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Comparative Effects of Calisthenic Exercises on Cardio- Respiratory Endurance Among Racket Game Players

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Abstract - The purpose of conducting this study is to find out the comparative effect of calisthenics exercises on the cardio-respiratory endurance among various racket sports players. The study was conducted by randomly selecting 30 male racket game players from sports specialization of badminton, table tennis and tennis with their age ranging between of 18 to 22 yearsfrom Lakshmibai National Institute of Physical Education, North East Regional Centre, Guwahati, Assam. The total subjects (N=30) were further divided into two groups with 15 subjects experimental & control group each. The experimental group was given 6-week calisthenic training program thrice a week for 45 minutes a session whereas the control group was not given any calisthenic training.Pre-test and post test was conducted for all 30 subjects selected prior to and after the implementation of the calisthenics training, The data wasanalysed using mean and SD as descriptive statistics. To reveal the result on comparative effect of the training two-way ANOVA was employed and tested at 0.05 level of significance. The results revealed that in the variable of cardio- respiratory endurance there was no significant differences seen in the test scores, whereas, significant differences were seen between the experimental and control group.

Keywords - ***Calisthenic Exercises, Physical Fitness Component, Cardio- Respiratory Endurance, Two-Way ANOVA, Test Scores, Experimental & Control Group.***

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INTRODUCTION

We all understand racket sports by including the popular sports like badminton, tennis, table tennis, squash rackets,etc. into the list. The games which are particularly played with a racket, the equipment consisting of a frame with a handle and an open hoop across like a web of cord is tightly stretched and tied. The term 'racket' is derived from a French word ' Rachasser' meaning to hit the ball back (Wood, 2015).

Racket sports offer something other fitness sports do not lateral movement.Most of our lives are spent moving forward, and that includes our exercise," says Daryanani. "Racket games involves movement both back and forth as well as side to side. The movements exhibited playing racket games displays frequent shifting of weight, body balance, body posture and jumping- landing of various kinds. Racket sports also helps in developing the mental faculties of prompt planning and execution, quick decision-making skills and proper reaction and anticipatory skills as well.

Physical fitness in turn gives rise to sound mental makeup also. Physical fitness is an inseparable

component of total fitness for effective living. Fitness involves inter relationship between intellectual and emotional as well as physical factors. Higher level of physical fitness assist in performing efficiently with more speed as well as recover much faster from tiredness (Bucher and Goldman,1969).

Cardio-respiratory endurance is a component of physical fitness which helps us understand and measure the efficient functioning of heart, lungs and muscles by assisting the body to work and remain active for a longer period of time. Exercisers can improve cardio-respiratory endurance by participating in a program of regular aerobic exercise. Improved cardio-respiratory fitness leads in providingmany positive health benefits (Panwar, 2018).

The present work was planned to explore the comparative effects of calisthenic exercises on cardio - respiratory endurance among the major racket games players.

METHODOLOGY

Selection of Subjects

The study was conducted by randomly selecting 30 male racket game players from sports specialization of badminton, table tennis and tennis with their age ranging between of 18 to 22 yearsfrom Lakshmibai National Institute of Physical Education, North East Regional Centre, Guwahati, Assam. The total subjects (N=30) were further divided into two groups into experimental (N=15) & control group (N=15) in each group5. The experimental group was given 6-week calisthenic training program thrice a week for 45 minutes a session whereas the control group was not given any calisthenic training.

Selection of Variables

With the help of the literature reviewed and researcher's understanding, consultation with experts and also to fulfil the purpose of the present study the fitness variable of Cardio – respiratory endurance was selected as the variable for this study.

Criterion Measures

The description of the test items for testing and collecting the pre and post data on the selected physical fitness variables of Cardio- respiratory endurance is as follows:

- **Cardio-respiratory endurance – Nine-minute run**

Distance runs are included in the battery as measures of cardio-respiratory function. The objective of the test is to measure the maximal functional capacity and endurance of the cardio-respiratory system.The 400 meters track of LNIPE, Guwahati was used to administer the test. In the track, every 10 meters was marked. Thirty subjects were tested at a time and a lap scorer was allotted to each subject. On the signal the subjects started running. They jogged and ran for nine minute and at the end of nine minute, they stopped where they were in the track. The distance completed by each subject was recorded with the help of the lap scorers.

Collection of Data

Prior to the administration of the test, the researchercommunicated about the purpose of the researchto the subjects of badminton, table tennis and tennis sports specialization groups. After that the subjects were randomly assigned to two groups i.e., experimental and control (N=15 each). A pretest was conducted on the subjects of both the designated groups for collecting data and testing the fitness variables of cardio- respiratory endurance.Pre and post test was conducted on subjects of both the groups before and after 6 weeks calisthenic exercises training for 3 days a week with a session duration of 45 minutes.

Statistical Procedures

The data collected was analysed with descriptive statistics such as mean and standard deviation, and comparative statistics such as two-way ANOVA was employed and tested at 0.05 level of significance.

RESULTS

To start with, the result of the total sample (N = 30) divided into experimental (N=15) and control group (N=15) investigated on the basis of pre-test and post-test scores, their descriptive statistics and the univariate analysis on their physical fitness variable of cardio-respiratory endurance has been presented in the following tables.

Table 1: Descriptive Statistics of Cardio-Respiratory Endurance in Pretest and Posttest of the Experimental and Control Group

Test	Treatment groups	Mean	Std. Deviation	N
pretest	experimental	1918.88	168.51	15
	control	1779.46	207.64	15
	Total	1849.17	198.87	30
posttest	experimental	2000.04	120.08	15
	control	1826.36	229.31	15
	Total	1913.20	200.37	30
Total	experimental	1959.46	149.57	30
	control	1802.91	216.26	30
	Total	1881.18	200.54	60

Descriptive statistics of cardio-respiratory endurance on table 1 shows that the total mean score of cardio-respiratory endurance was 1881.18 ± 200.54. The total mean and SD of the pretest was 1849.17 ± 198.87. In pre test of experimental and control group, the mean and SD of cardio-respiratory endurance was 1918.88 ± 168.51 & 1779.46 ± 207.64 respectively.

The total mean score and SD of cardio-respiratory endurance in post test was 1913.20 ± 200.37 where, the mean and SD of post test of experimental group was 2000.04 ± 120.08 and of control group was 1826.36 ± 229.31. The mean scores of cardio-respiratory endurance for both the groups and tests are illustrated graphically in figure 1.

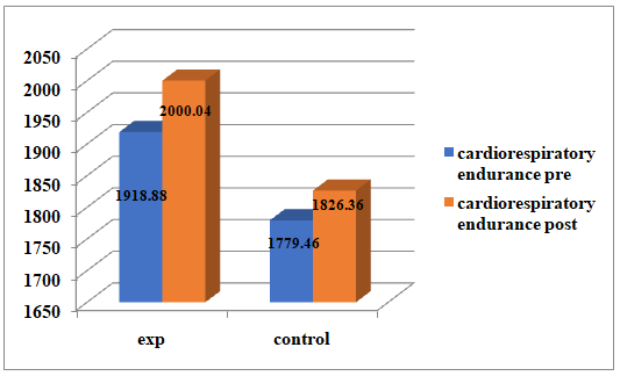

Figure 1: Means scores of Tests and Treatments in theVariable of Cardio-Respiratory Endurance

Table 2: Univariate analysis of Pretest and Posttest in the Variable of Cardio-Respiratory Endurance

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	61503.376	1	61503.376	1.776	.188
Error	1939278.545	56	34629.974		

*Significant at .05 level F.05 (1, 56) = 4.01

The 'f' value tested for significance for the present findings was at 0.05 level with 1,56 df. The required value is 4.01.Table 2, shows that the obtained 'f' value of pretest and posttest scores in cardio-respiratory endurance was 1.776 which was less than the tabulated value. This indicated there was no significant difference between the pre and post tests in the factor of cardio-respiratory endurance. As there was no significant differences seen further calculations are not done for the tests.

Table 3: Univariate Analysis of Experimental and Control Groups in the Variable of Cardio Respiratory Endurance

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	367601.317	1	367601.317	10.615*	.002
Error	1939278.545	56	34629.974		

*Significant at .05 level F.05 (1, 56) = 4.01

The 'f' value tested for significance for the present findings was at 0.05 level with 1,56 df. The required value is 4.01.Table 3, shows that the obtained 'f' value of experimental and control group in cardio-respratory endurance was 10.615, greater than the tabulated value. This indicated that there was significant difference between the groups in the factor of cardio-respiratory endurance.As there was significant difference, pair-wise comparison was done that has been presented in table 4.

Table 4: Pairwise Comparison of Cardio Respiratory Endurance between the Experimental and Control Groups of the Tests

(I) Treatment groups	(J) Treatment groups	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
experimental	control	156.54	48.049	.002	60.293	252.799
Based on estimated marginal means						
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).						

Pairwise comparison of cardio-respiratory endurance in the experimental and control group are shown in table 4, indicated statistically significant difference between experimental and control group endurance (MD = 156.54; p = .002).

Table 5: Interaction of Test and Treatment Groups in the Variable of Cardio Respiratory Endurance

Test	Treatment groups	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
pretest	experimental	1918.880	48.049	1822.627	2015.133
	control	1779.465	48.049	1683.212	1875.718
posttest	experimental	2000.044	48.049	1903.791	2096.297
	control	1826.367	48.049	1730.114	1922.620

Table 5, shows the interaction of test and treatment groups where in pretest the experimental group in cardio respiratory endurance (Mean = 1918.880) and control group (Mean = 1779.465) revealed that the mean score of experimental group was higher than the control group. Whereas, in post test the mean score of experimental group (Mean = 2000.044) and the control group (Mean = 1826.367) was greater than the control group. In overall context of interaction among the tests and treatment groups in the dependent variable of cardio respiratory endurance it can be said that there was no improvement in pre & post test among both the groups.

DISCUSSION

It was hypothesized that there would be significant effect of six weeks calisthenic exercises on the physical fitness component of cardio-respiratory endurance of the racket game players. From the analysis, it can be said that the hypothesis of the study stands partially accepted, as because in the variable of cardio-respiratory endurance there was no significant differences seen in the test scores, whereas, significant differences was seen between the experimental and control.

The result obtained from this present study is similar to the study conducted by Gray (1988) conducted a study on the comparison of continuous and interval running on the development of cardio-respiratory endurance. Twenty-eight untrained college males were the subjects of this study. Results of this study showed that the continuous and interval training programmes employed were capable of significant improvement on cardio-respiratory endurance.

The results of this study is in harmoniousness to the research of Barik and Banerjee (1990) studied the effect of six week conditioning programme on some performance variables among tribal students by random sampling where 17 tribal school boys of 14-16 years were selected. All the subjects had undergone a six-week conditioning programme. The standard fitness test comprised of 50 meters dash for speed, vertical jump for strength, squat thrust for agility and Cooper's 12-minute run and walk for endurance, T' ratio was computed and analysis of data revealed that speed, endurance and strength increased significantly after training.

Karesn and Young (1980) tested 213 boys and girls of tine Kern High School in the 1.5 mile run for aerobic endurance, the 440 Yard run for anaerobic endurance, the sit-up and push-up for strength and the sit and reach test for flexibility. Comparisons of means within treatments were analyzed by a correlated t- test. Comparisons between treatments were interpreted by analysis of variance. No significant difference was found in any of the five tests. The experimental group significantly increased in strength and flexibility.

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