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Comparative Study Between Breathing Exercise and Aerobic Training on Physical Fitness

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Abstract

Background: Aerobic and breathing exercise in healthy individuals produce various types of physiological responses.

Aim of the study: Comparative study between breathing exercise and aerobic training on physical fitness in healthy individuals.

Materials and Methods: The selected subjects were allocated conveniently to two groups: group A is aerobic and group B is breathing each with 15 subjects. Breathing exercises such as deep breathing, pursed lip breathing and diaphragmatic breathing exercise were performed in supine, sitting, lying crooked and standing with inspiration: expiration ratio 1:1,1:2,1:2:2 for 6 weeks. Aerobic exercise was conducted by rope skipping with moderate intensity exercise. Total exercise duration for 6 weeks was 5 days a week.

Results: Results of the study showed significant in pulse rate, blood pressure a VO_2 max in aerobic group from pre-to post-intervention. It also found that the quality of life was significantly improved from pre-to post-intervention in both the breathing and aerobic group. With respect to the above variables, however, there was statistically significant difference between the two groups, which was significantly increased in aerobic group.

Conclusion: The study was demonstrated that aerobic and breathing exercises are effective in improving physical fitness in healthy individuals. A good physical fitness or cardiorespiratory fitness will help the students to perform all the exercises. Breathing exercise and aerobic training improved cardiorespiratory parameter and quality of life. However, aerobic training has better effect on improving physical fitness with 6 weeks intervention in healthy individuals.

Keywords: Aerobic exercise; Breathing exercise; Systolic and Diastolic Blood Pressure; Pulse Rate and VO_2 max.

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Introduction

Physical activities form an integral part of our lives in today's world. They help to keep our body as well as mind fresh. A good and healthy life style requires a good meal along with physical activity. Also, proper and adequate sleep has its own positive effect. With the modernization people have inculcated in such habits that directly effects their physical health [1]. Physical activity has a positive mental health effect. Studies suggest that physical fitness and problem solving can help preserve mental health. Mental conditions are common among students attending college. Regular physical activity helps to reduce the risk of poor mental health [2]. Lifestyle is one of the major factors which contributes to a number of health conditions nowadays, which may include cardiovascular disease, hypertension, diabetes and obesity [3]. It is necessary to study our lifestyle daily and document it on regular basis. For optimal working capacity and maintaining physical fitness healthy body is very important. Physically fit persons perform activities better than individuals who are not physically fit.

Cardiovascular fitness (CVF) is a function of heart's maximum ability to pump blood and the ability of skeletal muscle to extract and use oxygen. The cardiac output and arteriovenous O_2 both are influenced by genetics and environment. Genetics contribute to heart size, structure and cardiac function variance. Environment has more effect on cardiovascular system than genetics [4]. CVF reduces the risk of various health conditions and may help to cure conditions like asthma [5]. Studies have shown that lack of physical fitness is an important risk factor of mortality in both men as well as women. A poor cardiorespiratory fitness is a major cause of mortality. A study focused that mortality was predicted well by a maximal treadmill test than baseline BMI. One of their previous work says that shifting from unfit to fit has shown significant reduction in mortality rate amongst men [6].

To maintain life, breathing is very important. It is derived from Sanskrit and pranayama, which means breathing evaluation [7]. Regular breathing exercise practice induces variegated types of physiological changes in a healthy individual [8]. In addition, many researchers during their studies are personal for the resurgence of pulmonary function by breathing exercise [9]. Variegated breathing and breathing patterns are practiced on stress management for people, forthe treatment of an uncomfortable disorder and for the modernization of psychological health [10]. As per WHO recommendations 150 minutes of moderate intensity aerobic physical activity is necessary for adults or 75 minutes of vigorous aerobic physical activity. Muscle strengthening should be done twice per week. The meaning of' aerobics is to obtain free O_2, aerobic training is a type of physical activity that can vary from low intensity to high intensity and mediated by aerobic metabolism, i.e. the use of oxygen during exercise to meet the energy requirement [11].

The indirect treadmill method for estimating aerobic capacity called the Rockport 1 mile walk test [12]. The Rockport 1 Mile walk test (1 MWT) was used to assess cardiorespiratory fitness by estimating orpredicting maximum consumption of oxygen in adults. In many samples, the Rockport 1 MWT was cross-validated all that supported the accuracy of this treadmill test to be used by many college and university to evaluate student's aerobic performance. Consequently, during test participation, some students may choose to use different walking techniques that may affect the heart rate and time data used to estimate maximum oxygen consumption of 1 MWT [13]. The current study will help us to determine which out of the two exercises, breathing or aerobic exercises, have a greater impact on physical activity and will then help us to plan out an effective treatment protocol to improve physical fitness. The aim of this study is to compare the effectiveness of breathing exercises and aerobic exercises on physical fitness in healthy individuals.

Methodology

The study design was Comparative. The study consisted of 30 healthy college students of both gender, Data was collected from Amity University from Amity Institute of Physiotherapy was taken with age group of 18-25 years in which 15 subjects who performed Aerobic training and other 15 subjects who performed Breathing exercises. participants with any diabetes mellitus, any history of respiratory disorder, cardiovascular disorder, neurophysiological and musculoskeletal disorder were excluded. The participants were chosen based on within the age group 18-25 years, Non-smokers, Normal BMI (i.e. 18.5 – 24.9), Pulse rate between 60-100 bpm and Blood Pressure within 110/70 mmHg to 140/90 mmHg were selected. The independent variables of the study are Aerobic exercises and Breathing exercises and dependent variables of the study are Systolic BP, Diastolic BP, Pulse Rate and VO_2 max respectively.

Procedure: General assessment of the subjects was performed to shortlist the participants meeting selection criteria. The subjects were explained about the procedure and the purpose of the study. Height was measured and recorded with the help of markings on the wall, made by measure tape. Weight was measured through weighing machine. Pulse rate was measured with the help of pulse oximeter and blood pressure was measured using sphygmomanometer respectively.

For measuring the VO_2 max, the subject was asked to perform the Rockport 1 mile walk test for using the treadmill. So, pre-intervention value of blood pressure and pulse rate was measured using sphygmomanometer and pulse oximeter respectively. Subjects was asked to walk on treadmill for 1 mile in their normal speed. The time taken by the subject to complete 1 mile was recorded. VO_2 max was calculated by Rockport 1MWT formula.

The subjects were then be randomly assigned into 2 groups with 15 subjects each: Group A performed Aerobic exercises and Group B performed Breathing exercises. Both breathing and aerobic exercise were

Rockport 1MWT formula used for measuring VO_2 max [14].

VO_2 max (ml/kg/min) = 132.853 - (0.0769 * weight) - (0.3877 * age) + (6.3150 * gender) – (3.2649 * time) – (0.1565 * heart rate/pulse rate).

Where weight is in kg, gender is 0 for female and 1 for male, time is in minutes for 1mile walk and pulse rate is in beats per minute.

performed in three phases, each phase consisted of two weeks. The aerobic exercises were conducted by rope skipping with moderate intensity exercise. The exercise duration was 15, 20 and 30 minutes respectively in phase 1, 2 and 3. For a total duration of 6 weeks, groups are told to exercise 5 days in a week. After 6 weeks reading of post-Rockport 1MWT was taken of following variables: blood pressure, pulse rate, and value of VO_2 max. After the whole procedure comparison between the before training program variables and after training program variables in group A was done. Breathing exercises used were deep breathing, pursed lip breathing, and diaphragmatic breathing exercise were performed in the first phase in supine lying, sitting and standing position with 1:1 (expiration: inspiration) for 15 minutes the exercise was performed. In the second and third phases in following position: supine, sitting, standing and crook lying but inspiration: expiration in the second phase of 1:2 for 15 minutes the exercise was performed. There was a breath retention time in the third phase, so inspiration: breath retention: the expiration ratio was 1:2:2 and the total exercise duration was 30 minutes. For a total duration of 6 weeks, groups are told to exercise 5 days in a week. After 6 weeks reading of post-Rockport 1MWT was taken for blood pressure, pulse rate and value of VO_2 max. After the whole procedure comparison between the before training program readings and after training program readings in group A was done. Readings of Group A and Group B were compared with each other after the procedure in both phases, both before training program and after training program.

Data Analysis

Statistical analysis was performed to find out comparison between Aerobic training and Breathing exercises on physical fitness in healthy individuals among college going students. The different statistical measured were used including mean, variance, standard deviation, t- Test: Paired Two Sample for Means and t-Test: Two-Sample Assuming Unequal Variances. The analysed to the data from Microsoft excel.

Results

Demographic details of the participants

A combined number of 30 participants participated in the study that comprised 8 females and 22 males. Out of the 15 participants in group A and other 15 participants in group B. The mean ± SD age of the subjects was found to be 21.33 ± 0.48 years, the mean ± SD body mass index of the subjects was found to be 21.06 ± 1.84 kg/cm^2, the mean ± SD systolic blood pressure was found to be 124.47 ± 7.07 MmHg, the mean ± SD diastolic blood pressure was found to be 78.53 ± 5.57 MmHg, mean ± SD pulse rate was found to be 113.13 ± 15.19 bpm and the mean ± SD VO_2 max of the subjects was found to be 64.43 ± 18.58 ml/kg/min.

Physical Fitness Measurement

T-stat value was calculated at p value = <0.05. Table 1 shows unaired t-test between group A and

Table 1: Shows intragroup comparison between group A and group B (after training program)

Variables	Mean		Variance		T stat	T critical	significance
	A Group	B Group	A Group	B Group			
Systolic BP	127.33	117.26	35.23	27.20	4.93	2.04	Significant
Diastolic BP	84.66	78.06	12.38	16.49	4.75	2.05	Significant
Pulse rate	128.40	110.80	195.11	276.74	3.13	2.05	Significant
vo2 max	93.26	61.60	198.92	336.40	5.30	2.05	Significant

Table 2: Shows comparison between inter group A

Variables	Mean		Variance		T stat	T critical	Significance
	BTP	ATP	BTP	ATP			
Systolic BP	121.60	127.33	50.68	35.23	-2.54	2.14	Significant
Diastolic BP	79	84.66	44	12.38	-3.29	2.14	Significant
Pulse rate	112.53	128.40	205.55	195.11	-5.20	2.14	Significant
vo2 max	67	93.26	301.42	198.92	-6.19	2.14	Significant

Table 3: Shows comparison between inter group B

Variables	Mean		Variance		T stat	T critical	Significance
	BTP	ATP	BTP	ATP			
systolic BP	126	117.26	54.28	27.20	3.19	2.14	significant
Diastolic BP	78.06	78.06	19.78	16.49	0	2.14	Not significant
Pulse rate	113.53	110.80	265.40	276.74	1.01	2.14	Not significant
vo2 max	61.86	61.60	399.26	33.40	0.25	2.14	Not significant

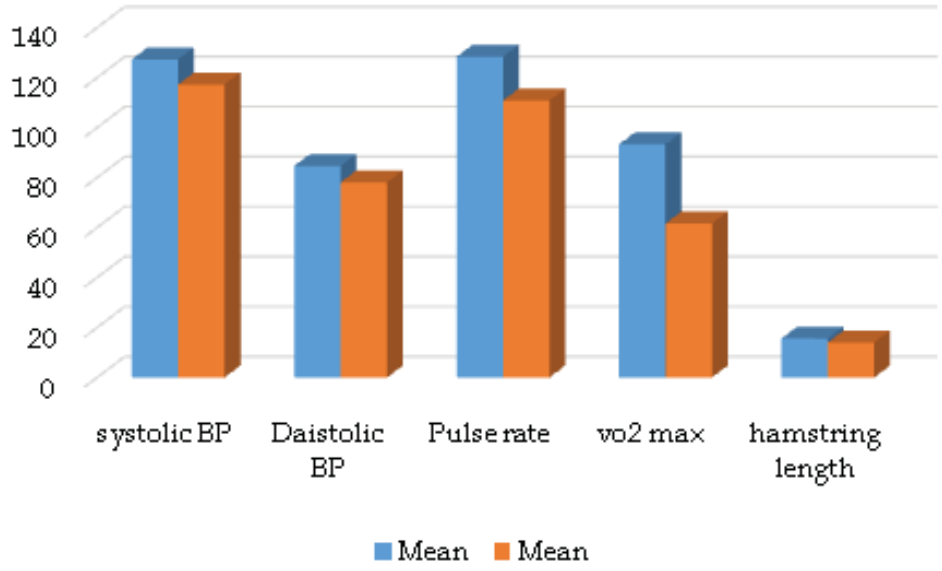

Fig. 1: Changes after 6 weeks follow-up

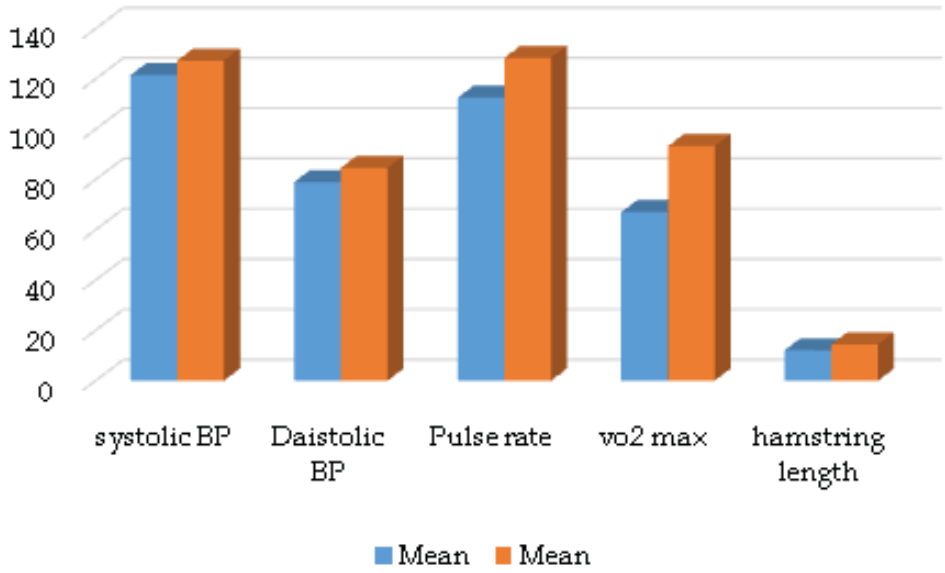

Fig. 2: Changes in between inter group A

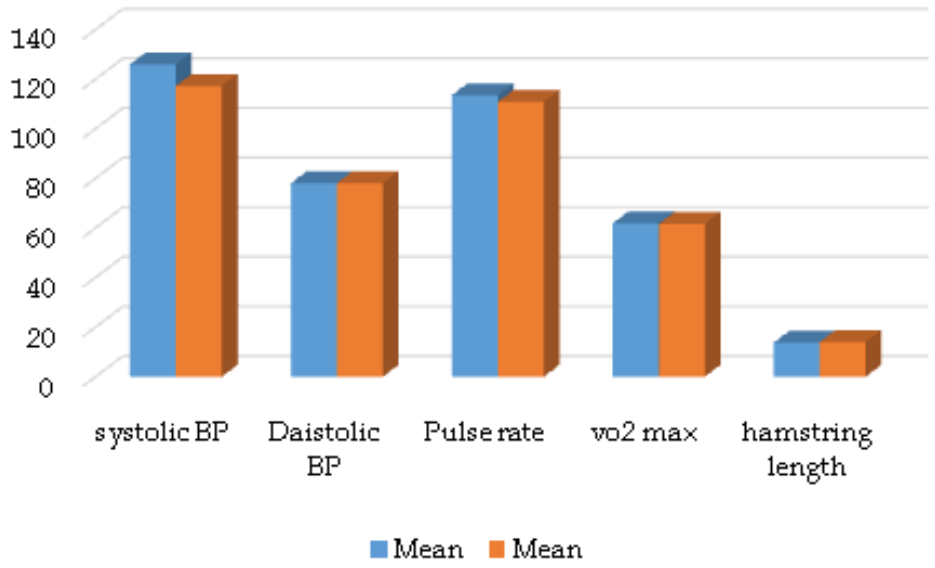

Fig. 3: Changes in between inter group B

group B; all variables show significant changes. Table 2 shows paired t-test among group A; all variables showa significant change. Table 3 show the results of paired t-test among group B.

Discussion

Physical fitness is associated with better academic performances. The individuals who are regularly active have a better and healthy adulthood. As per WHO recommendations 60 minutes of physical activity daily is must for all [11]. Physical activity can make anyone healthier, happier and smarter. Physical fitness alone cannot lead to a healthy and happy life. In many stages we are faced with problems and we need to find an optimal solution to deal with it. One of the most important components of overall physical fitness is aerobic (or cardiovascular) fitness [5]. It reflects the amount of oxygen pumped by the heart in the blood and transported to the working muscles, as well as the effectiveness of the muscles in the use of that oxygen [6].

The present study was conducted to find the comparison between aerobic training and breathing exercise on physical fitness in healthy individuals. For several reasons, aerobic exercise is essential to muscle health. Your heart rate increases during aerobic exercise and your blood flows faster, bringing more oxygen between your lungs and muscles. Aerobic activity helps promote overall health, which in turn makes muscle health easier to maintain and improve the aerobic capacity [15].

Each system in the body is based on oxygen. Effective breathing can not only give you a greater sense of mental clarity from cognition to digestion, it can also help you sleep better, digest food more efficiently, maintain physical fitness, improve the immune response of your body, and reduce stress levels [12].

In this study 30 subjects were selected based on the inclusion and exclusion criteria. The study included two groups: group A is aerobic group and group B is breathing group and included 2 phases:

Before training program perform the Rockport 1mwt for using the treadmill and Subjects was asked to walk on treadmill for 1 mile walk in their normal speed and then measured blood pressure, pulse rate, VO_2 max and hamstring length. After the phase 1 subjects was given 6 weeks duration for the exercises.

Aerobic exercise was conducted by rope skipping with moderate intensity exercise. The exercise duration was 15 minutes, 20 minutes and 30 minutes respectively in phase 1, 2 and 3. For a total duration of 6 weeks, groups are told to exercise 5 days in a week. After 6 weeks reading of post-Rockport 1MWT was taken of following variables: blood pressure, pulse rate, hamstring length and value of VO_2 max. After the whole procedure comparison between the before training program readings and after training program readings in group A was done.

Breathing exercises such as deep breathing, pursed lip breathing and diaphragmatic breathing exercise were performed in the first phase in

supine lying, sitting and standing position with 1:1 (expiration: inspiration) for 15 minutes the exercise was performed. Breathing exercise was performed in the second and third phases in following position: supine, sitting, standing and crook lying but inspiration: expiration in the second phase of 1:2 for 15 minutes the exercise was performed. there was a breath retention time in the third phase, so inspiration: breath retention: theexpiration ratio was 1:2:2 and the total exercise duration was 30 minutes. For a total duration of 6 weeks, groups are told to exercise 5 days in a week. After 6 weeks reading of post-Rockport 1MWT was taken of following variables: blood pressure, pulse rate, hamstring length and value of VO_2 max. After the whole procedure comparison between the before training program readings and after training program readings in group A was done. Readings of Group A and Group B were compared with each other after the procedure in both phases: before training program and after training program.

However, aerobic training has better effect on physical fitness and improvement in VO_2 max with 6 weeks intervention in healthy individuals.

Conclusion

The study was conducted to check comparison between aerobic training and breathing exercises on physical fitness in healthy individuals. However, aerobic training has better effect on physical fitness and improvement in VO_2 max with 6 weeks intervention in healthy individuals.

Conflict of Interest: Nil

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