

Effect of Aerobic Training on Cardio Respiratory Endurance and Muscular Endurance among Female Athletes

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Abstract

The goal was to analyze the effects of aerobic training on a range of cardio respiratory endurance and muscular endurance variables among female athletes aged 18–24, who had been training for at least two years. In order to conduct this study, twenty four female athletes were picked at random from Punalur, Kollam district, Kerala, India. Age varied among the subjects chosen; they spanned between 15 to 17 years. With 12 participants per group, the sample consisted of Group 'I', receiving Aerobic training, and Group 'II', serving as the control group. Group 'I' engaged in a training plan spanning three days, including one session every twenty-four hours. Sessions typically extended from sixty to ninety minutes. No specific training was received by members of control group (Group 'II'). Cardio respiratory endurance and muscular endurance were measured using the Cooper 9-minute walk/run test and wall sit test. Pre and post-test data collection focused on predetermined variable criteria before and following the training session. Statistical methods were applied to examine the pre and post-tests scores via dependent -'t' tests and ANCOVA respectively. Examining the results, it became clear that the aerobic training program had a substantial effect on improving cardio respiratory endurance and muscular endurance within the experimental population. Control group members demonstrated neither notable advancements nor statistically meaningful differences across three key performance indicators (cardio respiratory endurance and muscular endurance).

Keywords: Aerobic Training, Cardio Respiratory Endurance, Strength Endurance

Introduction

Aerobic exercise involves continuous movement fueled by oxygen from the air you breathe. Aerobic means "with oxygen," therefore the amount of oxygen that reaches your muscles depends on how much you're breathing [1]. Aerobics is a physical activity that uses your body's large muscle groups, is rhythmic and repetitive. It increases your heart rate and how much oxygen your body uses. By definition, aerobic running entails pushing yourself to exhaustion while consuming oxygen [2]. With regard to oxygen intake, there exists a predetermined limit for each individual based on their health. Exercise plays an essential role in raising personal limitations. The benefits of aerobic exercise include improved heart health and a lower risk of conditions including diabetes, high blood pressure, and high cholesterol [3]. To improve endurance, strength, and athletic performance, it is a crucial component of

every training programme [4]. Exercises that raise your respiration and heart rate are considered endurance exercises, and include jogging, swimming, biking, and jumping rope. Your heart, lungs, and circulatory system stay healthy with endurance exercise, which also boosts your general fitness [5].

Numerous variations exist for aerobic exercise. In general, it takes place over a sizable amount of time with a moderate level of intensity. Running a long distance at a steady pace is an example of an aerobic activity; sprinting is not. Singles tennis is typically seen as an aerobic activity, in contrast to pursuits that involve short bursts of energising action interspersed with prolonged periods of leisurely movement [6]. Exercise that is aerobic strengthens the heart and lungs and enhances muscle performance. Increasing athletic performance and improving training responsiveness are two objectives of aerobic exercise [7]. The rate at which oxygen is transferred from the lungs and heart to the bloodstream and utilised by the muscles rises with aerobic exercise. Athletes that are aerobically fit can work out longer and harder before getting exhausted [8]. They experience less muscle weariness, more energy, a slower heartbeat, and slower breathing during activity. Recovery happens more quickly after exercise. You can test your aerobic fitness in a lab environment by cycling or on a treadmill [9].

Cardiorespiratory endurance is an important sign of physical health, which is the capacity of the heart and lungs to supply oxygen-rich blood to working muscles throughout prolonged physical exercise [10]. An organism's capacity for sustained effort and activity, as well as its capacity to withstand stress, heal from injuries, and be immune to weariness, are all examples of endurance. The phrase is frequently used while discussing aerobic or anaerobic exercise [11]. The term "muscular endurance" describes a muscle's capacity to contract and release repeatedly and steadily over an extended length of time. It has a significant impact on practically every sporting activity [12].

Purpose of the Study

The intention of the study was to explore how aerobic training programme effects the selected cardio respiratory endurance and muscular endurance variables among female athletes.

Methodology

To carry out the study's objective, I have selected 24 female athletes from Punalur, Kollam District, Kerala, India. Twelve were randomly allocated to the aerobic training programme group and twelve to the control group. The subjects ranged in age from 15 to 17 years. The chosen subjects were separated into two equal groups at random; Group I received an aerobic training course, while Group II served as the control group. Except for their regular activity, the control group did not take part in any of the training activities. A pre- and post-test design that was randomly assigned was used for the investigation. Pre- and post-test data were obtained for cardio respiratory endurance and muscular endurance using the Cooper 9-minute walk/run test and wall sit test respectively. The experimental groups participated in a six-week training regimen that included three days per week of aerobic

training. The dependent-'t' test and Analysis of Covariance (ANCOVA) test for certain a variable were used to statistically compare the results of the pre- and post-tests.

Training Programme for Aerobic Training

The experimental group completed a six-week aerobic training routine, consisting of three sessions each week that lasted between 60 and 90 minutes each. With the assistance of specialists in the field of sports training, an investigator gave the subjects an exercise programme. The workout included a 10-minute warm-up, a 40- to 70-minute aerobic training, and a 10-minute cool-down period. Every training session was conducted at the necessary level of intensity. The level of training intensity was steadily raised after each week.

Result and Findings

TABLE I
Means and Dependent 'T'-Test For the Pre and Post Tests on Cardio Respiratory Endurance and Muscular Endurance of Experimental and Control Groups

Criterion Variables	Mean	Experimental Group	Control Group
Cardio Respiratory Endurance	Pre test	1462.51	1449.72
	Post test	1637.76	1492.33
	't'-test	11.52*	1.05
Muscular Endurance	Pre test	34.29	34.15
	Post test	39.51	34.68
	't'-test	8.29*	0.85

*Significant at .05 level. (Table value required for significance at .05 level for 't'-test with df 11 is 2.20)

From the table I the dependent-'t'-test values of cardio respiratory endurance and muscular endurance between the pre and post-tests means of experimental groups were greater than the table value 2.20 with df 11 at 0.05 level of confidence, it was concluded that the experimental group had significant improvement in the cardio respiratory endurance and muscular endurance between while compared to control group.

A. Computation of Analysis of Covariance

The descriptive measures and the results of analysis of covariance on the criterion measures were given in the following tables.

TABLE – II
MEANS AND DEPENDENT 'T'-TEST FOR THE PRE AND POST TESTS ON CARDIO RESPIRATORY ENDURANCE AND MUSCULAR ENDURANCE OF EXPERIMENTAL AND CONTROL GROUPS

	Experimental Group	Control Group	Source of Variance	Sum of Squares	Df	Mean Square	F-ratio
Cardio Respiratory Endurance (Adjusted Post Mean)	1672.19	1502.33	BG	304.40	1	304.40	25.43*
			WG	251.37	21	11.97	

Muscular Endurance (Adjusted Post Mean)	40.68	34.82	BG	21.82	1	21.82	16.28*
			WG	28.14	21	1.34	

* Significant at 0.05 level. Table value for df 1, 21 was 4.32.

The above table indicates the adjusted mean value on cardio respiratory endurance and muscular endurance of experimental training group and control group were 10.71 & 1672.19 & 1502.33 and 40.68 & 34.82 respectively. The obtained F-ratio of 25.43 and 16.28 for adjusted mean was greater than the table value 4.32 for the degrees of freedom 1 and 21 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among experimental training group and control group on cardio respiratory endurance and muscular endurance.

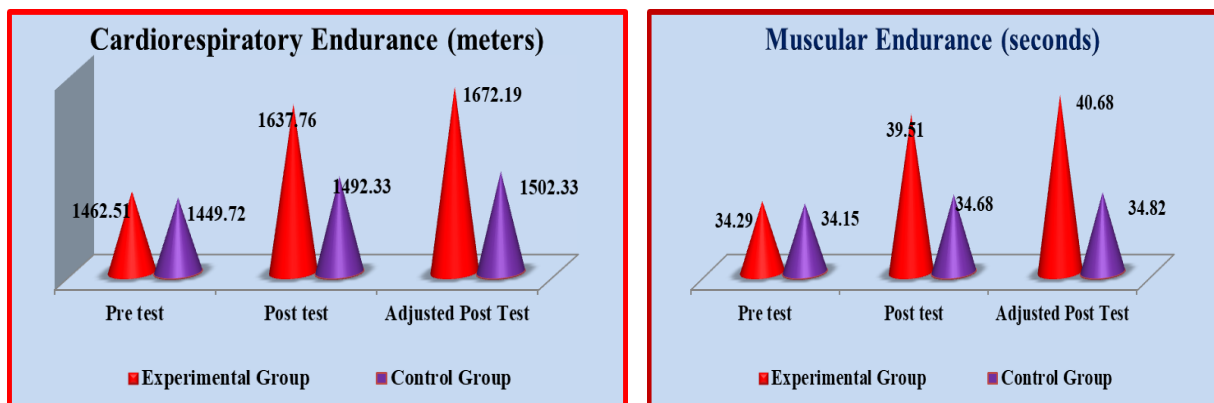


Fig. 1: Pre-test, post-test and adjusted post-test mean values of experimental group and control group on cardio respiratory endurance and muscular endurance.

Discussion on Findings

According to the study's findings, the selected dependent variables such as cardio respiratory endurance and muscular endurance that were chosen among female athletes significantly improved in the experimental group, which was the aerobic training programme group. None of the selected variables had significantly changed in the control group. It demonstrates that, as compared to the control group among female athletes, the aerobic training plan had documented substantial level differences in cardio respiratory endurance and muscular endurance. According to Mallanna, N. B (2023)- Aerobics is a form of physical exercise that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness (flexibility, muscular strength and cardio – vascular fitness). Liu, A. (2023) in his study stated that the Aerobic training positively impacted overall physical quality, including elevation of fitness indices and cardiopulmonary endurance in college students. 5. Perrotta, A. S., Correa, C. J., Khan, A. D., Day, B. D., Warburton, D. E. R., & Yasinski, J. Y. (2023) stated in his study that the Cardiovascular function can support practitioners in better understanding sport performance attributes in female soccer players. Jakeiso, A. (2017) obtained from his study indicated that

there were significant improvements within 12 minutes run. However, in the case of steps test, a test result was decreased because of improvement in the performance

Conclusions

1. There was significant improvement on cardio respiratory endurance due to the impact of aerobic training programme among female athletes.
2. There was significant improvement on muscular endurance due to the impact of aerobic training programme among female athletes.
3. There was significant difference exists between experimental and control groups on cardio respiratory endurance and muscular endurance.
4. However, the control group had not shown any significant improvement on any of the selected variables.

Reference

1. Mallanna, N. B., & Director, P. E. (2023). Impact of eight weeks aerobic exercise training on sports performance among volleyball players of Kalaburagi district.
2. Saini, R. (2023). Effect of ten weeks circuit training and aerobic exercises on endurance of gymnasts. *International journal of research pedagogy and technology in education and movement sciences*, 12(02), 101-105.
3. Liu, A. (2023). Effect of aerobic training on physical fitness and cardiopulmonary resistance of university students. *Revista Brasileira de Medicina do Esporte*, 29, e2023_0021.
4. Heril, A. H., Ambardini, R. L., & Fitrah, M. (2023). Comparison of cardiovascular endurance in softball and basketball athletes in Bone district viewed from blood group.
5. Perrotta, A. S., Correa, C. J., Khan, A. D., Day, B. D., Warburton, D. E. R., & Yasinski, J. Y. (2023). Resting cardiovascular function and athletic performance in female soccer players. *Science & Sports*.
6. Papaevangelou, E., Papadopoulou, Z., Michailidis, Y., Mandroukas, A., Nikolaidis, P. T., Margaritelis, N. V., & Metaxas, T. (2023). Changes in Cardiorespiratory Fitness during a Season in Elite Female Soccer, Basketball, and Handball Players. *Applied Sciences*, 13(17), 9593.
7. Jakeiso, A. (2017). Effect of Selected Aerobic Exercises on the Improvement of Cardiovascular Endurance for Performance of Athlete: The Case of Fonko Preparatory School, Fonko, Hadiya Zone, Snnpr, Ethiopia (Doctoral dissertation, Addis Ababa University).
8. Punithavathi, S. (2010). Effect of selected aerobic exercises and yogic practices on physical, physiological and biochemical variables (Doctoral dissertation, Department of Physical Education and Sports, Pondicherry University).

9. Bahram, M. E., Pourvagar, M. J., Mojtahedi, H., & Movahadi, A. R. (2014). The effect of 8 weeks of aerobic exercise training on some of cardiovascular endurance and body composition characteristics of male high school students in Kashan. *Journal of Practical Studies of Biosciences in Sport*, 2(4), 90-100.
10. Arfanda, P. E., Wiriawan, O., Setijono, H., Kusnanik, N. W., Muhammad, H. N., Puspodari, P., ... & Arimbi, A. (2022). The Effect of Low-Impact Aerobic Dance Exercise Video on Cardiovascular Endurance, Flexibility, and Concentration in Females with Sedentary Lifestyle. *Physical Education Theory and Methodology*, 22(3), 303-308.
11. Kumar, S. (2016). The effect of Zumba & aerobics exercise training on physical fitness variables-A study. *International Journal of Physical Education, Sports and Health*, 3(5), 275-276.