

Effect of aerobic and circuit training on explosive strength and cardio-respiratory endurance of football players

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■ **ABSTRACT**

The main aim of the study was to find out the comparative effects of aerobic and circuit training on explosive strength and cardio-respiratory endurance of football players. The study was conducted on thirty (30) male football players randomly selected from Dr. Babasaheb Nandurkar College of Physical Education, Yavatmal as subjects. The environmental conditions, daily routine work of the subjects were same. Ages of the subjects were ranging from 18 to 28 years. All the subjects are divided into three groups of 10 subjects in each group. One was treated as experimental group-I (Aerobic training group) and second one was experimental group-II (Circuit training group) and third one was control group-III. Attempt was made to maintain the homogeneity in grouping as far as possible. The aerobic and circuit training groups underwent their respective trainings for three days in a week for the period of nine weeks. A common weekly off day *i.e.*, Sunday was allowed them for rest. The intensity of the exercises was given according to their physical efficiency. The control group did not practice any specific training during the period of nine weeks apart from the physical education programme. The following variables namely, leg explosive strength and cardio-respiratory endurance were selected as criterion variables. The data were collected for all subjects on variables such as leg explosive strength and cardio-respiratory endurance by using vertical jump and 12 minute run and walk test. Data for the selected variables were taken at the beginning (pre- test) and the end of the experiment period (post- test). To find out the significance difference the ANCOVA was used. The level of significance chosen was 0 .05. The result indicated that aerobic and circuit training showed significant improvement on leg explosive strength and cardio-respiratory endurance of football players.

■ **Key Words** : Aerobic training, Circuit training, Football

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Football is a team sports which require a high standard of preparation in order to complete ninety minutes of competitive play and to achieve success. Football is a strenuous sport that places emphasis on running, sprinting, throws in, blocking, kicking, and dribbling. Training denotes the process of preparation for some task like strength, endurance, speed etc. For top level performance, it is very important to the football players.

Circuit training is a form of conditioning combining resistance training and high intensity aerobics. It is designed

to be easy to follow and target strength building as well as muscular endurance. Traditionally, the time between exercises in circuit training is short, often with rapid movement to the next exercise. A well rounded programme of physical activity includes strength training, to improve bone, joint function, muscle, tendon and ligament strength, as well as improve our heart and lungs fitness (Baechle, 1994).

Aerobic exercises refer to exercise that involves oxygen consumption by the body. Aerobic means “with

oxygen” and refer to the use of oxygen in the body’s metabolic or energy generating process. Many types of exercises are aerobic and are performed at moderate levels of intensity for extend period of time. Aerobic is a system of exercising by means of rhythmic activities. Regular performed aerobic exercises, such as dancing, rope skipping, walking, jogging, cycling, rowing, skating and swimming etc. have positive impact on physical fitness variables.

■ METHODOLOGY

The study was conducted on thirty (30) male footballers randomly selected from Dr. Babasaheb Nandurkar College of Physical Education, Yavatmal as subjects. The environmental conditions, daily routine work of the subjects were same. Ages of the subjects were ranging from 18 to 28 years. All the subjects were divided into three groups of 10 subjects in each group. One was treated as experimental group-I (aerobic exercises group) and second one was experimental group-II (circuit training group) and third one was control group-III. The aerobic and circuit training groups underwent their respective trainings for three days in a week for the period of nine weeks. A common weekly off day *i.e.*, Sunday was allowed them for rest. The intensity of the exercises was given according to their physical efficiency. The control group did not practice any specific training during the period of nine weeks apart from the physical education programme. The following variables namely, leg explosive strength and cardio-respiratory endurance were selected as criterion variables. The data were collected for all subjects on variables such as leg explosive strength and cardio-respiratory endurance by using vertical jump and 12 minute run and walk test. Data for the selected variables were taken at the beginning (pre-test) and the end of the experiment period (post-test) (Fleck and Kraemer, 2004).

Statistical technique:

The obtained data were statistically analyzed by using ANCOVA to see any significant difference between the means of pre and post-test scores of the three groups on selected variables (Verma, 2000). Results have been presented in Tables 1 to 4.

■ OBSERVATIONS AND DISCUSSION

Within the limitation of the study, the following results were drawn:

Results of leg explosive strength:

Table 1 shows that the pre-test means of leg explosive strength were 6.33 for aerobic exercise group, 6.36 for circuit training group and 6.35 for control group. The obtained ‘F’ ratio 1.11 was less than the tabulated ‘F’ ratio 3.35 at 0.05 level for the 2 and 27 (df).

The post-test means of leg explosive strength were 9.12 for aerobic exercise group, 9.25 for circuit training group and 6.45 for control group. The obtained ‘F’ ratio 82.71 was greater than the tabulated ‘F’ ratio 3.35 at 0.05 level for the 2 and 27 (df).

The adjusted post-test means of leg explosive strength were 9.12 for aerobic exercise group, 9.24 for weight training group and 6.42 for control group. The obtained ‘F’ ratio 83.12 was greater than the tabulated ‘F’ ratio 3.37 at 0.05 level for the 2 and 26 (df). Hence, it was significant and scheffe’s post- hoc test was used.

Table 2 shows that the adjusted post-test means for aerobic exercise, circuit training and control groups were 9.12, 9.24 and 6.42, respectively. The mean differences between experimental group-I and experimental group-II (0.12), experimental group-I and control group (2.7), experimental group-II and control group (3.82) were greater

Table 1 : Analysis of covariance of pre-test, post- test and adjusted post- test of leg explosive strength among the two experimental and control group (scores in inches)

Test	E.G-I	E.G-II	C.G	S.V	S.S	df	M.S	F ratio
Pre test μ	6.33	6.36	6.35	B	0.02	2	0.01	1.11
SD	1.5	1.52	1.51	W	0.26	27	0.009	
Post test μ	9.12	9.25	6.45	B	1.34	2	0.67	82.71*
SD	1.8	1.89	1.56	W	0.22	27	0.0081	
Adjus.post test μ	9.12	9.24	6.42	B	1.33	2	0.665	83.12*
				W	0.21	26	0.0080	

* indicate significance of value at P=0.05, Table F- ratio at 0.05 level of confidence for 2, 27(df) and 2,26 (df) 3.35 and 3.37

Table 2: Adjusted mean differences of scheffe’s post hoc test of leg explosive strength

E.G-I	E.G-II	C.G	Mean differences	Confidence interval value
9.12	9.24	----	0.12*	0.12
9.12	-----	6.42	2.7*	0.12
	9.24	6.42	3.82*	0.12

Table 3 : Analysis of covariance of pre-test, post- test and adjusted post- test of cardio-respiratory endurance among the two experimental and control group (scores in yards)

Test	E.G-I	E.G-II	C.G	S.V	S.S	df	M.S	F ratio
Pre test μ	2365	2397	2372	B	252.00	2	125.0	0.004
SD	16.04	16.12	16.06	W	842740	27	31212.59	
Post test μ	2392	2419	2375	B	1678000	2	839000	46.02*
SD	16.11	16.15	16.06	W	492230	27	18230.74	
Adjus.post test μ	2391	2418	2375	B	1697806	2	848903	117.69*
				W	187523.2	26	7212.43	

* indicate significance of value at P=0.05, Table F- ratio at 0.05 level of confidence for 2, 27(df) and 2,26 (df) 3.35 and 3.37

Table 4 : Adjusted mean differences of scheffe's post hoc test of cardio-respiratory endurance

E.G-I	E.G-II	C.G	Mean differences	Confidence Interval value
2391	2418	----	27*	14
2391	-----	2375	16*	14
	2418	2375	43*	14

than the confidential interval value of 0.12. Hence, above comparisons were significant.

Result of cardio-respiratory endurance:

Table 3 shows that the pre-test means of cardio-respiratory endurance were 2365 for aerobic exercise group, 2397 for circuit training group and 2372 for control group. The obtained 'F' ratio 0.004 was less than the tabulated 'F' ratio 3.35 at 0.05 level for the 2 and 27 (df).

The post-test means of cardio-respiratory endurance were 2392 for aerobic exercise group, 2419 for circuit training group and 2375 for control group. The obtained 'F' ratio 46.02 was greater than the tabulated 'F' ratio 3.35 at 0.05 level for the 2 and 27 (df).

The adjusted post-test means of cardio-respiratory endurance were 2391 for aerobic exercise group, 2418 for weight training group and 2375 for control group. The obtained 'F' ratio 117.69 was greater than the tabulated 'F' ratio 3.37 at 0.05 level for the 2 and 26 (df). Hence, it was significant and Scheffe's post hoc test was used.

Table 4 shows that the adjusted post-test means for aerobic exercise, circuit training and control groups were 2319, 2418 and 2375, respectively. The mean differences between experimental group-1 and experimental group-

II(27), experimental group-I and control group (16), experimental group-II and control group (43) were greater than the confidential interval value of 14. Hence, above comparisons were significant.

Conclusion:

On the basis of the results and findings, it was concluded that the nine weeks of aerobic and circuit trainings showed significant improvement on leg explosive strength and cardio-respiratory endurance of football players. There was a significant difference among the aerobic training group, circuit training group and control group on leg explosive strength and cardio-respiratory endurance.

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