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ORIGINAL RESEARCH ARTICLE

Development, Validation, and Feasibility Testing of an Integrative Therapy Module for Obesity

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ABSTRACT

Background: Obesity is a condition where the accumulation of excess fat in the body takes place. Obesity is a metabolic disorder caused due to defects in food and unhealthy lifestyle, and other causes are thyroid and pituitary gland secretion abnormalities, etc., which regulate fat and lipid metabolism in the body. Obesity is the casual factor of various diseases such as heart disease, diabetic mellitus, osteoarthritis, and certain cancers. The integration module of yoga, Ayurveda, and naturopathy may reduce the weight of individuals and hence reduce the cause of other diseases due to obesity.

Objectives: To develop and validate of integrated module for obesity, to improve the quality of life, to reduce the weight, to check the psychological issues like stress and depression, to check the effect of integrated therapy of obesity on vikriti of kapha on obese individuals.

Methods: The integrated module validation was done by 60 experts of Ayurveda, yoga, and naturopathy using the methods of Lawshe's formula: Content validity ratio (CVR) = (Ne-N/2)/N/2, 30 sample size was taken for feasibility testing. Where Ryff scale, mindful attention awareness scale, and vikriti questionnaire were taken for analyzing the score.

Results: 51 integrated module practices are selected for validation, 38 IAYT practices are selected for validation, 46 practices had a CVR score of ≥0.4 indicating high score validity, 5 practices are with low score <0.4

Conclusion: The integrated module of yoga, naturopathy, and Ayurveda has not only a definite role in weight reduction, improved quality of life, and psychological factors but also improved physical activities, emotional status, and social well-being.

1. INTRODUCTION

In the present world, human beings are more prone to lifestyle disorders. Obesity is one of the major lifestyle disorders. This may be due to the cause of improper, defects in food, and sedentary lifestyle. Obesity is a condition in which increased adipocytes take place and an imbalance in energy intake and energy expenditure is evident clearly. There is inflammation, altered brown tissue activity, dysregulated autonomic nervous system function, psychological changes, and basal metabolic rate alteration.[1]

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Obesity prevalence is nearly tripled worldwide since 1975. According to the World Health Organization, obesity is the most neglected health problem in developed and developing countries. In India, the urban population is predominantly obese. In the world adult population, in 2016 about 39% of adults aged above 18 years were overweight and 13% were obese.[2,3] In India, the prevalence of obesity is increasing rapidly among adults and adolescents and also in other South Asian countries.[4] The urban Indian population is about 30–65% obese or overweight.[5]

Obesity is the 5th leading risk of mortality globally. Obesity impairs health and also morbidity risk.[3] According to Epidemiologists, young people are more prone to obesity due to unhealthy food habits and lack of physical activities or sedentary lifestyle.[6]

Obesity is a condition in which the accumulation of excess fat in the body takes place. Obesity is a metabolic disorder caused due to improper food habits and a sedentary lifestyle, thyroid and pituitary gland secretion abnormalities, etc., which regulate fat and lipid metabolism in the body. Obesity is the casual factor of various other diseases such as heart diseases, diabetic mellitus, certain cancers, and osteoarthritis.[7]

1.1. Obesity and Stress

The autonomic nervous system is a fundamental factor in controlling the energy equilibrium and fat storage in the body. There is an alteration in the activities of the autonomic nervous system and systematic nervous system in obese patients. This not only becomes a cause for obesity and its complications but also a mortality risk factor from disease. Stress is a condition of compromised homeostasis which is neutralized by the redundancy of physiologic and social reactions to recapture the body's equilibrium. This may be due to various causes of intrinsic and extrinsic factors. Reaction to stress appears as changed actual responses represented by the sympatho-adrenal system and hypothalamo–pituitary–adrenal axis (HPA). The eating behavior and pattern of an individual are influenced by the many psychological factors such as depression and anxiety by actuating neural response framework to stress. This brain emotional alteration further shows increased food intake behavior leading to obesity. Thus, the altered activity of the HPA axis leads to increased excess secretion of hormones like glucocorticoids and corticotrophin-releasing (CRH). Raised CRH levels cause the activation of locus coeruleus – norepinephrine system and neuronal excitability is enhanced to norepinephrine system by glucocorticoids, which thus actuates CRH secretion in the hypothalamus. This leads to increased food cravings by excess glucocorticoid secretion. Excess secretion of glucocorticoids further increases the craving for food.[8]

1.2. Ayurveda, Yoga, Lifestyle Intervention, and Obesity

In another study, a 12 weeks of intervention following yoga 2 h/day for 2 weeks and then continuation of same for 10 weeks at home showed a significant decrease in the leptin levels, interleukin 6 (IL-6), tumor necrosis factor (TNF)- alpha, TBARS, 8-OHdG, and increase in adiponectin levels and superoxide dismutase of patients suffering from metabolic syndrome including obesity. Yoga significantly reduces the body mass index (BMI), weight, anthropometric measurements, and blood pressure (BP).[9]

A randomized controlled preliminary in patients with coronary atherosclerosis showed a relapse in disease action following an extensive healthy lifestyle intervention. In the same trial group, a study was conducted which showed relapse of coronary atherosclerosis through constant yoga intervention following 1 year and more relapse of coronary atherosclerosis seen following 5 years than the 1-year trial. In India, a study was evaluated on coronary atherosclerosis retardation through yoga intervention. Toward the finish of 1 year, the yoga group showed critical critical decrease in the number of angina episodes each week, reduction in body weight, and improved activity levels. The levels of serum total cholesterol, triglyceride, and low-density lipoprotein cholesterol showed more noteworthy decreases when contrasted with the control group. Significantly, even yoga intervention for a short time showed a prominent decrease in BMI, BP, and blood glucose levels and with a clinically significant lipid profile improvement.[10]

A study recently recommended that a yoga intervention for weight loss given residentially improved encouraged psychological well-being and nutrition behaviors and weight reduction. A comparative decrease in weight was seen in more review that incorporated a 8-week yoga intervention that brought about an improvement in the composition of body and cholesterol levels in obese individuals boys.[11]

In a study consisting of youthful hypertensive and prehypertensive patients, it was seen, there was an evident decrease in BP (systolic BP/diastolic BP: 2.0/2.6 mmHg) practicing yoga. Essentially, a yoga-based intervention brought about a decline in all lipid levels with the exception of high-density lipoprotein. The impact began for about a month and went on for quite a long time 14 weeks. Together these outcomes demonstrate that a yoga-based intervention might affect the risk factors which could most likely make sense of the preventive and remedial valuable impacts of yoga seen in CVD. In general, yoga intervention can lead to modulation of vascular inflammation pathogenesis, thus consequently balancing the causation of CVD.[12]

A lifestyle yoga-based intervention is effectual in weight reduction and it likewise forestalls weight gain, particularly among people who are overweight. Other than this yoga intervention shows a decline in levels of interleukin-18, IL-16, and C-reactive protein (CRP) and improved adiponectin levels in postmenopausal women and obese people. Comparative advantage was seen in another review where yoga intervention showed improved serum lipids, adiponectin levels, and metabolic condition risk factors in postmenopausal women suffering from obesity.[13]

Another short-term lifestyle yoga-based intervention showed a significant decrease in TNF-alpha, and IL-6 in obesity patients and normal-weight people. And decrease in IL-6 and raised levels of adiponectin in obesity males.[12]

The decrease in inflammatory markers such as TNF-alpha, IL-6, and CRP levels shows a reduction in inflammation through constant practice of yoga.[14]

In a recent study, 36% reduction in leptin levels and 28% adiponectin levels were increased, and a significant evident increase in adiponectin and leptin ratio was seen in yoga experts and others who did not know about yoga. The duration of the practice of yoga had a positive impact on adiponectin levels and ratio of adiponectin to leptin levels and had a negative impact on the leptin levels.[9]

In a study done recently, the yoga intervention of 8 weeks showed a significant increase in adiponectin levels and a decrease in leptin levels in both obese and overweight women which was compared to an energy diet-restricted group of individuals.[15]

In a pilot study consisting of seventeen obesity patients, ayurvedic medicine and yoga-based intervention 3 times weekly was given for 3 months. Significant reduction in weight, BMI, body fat percentage, waist–hip circumference, wiast-to-hip ratio was observed. There was lifestyle modification, weight reduction, and positive psychological changes seen.[16]

A study consisting of seventy obese patients was taken and grouped into two. Ayurveda drug treatments were given to one group for 3 months while placebo treatment to another group. Significant weight reduction was observed in the group of Ayurveda treatment compared to the placebo group. Reduction in weight, BMI, antropometric measures, and skin fold thickness was evident. A decrease in lipid profile was seen.[17]

A recent study on childhood obesity through vachadi vati an Ayurveda medication on a 10-year-old female child showed a significant 10%

reduction in weight, BMI, chest circumference, and waist–hip ratio. Lifestyle and diet modification was also seen.[18]

A study based on Ayurveda treatment in fatty liver and obesity for about 2 months intervention was given in a 35-year-old obese male with grade two fatty liver. Significant improvement was seen in the reduction of BMI, signs, and symptoms.[19]

A case study on obesity was conducted and observed that the effect of "guru cha *Aptarpanam Chikitsa*" in the management of *Sthoulya* patients. Ayurveda treatment like *Udvartana*, *Parisheka, Shamana Aushadhis, Ahara,* and *Vihara* was given within the treatment duration and found significant improvement in the reduction of weight and quality of life.[20]

In a study consisting of 30 subjects of age group 25–40 years were selected. Two groups were decided where Group A (first group) was given a diet of fast food for 10 days and Group B (second group) was given a diet of satwik food for 10 days. Pre- and post-assessments were done after intervention. The results showed a significant decrease in lipid profile in Group B who had satwik food as compared Group A which showed an increase in lipid profile who ate fast food.[21]

A short-term study consisting of 50 healthy individuals received about 300 mL of lemon honey juice given 4 days about 4 times in a day continuously. Pre-post assesments were done after the intervention. This study showed a significant reduction in body weight, BMI, and decrease in lipid profile.[22]

An experimental study was conducted on 45 obese boys' students. They were divided into 3 groups 15 each. Group A was given naturopathic treatment, group B was given yoga practices and Group C as a control group. The intervention was given for 6 weeks. The pre- and postassessment was done. The results showed that there was significant improvement in Groups A and B with weight reduction and in total cholesterol and triglycerides levels. The control group showed no changes.[23]

A study reviewed on abdominal obesity following naturopathic intervention for 6 days on twenty obese individuals who had waist circumference cut off to 90 cm in men 80 cm in women showed a significant reduction in weight and BMI. The average weight reduction was 2.52 kg and 1.95 kg in men and females. The waist circumference reduced significantly 5.05 cm in male and 4.25 cm in females.[24]

2. METHODOLOGY

2.1. Study Outline

The study was conducted in two parts:

1. Development and validation of integrated therapy module
2. Feasibility assessment-pilot study of integrated therapy module.

2.2. Module Development and Validation

The integrated module will be developed by a panel comprising 30 experts with the aforementioned qualifications will be assembled to determine the content validity. Experts in Yoga therapy, Ayurveda, and naturopathy with clinical experiences (up to 10 years) will also be considered as experts. A customized protocol will be developed, which will be comprised practices supported by classical texts and research evidence.

A panel comprising of 60 experts with the aforementioned qualifications will be assembled for determining the content validity. Experts of Yoga therapy, Ayurveda, and naturopathy with clinical experiences (up to 10 years) will also be considered as Yoga experts. In addition to this, they should also be using the practices to be included in the module. For calculating the content validity ratio (CVR), the expert panel will be asked to comment on the necessity of the included items for validation; the complete module will be presented to experts with clinical experience with a minimum of 5 years of experience in handling with the patients. These experts will be requested to validate the practices in the proposed module on a three-point scale as follows.

a. Essential (1): Very important for reduction of weight in obese people
b. Useful but not essential (2): Useful in improving general well-being, but they are not important to reduce weight
c. Not essential (3): Not necessary in reduction of weight.

Details about the experts:

The 20 Ayurveda experts are from Sushrutha Ayurveda College, Prashanthi Kutira, Jigani, Karnataka.

The 19 yoga experts and naturopathy experts are from the SVYASA, Prashanthi Kutira, jigani, Karnataka.

The 5 naturopathy experts are from Swami Vivekananda Subharthi University, Uttar Pradesh.

2.3. Feasibility Study

This was a single group pre-post study. Adults, 30 subjects having the age ranging from 18 to 50 years, adults who understand and write in English, Adults whose BMI >30 kg/m^2 were included in the study.

Adults who have any other complications such as cardiovascular diseases, diabetes mellitus, and thyroid. Participants who are under medication for any diseases were excluded from the study.

- Primary parameters
- Weight
- BMI
- BP
- Respiratory rate
- Pulse
- Secondary parameters
- Mindful Attention Awareness Scale
- Ryff scale of wellbeing
- *Vikriti* questionnaire/analysis.

2.4. Data Analysis

The obtained scores will be computed on the expert's validation. According to Lawshe's formula, if more than half of the panelists indicate that an item is essential, then that item will have the minimum content validity.

Lawshe's formula: CVR =(Ne − N/2)/N/2

Where

- Ne = total number of panelists indicating "essential" for each practice
- N = total number of panelists.

For feasibility, pre –post mean difference will be analyzed using suitable statistical test.

3. RESULTS

CVR: 51 Integrated modules are selected for validation, out of which 46 had a CVR score of >0.4 which indicates high score validity. High

CVR scores and contents validity are listed in Tables 1 and 2. Other practices are listed in Table 3 which has content <0.4 CVR scores indicating low content validity [Table 4].

3.1. Feasibility

Results showed that the primary parameters such as weight and BMI ($P < 0.001$) reduced significantly, whereas the BP, respiratory rate, and pulse ($P < 0.001$) reduced to normal values significantly [Table 5].

Ryff psychological well-being scales show that there was significant improvement in total Ryff scores ($P < 0.001$) and significant improvement was seen in autonomy scales, environment mastery, personal growth, positive relations, purpose of life, and self-acceptance scores ($P < 0.001$). Thus showing that overall psychological well-being improved in the obesity patients [Table 4].

Vikrti scale scores show that there was significant improvement ($P < 0.001$) and the vata vikriti, pitta vikriti, and kapha vikriti scores showed significant reduction ($P < 0.001$) [Table 6].

4. DISCUSSION

This study was planned to develop and validate an integrated module for obesity. And check the feasibility of the integrated module through quality of life, weight reduction, and psychological well-being.

The developed integrated module had 46 practices and medication and diet included with CVR >0.4 and 5 practices below <0.4. The final module consisted of 46 practices. Overall CVR of the module was 0.9. we observed in the paired sample t-test that the integrated module has resulted in significant improvement in quality of life, psychological well-being, reduction in weight, and *Kapha Vikrti* in the body. Also integrated module brought a significant reduction in primary parameters such as weight, BMI, BP, and pulse, respiratory rate. Significant improvement was seen in the mindful awareness attention scales, and Ryff psychological well-being scales which included the autonomy subscales, environmental mastery, positive growth, personal relations, purpose of life, and self-acceptance. There was a significant reduction in *Vata Vriddhi, Pitta Vriddhi, and Kapha Vriddhi Lakshanas* in the *Vikriti* questionnaire. This confirmed that the developed integrated module is feasible.

The decrease in inflammatory markers such as TNF-alpha, IL-6, and CRP levels shows a reduction in inflammation through constant practice of yoga.[12]

A short-term study consisting of 50 healthy individuals received about 300 mL of lemon honey juice given 4 days about 4 times a day continuously. Pre-post assessments were done after intervention. This study showed a significant reduction in body weight, BMI, and a decrease in lipid profile.[22]

Compared to all the above studies which have proved significant improvement of yoga intervention in obesity, naturopathy intervention in obesity, and Ayurveda intervention in obesity separately but never an integrated study took place. Thus, this is the integrated module of all three streams and thus effectively proved in reduction of weight, BMI in obesity, and also improved quality of life and psychological well-being also [Table 1].

4.1. Possible Mechanism

4.1.1. Possible mechanism of yoga for obesity

The practicing of yoga regularly has an effect on the adipokines, autonomic nervous system, and the hypothalamo–pituitary–adrenal axis. The decrease in various factors such as leptin levels, il-6, TNF-alfa, serum vistatin, and resistin is evident and also the increase in adiponectin levels FGF-21, irissin, etc., is observed. Yoga acts on the autonomic nervous system by increasing the basal metabolic rate (BMR) and increasing brown adipose tissue activity. Both these actions lead to decrese in inflammation and insulin resistance which decreases obesity and its complications. The constant practice of yoga has a significant effect on the hypothalamo–pituitary–adrenal axis by reduction of stress which in turn reduces the food craving leading to a decrease in obesity and its complications.[5]

4.1.2. Ayurveda possible mechanism

- *Varnadi Kashyam* helped reduction in the differentiation of T3-L1 pre-adipocytes to adipocytes by regulating the adipogenic transcription factors like PPAR-gamma 2 and C/EBP-alfa by downregulating these factors.
- *Varnadi Kashayam* also reduces the adipocyte-specific gene expression such as fatty acid synthase (FAS), AP2, and LPL (lipoprotein) which is involved in lipid transport and synthesis in adipocytes.
- *Varnadi Kashayam* showed an effect on reducing potent glucose uptake inhibitory in 3T3 –L1 cells by downregulating the expression of glusose transporter GLUT-4.[25]

It is the first study on integrative therapy for obesity. Ayurveda, Yoga and Naturopathy have shown efficacy on obesity individually. However, it is the first study to validate the integrated therapy module.

5. CONCLUSION

The integrated module of yoga, naturopathy, and Ayurveda has not only a definite role in weight reduction, improved quality of life, and psychological factors but also improved physical activities, emotional status, and social well-being.

6. AUTHOR'S CONTRIBUTION

Banusri: Concept, Design, Definition of Intellectual content, Manuscript preparation, Suchitra S Patil: Data Analysis, Manuscript editing, Manuscript review. Apar Saoji: Manuscript editing, Manuscript review.

7. DECLARATION OF CONFLICTING INTERESTS

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All the authors contributed equally to the design and execution of the article.

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12. ETHICAL APPROVALS

This study does not require ethical clearance.

13. CONFLICTS OF INTEREST

Nil.

14. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from principal investigators.

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Table 1: Content validity ratios for the integrated therapy module

Sl no.	Specific practice	Ne	N	N/2	Ne-N/2	CVR
1	Udvartana –kolakullathadhi churna	18	20	10	8	0.8
2	Tab. Navaka Guggullu	17	20	10	7	0.7
3	3) Varnadi Kashaya	17	20	10	7	0.7
4	Diet: 6:00 am Wake up Empty stomach –water drinking (1–2 glass) Juices –wheat grass juice/triphala churna/ amala juice/aloe vera juice/(coriander leaves+lemon+honey juice)/cinnamon water/Lemon honey -Soaked almond/soaked raisins	20	20	10	10	1
5	8:00 am –Fruits or fruit juices (apple/watermelon/papaya/muskmelon/pomegranate/oranges/mosambi/) -vegetable salad or juice (cucumber/bottale guard juice/ash guard juice/beetroot juice/carrot juice) -upma/poha/ idali-2piece/dosa/vegetable daliya/oates	20	20	10	10	1
6	1:00 pm 2chapati/1 bowl rice+2 servings green vegetables+vegetable dal+rasam+buttermilk or curd+green salad (cucumber+raddish+lemon+carrot+tomato) 5:00 pm Boiled sprouts/soup (vegetable homemade soup-tomato, beetroot, spinach, methi, pumkine , bottle guard, cabbage soup, sweet corn) • Green salad • Buttermilk (1 glass) with jeera powder • Roasted sunflower seeds (1tsp) • Roasted flaxseeds (1tsp)	20	20	10	10	1
7	7:00 pm Vegetable khichari/moong dal khichari/vegetable daliya (1 serving) 1chapati+green leafy vegetables+buttermilk with jeera powder or methi powder or hing powder or ginger	20	20	10	10	1
8	9:00 pm Warm milk with turmeric powder	16	20	10	6	0.6
9	Acupressure POINTS: ST36, SP6, CV12, GV26, SP10	17	20	10	7	0.7
10	Short intermittent fasting	19	20	10	9	0.9
11	Sunbath (Daily 10 min)	20	20	10	10	1
12	Full body (reverse) massage (45 min/day)	20	20	10	10	1
13	Steam bath (10 min)	20	20	10	10	1
14	Hydrotherapy	16	20	10	6	0.6
15	Warm water enema Weekly once	19	20	10	9	0.9
16	Neutral hip bath 20 min	18	20	10	8	0.8
17	Cold leg pack 20 min	17	20	10	7	0.7
18	Cold abdominal Pack 20 min 10	18	20	10	8	0.8
19	Mud therapy	17	20	10	7	0.7
20	Mud pack to abdomen and eyes 20 min	17	20	10	7	0.7
21	Mud application to both legs 20 min	14	20	10	4	0.4
22	Plantain leaf bath 40 Min	14	20	10	4	0.4
23	SukshamaVyayama (Loosening exercises): 1. Head and neck movt.	19	20	10	9	0.9
24	Shoulder movement	19	20	10	9	0.9
25	Stretching arms and rotating fist	19	20	10	9	0.9
26	Spine movement	20	20	10	10	1
27	Leg stretch and feet rotation	20	20	10	10	1
28	Abdominal breathing in hip hinge position 10 Min	18	20	10	8	0.8
29	Sthula Vyayama (Locomotive exercises): 1. Engine daud	13	20	10	3	0.3
30	Sarvang pushti kriya 03 Min	15	20	10	5	0.5
31	Surya namaskara - 3 rounds 05 Min	20	20	10	10	1
32	Asana: Tadasana - 2Round	05	20	10	-5	-0.5
33	Virabhadrasana - 2Round	15	20	10	5	0.5
34	Trikonasana - 1Round	18	20	10	8	0.8
35	Uttan Padasana- 2Round	17	20	10	7	0.7
36	Pawan-Muktasana - 3Round	17	20	10	7	0.7
37	Setu Bandhasana - 2Round	18	20	10	8	0.8
38	Sarvangasana - 3Round	17	20	10	7	0.7

(Contd...)

Table 1: *(Continued)*

Sl no.	Specific practice	Ne	N	N/2	Ne-N/2	CVR
39	Bhujangasana -2Round	18	20	10	8	0.8
40	Shalbhasana - 2Round	18	20	10	8	0.8
41	Dhanurasana - 2Round	17	20	10	7	0.7
42	Shashankasana - 1Round	19	20	10	9	0.9
43	Ardhmatsyendrasana - 1Round	17	20	10	7	0.7
44	Yoga mudra -1 Round	14	20	10	4	0.4
45	Shavasana -1 Round	19	20	10	9	0.9
46	Pranayama: (Each 3 min) Anulom-vilom Pranayama	19	20	10	9	0.9
47	Suryabhedi Pranayama	20	20	10	10	1
48	Bhastrika Pranayama	20	20	10	10	1
49	Bhramari Pranayama 12 min	19	20	10	9	0.9
50	Meditation: Omkara chanting or guided meditation. 05 min	19	20	10	9	0.9
51	Relaxation: Deep relaxation technique 05 min	18	20	10	8	0.8

Experts qualification	No of experts	No of years of experience
BAMS	5	8 years
BAMS, MD (ayu)	12	6 years
BAMS, MD (yoga)	7	7 years
BNYS	5	5 years
BNYS, MD (yoga)	6	4 years
BNYS, MD (naturopathy)	5	5 years
BNYS, MD (naturopathy)	8	5 years

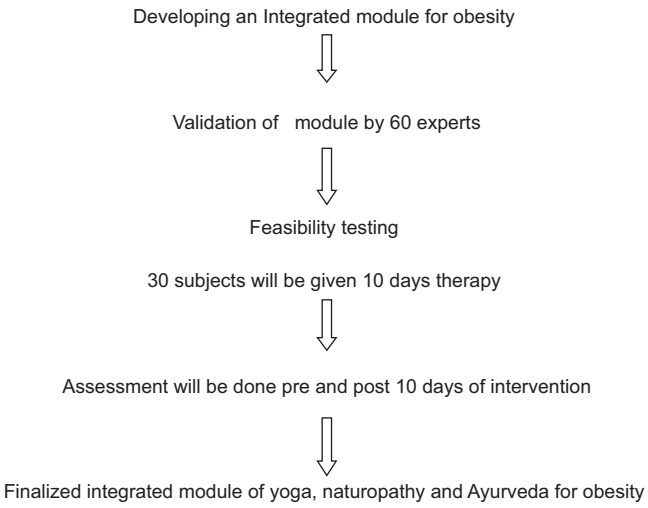

Table 2: Final validated module with high CVR

Sl. No.	PRACTICE S	CVR
1	Udvartana –kolakullathadhi churna	0.8
2	Tab. Navaka Guggullu	0.7
3	Varnadi Kashaya	0.7
4	Diet: 6:00 am Wake up Empty stomach –water drinking (1-2 glass) Juices –wheat grass juice/triphala churna/amala juice/aloe vera juice/ (coriander leaves+lemon+honey juice)/cinnamon water/Lemon honey -Soaked almond/soaked raisins	1
5	8:00 am –Fruits or fruit juices (apple/watermelon/papaya/muskmelon/pomegranate/oranges/mosambi/) -vegetable salad or juice (cucumber/ bottale guard juice/ash guard juice/beetroot juice/carrot juice) -upma/poha/idali-2piece/dosa/vegetable daliya/oates	1
6	1:00 pm 2chapati/1 bowl rice+2 searvings green vegetables+vegetable dal+rasam+buttermilk or curd+green salad (cucumber+raddish+lemon+carrot+tomato) 5:00 pm Boiled sprouts/soup (vegetable homemade soup-tomato, beetroot, spinach, methi, pumpkin, bottle guard, cabbage soup, sweet corn) • Green salad • Buttermilk (1glass) with jeera powder • Roasted sunflower seeds (1tsp) • Roasted flaxseeds (1tsp)	1
7	7:00 pm Vegetable khichari/moong dal khichari/vegetable daliya (1 serving) 1chapati+green leafy vegetables+buttermilk with jeera powder or methi powder or hing powder or ginger	1
8	9:00 pm Warm milk with turmeric powder	0.6
9	Acupressure POINTS: ST36, SP6, CV12, GV26, SP10	0.7
10	Short intermittent fasting	0.9
11	Sunbath (Daily 10 min)	1
12	Full body (reverse) massage (45 min/day)	1
13	Steam bath (10 min)	1
14	Hydrotherapy	0.6
15	Warm water enema Weekly once	0.9
16	Neutral hip bath 20 min	0.8
17	Cold leg pack 20 min	0.7
18	Cold abdominal Pack 20 min 10	0.8
19	Mud therapy	0.7
20	Mud pack to abdomen and eyes 20 min	0.7
21	Sukshama Vyayama (Loosening exercises): 1. Head and neck movt.	0.9
22	Shoulder movement	0.9
23	Stretching arms and rotating fist	0.9
24	Spine movement	1
25	Leg stretch and feet rotation	1
26	Abdominal breathing in hip hinge position 10 Min	0.8
27	Sarvang pushti kriya 03 min	0.5
28	Surya namaskara - 3 rounds 05 min	1
29	Virabhadrasana - 2Round	0.5
30	Trikonasana - 1Round	0.8
31	Uttan Padasana- 2Round	0.7
32	Pawan-Muktasana - 3Round	0.7
33	Setu Bandhasana - 2Round	0.8
34	Sarvangasana - 3Round	0.7
35	Bhujangasana -2Round	o. 8
36	Shalbhasana - 2Round	0.7
37	Dhanurasana - 2Round	0.7
38	Shashankasana - 1Round	0.9
39	Ardhmatsyendrasana - 1Round	0.7
40	Shavasana -1 Round	0.9

(Contd...)

Table 2: *(Continued)*

Sl. No.	PRACTICE S	CVR
41	Pranayama: (Each 3 min) Anulom-vilom Pranayama	0.9
42	Suryabhedi Pranayama	1
43	Bhastrika Pranayama	1
44	Bhramari Pranayama 12 min	0.9
45	Meditation: Omkara chanting or guided meditation. 05 min	0.9
46	Relaxation: Deep relaxation technique 05 min	0.8

Table 3: Practices with a CVR score <0.4

Sln	Practices	CVR
1	Mud application to both legs 20 min	0.4
2	Plantain leaf bath 40 min	0.4
3	Engine daud	0.3
4	Tadasana	−0.5
5	Yogamudra	0.4

CVR: Content validity ratio

Table 4: Pre and post mean±SD scores of Ryff scale of psychological well-being factors following intervention

Sl No.	Variables studied	Pre scores (mean±SD)	Post scores (mean±SD)	*P*-level of significance
1	Ryff total	98.23±8.480	105.87±6.877	<0.001
2	Autonomy subscale	16.17±2.245	17.50±2.097	<0.001
3	Environmental mastery	12.73±3.290	13.97±3.0	<0.001
4	Personal growth	17.47±2.825	18.63±2.526	<0.001
5	Positive relations	16.60±3.909	17.87±3.521	<0.001
6	Purpose of life	17.0±2.613	18.30±2.628	<0.001
7	Self-acceptance	17.80±2.592	18.60±2.343	<0.001

(*P<0.05, comparing the "Pre" with the "Post" scores, using Paired "t" test, following an integrated module.) Table 4 Ryff psychological well-being scales shows that there was significant improvement in total Ryff scores (P<0.001) and significant improvement was seen in autonomy scales, environment mastery, personal growth, positive relations, purpose of life, self-acceptance scores (P<0.001). Thus showing the overall psychological well-being improved in the obesity patients. SD: Standard deviation

Table 5: Pre and post mean±SD scores of primary parameters following intervention

Sl. No.	Variables studied	Pre scores (Mean±SD)	Post scores (Mean±SD)	*P*-level of significance
1	Weight	93.413±19.44	87.70±18.499	<0.001
2	BMI	35.527±4.6967	33.350±4.4069	<0.001
3	BP (sys)	127.07±10.812	118.40±7.885	<0.001
4	BP (dys)	79.73±8.081	75.70±6.353	<0.001
5	RR	18.80±4.172	16.90±2.203	<0.001
6	Pulse	82.57±9.619	76.90±5.403	<0.001

(*P<0.05, comparing the "Pre" with the "Post" scores, using Paired "t" test, following an integrated module.) Table 5 results showed that the primary parameters like weight, BMI (P<0.001) reduced significantly, whereas the blood pressure, respiratory rate and pulse (P<0.001) reduced to normal values significantly. BMI: Body mass index, BP: Blood pressure, SD: Standard deviation

Table 6: Pre and post mean±SD scores of MAAS scales and vikriti scales factors following intervention

Sl. No.	Variables studied	Pre scores (mean±SD)	Post scores (mean±SD)	*P*-level of significance
1	Vikrti	61.67±10.233	67.10±10.581	<0.001
2	Vata vikriti	4.40±3.297	2.50±1.889	<0.001
3	Pitta vikriti	3.27±1.893	2.20±1.215	<0.001
4	Kapha vikriti	4.43±2.029	2.07±1.143	<0.001

(*P<0.05, comparing the "Pre" with the "Post" scores, using Paired "t" test, following an integrated module.) Table 6 Vikrti scales scores show that there was significant improvement (P<0.001) and the vata vikriti, pitta vikriti, kapha vikriti scores showed significant reduction (P<0.001). MAAS: Mindful attention awareness scale