



## EFFECTIVENESS OF AEROBIC INTERVAL TRAINING ON BODY MASS INDEX AND AEROBIC FITNESS AMONG OBESE INDIVIDUALS

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**ABSTRACT** **BACKGROUND:** Obesity is an important risk factor for non-communicable disease in young adults. Obesity is often seen in youngsters due to modern lifestyle adaption and food habits. Strategy of aerobic interval training is to induce a number of metabolic adaptations and thereby alter the body composition. Recent evidence suggests that aerobic interval training can be a time-efficient strategy to promote health in sedentary obese individuals. A special focus is on the effect of Aerobic interval training on weight loss and aerobic fitness. **OBJECTIVE:** To find out the effectiveness of aerobic interval training on BMI and aerobic fitness among obese individual. **STUDY DESIGN:** Quasi Experimental study. **METHODOLOGY:** Total of 30 young obese adults between 21-30 years (both male and female) were included in this study based on inclusion criteria. Anthropometric body assessment and aerobic fitness for each individual was taken. **OUTCOME MEASURES:** BMI and Anderson test. **RESULTS:** It was found that there is a statistically significant result in aerobic fitness, it has increased after 4 weeks of intervention as post mean (50.53) from baseline (46.80) but BMI has not shown any significant difference among obese individuals. **CONCLUSION:** It was concluded that there is an effect of aerobic interval training in increasing the aerobic fitness among obese individuals.

**KEYWORDS :** Aerobic interval training, Body Mass Index, Aerobic fitness, Anthropometric measurements, Anderson test.

### INTRODUCTION

Obesity is defining as excess fat accumulation due to lack of physical activity leads risk to health. In India Obesity has reached epidemic proportion with morbid obesity affecting 5% of the total population. It threatens the health of children and adolescents.

Indians are more prone to abdominal obesity due to genetic tendency and its associated risk of related lifestyle diseases like Diabetes & Heart Disease. According to Journal of the Association of Physicians of India-2009(JAPI) guidelines for diagnosis of obesity and abdominal obesity for India states that a BMI over 23 kg/m<sup>2</sup> is considered overweight. 5 Normal BMI: 18.0-22.9 kg/m<sup>2</sup>, Overweight: 23.0-24.9 kg/m<sup>2</sup>, Obesity: >25 kg/m<sup>2</sup>

Involvement of exercise is important for weight loss through the potential to raise energy expenditure. Exercise plays a significant role in utilization of fat and carbohydrate during exercise. Low/moderate intensity exercise advocate for overweight and obese individual to stimulate fat oxidation.

### BMI Chart

BMI	Risk Level	Classification
<18.5	Increased Risk	Underweight
18.6-24.9	Normal Risk	Optimal
25-29.9	Increased Risk	Overweight
30-34.9	High Risk	Obese -Class 1
35-39.9	Very High Risk	Obese -Class 2
≥40	Extreme Risk	Obese -Class 3

Aerobic exercises are the continuous exercise that has rhythmic movements in larger muscle groups of body. The American College of Sports Medicine suggested walking, jogging, cycling, swimming, hiking, stair climbing, rope jumping, cross-country skiing, skating, rowing and dancing to improve both muscle and cardiac endurance.

Benefits of aerobic training are reduced cardio vascular mortality, depression, anxiety and improvement in the immune system. Previous articles stated that oxygen consumption is lower in female when compared to male due to skeleton muscle difference.

Aerobically trained muscles exhibits the great oxidation capacity that not in untrained muscles. Carbohydrate deficit diet depletes the muscle, liver glycogen and profound that it affects both the anaerobic capacity and aerobic physical effort due to degrade of Glucose occurs in anaerobic and aerobic stage, and breakdown of protein facilitates water loss through urine. During 20 minutes of aerobic exercise 50% of

energy is supplied by liver and muscle glycogen remainder is provided by breakdown of fat.

The Andersen test is used for determination of aerobic fitness among obese individual in this study. Moreover, at least one Andersen tests should be performed to obtain valid results among obese individuals.

Aerobic fitness is widely recognized as necessary for the primary and secondary prevention, and treatment of chronic illness. But there are only a few studies focusing on aerobic interval training on body mass index and aerobic fitness among obese individuals. Hence this study was needed to find out the effectiveness of aerobic interval training on body mass index and aerobic fitness among obese individuals.

### PROCEDURE

A quasi experimental study was done with 30 adult obese individuals of both genders with an age group of 21-30 years with BMI of 30-34.9. An inform consent was obtained after clear explanation about the training procedure. The baseline BMI was calculated by using a formula height in meter square divided by weight in kilogram. And the baseline aerobic fitness was measured by using an Anderson aerobic fitness test.

The Anderson test is a simple aerobic fitness test.

The aim of this test was to cover 20 meters distance in 10 minutes. The test involves runs, along the track forth and back as fast as they can. The participants should touch the ground with hand at each end of the pitch. During the test they should run for 15 second and pause for 15 seconds totally 20 intervals. Rating = 18.38 + (0.03301 x running distance in meters) minus (5.92 x gender). (Male = 0 Female = 1). At the end of 10 minutes, distance covered was measured and calculation done with formula.

After completing a baseline measurement, the participants have undergone a four weeks of aerobic interval training.

Aerobic interval training consists of 5 days a week of treadmill walking under supervision of therapist for a 4-week period. Detailed explanation about equipment and exercise training for obesity was given to the participant before the start of intervention.

Maximum heart rate was calculated for exercise intensity with a formula 220- age (MHR= 220 - age). Intensity For first two weeks of treadmill walking is 50-60% of maximum heart rate. On third week onwards, it was progressed to 60-85% of maximum heart rate.

The duration of treadmill walking was 15 minutes for the first two

weeks and increased to 20 minutes from the third week onwards.

Aerobic interval training consists of 8 minutes of warm-up and 5 minutes of cool down period. The individuals trained aerobic interval exercise in Treadmill walking with intensity of 60% of maximum heart rate with 4 times of 4 minutes of interval with active phase of walking at 50% of maximum heart rate. Thus 30-40 minutes was the total duration of one session of aerobic interval training.

Pre test and post test BMI was calculated and the aerobic fitness was measured by the Andersen aerobic fitness test which is a reliable and valid tool which is used for determination of aerobic fitness among obese individuals.



**FIGURE:1 PARTICIPANT UNDERGOING AEROBIC INTERVAL TRAINING WITH TREADMILL.**

**STATISTICAL ANALYSIS**

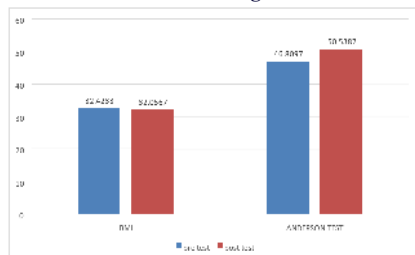
By using BMI Calculator and aerobic Anderson test, calculation values of pre and post test were obtained from obese individual were tabulated and enter in ES- Excel spread sheet. The data was analysis by using student t test with IBM SPSS statistic version 22. The p value< 0.05 considered as a significant result.

**TABLE -I COMPARISON OF PRETEST AND POST TEST VALUE OF BMI AND ANDERSON AEROBIC FITNESS TEST AFTER 4 WEEKS OF AEROBIC INTERVAL TRAINING AMONG OBSE INDIVIDUALS**

VARIABLES	PRE/POST TEST	MEAN	N	STD. DEVIATION	MEAN DIFFERENCE	STD. DEVIATION	t	df	Sig( 2-tailed)
BMI	PRE TEST	32.4233	30	1.5133	.36667	1.16006	1.731	29	.094
	POST TEST	32.0567	30	1.8437					
ANDERSON TEST	PRE TEST	46.8097	30	1.8569	-3.72900	1.46515	-13.940	29	.000
	POST TEST	50.5387	30	2.0953					

P value<0.05 shows significant result. The above table shows the mean value, standard deviation of pre and post test of BMI and AEROBIC FITNESS TEST among young obese adult.

**GRAPH 1 Comparison Of Pretest And Post Test Mean Value Of Bmi And Anderson Aerobic Fitness Test Among Obese Individuals**



**RESULTS**

Table 1 and Graph 1, shows the mean value of POST TEST (32.05) were BMI has not shown statistically significant difference from PRE

TEST(32.42) p>0.05. The POST TEST (50.54) mean value of Anderson aerobic fitness test shows a statistically significant difference from PRE TEST (46.80) mean value<0.05.

**DISCUSSION**

The aim of this study is to find the effectiveness of aerobic interval training on Body Mass Index and Aerobic Fitness among obese individuals. Thirty adult obese individuals were selected based on inclusion criteria (n=30). Both male and female subjects were taken in this study. Participants have signed the consent form after explanation of the procedure.

Before starting the exercise session the whole body assessment and aerobic fitness (pre test) was taken by using BMI monitor, electrical body fat caliber and aerobic Anderson fitness test.

Some studies suggested that Aerobic interval training can represent as an important intervention for weight loss in sedentary overweight/obese individuals. A recent article reviewed that a significant reduction in waist circumference and subcutaneous adipose tissue was found after 2 weeks of Aerobic Interval Training in overweight/obese sedentary men.

Regular exercise has been shown to substantially reduce total fat, visceral fat, skeletal muscle lipid, and insulin resistance in obese individuals. It can also reduce the risk of cardiovascular disease.

But there are only few studies that have investigated the impact of Aerobic interval training on aerobic fitness in sedentary overweight/obese individual.

In this study 4weeks of aerobic interval training consists of treadmill walking with 60% of maximum heart rate. During first session of aerobic interval training muscle metabolic responses is not achieved. After 2 sessions of aerobic interval training musculoskeletal adaptation and metabolic response is initiated.

The baseline and post intervention measurement was calculated by BMI and Anderson aerobic fitness test. The measured values were tabulated to known the effectiveness of aerobic interval training on BMI and aerobic fitness among obese individual after 4weeks of treadmill walking.

From the data analysis it was shown that there is statistically significant increase of aerobic fitness after 4weeks of aerobic interval training. But the BMI of

the participants was not shown any difference statistically. TriklJL, SingalA et (2000) concluded that aerobic interval training can be a time effective strategy to increase the function capacity and decrease the risk for all mortality cause in over weight / obese.

Andersen LB, Anderssen SA (2008) proved that an intermittent running test to estimate maximal oxygen uptake through the Andersen test. There are numerous studies on aerobic training has strongly established and associate to increase aerobic capacity and to reduce cardio vascular mortality and morbidity. But only a few study was done on the time efficient aerobic interval training among obese individuals. In this study it has clearly shown that the aerobic interval training can increase the aerobic fitness among obese individual but not have an effect on BMI. From the above results it was proved that aerobic interval training can increase aerobic fitness in obese individuals.

**CONCLUSION**

Therefore, this study concluded that Aerobic interval training can improve the aerobic fitness among obese individuals.

**RECOMMENDATIONS**

- Similar study can be done with large sample size.
- There can be a control group to rule out the effectiveness quantitatively.
- Diet management can be considered in further research.
- Long term effects of aerobic interval training on obese can be studied.
- Other obese components can be assessed in further studies.

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