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The Effects of Cardiovascular Exercises on Body Mass Index and Vital Capacity among Students of Sargodha University

Abstract

This research was designed to evaluate the effect of cardiovascular exercises on body mass index (BMI) and vital capacity (VC) among student aged between 21-27 years ($M \pm SD 22.3 \pm 3.05$). The experimental research study was applied to 54 University students of Sargodha. Data were analyzed by using SPSS version 24.0. P-value ≤ 0.05 was considered significant. The result showed that the average BMI of the control group and experimental groups was 20.73 ± 3.02 vs 21.51 ± 3.21 . The effectiveness of cardiovascular exercise on Vital capacity on Pre and post-test of the experimental group was -56.91272 ± 22.03192 with a p-value of 0.000, which was showed there was a highly significant improvement in vital capacity of students and compare with the control group. It was concluded that body masses index and vital capacity is significantly improved in university students of the experimental group as a result of 10 weeks of the cardiovascular exercise training program. Conclude that there is a significant difference between the effects of cardiovascular exercise and daily routine sports activities on BMI.

Key Words: Cardiovascular Exercises, BMI Body Mass Index, VC Vital Capacity, University Students, and Sedentary Lifestyle

Introduction

Various research studies highlighted that cardiovascular exercises play a vital role in a healthy life and weight management, in addition to improving the function and performance of the circulatory system. Cardiovascular exercises have many health and fitness benefits. During cardiovascular exercises, a person's heartbeat and VO₂ max increases. Cardiovascular exercise strengthens and tones the muscles of the heart and lungs. It is well documented, established and recommended that different forms of cardiovascular exercises, at least three to four days per week for 25 to 35 minutes per session, have great effects on sports performance and beneficial for an active and healthy life. Furthermore, cardiovascular exercises have great effects on the immunity system of the human body. As a consequence of cardiovascular exercises, lungs expansion improves, which means vital capacity is improved. When a person exercises regularly, working muscles and tissues need more oxygen, and per minute ventilation also improves; minute ventilation is the volume of air that a person can inhale and exhale per minute. Cardiovascular exercises increase the strength and efficiency of concerned muscles, which are responsible for respiration. When minute ventilation increases, the rate of exchange of gasses increased. Consequently, a person's vital capacity also improves. Therefore, a person can perform better in daily life activities and even in sports competitions.

Cardiovascular workouts are beneficial for overall health. Regular cardiovascular exercises reduce the chances of premature death, generally in heart-related problems, diabetes, blood pressure, hypertension, cancer and especially obesity. Obesity is linked to many health-related problems. These problems are found in all ages ranging from children to adults of both genders. The major causes of obesity are physical inactivity and inappropriate nutrition. Physical inactivity and diet-related issues must be addressed before it is too late. Medical Science has made marvellous advancement in the diagnosis and treatment of many incurable diseases during the past decades, but obesity so remote

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from most of them. New solutions for low fat are being introduced every other day in the market. These solutions are in the form of drugs with an ultra-modern claim for high effects of weight loss. [Keil \(2002\)](#) and [Alison et al. \(2007\)](#) observed that different effects could be produced by crash dieting in different persons. Multiple gadgets to remain fit are manufactured and advertised to the population intended in reducing/manage unhealthy weight. Results are reported that in rapid weight loss cases of biliary stones, [Stinton, L. M. & Shaffer, E. A. \(2012\)](#); [Totani et al., \(2008\)](#) promotes fitness clubs to attract people of diverse ages and genders from all over the country, for fitness and weight management programs. Some of these programs are expensive yet consume much energy but surely are very effective. Weight management can be a natural activity and pleasant for those who are impacted by a serious overweight related health issue. However, suitable solutions for weight loss for all those who do not have adverse side effects for health issues and have a lasting effect at the same time. A cardiovascular exercises program is recommended to lose weight.

Cardiovascular training includes a variety of exercises like a brisk walk running, running, aerobics, hiking, rowing, swimming, cycling, roller skating and many other exercises. Climbing stairs, rope skipping, and jumping are also cardiovascular exercises. The basic purpose of cardiovascular exercise is to improve the level of performance of students [Park, S. K., Park J. H., Kwon Y. C., Kim H. S., Yoon M. S., & Park H.T. \(2003\)](#). Cardio workouts or aerobic programs can improve body composition, reduce cholesterol level, and increase fat utilization in normal and obese persons [Blaak, E. I. E., Saris, Wim, H. M. \(2002\)](#). Instead of doing exercise in an irresponsible way, individual/one should choose the type of cardiovascular training that suits individual/ one's needs [Okura, T. Nakata Y. Lee D. J., Ohkawara K. & Tanaka K. \(2005\)](#). Most overweight or obese patients suffering from minor heart diseases and respiratory/lungs diseases can walk as cardiovascular exercise after doctor advice.

Cardiovascular diseases (CVD) are the prominent reasons for mortality worldwide, and they cause 47% of all mortality in Europe [Lozano, R. Naghavi, M. Foreman, K. Lim, S. Shibuya, K. & Aboyans V. \(2012\)](#). Six hundred seventy-one million people are overweight, including 78 million in the United States, 5% of the population worldwide, but more than 1/10 of the overweight population. On the list of 10 countries with an obese population, China was at second, and India was in third place with a larger population with 46 million and 30 million fatty people respectively, followed by Russia, Brazil, Mexico, Egypt, Germany, Pakistan, and Indonesia. The outcomes of research studies found that overweight people are more at risk for cardiovascular disease, diabetes, arthritis, cancer, and disease of kidney failure, and are increasingly debilitating for health care systems [Medicine ACoS, \(2006\)](#). Cardiovascular disease (CVD), the leading cause of mortality in the United States, is responsible for more than 600,000 deaths a year. In addition, 80.7 million adults in the US suffer from cardiovascular disease [Daniels, S. R. \(2006\)](#). Exercise, especially aerobics, therapeutic change at low cost has been recommended to improve the levels of lipids and lipoproteins in adults. [Rosamond, W. K. Flegal. \(2008\)](#) Research studies reveal that physical inactivity and a sedentary lifestyle leads to obesity. Obesity is a big health problem that can affect the health of any person [Boone, J. E., Gordon-Larsen, P. Adair, L. S., & Popkin, B. M. \(2007\)](#). There are many factors that cause obesity, including a sedentary lifestyle, use of drugs during pregnancy or childhood, poor eating habits. Most of the risks for health are attached to obesity, such as heart diseases, a disorder of metabolic, lungs and gastrointestinal diseases. [Green, G. & Reese, S. \(2006\)](#) Obesity causes type II diabetes, metabolic syndrome, hypertension, heart diseases, stroke, sleep disorders, long-term depression, arthritis, and sudden cardiac arrest. More than four million people in the United States are overweight. Among those four million people, there are two million people become overweight in less than five years. [Sedlock, D. A., Lee, M. Flynn, M. G., Park, K. Kamimori, G. H. \(2010\)](#).

Obesity is a new threatening challenge for humans; it is also increasing in Pakistan. Unhealthy foods, as well as a sedentary lifestyle, are the causes that contribute to obesity among people. According to an article published in the express tribune on September 8th, 2016, Pakistan stands at number nine (09) among the world most obese nation. World health organization (WHO) data published in May 2014 coronary heart disease deaths in Pakistan reached 111,367 or 9.8% of total deaths. Other studies show that one out of four adults is overweight. Research shows in Pakistan, people living in the big cities are more exposed to the risk of overweight as compared with people

living in country areas. Women, of course, also have a higher risk of being fatty compared to men. Obesity and overweight are the fifth most frequent death risk overall. According to estimates given by World Health Organization (WHO), 26% of women and 19% of men in Pakistan are obese, which means they have a high level of body mass index (BMI). Women are 2-3 times more obese. Obesity increased with an estimated value of 10 per cent. Most of the Pakistani people have lack facilities and awareness of physical activities and exercise. Physical activity plays a very significant role in the life of university students as well as athletes. There are varieties of fitness activities of different types available that have an impact on various body parts. This study focuses on a cardiovascular training program to observe the program effects on the students' fitness level currently studying at the University of Sargodha. Therefore, the purpose of this study is to evaluate the outcome of ten (10) weeks of exercises program of cardiovascular sessions on the body mass index and vital capacity among the students. This study will also help to measure the body mass index (BMI), vital capacity (VC), and effectiveness of low to moderate and high-intensity cardiovascular exercises on the performance or fitness level of young university students.

Objectives

- To examine the effect of cardiovascular exercise on the BMI of the students at the university.
- To analyze the effect of cardiac exercise on vital capacity.
- To evaluate the effect of cardiovascular training on the performance of university students

Material and Methods

The experimental research design was adopted to investigate the study to evaluate the effect of cardiovascular exercise on BMI and vital capacity among University students of Sargodha. The population of the study was male students of master level classes from the University of Sargodha who participated in the study for gathering the information. The participants were selected for the study who were participated in different sports and physical activity in their daily life for maintaining fitness.

Population and Sample

This research was designed to evaluate the effect of cardiovascular exercise on BMI and vital capacity among university students of Sargodha. The population of the research was male students of MA / MSc. Classes from the University of Sargodha, aged between (21-27 years old). On a willing basis, considering the age limit, 54 students out of one hundred twenty (120) students from the department of sports sciences were taken as a sample. The students were fully aware and willing to participate in the study to improve the level of their fitness.

Inclusion Criteria

- Male students at the University
- Age ranged between 21 to 27 years.
- They are restricted to health-related physical fitness and physiological variables.

Exclusion Criteria

- Age before 21 and after 27 years.
- Female students at the University
- Any physical and physiological misfit

Training Program for Experimental Group

A total of ten weeks of the intervention training program was conducted for the experimental group. The training was performed five days per week; 45 minutes per training session were applied, Low to moderate and then moderate to a high-intensity workout schedule. In the orientation session, written

consent forms were asked to complete and signed by the participating students and medical history to determine the eligibility. Due to the long ten-week training program novelty effect was subsided.

Formation of Groups

The main aim of the research was to study the effect of cardiovascular exercises training on BMI and the vital capacity of university students. After the Pre-Test, students were divided into two equal groups with the help of proper randomization on the basis of pretest data of body mass index. There were 27 students in group (A), which is called a controlled group. There were 27 students in the group (B), which is called the experimental group. Both groups of students were advised and supervised not to take any extra training and medicine.

Protocol of Training

The data of Pre-test and post-test of both experimental as well as a controlled group were recorded on a self-developed research Performa. During the ten weeks, cardiovascular training program. The participants for the experimental group were 27 to took part in cardiovascular and complete body exercises. The ten-week cardiovascular program divided into three parts week-1 to week-2 include physical conditioning, week-3 to week-5 students were involved in aerobic / endurance training week-6 to week-8 training program focused on cardiovascular training with moderate intensity exercises, and during week-9 to week-10 students involved in cardiovascular / endurance training with moderate to high-intensity exercises.

Data Analysis

The collected data was entered and analyzed by using SPSS version 24. The quantitative variables like age, height and weight, along with BMI and vital capacity was tabulated in the form of mean \pm SD, and a sample t-test was used for the analysis of the data.

Results

Data had been collected through self-developed Performa related to the research topic. It was an experimental study. A pre-test was conducted on the basis of BMI, height, weight, vital capacity levels of the students from both groups (A) controlled and (B) experimental. All participants, including the control and experimental group. It was observed that the average age of students was 22.3 ± 3.05 (Mean \pm SD). The minimum age of students was 21 years old as compared with the maximum age was 27 years.

Table 1.

Control and Experimental Group	
Age of Participants	
N	54
Mean	22.3
Std. Deviation	3.05
Minimum	21
Maximum	27

Table 2. BMI Pre and Post Test of Experimental Group

Research Group	Mean	Std. Deviation
BMI Pre-Test Experimental Group	21.5116	3.20803
BMI Post Test Experimental Group	20.7333	3.02524

Table 2 showed that the mean BMI of the experimental group pre-test before the treatment is 21.5116, while the BMI has been decreased calculated post-test after the ten weeks cardiovascular exercise sessions was 20.7333.

Table 3. BMI (pre and post-test) Control and Experimental Group

Paired Samples Test				
Pair	Group	Mean \pm S. D	t	P-value
Pair 1	BMI Pre and Post Test Experimental Group	0.77829 \pm .51848	7.800	0.000
Pair 2	BMI Pre and Post Test Control Group	0.23630 \pm 1.87707	0.654	0.519

Table 3 shows that the t-test value between BMI (pre and post-test) of experimental was $0.000 < 0.05$, it proved that the cardiovascular exercise training session had made significant improvement on body surface area of students. The p-value for BMI of the control group pre and post-test was $0.519 > 0.05$; it was obvious that there was no significant difference observed between pre and post-test of BMI.

Table 4. Vital capacity post-test Control vs post-test Experimental Group

Paired Samples Test				
Pair	Group	Mean \pm S. D	t-test	P-value
Pair 1	Vital Capacity Pre and Post Test Experimental Group	-56.91272 \pm 22.031	-13.4	0.000
Pair 2	Vital Capacity Pre and Post Test Control Group	1.18481 \pm 26.789	0.23	0.820
Pair 3	Vital Capacity Post Test Control Group Vs Vital Capacity Post Test Experimental Group	-84.20815 \pm 125.106	-3.49	0.002

Table 4 shows that the t-test value between Vital capacity (pre and post-test) of experimental was -13.4, while the p-value $0.000 < 0.05$, proved that the cardiovascular exercise training session had made significant improvement in the vital capacity of university students.

The t-test value for the vital capacity of the control group pre and post-test was 0.230, while the value of p is $0.820 > 0.05$; it showed that there was no significant difference observed between pre and post-test of Vital Capacity of the control group.

But when the comparison between the post-test control group with the post-test of the experimental group, the t value is -3.49 with a p-value of $0.002 < 0.05$ which shows that there is a significant difference between the two groups.

Discussion

The main focus of the study was to observe all factors involved in research to assess the effect of cardiovascular exercise on Body Mass Index and vital capacity among the students at the University of Sargodha. All the students of the experimental group involved in this study had undergone a regular cardiovascular training program for a period of eight weeks. In this current Research, participants fitness improved over the 8-weeks program, and overall results show that cardiovascular exercises have numerous benefits (short term and long term) on BMI and Vital Capacity.

In this study, a total of 54 students aged between 21-27 years enrolled, the students divided into two equal groups. The mean age of participants was 22.3 years; the maximum age of student was 27. Similar results found by [Pantelić, S \(2007\)](#), [Mukesh, K. M., Vishan, S. R. \(2015\)](#), who registered 59 young women and then divided into two groups. The mean age of participants was 23.1 vs 22.1 years old, respectively, in experimental and controlled groups. The experimental group consisted of 29 female subjects (age 23.1 ± 1.9 years, body height 164.4 ± 6.1 cm, body weight 62.1 ± 5.6 kg, BMI 23.0 ± 2.2 kg/m²), while the control group was made up of 30 subjects (age 22.7 ± 1.8 years, body height 165.3 ± 6.2 cm, body weight 59.4 ± 6.3 kg, BMI 21.7 ± 1.7 kg/m²). The results of this study demonstrated the same results.

The data were obtained before and after the training session, and findings of VC average in the group of students in control before was 563.0252 compared with after changed with 561.8404 modification as compared to experimental group the mean VC group of students was 589.1358 but after cardiovascular exercise training the VC group of students changed into 646.0485.

The effect of six weeks of training of aerobic exercise assessed by Mishra and Rathore (2015)¹⁸ they selected 30 male students at college randomly and further divided into two groups. The results showed that there was a significant difference between pre and post-test (experimental group) of Vital Capacity (VC) as the control group (vs 3.47 ± 0.61 vs $3.482 \pm .62$) compare pre and post-test results of the experimental group (3.76 ± 0.38 vs 4.29 ± 0.49), which are supporting our findings.

Conclusion

It is concluded that students of the experimental group have improved their body mass index and vital capacity as compared with the control group. The vital capacity of students of research improved after cardiovascular exercise; there is a significant difference between the effects of cardiovascular exercises and daily routine sports activities on the Vital Capacity of the experimental group; however, a larger population with severe obese students should involve in physical activity based on cardiovascular training programs to assess the effect of exercise and diet on body weight and vital capacity.

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