

Feasibility study of integrated yoga module in overweight & obese adolescents

Background

Yoga has been known to have stimulatory or inhibitory effects on the metabolic parameters and to be uncomplicated therapy for obesity. Adolescence is more prone to get obese due to lack of physical activity making them more sedentary.

Aim: To identify feasibility of validated Integrated Approach of yoga Therapy module (IAYTM) for Obesity in adolescents.

Method: RCT (Randomized Controlled Trial) was conducted on overweight & obese adolescents. Special yoga training was conducted for yoga group parameters like weight, Body Mass Index (BMI), pulse rate, blood pressure, MAC (Mid Upper Arm Circumferences), Waist Circumference (WC), HC (Hip Circumference), Fasting blood sugar, total cholesterol, High-density lipoproteins, low-density lipoproteins, very low-density lipoprotein & Sr. triglycerides were assessed before and after intervention for both yoga and control groups. Within and between group analyses of the variables were carried out.

Result: The study showed significant reduction in weight, body mass index, very low-density lipoprotein & Sr. triglycerides, circumference & Serum cholesterol in yoga group & percentage of improvement is more in yoga group than that of control group.

Conclusion: Integrated Approach of yoga Therapy module (IAYTM) is effective in management of weight, serum triglyceride & very low - density lipoprotein in adolescent obesity.

Keywords: integrated approach of yoga therapy module, IAYTM, obesity, adolescence, yoga, feasibility

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Introduction

Obesity is a metabolic disorder with excessive accumulation of fat cells which leads to adverse impacts on physical as well as psychological functions of the person.¹ Energy-dense overeating, nutrient-poor foods and a sedentary lifestyle have led to an epidemic of obesity all over the world.² Apart from physical problems there are issues which affect psychological well-being of an individual. Depression is the commonest psychological co-morbidity of obesity. A wide range of treatment options are available for obesity but, balanced nutritional food intake and regular exercise are considered to be the safest and the easiest option.³ The most common reason of obesity is increased high calorie & irregular food intake, insufficient exercise, and hereditary body pattern.⁴ As per the leading scientist, if not controlled vigorously it may end up in a serious health challenge to the society.⁵ According to WHO, UNICEF & CARE it is one of the most neglected public health problem in recent years.⁶

Adolescence is a transitional stage of physical and psychological human development that occurs between the age of 13 and 19 years.⁷ Overweight or obese children may continue this body pattern in adulthood with same or increased levels which may lead to high risk of developing disorders like diabetes, hypertension, cardiovascular diseases and cancers.⁸ It has been observed that obesity in children has dramatically increased over the past two decades.⁹ In the last decade, 43 million children were found overweight or obese. 35 million of this data were living in developing countries. This data may cross 60 million in coming years if not managed with systematic & scientific channels. Two systematic review papers^{10,11} and one clinical review

paper¹² suggest that yoga has beneficial effects on mental and physical health in children and adolescents.

Yoga has been proved its efficacy in psychosomatic disorders along with scientific evidence in past decade. Few national surveys has reported that more than 10 million Americans are practicing yoga for different health challenges since last 15 years.^{13,14} Diseases due to stress are found to be well managed with Yoga therapy according to many scientific research article.¹⁵ Different schools of yoga have varying proportions of physical, breathing, and mind activities executed through varied practices. Most of these studies found a varied range of positive benefits on obesity. They have a common objective of voluntary mastery over the modifications of the mind.¹⁵

In order to provide yoga for adolescent obesity, we have designed & developed an integrated yoga module for Obesity in adolescents from authentic Yoga texts which were result of group discussion of 16 subject matter experts. The module has been checked for content validity by using Lawshe's content validity ratio. This study is accepted for publication in another publication. Now before going for a proper randomised trial control in larger population, it needs to be checked for feasibility on pilot basis. This study is designed to provide feasibility of Integrated Yoga Module in overweight & obese Adolescents. It also aims to objectively and rationally uncover the strengths and weaknesses of the module.¹⁷ It evaluates the project's potential for success.

Materials and methods

Two armed perspective RCT (Randomized Controlled Trial) has

been conducted for 1 month with overweight & obese adolescents of a residential school in Sangamner, Pune, and Maharashtra, India who did not have any exposure to Yoga previously. Adolescents having any physical disability, any medical disorder or complication were not included in the study, overweight & obese adolescents (15 male and 8 female) between 11 & 17 years of age who consented to participate in the study were selected for the study. All the participants were allocated in two groups (Yoga n=14 and control n=9). Signed informed consent was obtained from all participants and their parents or guardians in the prior stage of intervention.

During intervention, Yoga group followed the Integrative Yoga Therapy module for obesity in adolescents which contains body posture, breathing tools, Relaxation and Meditation techniques. All the techniques were conducted under guidance & expert's observation. Duration of each session of the intervention was 60 minutes & sessions were conducted for five days in a week for 1 month. The control group were doing regular physical activities. All participants received same type of meal throughout the month. All the participants were assessed for weight, BMI, pulse, blood pressure, mid-arm circumference, waist circumference, hip circumference, fasting blood sugar, serum total cholesterol, high-density lipoprotein, low-density lipoprotein, very low-density lipoprotein, serum triglycerides respectively at baseline and after 1-month of the intervention. All the 23 adolescents completed the intervention. There were no adverse effects observed during the study period.

Data analysis

The data analysis was performed with SPSS software 20th version. In very beginning, the data was analysed for normal distribution. Within groups analysis was analysed with all the variables. Between groups analysis was conducted for the post variables of both the groups.

Results

The basic demographic data of age and height of the yoga and control group are given in Table 1. The average age of Yoga group was 14.21±1.84 and that of control group was 15.22±1.09. The average height of Yoga group was 1.64±0.09 and that of control group was 1.66±0.09. The minimum age in yoga group was 11 years whereas that in control group was 14 years and the maximum age in both groups was 17 years. The minimum height in yoga group was 1.51 meter and that of control group was 1.54 meter. The maximum height in yoga group was 1.85 meter and that of control group was 1.75 meter.

Table 1 Baseline data of age and height

Variables	Yoga Gr. n = 14	Control Gr. n = 9
Age	14.21±1.84	15.22±1.09
Height	1.64±0.09	1.66±0.09

Results of within group analysis of the normally distributed variables of Yoga group are given in Table 2. Weight, blood pressure, mid-arm circumference, waist circumference, fasting blood sugar, high-density lipoprotein, very low-density lipoprotein, serum triglycerides were normally distributed with Yoga group. There is significant reduction in weight (p=0.000), diastolic blood pressure (p=0.018), fasting blood sugar (p=0.059), very low-density lipoprotein (p=0.001), serum triglycerides (p=0.001) after intervention. There is significant increase in mid-arm circumference (p=0.01). There is

non-significant reduction in systolic blood pressure (p=0.08), waist circumference (p=0.45) & high-density lipoprotein (p=0.75).

Table 2 Within group analysis results (Parametric test) of yoga Group (n=14)

Variables	Pre	Post	T	Sig.
Weight	81.64±13.79	78.99±13.47	7.29	0.000**
Systolic blood pressure	124.57±10.18	121.85±7.87	1.84	0.08
Diastolic blood pressure	81.74±12.28	78.21±8.54	2.71	0.01*
Mid arm circumference	30.20±2.34	31.67±1.68	-2.80	0.01*
Waist circumference	100.5±9.81	99.21±8.57	0.77	0.45
Fasting blood sugar	75.61±7.06	70.49±8.46	2.06	0.05*
HDL	40.25±2.64	40.05±1.89	0.32	0.75
Triglycerides	115.85±30.07	104.54±32.27	4.02	0.001**
VLDL	23.19±6.03	20.90±6.45	4.15	0.001**

*Significance at the level of 0.05

**Significance at the level of 0.001

Results of within group analysis of the not normally distributed variables of Yoga group are given in Table 3. BMI, pulse rate, hip circumference, serum total cholesterol, low-density lipoprotein were not normally distributed in Yoga group. There is significant reduction in BMI (p=0.00), pulse rate (p=0.03), hip circumference (p=0.01), serum total cholesterol (p=0.03). There is non-significant reduction in low-density lipoprotein (p=0.24).

Table 3 Within group analysis results (Non-Parametric test) of Yoga group (n=14)

Variables	Pre	Post	Z	Sig.
BMI	30.17±4.37	29.19±4.26	3.29	0.001**
Pulse rate	77.35±4.60	75.35±4.76	2.07	0.038*
Hip circumference	109.27±11.98	108.08±12.03	2.55	0.011*
Sr. cholesterol	107.61±30.54	97.90±20.23	2.10	0.035*
LDL	44.16±29.29	36.93±20.42	1.16	0.245

*Significance at the level of 0.05

**Significance at the level of 0.001

Results of within group analysis of the normally distributed variables of control group are given in Table 4. Weight, BMI, blood pressure, waist circumference, fasting blood sugar, Serum cholesterol, high-density lipoprotein, low-density lipoprotein, very low-density lipoprotein, serum triglycerides were normally distributed in control group. There is significant reduction in high-density lipoprotein (p=0.15), serum triglycerides (p=0.009) & very low-density lipoprotein (p=0.009). There is reduction in weight (p=0.634), BMI (p=0.616), systolic blood pressure (p=0.152), diastolic blood pressure (p=0.055), waist circumference (p=0.621), fasting blood

sugar ($p=0.851$), serum total cholesterol ($p=0.260$) & low-density lipoprotein ($p=0.749$) but without significance.

Results of within group analysis of the not normally distributed variables of control group are given in Table 5.

Pulse rate, mid arm circumference & hip circumference were not normally distributed in control group. There is significant increase in mid arm circumference ($p=0.015$). There is reduction in pulse rate ($p=0.223$), & hip circumference ($p=0.916$) but without significance. Between group analysis results are given in Table 6.

Table 4 Within group analysis results (Parametric test) of Control group (n=9)

Variables	Pre	Post	T	Sig.
Weight	75.11±10.11	75.36±10.46	-0.495	0.634
BMI	26.87±1.71	26.97±1.99	-0.522	0.616
Systolic blood pressure	131.11±10.89	127.44±6.02	1.584	0.152
Diastolic blood pressure	85.33±8.26	82.33±5.61	2.250	0.055
Waist circumference	93.86±5.95	94.47±5.50	-0.514	0.621
Fasting blood sugar	74.55±5.20	74±9.63	0.194	0.851
Sr. cholesterol	94.89±10.06	91.66±8.13	0.260	0.260
HDL	41.80±1.63	42.85±1.86	-3.088	0.015*
Triglycerides	110.98±21.38	94.88±11.68	3.437	0.009*
LDL	30.89±12.07	29.82±9.92	0.331	0.749
VLDL	22.19±4.27	18.97±2.33	3.438	0.009*

*Significance at the level of 0.05

Table 5 Within group analysis results Non- Parametric test) of Control group (n=9)

Variables	Pre	Post	Z	Sig.
Pulse	71.33±4.60	69.88±5.10	-1.219	0.223
Midarm circumference	29.61±2.11	31.89±1.48	-2.433	0.015*
Hip circumference	107.03±3.61	106.92±3.93	-0.105	0.916

*Significance at the level of 0.05

Table 6 Analysis results of comparison between Yoga & Control Group

Variables	Yoga Gr. (n = 14)		Control Gr. (n = 9)		T	Sig.	Diff. in % of Improvement
	Post Mean	% of Improvement	Post Mean	% of Improvement			
Weight	78.99±13.47	3.24%	75.36±10.46	-0.34%	0.684	501	3.5
BMI	29.19±4.26	3.25%	26.97±1.99	-0.35%	1.457	0.16	3.61
Pulse	75.35±4.76	2.58%	69.88±5.10	2.02%	2.612	.016*	0.56
Sys. BP	121.85±7.87	2.17%	127.44±6.02	2.79%	-0.81	0.085	-0.61
Dia. BP	78.21±8.54	4.28%	82.33±5.61	3.51%	-0.275	0.216	0.76
MAC	31.67±1.68	-4.86%	31.81±1.48	-7.42%	-0.203	0.841	2.55
WC	99.21± 8.57	1.28%	94.47±5.50	-0.64%	1.468	0.157	1.92
HC	108.08±12.03	1.08%	106.92±3.93	0.09%	0.277	0.785	0.98
FBS	70.49±8.46	6.76%	74±9.63	0.74%	-0.918	0.369	6.02
Sr. Cholesterol	97.90±20.23	9.02%	91.66±8.13	3.40%	0.875	0.391	5.61
HDL	40.05±1.89	0.48%	42.88±1.86	-2.51%	-0.487	.002*	3
Sr. Triglycerides	104.54±32.27	9.76%	94.88±1.68	14.50%	0.856	401	-4.74
LDL	36.93±20.42	16.36%	29.82±9.92	3.45%	0.968	0.344	12.91
VLDL	20.90±6.45	9.87%	18.97±2.33	14.51%	0.857	0.401	-4.64

*Significance at the level of 0.05

Percentage of improvement (reduction) of weight & serum cholesterol, waist circumference, hip circumference, serum cholesterol, low-density lipoprotein, high-density lipoprotein is more in yoga group than that of control group. Percentage of improvement (reduction) of serum triglycerides & very low-density lipoprotein were more in control group than that of yoga group.

Discussion

23 adolescents were intervened by validated IYTM (36practices), and they were assessed pre- and post-intervention for variables out of which weight ($P<0.001$), Serum triglyceride & triglycerides ($P<0.001$) & very low-density lipoprotein ($P<0.001$) showed statistically significant reduction whereas waist circumference ($P<0.45$) & high-density lipoprotein ($P<0.75$) showed statistically non-significant reduction by validated IYTM on obesity in yoga group. This could be due to short duration of study. There was significant reduction in BMI ($p=0.001$), pulse rate ($p=0.038$), hip circumference ($p=0.011$), serum total cholesterol ($p=0.035$) in non-parametric test. So this result cannot be implicated for the universe.

There is significant increase in mid-arm circumference ($p=0.01$) with yoga group & ($p=0.015$) in control group. This could be because that integrated approach of yoga therapy module for obesity practises are having more emphasis on below naval part of body especially focused on hips & thighs. Few practises were there like suryanamaskara, chakarsana & Bhujangasana which was having effect on arm muscles but they were not significant.

Percentage of improvement (reduction) of serum triglycerides & very low-density lipoprotein were more in control group than that of yoga group. The reason of this could be that all subjects were from same hostel & blinding on the intervention was not possible. When yoga group inducted for Yoga intervention, the control group were aware of the yoga programme but practical details were not conveyed to them. This might have also given them some motivation to do regular physical activities because of which improvement was observed with their variables also. All 14 adolescents completed the intervention, there were no adverse effects noticed during the study. However, RCT with larger samples are needed to validate its efficacy as a primary intervention.

Strengths & limitations

This is a unique study on adolescent obesity with control group. It is found that INTEGRATED APPROACH OF YOGA THERAPY MODULE has been proved effective in obesity parameters management. Further both the groups were belonging to similar age limits which leads to reduction of confounding factors. Blind study was difficult as participants of both the groups were studying in same campus. The food plan was same for both the groups. Current study confirms that the one hour INTEGRATED APPROACH OF YOGA THERAPY MODULE is an effective alternative in adolescent obesity. Larger sample study along with psychological parameters is needed to strengthen its efficacy as a primary intervention.

Conclusion

Integrated approach of yoga therapy module having 36practices for adolescent obesity is effective in management of weight, serum triglyceride & very low-density lipoprotein, hip circumference &

serum cholesterol. Yoga group has improved better than control group with INTEGRATED APPROACH OF YOGA THERAPY MODULE. This module hasproved efficient in management of adolescent obesity.

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Conflicts of interest

No conflicts of interest.

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