Galore International Journal of Health Sciences and Research
Vol.1; Issue: 1; Dec. 2016
Website: www.gijhsr.com
Original Research Article *P-ISSN: 2456-9321*

Aerobic Exercise Programme and Reduction in Body Weight and Body Mass Index (BMI)

Dr Suman C.

Director, Global Physiotherapy Centre, Baroda, Gujarat.

ABSTRACT

Background: Overweight and obesity are one of the difficult challenges in modern lifestyle. It could be due to several factors like sedentary lifestyle, digitization, modern technologies, junk foods etc.
Aerobic exercise is recommended as one of the best exercises to reduce body fat.
Aim of present study was to investigate effect of eight weeks aerobic exercise training programme to reduce body weight and body mass index (BMI).
Materials and Methods: 40 participants were randomly recruited in two groups- experimental group and control group with 20 participants in each group. Eight weeks aerobic exercise training was administered to participants of experimental group while control group refrained from aerobic exercise training programme.
Result: There were statistically significant reductions ($p < 0.05$) in body weight and body mass index in experimental group as compared to control group after eight weeks of aerobic exercise programme.
Conclusion: Aerobic exercise significantly reduces body weight and body mass index (BMI).

Key words: Aerobic exercise, Aerobics, Body weight, Body Mass Index (BMI).

INTRODUCTION

Overweight and obesity are increasing at alarming pace due to urbanization, changes in lifestyle and adoption of modern technologies. With the advent of modern technologies in this era of computerization people tends to be less physical active. Modern trends in society like online shopping and digitization of work has lead to consequences like overweight and obesity.

World Health Organization (WHO) has defined overweight and obesity as 'abnormal or excessive fat accumulation that may impair health'. [1]
According to the World Health Organization (WHO), obesity is one of the most common public health problems in both developed and developing countries. [2]
In developing countries like India, obesity is attributed by several factors like increasing urbanization, use of mechanized transport, increasing availability of processed and fast foods, increased television viewing, adoption of less physically active lifestyles and consumption of more "energy-dense, nutrient-poor" diets. [3-5]
As we know obesity and overweight lead to several diseases e.g. hypertension, diabetes and cardiovascular disease.
Obesity reduces vascular compliance and work with the stiffness and hardness and increased resistance to blood vessels in the long term. [6]
On the other hand people tends to be more physically fit and active by performing different types of activities like exercise, walking, jogging, yoga etc.
Aerobic exercise is considered one of the best exercises to reduce body weight and body mass index (BMI).
Any physical activity which requires increased oxygen intake is an aerobic exercise.
According to American College of Sports Medicine (ACSM), aerobic exercise is defined as "any activity that uses large muscle groups, can be maintained continuously, and is rhythmic in nature."

Aerobic exercise includes walking, cycling, jogging, running, swimming etc.

The term 'aerobic' and the specific exercise method were developed by Kenneth H. Cooper, M.D., an exercise physiologist, and Col. Pauline Potts, a physical therapist both from USA.

There are many benefits of regular exercise. [7]

Stasiulis A et. al. has investigated that two months of aerobic activity three times a week for 60 minutes have desirable effects on body composition and blood lipid profiles in young women. The researchers found that aerobic exercise reduces fat mass and decreased body weight that followed. [8]

There are other benefits of regular exercise which helps to reduce triglycerides (TG), total cholesterol (TC), LDL, Body Mass Index (BMI), body mass, body fat and increased HDL, body mass, and Basal Metabolic Rate (BMR). A low-calorie diet improves the lipid profile, which if combined with exercise, is targeted at improving body composition. [9]

The aim of the study was to investigate eight weeks of aerobic exercise to reduce body weight and body mass index.

MATERIALS AND METHODS

This experimental study was conducted in a private physiotherapy and fitness clinic in Baroda, Gujarat. Forty middle aged obese/overweight participants (both males and females) within age group 24-40 years with body mass index (BMI) ≥25 to 30 kg/m^2 participated in the study. Participants with any disease were excluded from the study.

Procedure: All participants were informed about the purpose of the investigation before start of the study. All procedures were explained to the participants prior to the study. Participants were asked to inform the investigator about any discomfort during the training programme. 40 participants with mean age (32.8±4.27 years) and mean BMI (28.88±1.87 kg/m^2) were participated in the study. 40 participants were randomly recruited in two groups (experimental group and control group) with 20 participants in each group. Participants in experimental group advised to perform 8 weeks aerobic exercise programme while control group participants advised for simple stretching exercise.

Warm up exercises were given to participants before the training programme. Participants in experimental group performed aerobic exercise training programme consisted of 4 sessions per week and each session of 60 minutes for 8 weeks. Each session was started with 10 minutes of warm up exercise and ended with 10 minutes of cool down exercise. Aerobic exercise included walking and jogging. Exercise intensity was calculated by Karvonen's equation:

EHR = RHR + 60-70% HRR

Where, EHR is exercise heart rate

RHR is resting heart rate

HRR is heart rate reserve that is difference of maximum heart rate and resting heart rate.

Exercise intensity was gradually increased towards the end of training schedule. Dependent variables (body weight and BMI) were measured at the end of 8 weeks. Body weight was measured in kg while BMI was calculated by equation:

BMI = weight/ height (kg/m^2)

Body Mass Index (BMI) range is compared with following table.

Category	BMI Value
Underweight	<18.5
Normal	18.5 to 24.9
Overweight	25.0 to 29.9
Obese	≥30.0

Statistical analysis

The data was analyzed by IBM SPSS Statistics software Inc., version 20.0 (Armonk, NY: IBM Corp.) Body weight and body mass index were selected as dependent variables. Shapiro-Wilk test was applied to check whether data is normally distributed or not. As the data were normally distributed, independent t test was used to compare means of experimental group and control group while paired

sample t test was applied within group analysis.

RESULT

Both body weight and Body Mass Index (BMI) was significantly reduced (p=0.00) from 77.95 kg to 71.20 kg in experimental group at the end of 8 weeks of aerobic training programme. Similarly BMI was highly significant (p=0.00) in experimental group. These findings clearly show that 8 weeks of aerobic training programme was effective to reduce body weight as well as BMI.

Table 1: Comparison of body weight and BMI in experimental group

Variables		Mean	SD	t value	p value
Body weight (in kg)	Body weight before training	77.95	4.81	7.056	0.00
	Body weight after training	71.20	3.34		
BMI (kg/m^2)	BMI before exercise	29.77	1.97	6.811	0.00
	BMI after exercise	27.16	0.73		

Table 2: Comparison of body weight and BMI in control group

Variables		Mean	SD	t value	p value
Body weight (in kg)	Body weight before training	77.50	3.06	1.83	0.08
	Body weight after training	77.35	2.88		
BMI (kg/m^2)	BMI before exercise	28.14	1.96	1.83	0.08
	BMI after exercise	28.09	2.06		

Table 3: Comparison of body weight and BMI after aerobic exercise program between experimental and control group

Variables	Group	Mean	SD	t value	p value
Body weight (in kg)	Experimental Group	71.20	3.34	- 6.218	0.000
	Control Group	77.35	2.88		
BMI (kg/m^2)	Experimental Group	27.16	0.73	- 2.654	0.012
	Control Group	28.09	1.37		

In control group, there was no statistically significant change (p>0.05) was observed in both variables body weight and BMI before and after training programme.

The findings of study revealed that 8 weeks aerobic training programme was effective in terms of reducing body weight and BMI in experimental group. After training body weight was 71.20±3.34 kg in experimental group while this was 77.35±2.88 kg in control group.

Body mass index (BMI) was 27.16±0.73 kg/m^2 and 28.09±1.37 kg/m^2 in experimental group and control group respectively after 8 weeks of aerobic exercise training programme.

DISCUSSION

Several studies have shown that overweight and obesity are detrimental for health. Sedentary life style is one of the predisposing factors of overweight and obesity which lead to several diseases like cardiovascular diseases, hypertension, diabetes etc.

Our study has shown that aerobic exercise programme is beneficial in reducing body weight and body mass index (BMI). It is very important to perform aerobic exercise at specific intensity to obtain the proper effect and benefit. While prescribing exercise programme it is crucial to monitor appropriate exercise intensity during the whole programme.

Exercise intensity should be kept in proper training heart zone. 50-60% of MHR (maximum heart rate) is effective to reduce body fat and this zone is called as healthy heart zone or fat burning zone. Exercise intensity of 60-70% of MHR is required to maintain cardiovascular fitness and this zone is called as fitness zone. 70-80% of MHR is called as aerobic zone which increases vital capacity. 80-90% of MHR is required for anaerobic zone which improves endurance. 90-100% of MHR is redline zone.

Thus, to reduce body fat exercise intensity should be 50-60% of MHR which should be increased later.

Our study findings are consistent with the finding of Nicklas BJ et al who recommended 30 minutes of activity most days a week to treat obesity. [10] Aerobic

exercise combined with controlled diet may cause further reduction in fat mass, when compared to using diet only. Aerobics increases capability of our body to use fat as a substrate and total fat oxidation increases during the process.

Studies have shown that regular exercise helps to reduce TG, TC, LDL, BMI, body mass, body fat and increase HDL, body mass, and BMR. [11] Some researchers reported that waist circumference decreased in people who adhere to diet and aerobic exercise for 60 to 90 minutes in 5 to 7 days a week due to the increase in VO2 max and HDL levels. Most of the studies recommend aerobics compared to other type of exercise because physical activity significantly reduces body fat content for the treatment of heart disease. [12]

Another study has investigated that aerobic exercise alone results in clinically significant body weight loss in men and women. [13]

CONCLUSION

Aerobic exercise programme is effective in reducing body weight and body mass index in sedentary overweight and obese individuals. It is concluded that aerobics with appropriate intensity should be recommended to overweight and obese people to reduce body fat.

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How to cite this article: Suman C. Aerobic exercise programme and reduction in body weight and body mass index (BMI). Galore International Journal of Health Sciences & Research. 2016; 1(1): 41-44.

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