

## EFFECT OF CYCLING AND SWIMMING ON CARDIO-RESPIRATORY ENDURANCE AMONG LONG DISTANCE RUNNERS

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**ABSTRACT** The purpose of the study was to find out whether there would be any significant improvement on cardiorespiratory endurance as a result of cycling and swimming training among long distance runners. To achieve the purpose of the study, 45 long distance runners from different colleges and SDAT trainees were selected at random within Chennai. The selected subjects were in the age group of 18 to 22 years. The subjects were randomly divided in to three groups of 15 subjects in each group. Group one acted as experimental group I and group two acted as experimental group -II and group three acted as control group. Group three underwent routine without any special treatment and group I underwent cycling exercises and group II underwent swimming exercises for six weeks. Pre test scores were collected on selected criterion variable cardiorespiratory endurance through Coopers' 12 minutes run/walk test. After six weeks of experimental treatments to the experimental groups, post test score on cardiorespiratory endurance was obtained. The differences between the initial and final score were the effect of respective experimental treatments. To test the statistical significance, the scores were subjected to ANCOVA and Scheffes' post hoc test. The results of the study proved that cycling and swimming exercises significantly improved cardiorespiratory endurance of the long distance runners.

**Key words:** Cycling, Swimming, Cardiorespiratory Endurance

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### INTRODUCTION

The aim of athletic training is to increase skill, endurance and strength. In general, it is necessary to develop; the individuals' resources until he can undertake tasks originally beyond his capabilities [1-2]. Attention to such factors as length of stride, speed of movements, load and posture can lead to more economical use of the body, as can training by repetition, or the use of auxiliary movements, strength and endurance are developed only by exercises at or close to the limit of performance [3-4]. Recent evidence shows that the difference between the trained and

untrained man is that the former is able to increase his heart output and transport oxygen to his muscles at a higher rate than the latter [5]. Training the series of physical activities executed for the purpose of increasing efficiency in running and racing should be continued throughout in athlete's lifetime. The specific physical fitness test that permits an athlete to run a given distance in a faster time acquired most efficiently through use of carefully planned training which is tailored to the length and anticipated speed of the racing distance. Swimming is primarily an aerobic exercise due to the long exercise time, requiring a constant oxygen supply to the muscles, except for short sprints where the muscles work anaerobically. As with most aerobic exercise it is believed to reduce the harmful effects of stress.

In recent years, sports persons began to use exercise bicycle as one of their routine fitness exercises to keep their fitness levels and improve strength,  $VO_2$  max and other cardiovascular endurance. These upright bicycles and indoor cycling bicycles which are bicycles built for riding in indoor cycling classes. Some models feature handlebars that are connected to the pedals so that the upper body can be exercised along with the lower body. Most exercise bicycles provide a mechanism for applying resistance to the pedals which increases the intensity of the exercise. Resistance mechanisms include magnets, fans and friction mechanisms. Some models allow the user to pedal backwards to exercise antagonist muscles which are not exercised in forward pedaling. Many bicycles now include attached television screens.

Long distance runners require long term endurance to excel in long distance running. There are different training methods being following by these athletes to improve their long term endurance. However, the effect of swimming and cycling in improving the long term endurance of long distance runners were not researched fully. Hence, the investigator selected this research topic. To test how far the long distance runners improved their, cardio respiratory endurance due to the influence of cycling and swimming training.

## **STATEMENT OF THE PROBLEM**

The purpose of the study was to find out the effect of cycling and swimming on cardiorespiratory endurance among long distance runners.

## **HYPOTHESIS**

It was hypothesized that there would be significant improvement on cardiorespiratory endurance due to cycling and swimming exercises.

## **DEPENDENT VARIABLES**

Cardiorespiratory Endurance

## **INDEPENDENT VARIABLES**

1. Cycling
2. Swimming

## **METHODOLOGY**

To achieve the purpose of the study, 45 long distance runners from different colleges and SDAT trainees were selected at random within Chennai. The selected subjects were in the age group of 18 to 22 years. The subjects were randomly divided in to three groups of 15 subjects in each group. Group one acted as experimental group I and group two acted as experimental group -II and group- three acted as control group. Group three underwent routine without any special treatment and group I underwent cycling exercises and group II underwent swimming exercises for six weeks.

Random group pre and post-test research design was followed in this study. Pre test scores were collected on cardiorespiratory endurance using 12 minutes Coopers run/walk test. After six weeks experimental treatments to the experimental groups, scores on cardiorespiratory endurance was obtained. The differences between the initial and final scores were the effect of respective experimental treatments. To test the statistical significance, the scores were subjected to ANCOVA and Scheffes' post hoc test.

## **RESULTS AND DISCUSSION**

The detailed procedure of analysis of data and interpretation are given below.

### **RESULTS ON CARDIORESPIRATORY ENDURANCE**

The statistical analysis comparing the initial and final means of, Cardiorespiratory Endurance due to cycling and swimming exercises among long distance runner is presented in Table I.

**Table I**  
**COMPUTATION OF ANALYSIS OF COVARIANCE OF CARDIORESPIRATORY ENDURANCE**

	Cycling Group	Swimming Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F'
Pre Test Mean	1833.33	1803.00	1856.67	Between	21723.33	2	10861.67	0.67
				Within	678307	42	16150.16	
Post Test Mean	2006.00	2011.00	1871.67	Between	187421	2	93710.56	6.02*
				Within	653303	42	15554.84	
Adjusted Post Test Mean	2005.63	2015.45	1867.59	Between	200389	2	100194	6.46*
				Within	636175	41	15516.46	
Mean Diff	172.67	208.00	15.00					

Table F-ratio at 0.05 level of confidence for 2 and 42 (df) =3.22 and 41 (df) =3.23.

\*Significant

As shown in Table I, the obtained pre-test means on Cardiorespiratory Endurance on cycling exercises was 1833.33, swimming exercises was 1803.00 and control group was 1856.67. The obtained pre-test F value was 0.67 and the required table F value was 3.22, which proved that there was no significant difference among initial scores of the subjects.

The obtained post-test means on Cardiorespiratory Endurance on cycling exercises was 2006.00, swimming exercises was 2011.00 was and control group was 1871.67. The obtained post-test F value was 6.02 and the required table F value was 3.22, which proved that there was significant difference among post test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F value 6.46 was greater than the required value of 3.21 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table II.

**Table II**

**Scheffe's Confidence Interval Test Scores on Cardiorespiratory Endurance**

MEANS				Required C I
Cycling Group	Swimming Group	Control Group	Mean Difference	
2005.63	2015.45		-9.82	117.73
2005.63		1867.59	138.04*	117.73
	2015.45	1867.59	147.86*	117.73

\* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between cycling group and control group (MD: 138.04). There was significant difference between swimming group and control group (MD: 147.86). There was no significant difference between treatment groups, namely, cycling group and swimming group (MD: 9.82).

## **DISCUSSIONS ON FINDINGS**

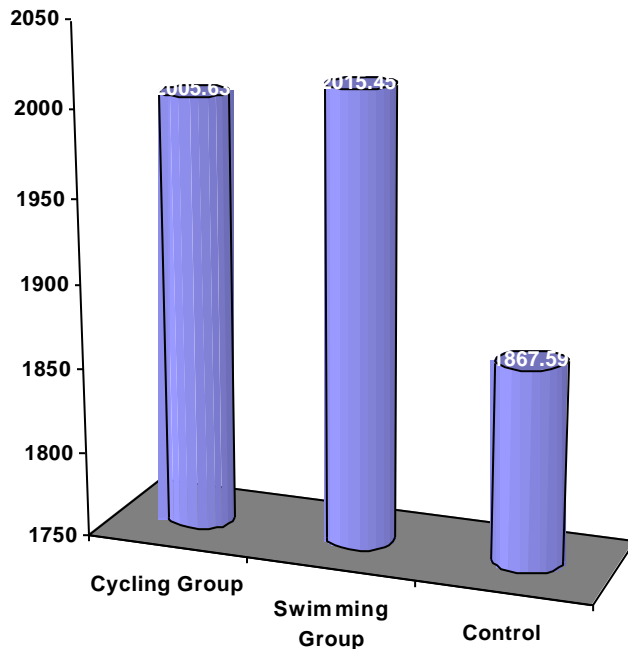
The effect of cycling and swimming Cardiorespiratory Endurance is presented in Table I. The analysis of covariance proved that there was significant difference between the experimental groups and control group as the obtained F value 6.46 was greater than the required table F value to be significant at 0.05 level.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table II proved that there was significant difference between cycling group and control group (MD: 138.04) and swimming group and control group (MD: 147.86). Comparing between the treatment groups, it was found that there was no significant difference between cycling group was better than swimming group in improving Cardiorespiratory Endurance of long distance runners..

Thus, it was found that cycling and swimming exercises were significantly better than control group in altering Cardiorespiratory Endurance of the long distance runners.

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I.

**Figure I**  
**BAR DIAGRAM ON ORDERED ADJUSTED MEANS ON CARDIORESPIRATORY**  
**ENDURANCE**



**DISCUSSIONS ON HYPOTHESES**

As stated in hypothesis that there would be significant improvement on cardiorespiratory endurance due to cycling and swimming exercises, it was accepted at 0.05 level of significance

**CONCLUSIONS**

Within the limitations and delimitations of the study, the following conclusions were drawn

It was concluded that Cycling and Swimming exercises significantly improved cardiovascular endurance of the long distance runners. However, it was also found that there was no significant difference between cycling and swimming in altering cardiovascular endurance.

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