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Effect of Anaerobic Training on Maximum Power and Fatigue Index among Female Athletes

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Abstract

The goal was to analyze the effect of anaerobic training on a range of maximum power and fatigue index variables among female athletes aged 16–18, 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 16 to 18 years. With 12 participants per cluster, the sample consisted of Cluster 'I', receiving Anaerobic training, and Cluster 'II', serving as the control cluster. Cluster '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 cluster (Cluster 'II'). Maximum power and fatigue index were measured using the running based anaerobic sprint 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' test and ANCOVA respectively. Examining the results, it became clear that the anaerobic training program had a substantial effect on improving maximum power and fatigue index within the experimental population. Control cluster members demonstrated neither notable advancements nor statistically meaningful differences across the key performance indicators (Maximum power and Fatigue Index).

Keywords: Anaerobic Training, Maximum power, Fatigue Index, Running Based Anaerobic Sprint

Introduction

Anaerobic exercise training has been studied by many scholars as an effective way to enhance strength and speed. Patel has proved through experiments that anaerobic exercise training has a significant effect on the prevention of cardiovascular disease, and put forward some method suggestions on anaerobic exercise training [1].

Anaerobic workout indicates the use of an explosive power and a load that exceeds anaerobic threshold, and is a physical activity type that presents itself with fatigue. Anaerobic activity cannot be sustained for long periods of time. Because, skeletal muscles are operating way above the steady-rate oxygen metabolism and through anaerobic metabolism. This circumstance increases lactate levels in muscle and blood. The buffering of accumulated lactate increases the CO2 release from the lungs. Fatigue presents itself in muscles due to decrease of pH (pH=6.4) [2]. Anaerobic capacity is defined as the maximal amount of adenosine triphosphate (ATP) re-synthesized via anaerobic metabolism (by the whole organism) during a specific mode of short-duration maximal anaerobic exercise [3].

Running-based Anaerobic Sprint Test (RAST) measurements were taken by Newtest Powertimer (Finland). Each subject warmed up for a period of five minutes which was followed by a five-minute passive recovery. The athlete completes six 35-metre runs at maximum pace with 10 seconds allowed between each sprint for turnaround. Maximum

power output (PP), average power output (AP), minimum power output (MP), and fatigue indexes (FI) were measured in this test [4].

Purpose of the Study

The intention of the study was to explore how anaerobic training programme effect the selected maximum power and fatigue index 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 anaerobic training programme cluster and twelve to the control cluster. The subjects ranged in age from 16 to 19 years. The chosen subjects were separated into two equal clusters at random; Cluster I received an anaerobic training course, while Cluster II served as the control cluster. Except for their regular activity, the control cluster 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 maximum power and fatigue Index using the running based anaerobic sprint test respectively. The experimental clusters participated in a six-week training regimen that included three days per week of anaerobic training. The dependent-'t' test and Analysis of Covariance (ANCOVA) test for certain variables were used to statistically compare the results of the pre- and post-test.

Training Programme for Anaerobic Training

The experimental cluster completed a six-week anaerobic 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 gave the subjects an anaerobic training programme. The workout included a 10-minute warm-up, a 40- to 70-minute anaerobic 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 Maximum Power and Fatigue Index of Experimental and Control Clusters

Criterion Variables	Mean	Experimental Cluster	Control Cluster
Maximum Power	Pre test	304.22	301.64
	Post test	356.85	307.29
	't'-test	**11.07***	1.17
Fatigue Index	Pre test	246.84	241.06
	Post test	271.33	246.33
	't'-test	**14.07***	1.22

***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 maximum power and fatigue index between the pre and post-tests means of experimental clusters were greater than the table value 2.20 with df 11 at 0.05 level of confidence, it was concluded that the experimental cluster had significant improvement in the maximum power and fatigue index between while compared to control cluster.

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 MAXIMUM POWER AND FATIGUE INDEX OF EXPERIMENTAL AND CONTROL CLUSTERS

	Experimental Cluster	Control Cluster	Source of Variance	Sum of Squares	Df	Mean Square	F-ratio
Maximum Power (Adjusted Post Mean)	361.04	309.51	BG	312.89	1	312.89	**51.89***
			WG	126.63	21	6.03	
Fatigue Index (Adjusted Post Mean)	279.56	245.84	BG	339.18	1	339.18	**23.44***
			WG	303.87	21	14.47	

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

The above table indicates the adjusted mean value on maximum power and fatigue index of experimental training cluster and control cluster were 361.04 & 309.51 and 279.56 & 245.84 respectively. The obtained F-ratio of 51.89 and 23.44 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 cluster and control cluster on maximum power and fatigue index.

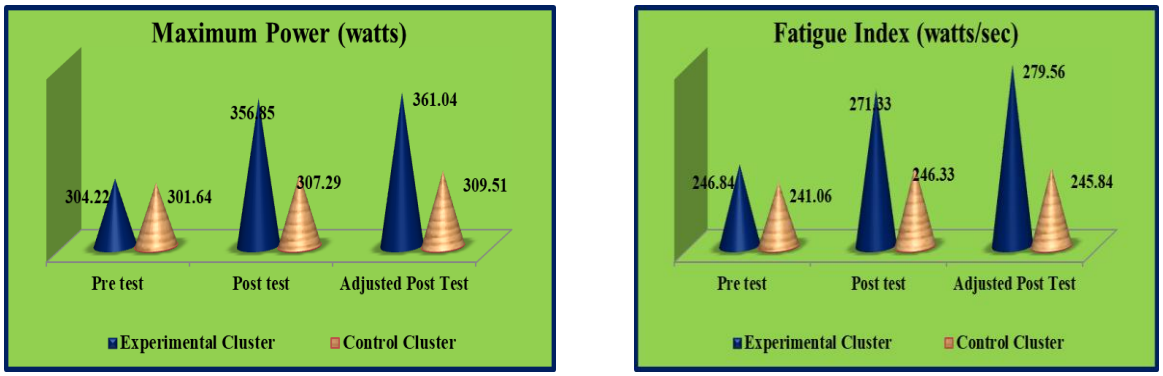

Fig. 1: Pre-test, post-test and adjusted post-test mean values of experimental cluster and control cluster on maximum power and fatigue index.

Discussion on Findings

According to the study's findings, the selected dependent variables such as maximum power and fatigue index that were chosen among female athletes significantly improved in the experimental cluster, which was the anaerobic training programme cluster. None of the selected variables had significantly changed in the control cluster. It demonstrates that, as compared to the control cluster among female athletes, the anaerobic training plan had documented substantial level differences in maximum power and fatigue index. Chittibabu, B. (2014) in his study concluded that high intensity interval training for eight weeks resulted in improvement of anaerobic capacity and fatigue index of male handball players. Arazi, H., Keihaniyan, A., EatemadyBoroujeni, A., Oftade, A., Takhsha, S., Asadi, A., & Ramirez-Campillo, R. (2017) in their study stated that both heart rate-based and speed-based HIIT

induced meaningful improvements in power, VO2max, and fatigue index in female soccer players, although the speed-based HIIT cluster achieved greater gains in power and fatigue index compared to the heart rate-based cluster. Zagatto, A. M., Beck, W. R., & Gobatto, C. A. (2009) stated in their study that this procedure is reliable and valid, and can be used to measure running anaerobic power and predict short-distance performances.

Conclusions

1. There was significant improvement on maximum power due to the effect of anaerobic training programme among female athletes.
2. There was significant improvement on fatigue index due to the effect of anaerobic training programme among female athletes
3. There was significant difference exists between experimental and control clusters on maximum power and fatigue index
4. However, the control cluster had not shown any significant improvement on any of the selected variables.

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