

EFFECTIVENESS OF AEROBIC TRAINING ALONG WITH RESISTANCE EXERCISE ON BMI AND DEPRESSION IN SUBJECTS WITH OBESITY-SIMPLE EXPERIMENTAL STUDY

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ABSTRACT

Background: Obesity is defined as “abnormal excessive fat (adipose tissue) accumulation that may impair health. Obesity is usually defined by using weight and height to calculate “body mass index” (BMI). It is often a major risk factor for the development of several non-communicable diseases, significantly disability and premature death. It is due to sedentary lifestyle changes, modern technologies and junk foods. It is major health hazard in later years.

Objective: The Study’s primary objectives was to determine the combined effectiveness of Aerobic training along with Resistance exercise to reduce BMI and Depression on subjects with obesity.

Subjects and Methods: The study design is a Simple experimental study. The 15 subjects were selected based on inclusion and exclusion criteria. Obese female were selected between the age group of 20-35 years. Following the baseline testing of Body mass index (BMI) ranging between 20-34.9kg/m² and Beck’s Depression Inventory (BDI) Scale for Depression. The Intervention consist of Aerobic training along with Resistance exercise. Aerobic training was given for 25 minutes for 6 days per week for 12 weeks, Along with Aerobic training the Resistance exercise were given for 20 minutes. Total treatment duration was 12 weeks. Pre-test and Post-test measured by using Body mass index (BMI) and Beck’s Depression Inventory (BDI) for depression.

Result: The results shown that, the statistical values were calculated using the paired ‘t’. The pre- test mean and standard deviation of BMI were 32.6 and 0.45 and post- test mean and standard deviation of BMI were 26.9 and 0.59. Thus the calculated ‘t’ value 11.95 which was greater than table ‘t’ value – 2.145. The pre- test mean and standard deviation of BDI were 24.2 and 0.96 and post-test mean and deviation 17.2 and 0.72. Thus, the calculated ‘t’ value 11.10 which was greater than the table ‘t’ value 2.145. Thus the statistical analysis of the study showed significant reduction in BMI and depression after Aerobic exercise along with resistance exercise.

Conclusion: There is significant reduction in BMI and Depression following the application of Aerobic training along with Resistance exercise for 12 weeks among obese subjects. This study was concluded that the Aerobic along with Resistance exercise is effective to reduce the Body mass index (BMI) and Depression among obese subjects.

Clinical Implication: Aerobic training is found to be produce a significant effect when combined with Resistance exercise on Body mass index (BMI) and Depression in subjects with obesity.

KEYWORDS: Aerobic exercise, Resistance exercise, Body mass index (BMI), Beck's Depression Inventory (BDI) Scale.

Article History

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INTRODUCTION

Obesity is a common and preventable disease of clinical and public health importance. It is often a major risk factor for the development of several non-communicable diseases, significantly disability and premature death.^[1] It is due to sedentary lifestyle changes, modern technologies and junk foods. "WHO defines obesity as a disease of excess body fat accumulation that can affect health by leading to complications in several different Organ systems"^[2]

Obesity is usually defined by using weight and height to calculate "body mass index" (BMI). Body mass index is a simple index of weight-for-height that is commonly used to classify overweight and obesity. It is defined as person's weight in kilograms divided by square of his height in meters [Kg²]^[3]

It is a major health hazard in later years. Its prevalence increase globally and threatens health of individuals. It is important to check the growth and weight, before it create health problems.^[4] Being obese, increase the risk of health problems including high blood pressure, high cholesterol, arthritis and cardiovascular disease.^[5]

There are two types of obesity they are, apple shape and pear shape. In the apple shape the excess amount of fat is accumulated above waist line that is in belly region, males are more common.^[6] And in the pear shape the excess amount of fat is accumulated below the waist line that is around the hip and thigh and females are more common in this type.

Recent studies have reported that globally, more than 1.9 billion adults are overweight and 650 million are obese. Approximately 2.8 million deaths are reported as a result of overweight or obese. Approximately 2.8 million deaths are reported as a results of overweight or obese. In INDIA, more than 135 million individuals were affected by obesity.^[7] According to WHO, more than 1.9 billion adults aged 18 years were overweight (39%), and of these, over 650 million (13%) were obese, 11% of men and 15 % of women.^[8]

More than 1 billion people Worldwide are obese – 650 million adults, 340 million adolescents and 39 million children. This number is still increasing. WHO estimates that by 2025, approximately 167 million people-adults and children-will become less healthy because they are overweight and obese.^[7]

Causes of obesity are physical inactivity, over eating, genetics, medical reasons (corticosteroids and antidepressants) psychological factors (stress, depression, and anxiety), and lack of sleep. The management of obesity includes, Behavioural modification to avoid some of the effects of the obesogenic environment is the cornerstone of long term control of weight. Regular eating pattern and maximizing physical activity are advised.^[15]

Initial treatment goal is usually a modest weight loss – 5 to 10 % of total weight. All weight loss programs require changes in eating habits and increased physical activity.

People with obesity need to get least 150 minutes a week of moderate intensity physical activity to prevent further weight gain or to maintain the loss of a modest amount of weight. Even though regular aerobic exercises is the most efficient way to burn calories. [15]

Bariatric surgery – to reduce the size of stomach is by far the most effective long term treatment for obesity. Several approaches are used and all can be performed laparoscopically. [15]. Once obesity had acquired, it is difficult to get rid. Exercise leads to decrease in cardiovascular disease risk. Aerobic exercise is augmentation of the energy utilization of the muscle by means of an exercise program. It improves the physical and emotional status of the individual. Exercise is sufficient in losing weight. [9]

On exploration of the literature, several treatment options have been described to manage obesity, and it consists of aerobic exercise along with resistance exercise training.

Aerobic exercise is defined as any activity that uses large muscle groups that can be maintained continuously and is rhythmic in nature. [19] Examples of aerobic exercise include cycling, dancing, hiking, jogging/long distance running, swimming and walking. These activities can be accessed via the aerobic capacity, which is the capacity of the cardio respiratory system to supply oxygen and capacity of the skeletal muscle to utilize oxygen. [10]

Resisted exercise is a form of active exercise in which dynamic are static muscle contraction is resisted by an outside force applied manually or mechanically. It improves and strength and tone. [11] Example: Dumbbells, TheraBand etc... resisted Exercises perform for upper and lower body large muscle groups. [12] Theraband colours are, Yellow-lightest, red light, green-light medium, blue-medium, black-heavy, silver and gold – heaviest. There band exercises are leg extension, chest press, arm flexion, arm extension, chair squat, calf strengthening, hamstring curl, biceps curl, Abdominal and oblique. [13]

The Karvonen formula is a mathematical formula that helps to determine target heart zone. The formula involves using maximum heart rate (MHR) minus age to come up with a target heart rate range (which is percentage of MHR). Target Exercise Heart rate = Resting heart rate + (60- 70% Heart Reverse Rate). $EHR=RHR+60-70\% HRR$. HRR (Heart rate reverse) and that is the difference of maximum heart rate and resting heart rate. [14]

Even though several studies have been conducted to ascertain the efficacy of different treatment approaches for obesity, only few studies have examined the combined effect of aerobic training along with resistance training and depression in subjects with obesity, so the need of the study is to find out the combined effect of both interventions to reduce the body mass index (BMI), And depression in subjects with obesity.

METHODOLOGY

Study Design: A Pre-test, post-test simple experimental study design was used with single intervention group to assess the effectiveness of aerobic training along with resistance exercise on BMI and depression in subjects with obesity.

Subjects: The patients with obesity visited the outpatient department of PPG College of physiotherapy, Coimbatore, Tamil Nadu formed the population of study. 15 obese subjects were selected for this study based on selection criteria. The criteria adopted to include the subjects with obesity consist of: 1) AGE 20 – 35 years, 2) Females, 3) Obese class 1(30-34.9), 4) Obese in Depression (beck depression inventory scale).

Methods: About 15 obese subjects were selected on selection criteria, the selected subjects have received the clear

explanation in detail about training procedure prior the study. And subjects were asked to inform investigator about any discomfort during training period. The patient body mass index was measured using BMI formula and BDI – Beck depression inventory questionnaire is done and pre – test value is recorded.

The pre-test and post- test values are measured using BMI and beck depression inventory scale. Total duration of each session is 60 minutes. The subjects were given Aerobic training for 25 minutes and resistance exercise for 20 minutes. The total treatment duration was 8 weeks (6 session per / week). The pre-test and post-test scores are were measured and date were recorded. Before starting the session, instruction are given.

Description of Experimental interventions

Aerobic Exercise: Aerobic exercise is defined as any activity that uses large muscle groups that can be maintained continuously and is rhythmic in nature.^[19] Examples of aerobic exercise include cycling, dancing, hiking, jogging/long distance running, swimming and walking. These activities can be accessed via the aerobic capacity, which is the capacity of the cardio respiratory system to supply oxygen and capacity of the skeletal muscle to utilize oxygen.

The aerobic exercise program consisted of static bicycle. Before starting the session warm up period is given, At the beginning, the bicycle riding demonstration was shown to the patients and then asked them to proceed under the direction given. After explaining the procedure. Each subject's Heart rate was measured by using pulse oximeter. Exercise intensity was calculated by using Karvonen formula. The pedalling was started and ended with low intensity. Starting intensity was maintained at 60 – 75 % HRR with duration of 10 minutes.

The exercise intensity was gradually increased to medium intensity of 75 – 80 % HRR. And the duration was 12 minutes. Total riding duration was 22 minutes with rest period of 3 minutes. And ended with cool down exercise, the total duration is about 25 minutes.

Resistance Training

Resisted exercise is a form of active exercise in which dynamic are static muscle contraction is resisted by an outside force applied manually or mechanically. It improves and strength and tone. Example: Dumbbells, TheraBand etc... resisted Exercises perform for upper and lower body large muscle groups.^[12] Theraband colours are, Yellow-lightest, red light, green-light medium, blue-medium, black-heavy, silver and gold – heaviest. There band exercises are leg extension, chest press, arm flexion, arm extension, chair squat, calf strengthening, hamstring curl, biceps curl, Abdominal and oblique. The duration of resistance exercise was 20 minutes.

Statistical Analysis

The statistical tool used in the study is paired test. The paired't' test was used to find out the statistical significant between pre-test and post-test of subjects treated with aerobic training along with resistance training.

Table No 1: Obesity By Using Body Mass Index

GROUP	MEAN	SD
PRETEST	32.6	0.45
POST-TEST	26.9	0.529

Result: The demographic presentation of subjects is shown in table 1. The pre-test mean value and standard deviation values of BMI were 32.6 and 0.45. The post-test mean value and standard deviation values of BMI were 26.9 and 0.59. The obtained t value at the significant level of 0.05. Hence the statistical report states that there were significant reduction in weight after the application of intervention in the experimental group.

Table 2: Obese On Depression Using Questionnaire

GROUP	MEAN	SD
PRETEST	24.2	0.96
POST-TEST	17.2	0.72

RESULT

The pre-test mean value and standard deviation values of BDI were 24.2 and 0.96. The pots test mean value and standard deviation values of BDI were 17.2 and 0.72. The obtained t value is greater than the table value at the significant level of 0.05. Hence the statistical report states that there was significant improvement in application of intervention in experimental group.

DISCUSSION: Obesity is defined as “abnormal excessive fat (adipose tissue) accumulation that may impair health. Obesity is usually defined by using weight and height to calculate “body mass index” (BMI). It is often a major risk factor for the development of several non - communicable diseases, significantly disability and premature death. It is due to sedentary lifestyle changes, modern technologies and junk foods. It is major health hazard in later years. Its prevalence increases globally and threatens health of individuals. Then important to check the growth and weight, before it creates health problems. Being obese increases the risk of health problems including high blood pressure, high cholesterol, arthritis, and cardiovascular disease. In 2017, GUO, et.al. Conducted a study of Aerobic exercise on the weight loss effect of obese female college students. 100 cases of female college students with weight over 58 kg where selected and evenly divided into two groups the experimental group took Aerobic exercise while the control group was given oral calcium pyruvate. Aerobic exercise shows good effects on weight loss of female college students.

In 2016, SUMAN, et.al conducted a study on effectiveness of Aerobic exercise Programme and reduction in body weight and BMI.40 participants randomly divided into two groups. Each group consist of 20 participants. 8 weeks Aerobic training was administered to experimental group. While control group refrained from Aerobic training. Aerobic training significantly reduced body weight and BMI.

On 2017, DT Funding Villarreal conducted a study of resistance training may prevent obese older people becoming frail when losing weight. This randomized controlled trial, 160 obese adults are receiving different types of exercise for six months where resistance is gradually increased as a muscle strength.

In the present study, Aerobic exercise along with resistance exercise were given to reduce BMI and depression in obese subjects. 15 obese subjects were selected based on the selection criteria. The subjects were received treatment for 8 weeks. The outcome measure was evaluated by BMI scale and Beck’s inventory depression scale.

LIMITATIONS

The study was a simple experimental study.

The study here is observed for a short period of time during the study. Long term effect of exercise is not found.

Long term follow up is needed to evaluate the differences in the condition of patients from their current status.

SUGGESTIONS

To make the result more valid, long term study may be carried out. Further studies can be done with more treatment time.

Further studies can be done with additional outcome measure. Further studies can be conducted with more subjects.

Further studies can done with different age groups.

CONCLUSION

There is significant reduction in Body mass index and depression in obese subjects following the application of 8 weeks of aerobic training along with resistance exercise among obese subjects.

This study concluded that the combination of aerobic training along with resistance exercises shows the significant difference by reducing body mass index and depression in subjects with obesity. The pre and post test data was obtained and analysed for the results.

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AUTHOR'S CONTRIBUTION

I understand my agreement to participation in this study and I am not waving any of my legal rights. I confirm that **Ms. AFRIN S / MR. S. SRI VIGNESH MPT, ASSISTANT PROFESSOR** have explained me the purpose of study, the study procedure and possible risk that I may experience. I have read and I have understood this concern to participate as a subject in this study.

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