implantation and liposuction may be considered to curb appetite or hinder fat absorption.

The conventional concept of etiopathogenesis, prognosis and management of obesity is very similar and equally advanced to the *Medoroga or Sthoulya roga* of Ayurveda, which was conceived in 1500 B.C by *Acharya Charak*a. Overweight or obesity is mostly found in people with predominantly *Kapha* type constitutions. Obesity occurs when excess fat builds up in adipose tissue. Disease likes coronary thrombosis, diabetes, coronary heart disease, stroke, hypertension, high cholesterol; some types of cancers are major health risks because of obesity. To keep this in mind, the current study is designed to evaluate the effectiveness of *Lauha Rasayana* and *Vidangadi Churna* treatments in the management of *Sthoulya*. Previous clinical trials on *Vidangadi Churna* have shown highly significant reduction of body weight, B.M.I, waist to hip ratio etc.[2] Above mentioned drugs are easily available, cost effective and easy to administer in patients. That is the basic reason to select these drugs for present clinical trial.

MATERIALS AND METHODS

Source of data

Literary source: All the Ayurvedic, Modern literature, Journals, websites about the disease and the Medicine was reviewed and documented for the planned study.

Sample source: The patients were selected from OPD and IPD of national institute of ayurveda hospital Jaipur and Bombaywala city Hospital.

Drug source: Raw drugs required were collected from the GMP approved pharmacy of National Institute of Ayurveda Jaipur. ***Lauha Rasayana***[3] and ***Vidangadi Churna***[4] was prepared in the Department of *Rasashastra* and *Bhaishajya Kalpana*, NIA Jaipur as per textual guidelines.

Methods of collection of data: The patient's evaluation was conducted following a thorough examination, and the pertinent data was meticulously documented in a specially designed proforma, adhering to scientific principles and standards.

Diagnostic criteria: Diagnosis would be done on the bases of signs & symptoms of *Sthoulya* as explained in the classical text. (Diagnosis will also be done according to subjective & objective parameters)

Study design: Interventional, randomized controlled study

Level of study	**OPD/IPD**
Trial drugs	1. *Lauha Rasayana* 2. *Vidangadi Churna*
Masking	Open label
Timing	Prospective
No. of group	Two
Number of patients	90
Number of patients in each group	45
Duration	60 days

Inclusion criteria

- Patients present with Classical Signs and Symptoms of *Sthoulya*.
- Patients between the age Group of 25 to 60 years, irrespective of religion, sex, socio-economic status, and occupation are included for the study.
- Patients without any Endocrinal Disorders will be selected for the study.
- BMI above 25 kg/m^2 and below 35kg/m^2 will be selected for the Study.
- WHR (Waist Hip Circumference ratio) > 0.95 in males and > 0.8 in females will be selected.

Exclusion criteria

- BMI below 25kg/m^2 and above 35kg/m^2 are Excluded.
- Pregnancy and Lactation
- Obesity secondary to or associated with hypothyroidism, hypertension, diabetes mellitus, hyperlipidaemia or cushing's syndrome.
- Any concomitant serious disorder of the liver, kidneys, heart, lungs or other organs.
- Patients suffering from psychiatric illness are excluded.
- Person undergoing treatment for any other serious illness.

Withdrawal criteria

- During the course of trial if any serious condition or any serious adverse effects occur which require urgent treatment.
- Patients himself wants to withdraw from the clinical trial.

Methodology: Evaluation of the patient will be done after detailed examination and the data will be recorded in a specially prepared proforma i.e. A separate case sheet will be prepared

with a complete history, physical signs and symptoms before treatment and at the time of every follow up.

Duration: Duration of Treatment - *Shamanoushadha* was given for 60 days in both groups
Group A- *Lauha rasayana*- 60 days. Follow up – one month (15 days interval)
Group B- *Vidangadi churna* -60 days Follow up- one month (15 days interval)

Assessment Criteria: both objective and subjective parameters were employed for assessment of the impact of the treatment.

Investigations (Objective parameters)
Haematological parameters: Hb, TLC, DLC, PCV (%), ESR
Biochemical parameters: Blood sugar, Lipid Profile (Serum Cholesterol, LDL, HDL, Serum Triglycerides)

Various anthropometric measures (Objective Parameters):- Weight**,** BMI**,** Chest circumference**,** Mid-thigh circumference**,** Waist circumference**,** Abdomen circumference**,** Hip circumference**,** Waist-Hip ratio.

Subjective parameter: - The following symptoms of *Sthoulya* were assessed before and after the Course of therapy. *Atikshudha* (Excessive hunger), *Atipipasa* (Excessive thirst), *Javoparodha* (Lack of enthusiasm), *Daurgandhya* (Unpleasant body odour), *Swedadhikya* (Excessive sweating), *Daurbalya* (Weakness), *Gaurava* (Heaviness of body), *Kricchvyavyata* (Difficulty in sexual intercourse), *Alasya* (Letharginess), *Atinidra* (Excessive sleep), *Ayase Swas kastata* (Breathing difficulty on exertion).

S. N.	Subjective parameters	Scoring
1	***Atiksihudha***	
	a) Totally unwilling for meal.	0
	b) Unwilling for food, but could take the meal.	1
	c) Willing towards only most liking food and not to other.	2
	d) Willing towards sonly sone among *Katu /Amla /Madhura Aahara*.	3
	e) Willing towards some specific *Ahara /Rasa vishesa.*	4
	f) Equal willing towards all the *Bhojya Padartha*.	5
2	***Atipipasa***	
	a) Normal thirst.	0
	b) Up to s1 litre excess intake of water.	1
	c) s1 to s2 litre excess intake of water.	2
	d) s2 to 3 litre sexcess intake of water.	3
	e) More than 3 litre excess intake of water.	4

3	***Daurgandhya / Swedadhikya*** a) Absence of foul smell. b) Occasionally foul smell limited to close areas difficult to suppress with deodorant. c) Persistent foul smell felt from long distance is snot suppressed by deodorants. d) S Persistent foul smell felt from long distance seven intolerable to the patient himself.	0 1 2 3
4	***Daurbalya / Javoparodha*** a) Can do routine sexercise. b) Can do moderate sexercise without difficulty. c) Can do sonly mild sexercise. d) Can do mild sexercise with very difficult. e) Cannot do seven mild sexercise.	0 1 2 3 4
5	***Anga gaurava*** a) No heaviness in body. b) Feeling of heaviness sin body but sit does not hamper routine work. c) Feeling of heaviness in body which hampers movement of the body. d) Feeling of heaviness with flabbiness sin all over s body which causes distress to the person.	0 1 2 3
6	***Alasya*** a) Not present b) Doing work satisfactory with initiation Slate Sin time. S c) Doing work unsatisfactory with Slot Sof mental pressure Sand Slate Sin Stime. S d) Not starting any work in his Sown responsibility, doing little work very slow. S e) Does Snot Shave Sany initiation and don't want to work even after pressure.	0 1 2 3 4
7	***Nidradhikya*** a) Normal sleep S6-7 hrs. /Day. S b) Sleep up to 8 hrs. /Day with *Anga Gaurav*. S c) Sleep up to 8 hrs./Day with *Anga Gaurav* and *Jrimbha*. S d) Sleep up to 10hrs./Day with *Tandra*. S e) Sleep up to 10hrs./Day with *Tandra* and *Klama.*	0 1 2 3 4
8	***Alpa Vyavaya*** a) Unimpaired libido Sand sexual performance. S b) Decrease in libido but Scan perform sexual act. S c) Decrease Sin libido but Scan perform sexual act with difficulty. d) Loss of libido Sand cannot perform sexual act.	0 1 2 3
9	***Ayase Swas Kastata*** a) Dyspnoea after heavy works but relaxed soon and Sup to tolerance. b) Dyspnoea after moderate works but relaxed late Sand up to tolerance. S c) Dyspnoea after little works but relaxed soon and up to tolerance. S d) Dyspnoea after little works but relaxed soon and beyond tolerance e) S Dyspnoea Sin resting condition	0 1 2 3 4

Overall assessment of the therapy

Complete Remission	100% relief
Marked Improvement	More than 75% relief
Moderate Improvement	50% to 75 % relief
Mild Improvement	25% to50% relief
Unchanged	Less than relief 25 %

OBSERVATIONS

It was planned to register 90 Patients (45 Patients in each group) for the study but due to lack of time and Covid-19 pandemic only 70 patients (Group A-38 and Group B-32) were registered. Out of them 5 patients were dropped out (Group A-3 and Group B-2) and failed to continue the treatment till one month. Finally, 65 (Group A-35 and Group B - 30) patients continued the treatment. Demographical profile and the effects of drugs on 65 patients have been discussed.

Observations has been presented under the following headings

1. Socio-demographic profile
2. Personal profile
3. Observation and result of different parameters

1. Observation on Socio-demographic Profile

Table no. 1: Showing the distribution according to 'Age' In 65 patients of *Stoulya.*

Age group	Group A	Group B	Total no. of patients	Percentage
Less than 25	2	1	3	4.61
25-30	10	6	16	24.61.
30-35	9	9	18	27.69
35-40	7	5	12	18.46
40-45	3	7	10	15.38
45-50	2	0	2	3.07
50-55	1	1	2	3.07
55-60	1	1	2	3.07

The incidence of *Sthoulya* in different age group was worked out. The highest incidence of *Sthoulya* was seen in the age group of 30-35 years (27.695) This shows that with the advancing age more incidence of *Sthoulya* has been reported.

Table No. 2: Showing the distribution according to 'Sex' in 65 patients of *Sthoulya.*

Sex	Group A	Group B	Total no. of patients	Percentage
Male	25	25	50	76.92
Female	10	5	15	23.07

During the current research trial 50 patients (76.92%) were Males, 15 patients (23.07%) were females which suggest that incidence of *Sthoulya* is more common in males than the females.

Table No. 3: Showing the distribution according to 'Religion' in 65 patients of *Sthoulya.*

Sex	Group A	Group B	Total no. of patients	Percentage
Hindu	34	27	61	93.84
Muslim	1	3	4	6.15

It was observed that the incidence of *Sthoulya* was more in patients of Hindu religion than Muslim religion. This may be due to that hospital from where the patients were selected is in Hindu dominated area.

Table No. 4: Showing the distribution according to marital status in 65 patients of *Sthoulya.*

Sex	Group A	Group B	Total no. of patients	Percentage
Married	22	22	44	63.69
Unmarried	13	8	21	32.30

In the present study maximum 44 patients (67.69%) were married, 21 patients (32.30%) were unmarried.

Table No. 5: Showing the distribution according to 'Address' in 65 patients of *Sthoulya.*

Address	Group A	Group B	Total no. of patients	Percentage
Jaipur	33	28	66	93.84
Chomu	1	1	2	3.07
Dausa	1	1	2	3.07

In this present study the above data indicates that in Rajasthan 61 patients (93.84%) were from Jaipur, 2 patients (3.07%) were from Chomu and 2 patients (3.07%) were from Dausa. In the current study, the data reveals that all the patients were residents of *Jangala Pradesha* (Dry Land). The study further indicates that the majority of the patients, specifically 50 individuals (76.92%), were from urban areas, with six patients (9.23%) residing in semi-urban areas, and 9 patients (13.84%) hailing from rural regions. Educational backgrounds were categorized into three groups: higher secondary, graduate, and postgraduate. The data indicates that 15 patients (23.07%) were in the higher secondary group, 44 patients (67.69%) held graduate degrees, and 6 patients (9.23%) were postgraduates. Notably, a significant portion of the cases, 67.69%, fell into the graduate category, suggesting a higher prevalence of *Sthoulya* among this group. Regarding occupation, the prevalence of *Sthoulya* was notably higher among students, accounting for 44.61% of the cases. The majority of patients enrolled

in the current trial belonged to the upper-middle class, comprising 41 patients (63.07%), while 22 patients (33.84%) were from the lower-middle class, and two patients (3.07%) were classified as poor. The results suggest that individuals from the upper-middle and lower-middle classes may have a lower awareness of dietary habits, possibly leading to a preference for high-fat, junk food consumption. During the present trial, 16 patients (24.61%) followed a mixed diet, while 49 patients (75.38%) adhered to a vegetarian diet. This dietary distinction may be a contributing factor to the observed prevalence of *Sthoulya* in the study population.

2. Personal profile

Table No. 6: Showing the distribution according to 'Nidra' in 65 patients of *Sthoulya.*

Parameters	Group A	Group B	Total no. of patients	Percentage
Samyaka Nidra	11	18	29	46.61
Ati Nidra	2	5	7	10.76
Alpa Nidra	2	2	4	6.15
Anidra	0	0	0	0
Asamyak Nidra	20	5	25	38.46

In the present study, the distribution of *Sthoulya* prevalence was assessed based on the type of nidra (sleep). It was observed that *Sthoulya* was most prevalent in the *Samyaka Nidra* group (46.61%), followed by the *Asamyaka Nidra* group (38.46%), *atinidra* (10.76%), and *alpa nidra* (6.15%). Among the 65 patients with *Sthoulya*, the majority had a *Madhyama* type of *kostha* (58 patients, 89.23%). This type of *Kostha* is characterized by a predominance of kaphadosha, which plays a crucial role in the development of the pathogenesis of *Sthoulya*. A smaller number of patients had *Krura Kostha* (3 patients, 4.61%), while some had *Mridu* type of *Kostha* (4 patients, 6.15%). In the present study, the distribution according to *Agni Pariksha* (assessment of digestive fire) revealed that *Sthoulya* was most prevalent in the *Mandaagni* group (44.61%), followed by the V*ishamaagni* group (32.30%). The *Samagni* group had a prevalence of 16.92%, and the least prevalence was found in the *Teekshnaagni* group (6.15%). The distribution based on *Kshuda* (appetite) showed that *Sthoulya* was most prevalent in the *Samyaka kshuda* group (66.15%). Regarding the distribution according to types of work, the prevalence of *Sthoulya* was highest in the secondary group (47.69%), followed by the mental group (36.92%), with the lowest prevalence found in the physical group (15.38%). In the study's analysis of distribution according to addiction, it was observed that *Sthoulya* was most prevalent in the no addiction group (43.07%). Other addiction categories included tea (13.84%), tobacco (12.30%), smoking (12.30%), and alcohol (12.30%), with the least prevalence found in the coffee group (6.15%).

3. Results of different parameters

All the Results are calculated by using Software: **In Stat Graph Pad 3.** For Nonparametric Data **Wilcoxon matched - pairs signed ranks test** is used while for Parametric Data Paired "**t" Test** is used and results Calculated in each group. For calculating the Inter group comparison, Mann- Whitney Test and Unpaired 't' Test was used

Table No. 8: Showing effect of therapy on Laboratory parameters (Objective parameter;) (Paired t test).

Variables	Group	Mean		Mean Diff.	% relief	Sd	Se	T value	P Value	Result
		Bta	At							
Hb	A	13.131	14.457	1.326	10.09824	0.7563	0.1278	10.370	< 0.0001	Es
	B	13.080	14.277	1.197	9.151376	1.931	0.3525	3.395	0.0020	Vs
Esr	A	15.800	16.143	0.3429	2.170253	5.589	0.9446	0.3630	0.7189	Ns
	B	16.167	16.100	0.06667	0.412383	5.291	0.9660	0.06901	0.9455	Ns
Tlc	A	8094.3	7440.0	654.29	8.083343	1534.2	259.33	2.523	0.0165	S
	B	7430.0	7923.3	493.33	6.639704	2551.8	465.89	1.059	0.2984	Ns
N	A	53.357	52.991	0.36657	0.685383	10.141	1.714	0.2133	0.8323	Ns
	B	53.817	53.823	0.00666	0.012375	10.768	1.966	0.003391	0.9973	Ns
L	A	31.197	33.949	2.751	8.818156	7.217	1.220	2.255	0.0307	S
	B	34.343	30.167	4.177	12.16259	9.025	1.648	2.535	0.0169	S
E	A	4.023	4.097	0.07429	1.846632	1.880	0.3177	0.2338	0.8166	Ns
	B	4.017	4.237	0.2200	5.476724	3.093	0.5647	0.3896	0.6997	Ns
M	A	5.929	6.780	0.8514	14.35993	1.349	0.2279	3.735	0.0007	Es
	B	6.623	6.143	0.4800	7.247471	2.280	0.4163	1.153	0.2583	Ns
B	A	0.9200	0.8314	0.08857	9.627174	0.5830	0.09854	0.8988	0.3751	Ns
	B	0.8600	0.9833	0.1233	14.33721	0.5380	0.09822	1.256	0.2193	Ns
Pcv	A	40.606	40.094	0.5114	1.25942	3.874	0.6549	0.7809	0.4402	Ns
	B	40.	40.	0.1	0.439	4.8	0.88	0.19	0.8	Ns

		237	413	767	148	68	87	88	438	
Rbs	A	103.39	106.10	2.717	2.627914	8.557	1.446	1.878	0.0689	Ns
	B	105.76	102.95	2.803	2.65034	9.747	1.779	1.575	0.1260	Ns
Sr. Cholesterol	A	222.49	202.66	19.829	8.912311	15.674	2.649	7.484	< 0.0001	Es
	B	234.22	197.36	36.853	15.73435	20.927	3.821	9.646	< 0.0001	Es
Sr. Triglycerides	A	230.31	149.78	80.537	34.96895	41.762	7.059	11.409	< 0.0001	Es
	B	252.09	147.18	104.91	41.61609	52.874	9.653	10.868	< 0.0001	Es
ldl/hdl	A	5.367	2.391	2.976	55.44997	2.111	0.3569	8.339	< 0.0001	Es
	B	5.784	2.383	3.593	62.11964	2.694	0.4919	7.305	< 0.0001	Es

(*Abbreviations*:- Hb - Haemoglobin**; TLC**-Total Leucocytes Count; **ESR-s**Erythrocyte Sedimentation Rate; **N**-Neutrophils**, L**- Lymphocytes**, E**-Eiosinophils**, M**- Monocytes**, B**-Basophils**, PCV –** Packed Cell Volume; **RBS –** Random Blood Sugar; **ES –** Extremely Significant; **VS –**Very Significant **NS-**Non –significant.

In this current study [Table no: 8] **s**it**s** were observed that the haemoglobin level was affected very much in both groups. On statistical analysis, extremely significant result was seen **s**in group A and Very significant result was seen **s**in group B. On statistical comparison, non-significant results were seen in both groups. Above data shows that the relief was more in group A (8.08%) in comparison to group B (6.63%). On statistical analysis, significant result was seen **s**in group A while non-significant result was observed in group B. On statistical comparison, non-significant results were seen in both groups. Above data shows that the relief was more **s**in group B (12.162%) **s**in comparison to group A (8.81%). On statistical analysis, significant result was seen **s**in both groups. On statistical comparison, non-significant results were seen in both groups. Above data shows that the relief was more in group A (14.36%) **s**in comparison to group B (7.24%). On statistical analysis, extremely significant result was seen in group A while non-significant result was observed in group B. On statistical comparison, non-significant results were seen **s**in both groups. On statistical comparison, non-significant results were seen **s**in both groups. On statistical comparison, non- significant results were seen **s**in both groups. Statistical data shows marked relief in Cholesterol level in both the groups (8.91% in group A and 15.73% **s**in group B). Extremely significant results were seen **s**in both the groups after the course of therapy. Statistical data

shows relief in Serum Triglycerides in both the groups (34.96% in group A and 41.61% **s**in group B). Extremely significant results were seen **s**in both the groups after the course of therapy. Statistical data shows relief in LDL/HDL ratio in both the groups (55.44% in group A and 62.11% **s**in group B). Extremely significant results were seen **s**in both the groups after the course of therapy.

Table No. 9: Showing effect of therapy on anthropometric parameters (Objective parameter) (Paired t test).

Variables	Group	Mean		Mean Diff.	% Relief	SD	SE	T value	P value	Result
		BT	AT							
Body Wt.	A	79.686	73.429	6.257	7.852069	3.936	0.6653	9.405	< 0.001	ES
	B	84.300	75.167	9.133	10.83393	4.361	0.7962	11.472	< 0.001	ES
BMI	A	28.446	26.157	2.289	8.046826	1.369	0.2315	9.887	< 0.001	ES
	B	29.433	26.170	3.263	11.0862	1.769	0.3230	10.104	< 0.001	ES
Che.cir	A	101.54	98.629	2.914	2.869805	15.170	2.564	1.137	0.2637	NS
	B	102.23	101.10	1.133	1.108285	0.8604	0.1571	7.215	< 0.001	ES
Mid.Thi	A	54.011	53.660	0.3514	0.650608	0.5049	0.08534	4.118	< 0.001	ES
	B	54.667	53.333	1.333	2.4384	1.028	0.1877	7.102	< 0.001	ES
Cal.cir	A	36.074	35.423	0.6514	1.805733	0.6036	0.1020	6.385	< 0.001	ES
	B	36.567	35.400	1.167	3.191402	0.7581	0.1384	8.42	< 0.001	ES
Abd.cir.	A	103.62	101.52	2.103	2.029531	1.646	0.2782	7.559	< 0.001	ES
	B	103.33	99.867	3.467	3.35527	1.196	0.2183	15.879	< 0.001	ES
WHR	A	0.9566	0.9571	0.0005	0.052268	0.01373	0.002321	0.2190	0.8280	NS
	B	0.9757	0.9760	0.0003	0.030747	0.00999	0.001825	0.1827	0.8563	NS

(*Abbreviations:* - **Che Cir.**- Chest Circumference; **Mid Thi** - Mid Thigh; **Cal. Cir.** -Calf Circumference; **Abd. Cir.** - Abdomen Circumference; **WHR** - Waist Hip Ratio; **ES**- Extremely Significant; **VS**- Very Significant; **NS**-Nonsignificant; **S**- Significant)

Statistical data shows [Table no: 9] that there was marked reduction in the body weight in both the groups. 7.85% and 10.83% relief were seen in group 1 and 2 respectively. Extremely significant results were obtained **s**in**s** both the groups. Data shows that extremely significant relief**s** was found **s**in BMI in both the groups. Relief was 8.04% **s**in group A **s**and 11.08% **s**in group B. Above data shows that the relief was more in group A (2.86%) in comparison to group B (1.10%). On statistical analysis, extremely significant result was seen **s**in group B while non-significant result was observed in group A. Statistical data shows that there was reduction in the mid-thigh circumference in both the groups. 0.65% and 2.4% relief were seen in group A and B respectively. Extremely significant results were obtained in both the groups. Statistical data shows that there was reduction in the calf circumference in both the groups. 1.80% and 3.19% relief were seen in group A and B respectively. Extremely significant results were obtained **s**in both the groups. Statistical data shows that there was reduction in the abdomen circumference in both the groups. 2.02% and 3.35% relief were seen in group A and B respectively. Extremely significant results were obtained in both the groups. Statistical data shows non-significant relief in WHR, both the groups have nonsignificant results, i.e., Group A (0.05) and in Group B (0.03).

Table No. 10: Showing effect of therapy on Subjective parameters: (Wilcoxon Matched pair Single ranked test).

Variables	Gr.	Mean		Mean Diff.	% Relief	SD	SE	P Value	Result
		BT	AT						
Atikshudha	A	2.829	2.400	0.4286	15.15023	1.008	0.1704	0.0263	S
	B	2.182	0.3333	1.848	84.69294	0.8337	0.1451	< 0.0001	ES
Atipipasa	A	2.857	1.000	1.857	64.99825	1.033	0.1746	< 0.0001	ES
	B	1.800	0.1000	1.700	94.44444	0.7022	0.1282	< 0.0001	ES
javoparodha	A	2.971	1.971	1.000	33.6587	0.9393	0.1588	< 0.0001	ES
	B	1.633	0.1667	1.467	89.83466	0.6814	0.1244	< 0.0001	ES
Daurgandhya	A	2.057	0.3143	1.743	84.73505	0.7413	0.1253	< 0.0001	ES
	B	1.200	0.2000	1.00	83.33333	0.5872	0.1072	< 0.0001	ES
Gaurav	A	2	1.6	0.4	20	1.218	0.2058	0.0706	NS
	B	1.767	0.9333	0.8333	47.15903	1.020	0.1862	0.0002	ES

Daurbalya	A	1.971	0.3143	1.657	84.069	0.9983	0.1687	< 0.001	ES
	B	1.733	0.1000	1.633	94.22966	0.6149	0.1123	< 0.001	ES
Swedaa-dhikya	A	1.543	0.9143	0.6286	40.73882	0.8075	0.1365	0.003	ES
	B	1.200	0.9000	0.3000	25	1.055	0.1927	0.1651	NS
Krichha-vyavaya	A	0.8571	0.1143	0.7429	86.676	0.5054	0.1927	< 0.001	ES
	B	0.7000	0.03333	0.6667	95.24286	0.5467	0.09981	< 0.001	ES
Aalsyata	A	2.429	0.7429	1.686	69.41128	0.5298	0.08955	< 0.001	ES
	B	2.467	0.2667	2.200	89.17714	0.5509	0.1006	< 0.001	ES
Atinidra	A	1.571	0.6571	0.9143	58.1986	0.7811	0.1320	< 0.001	ES
	B	1.633	0.1333	1.500	91.85548	0.6297	0.1150	< 0.001	ES
Ayaseswas-kashata	A	0.5143	0.1143	0.4000	77.77562	0.5531	0.09349	0.008	ES
	B	0.4333	0.03333	0.4000	92.31479	0.4983	0.09097	0.005	ES

(***Abbreviations*: - ES**-Extremely Significant; **VS-** Very Significant; **NS-** Significant; **S-** Significant)

Statistical data shows [Table no: 10] that extremely significant relief was seen in *Atikshudha* in Group B (51.5%, p=0.001), while significant improvement was observed in Group A (23.71%, p<s0.05). Statistical data shows that there was extremely significant relief sin *Atipipasa* sin both the groups. But relief was more sin group B (94.44%) sin comparison to group A (64.99%). In group A, 33.65% relief was seen sin *Javoparodha* sand 89.83% relief was seen in group B. Extremely significant results were observed in both the groups. Extremely significant relief was seen sin *Daurgandhya* in both the groups. The relief was 84.73% and 83.33% sin group A sand group B respectively. Statistical data shows that there was extremely significant improvement in group B (47.15%) and non-significant relief was seen in group A (20%). Statistical data shows significant and extremely significant relief was seen sin group A sand group B respectively relief was 84.06% sin group A sand s94.22% sin group B. Statistical data shows that there was extremely significant improvement in group A (40.73%) and non-significant relief was seen in group B (25%). Statistical data shows that extremely significant relief was seen in *Krichhyavyavayata* in Group B (95.24%), while

significant improvement was observed in Group A (86.67%). Statistical data shows highly significant result in Group B (89.17%) as compared to Group A (69.41%). Statistical data shows that extremely significant relief was seen in *Atinidra* in Group B (91.85%), while significant improvement was observed in Group A (58.19%). Statistical data shows that extremely significant relief was seen in *Ayaseswaskashtata* in Group B (92.31%), while significant improvement was observed in Group A (77.77%).

DISCUSSION

In the present study LR provided marked reduction of 7.85 in the body weight, 8.04% in BMI. There was 2.86% reduction in chest circumference, 0.65% reduction in mid-thigh circumference, 1.85% reduction in calf circumference and 2.02% reduction in abdominal circumference. LR showed extremely significant relief in *Atipipasa* (64.99%), *Javoparodha* (33.65%), *Daurgandhya* (84.73%) and *Swedadikya* (40.73%). LR showed significant relief in *Atikshuda*, *Daurbalya*, *Krichravyavayata*, *Alasya*, *Atinidr*a and *Ayase swasa kashtata*. LR did not show any significant relief in *swedadikya*. Oral administration of LR showed an extremely significant improvement in Hb level, extremely significant reduction in LDL/HDL ratio, serum cholesterol and serum triglycerides. On parameters like ESR, TLC, Neutrophils, Eosinophils, RBS score, Basophil score and PCV score no significant effect were observed. VC showed an extremely significant improvement in Hb level. extremely significant reduction in LDL/HDL ratio, serum cholesterol and serum triglycerides. On parameters like ESR, TLC, Neutrophils, Eosinophils, RBS score, Monocytes, Basophil score and PCV score no significant effect were observed. VC provided marked reduction of 10.83 % in the body weight, 11.08% in BMI. There was 1.1% reduction in chest circumference which was less than that of LR group, 2.4 % reduction in mid-thigh circumference, 3.19% reduction in calf circumference and 3.35% reduction in abdominal circumference. No signification reduction was seen in waist hip ratio. VC showed extremely significant relief in *Atitkshuda* (51.5%), *Atipipasa* (94.44%), *Javoparodha* (89.83%), *Daurgandhya* (83.33%), *Gaurava* (47.15%), *Daurbalya* (94.22%), *Krichhcravyavayata* (95.24%), *Alasya* (89.17%), *Atinidra* (91.85%) and *Ayaseshwasakastata* (92.31%). No significant effect was observed in *swedadikya*.

Table No. 10: Showing the s% relief sin both the groups sin Laboratory Parameters (Objective parameters).

S. N.	Blood Parameters	Relief In Percentage (%)	
		Group A	Group B
1.	Hemoglobin	10.09824	9.151376
2.	ESR	2.170253	0.412383
3.	TLC	8.083343	6.639704
4.	Neutrophils	0.685383	0.012375
5.	Lymphocytes	8.818156	12.16259
6.	Eosinophils	1.846632	5.476724
7.	Monocytes	14.35993	7.247471
8.	Basophils	9.627174	14.33721
9.	PCV	1.25942	0.439148
10.	RBS	2.627914	2.65034
11.	Sr. Cholesterol	8.912311	15.73435
12.	Sr. Triglycerides	34.96895	41.61609
13.	Sr. LDL/HDL	55.44997	62.11964
Average		**12.22367**	**13.69226**

Analysis of Overall effect of therapies on blood parameters shows that relief of 12.22% and 13.69% was seen in group A and group B respectively.

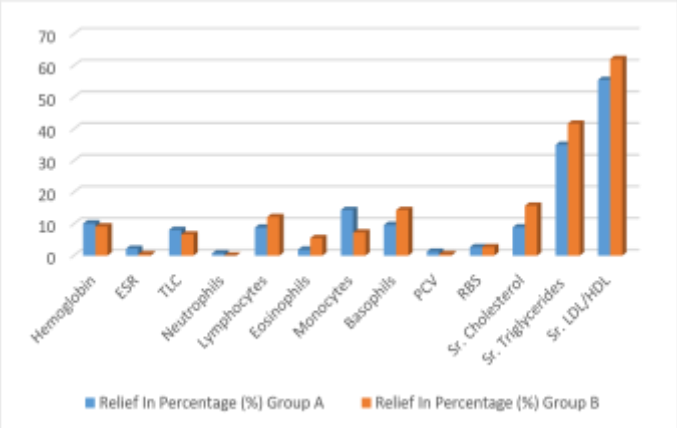


Table No. 11: Showing the s% relief sin both the groups son Objective Parameters.

S. N.	Anthropometric parameters	Relief In Percentage (%)	
		Group A	sGroup B
1.	Body Weight	7.852069	10.83393
2.	BMI	8.046826	11.0862
3.	Chest Circumference	2.869805	1.108285
4.	Mid-Thigh Circumference	0.650608	2.4384
5.	Calf Circumference	1.805733	3.191402
6.	Abdomen Circumference	2.029531	3.35527
7.	WHR	0.052268	0.030747
Average		**3.329549**	**4.577747**

Analysis of Overall effect of therapies on Anthropometric parameters shows that relief of 3.30% and 4.58% was seen in group A and group B respectively.

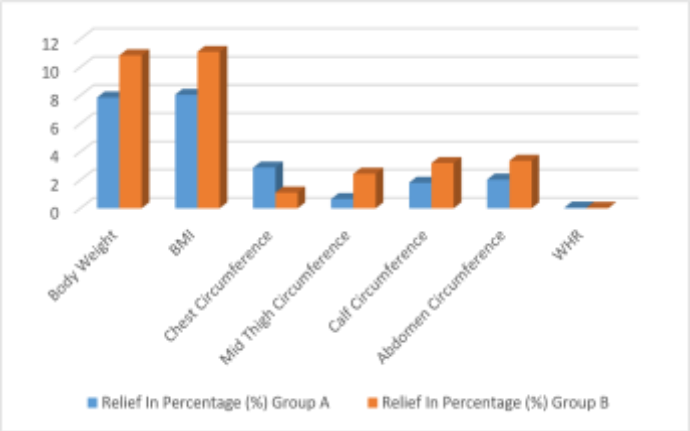
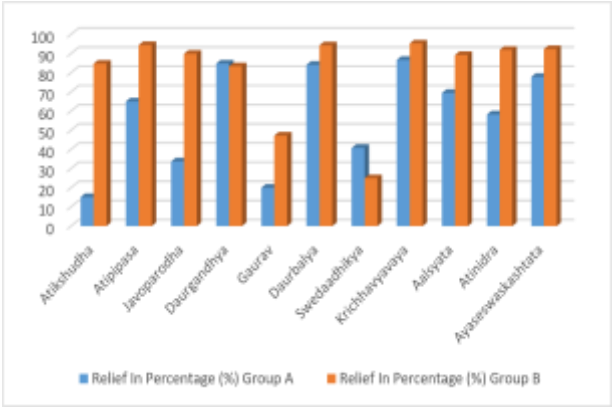


Table No. 12: Showing the s% relief sin both the groups on Subjective parameters.

S. N.	Sign and Symptoms	Relief In Percentage (%)	
		Group A	Group B
1.	*Atikshudha*	15.15023	84.69294
2.	*Atipipasa*	64.99825	94.44444
3.	*Javoparodha*	33.6587	89.83466
4.	*Daurgandhya*	84.73505	83.33333
5.	*Gaurav*	20	47.15903
6.	*Daurbalya*	84.069	94.22966
7.	*Swedaadhikya*	40.73882	25
8.	*Krichhavyavaya*	86.676	95.24286
9.	*Aalsyata*	69.41128	89.17714
10.	*Atinidra*	58.1986	91.85548
11.	*Ayaseswaskashtata*	77.77562	92.31479
Average		**57.76469**	**80.66221**

Analysis of Overall effect of therapies on Subjective parameters shows that relief of 57.76% and 80.66% was seen **s**in group A **s**and group B respectively.



CONCLUSION

The examination of the comprehensive impact of therapeutic interventions on blood parameters revealed a mitigation of 12.22% and 13.69% in group A and group B, respectively. Similarly, the assessment of the overall therapeutic effect on anthropometric parameters demonstrated a relief of 3.30% and 4.58% in group A and group B, respectively. Moreover, the analysis of the overall impact of interventions on subjective parameters indicated a substantial relief of 57.76% and 80.66% in groups A and B, respectively.

Hence, the research findings of this study suggest that administering VC orally to patients with obesity yields more favourable outcomes compared to the use of LR.

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