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Effects of strength training and circuit training on selected physical and physiological variables of school level football players

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Abstract
Strength training is important for athletes across all sports but for football players, it's a prerequisite for safe competition. The physicality of football means that athletes, especially young athletes, must be structurally strong and conditioned to compete safely. If one of your players shows up under-prepared, his safety and your team's chance of success is at risk. The good news is that most football programs have adopted some system of strength and conditioning to prepare their players. But if you're not currently training your players on a periodized strength training program, designed by a certified strength coach for the specific demands of football, you might not be doing enough to reduce your athletes' risk of injury. The purpose of the present study, 60 players were selected as samples from in and around schools Mettupalayam Corporation in the year of 2019 - 2020. They were divided into three groups. Each group consists of 20 subjects. Group -I Strength Training Group (STG), Group - II Circuit Training Group (CTG) and Group III control group (CG). The ages of subjects were ranged from 15-18. In the present study are significant source to maintain with its related physical and physiological such as explosive power and cardio respiratory endurance. The statistical tools used are the analysis of co-variance was applied. To determine whether the training programmes produced significantly different improvements in selected variables after 12 weeks of training the analysis of co-variance was used. The result of this study indicates that there is insignificant difference in explosive power and cardio respiratory endurance among players of football game. The study stated that there would be significant difference among players of football game. From the result of this study it is observed that there is significant improvement in explosive power and and cardio respiratory endurance

Keywords: explosive power and cardio respiratory endurance

Introduction
Strength training is important for athletes across all sports but for football players, it's a prerequisite for safe competition. The physicality of football means that athletes, especially young athletes, must be structurally strong and conditioned to compete safely. If one of your players shows up under-prepared, his safety and your team's chance of success is at risk. The good news is that most football programs have adopted some system of strength and conditioning to prepare their players.

Methodology
The purpose of the present study, 90 players were selected as samples from in and around schools Mettupalayam Corporation in the year of 2019 – 2020. They were divided into three groups. The ages of subjects were ranged from 15-18. In this study the physical fitness variable was explosive power and the physiological factors was resting cardio respiratory endurance. The statistical tools used are analysis of co-variance was applied. To determine whether the training programmes produced significantly different improvements in selected variables after 12 weeks of training the analysis of co-variance was used. The significance on difference of pairs of adjusted final group means were tested for significance by applying Schefe post hoc test. Further, the group means gains recorded by the various groups in the pre-test and post-test was tested for significance by applying paired 't' test. In the present study as invention strategies pre-season strength training, pre-season circuit training were used. These invention strategies are differed from one another in nature and the degree of influence on changes of physical and physiological variables. In the effect of strength training and circuit training would be higher rather than the individualized effect on physical and physiological variables.

Table 1: F-ratio for pre-test and post-test among the strength training circuit training and control group on explosive power

	group	mean	source	sum of square	df	mean square	f-ratio
pre-test	pstg	42.50	between set	22.80	2.00	11.40	2.03
	pptg	41.90	within set	318.80	57.00	5.59	
	cg	41.00					
post test	pstg	46.20	between set	557.63	2.00	278.81	34.44
	pptg	47.05	within set	461.35	57.00	8.09	
	cg	40.20					
adjusted mean	pstg	45.79	between set	430.00	2.00	215.00	34.25
	pptg	46.99	within set	351.54	56.00	6.28	
	cg	40.67					

Table 4.3 reveals that the F-value for pre-test 2.03 and post-test 34.44 among the experimental groups strength training group circuit training group and control group on explosive power. The obtained F-ratio for pre-test and post-test to be significant at 0.05

level for degree of freedom 2, 57 the required critical value was 3.16.hence, the F-ratio 2.03 obtained for pre-test was found to be not significant since it do not reach the required critical value 3.16 regarding this F-ratio for post-test 34.44 was found to statistically significant since it was higher than their required critical value 3.16. Based on F-ratio it was informed that experimental group and control group are equal in this performance of explosive power before they included into their respective treatment whereas, after completion of 12-week treatment period, experimental group as control group were significantly different from one another in the performance of explosive power.

The F-ratio for explosive power 34.25 obtained for adjusted posttest was found to be significant. To be significant at 0.05 level for degree of freedom 2, 56 the required critical value was 3.16. Based on the results, in testing the hypothesis that there may be significant difference among the effects of training namely pre-season strength training group, pre-season circuit training group and control group on physical and physiological variables of football players is accepted. The mean value of explosive power among strength training group, circuit training group and control group are graphically represented in figure 1.

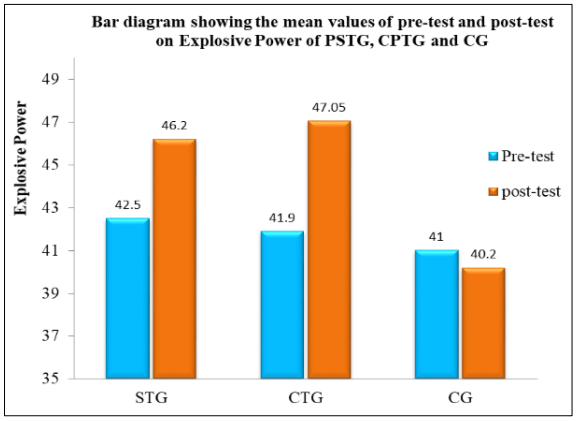

Fig 1

To identify the specific differences among the three groups as post hoc test was used. The results of post hoc testes are presented in table 2.

Table 2: Table showing the scheffes post hoc test on explosive power

Variables	ST	CT	CG	MD	F
Explosive Power	45.79	46.99	------	-1.2	1.44
	45.79	-------	40.67	5.12	71.15
	------	46.99	40.67	6.32	89.05

Table 2 shows that the mean differences of explosive power among strength training group, circuit training group and control group were 1.2, 5.12 and 6.32 respectively. The required confidence interval value was 3.16.

Since the mean difference between explosive power among strength training group, circuit training group and control group were greater than the confidence interval value 3.16, it was observed that there was significant difference on explosive power between these groups. The mean value of explosive power among strength training group, circuit training group and control group were graphically represented in figure 2

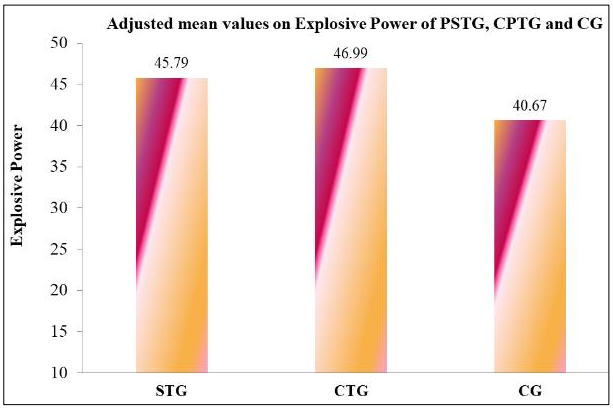

Fig 2

Table 3: F-ratio for pre-test and post-test among strength training circuit training and control groups on cardio respiratory endurance

	Group	Mean	Source	Sum of Square	DF	Mean Square	F-ratio
Pre-test	PSTG	2232.00	Between set	26130.00	2.00	13065.00	0.09
	PPTG	2277.00	Within Set	8627195.00	57.00	151354.30	
	CG	2233.50					
Post test	PSTG	2410.00	Between set	406893.33	2.00	203446.67	1.25
	PPTG	2382.00	Within Set	9252940.00	57.00	162332.28	
	CG	2223.00					
Adjusted Mean	PSTG	2425.60	Between set	361211.80	2.00	180605.90	19.56
	PPTG	2352.31	Within Set	516974.30	56.00	9231.68	
	CG	2237.09					

Table 3 reveals that the F-value for pre-test 0.09 and post-test1.25 among the experimental groups strength training group, circuit training group and control group on cardio respiratory endurance. The obtained F-ratio for pre-test and post-test to be significant at 0.05 level for degree of freedom 2, 57 the required critical value was 3.16.Hence, the F-ratio0.09 obtained for pre-test was found to be not significant since it do not reach the required critical value 3.16 regarding this F-ratio for post-test 1.25 was found to statistically not significant since it was higher than their required critical value 3.16. Based on F-ratio it was informed that experimental group and control group are equal in this performance of cardio respiratory endurance before they included into their respective treatment whereas, after completion of 12-week treatment period, experimental group as control group were significantly different from one another in the performance of cardio respiratory endurance.

The F-ratio for cardio respiratory endurance 19.56 obtained for adjusted posttest was found to be significant. To be significant at 0.05 level for degree of freedom 2, 56 the required critical value was 3.16. Based on the results, that there may be significant

difference among the effects of training namely strength training group, circuit training group and control group on physical and physiological variables. The mean value of cardio respiratory endurance among strength training group, circuit training group and control group are graphically represented in figure 3

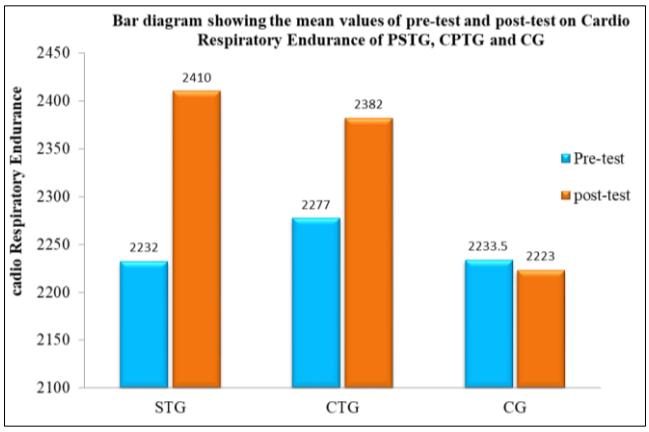

Fig 3

To identify the specific differences among the three groups as post hoc test was used. The results of post hoc testes are presented in table 4.

Table 4: Table showing the scheffes post hoc test on endurance

Variables	ST	CT	CG	MD	F
Cardio Respiratory Endurance	2425	2352.31	------	73.29	5.82
	2425	-------	2237.09	188.51	38.49
	------	2352.31	2237.09	115.22	14.38

Table 4 shows that the mean differences of cardio respiratory endurance among strength training group, circuit training group and control group were 73.29, 188.51 and 115.22 respectively. The required confidence interval value was 3.16.

Since the mean difference between cardio respiratory endurance among strength training group circuit training group and control group were greater than the confidence interval value 3.16, it was observed that there was significant difference on cardio respiratory endurance between these groups. The mean value of cardio respiratory endurance among strength training group, circuit training group and control group are graphically represented in figure 4.

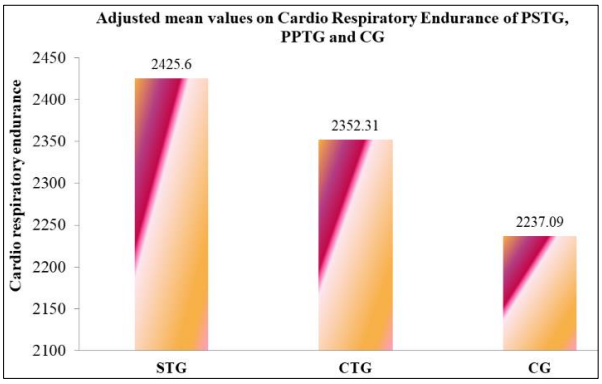

Fig 4

Discussion of Findings

The pre-test before the related training showed that there was an insignificant and variation on explosive power and cardio respiratory endurance among the three groups. The post-test after the related training showed significant improvement explosive power and cardio respiratory endurance. In the strength training group and in the circuit training group than the control group. Comparision among these three groups resulted that the strength training group shows better improvement in all the selected variables than the circuit training group and control group. The result also revealed that the explosive power and cardio respiratory endurance were comparative better in the circuit training group than the strength training group after the related training.

Conclusion and Recommendations

Based on the results of the study, the following recommendations have been made.

In the framing of physical exercise, while designing the training programme the effect of varied training programme is explained positively on muscle fitness parameters and physiological variables of football players. This is due to integrating the circuit with strength training which requires the players to perform the circuit exercises in a fatigue stage, resulting in potentially increasing the load and density. Hence the football players can use this type of training as a module in order to achieve high level skill performance in the game of football. In a combined training routine, a player performs a heavy set of traditional resistance training exercise, which is followed almost immediately by a circuit exercise. Another training strategy is known as complex training in which a player alternates biomechanically similar high load strength training exercises with circuit exercises, set forest, in the same workout. Since this type of training also proves to be effective in developing the fitness parameters of the football players the coaches can utilize this technique in their conditioning programme to develop the fitness and skill performance.

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