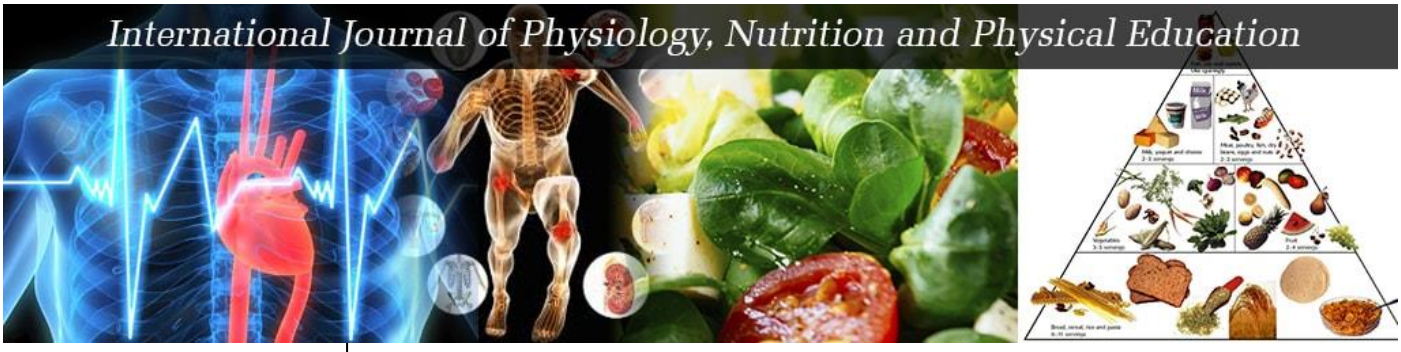

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Analysis of resistance training and concurrent resistance and aerobic training impact on selected skill performances of football players

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Abstract
The objective of this study was to analyze resistance training and concurrent resistance and aerobic training impact on selected skill performances of football players. To achieve the purpose of this study, forty eight men football players were selected as subjects. The subjects were selected in the age group of 18 to 22 years and they were randomly assigned into three equal groups of 16 each. Experimental group-I performed resistance training, experimental group-II performed concurrent resistance and aerobic training and group-III was acted as control. The football skills such as dribbling and passing were selected as dependent variable. The research design of the study was random group design. The pre and post test data collected from the experimental and control groups on selected dependent variables were statistically analyzed by paired 't' test and Analysis of Covariance (ANCOVA). Since, three groups were involved, whenever the obtained 'F' ratio value in the adjusted post test mean was found to be significant, the Scheffe's test was applied as post hoc test. Further, percentage of changes was calculated to find out the improvement in selected dependent variables due to the impact of experimental treatment. It is concluded that due to the effect of resistance training and concurrent training the dribbling and passing skill performances of the football players were significantly improved however, concurrent training was significantly better than resistance training in improving dribbling skill performances whereas no significant differences were found between resistance training and concurrent training in improving passing skill performances.

Keywords: Concurrent resistance and aerobic training, dribbling and passing, football players

Introduction
For both elite and recreational football players, proper training optimizes game performance, but also decreases the likelihood for injury, prevents over-training and provides greater satisfaction. The importance given to training by today's elite and recreational players striving for their personal best performance has demanded research on how best to train for a given sports. Scientists of exercise physiology have responded to these needs, and numerous studies have been conducted on optimal training practices and on practices detrimental to improved performance (Roberg & Robert, 1997) [9].

The strength training will build and maintain the muscle elasticity and power. Concurrent strength and endurance training in endurance athletes produced improvements in explosive force associated with rapid activation of leg muscles. The training also led to more economical sport-specific performance. The concurrent explosive strength and endurance training improved anaerobic and selective neuromuscular performance characteristics in young distance runners without decreases in aerobic capacity.

Still there is a lot of controversy associated with concurrent resistance and aerobic training. This may be due to the variations in regimens and experimental designs (Bell *et al.,* 1991). However, by considering factors such as modality and duration, session sequencing, timing, volume, intensity and training frequency, as well as the training status of the individual client, trainers can develop an effective model for concurrent training (Chtara *et al.,* 2005; Glowacki *et al.,* 2004; McCarthy *et al.,* 1995) [3, 5, 7]. Strength athletes have to perform endurance exercise in order to maintain an optimal body weight or to reduce body fat levels. Aerobic endurance exercises are an effective and efficient method of reducing body fat.

Concurrent training tries to develop all important qualities at the same time. The biggest advantage of the concurrent training is the parallel development of all qualities, without risking or overtraining athletes.

The neuromuscular status of the muscle is altered through resistance training by enabling either greater muscle fibre recruitment or by increasing the firing frequency of the motor units. It should be expected that these same neuromuscular adaptations will occur when an untrained individual commences a program of concurrent resistance and aerobic training (Docherty & Sporer, 2000) [4]. Strength and conditioning professionals prescribing aerobic exercise for their strength and endurance athletes often cite the benefit of enhanced recovery during the limited rest periods which intersperse the supra maximal work efforts. Recovery from strength exercises is highly dependent upon aerobic metabolism. Thus, aerobic training may help athletes recover more quickly between anaerobic work intervals, such as multiple sets in resistance training or repeated sprints. Based on these concepts the investigator selected resistance training and concurrent resistance and aerobic training as independent variable.

The influence of resistance training and concurrent resistance and aerobic training on skill performance of football players has received little attention and not completely understood. Few studies have only assessed the longevity of changes after resistance training and concurrent resistance and aerobic training on selected variables considered in this study. Consequently, the aim of the present study is to examine the effectiveness of resistance training and concurrent resistance and aerobic training on skill performance of football players.

Methodology

Subjects and Variables

To achieve the purpose of this study, forty eight men football players from Kanyakumari district, studying in various arts and science colleges affiliated to Manonmanium Sundaranar University, Tirunelveli district, Tamilnadu, India during the academic year 2017-2018 were selected as subjects. The subjects were selected in the age group of 18 to 22 years and they were randomly assigned into three equal groups of 16 each. Experimental group-I performed resistance training, experimental group-II performed concurrent resistance and aerobic training and group-III was acted as control. The football skills such as dribbling and passing were selected as dependent variables for the study and it was Warner Dribbling test and Bobby Charlton's Test for Passing.

Training Protocol

Training programme was administered to the football players for twelve weeks with three training units per week. The experimental group-I performed resistance training, group-II performed concurrent resistance and aerobic training. The resistance training program was a total body workout consisting of 3 sets of 6-10 repetitions on 8 exercises that trained all the major muscle groups. A percentage of each subject's one-repetition maximum for each exercise was used to determine the intensity of each week. The intensity and number of repetitions performed for each exercise was progressively increased. The aerobic training consists of continuous running with 65- 80% HRR. The running intensity was determined by a percentage of heart rate reserve (HRR). The intensity was increased as training progressed. Resistance training group performed only resistance exercises three days in a week for 12 weeks. Concurrent resistance and aerobic training group performed every odd numbered week resistance training in the morning session and aerobic training in the evening session. Every even numbered week they performed aerobic training in the morning session and resistance training in the evening session.

Statistical Technique

The pre and post test data collected from the experimental and control groups on selected dependent variables were statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the chances in selected dependent variables due to the impact of experimental treatment. In order to nullify the initial mean differences the data collected from the three groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since, three groups were involved, whenever the obtained 'F' ratio value in the adjusted post test mean was found to be significant, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. The level of confidence is fixed at 0.05 for significance.

Result

The descriptive analysis of the data on dribbling and passing skill performances of experimental and control groups are presented in table-1.

Table 1: Descriptive Analysis of the Data on Dribbling and Passing Skill Performances of Experimental and Control Groups

Variable	Group	Test	Mean	SD	MD	't' ratio	Percentage of Changes
Dribbling	Resistance Training	Pre	15.41	1.07	0.47	9.57*	3.05%
		Post	14.94	1.06			
	Concurrent Training	Pre	15.23	1.08	0.83	4.65*	5.45%
		Post	14.40	1.07			
	Control Group	Pre	15.54	1.39	0.39	1.27	2.51%
		Post	15.94	1.37			
Passing	Resistance Training	Pre	8.38	1.31	1.25	5.00*	14.92%
		Post	9.63	1.67			
	Concurrent Training	Pre	8.13	1.86	2.00	4.14*	24.60%
		Post	10.13	1.36			
	Control Group	Pre	8.50	2.00	0.38	1.15	4.47%
		Post	8.13	1.86			

Table t-ratio at 0.05 level of confidence for 15 (df) =2.13
*Significant

The obtained 't' values on dribbling skill performances of resistance training and concurrent training groups are 9.57 and 4.65 respectively which are greater than the required table value of 2.13 for significance at 0.05 level for 15 degrees of freedom. It revealed that due to the effect of resistance training and concurrent training the dribbling skill performances of the football players were significantly improved. As a results of resistance and concurrent training 3.05% and 5.45% of improvement in dribbling skill performance were found.

The obtained 't' values on passing skill performances of resistance training and concurrent training groups are 5.00 and 4.14 respectively which are greater than the required table value of 2.13 for significance at 0.05 level for 15 degrees of freedom. It revealed that due to the effect of resistance training and concurrent training the passing skill performances of the football players were significantly improved. As a results of resistance and concurrent training 14.92% and 24.60% of improvement in passing skill performance were found.

The pre and post test data collected from the experimental and control groups on dribbling and passing skill performances was statistically analyzed by using Analysis of Covariance and the results are presented in table–2.

Table 2: Analysis of Covariance on Dribbling and Passing Skill Performances of Experimental and Control Groups

Variable	Resistane Training Group	Concurrnt Training Group	Control Group	SoV	Sum of Squares	df	Mean squares	'F' ratio
Dribbling	14.93	14.54	15.80	B	12..90	2	6.45	35.46*
				W	8.01	44	0.18	
Passing	9.60	10.25	8.03	B	41.46	2	20.73	12.40*
				W	73.53	44	1.67	

(The required table value for significance with degrees of freedom 2 & 44 is 3.21)
*Significant at.05 level of confidence

Table-2 shows that the adjusted post-test means on dribbling skill performances of resistance training, concurrent training and control groups are 14.93, 14.54 and 15.80 respectively. The obtained 'F' value of 35.46 on dribbling skill performances is greater than the required table value of 3.21 for df 2 and 44 at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of resistance training, concurrent training and control groups on dribbling skill performances.

Table-2 shows that the adjusted post-test means on passing skill performances of resistance training, concurrent training and control groups are 9.60, 10.25 and 8.03 respectively. The obtained 'F' value of 12.40 on passing skill performances is greater than the required table value of 3.21 for df 2 and 44 at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of resistance training, concurrent training and control groups on passing skill performances.

Since, the obtained 'F' value in the adjusted post test means was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean difference, and it is presented in table-3.

Table 3: Scheffe's Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups on Dribbling and Passing Skill Performances

Variable	Resistance Training Group	Concurrent Training Group	Control Group	Mean Difference	Confidence Interval
Dribbling	14.93	14.54		0.39*	0.38
	14.93		15.80	0.87*	0.38
		14.54	15.80	1.26*	0.38
Passing	9.60	10.25		0.65	1.16
	9.60		8.03	1.57*	1.16
		10.25	8.03	2.22*	1.16

*Significant at .05 level

The Scheffe's post hoc analysis proved that significant mean differences existed between resistance and concurrent training groups, resistance training and control groups, concurrent training and control groups on dribbling skill performances since, the mean differences 0.39, 0.87 and 1.26 are higher than the confident interval value of 0.38 at 0.05 level of significance. Hence, it was concluded that due to the effect of resistance training and concurrent training the dribbling skill performances of the subjects was significantly improved however, concurrent training was significantly better than resistance training in improving dribbling skill performances.

The Scheffe's post hoc analysis proved that significant mean differences existed between resistance training and control groups, concurrent training and control groups on passing skill performances since, the mean differences 1.57 and 2.22 are higher than the confident interval value of 1.16 at 0.05 level of significance. However, insignificant mean differences existed between resistance and concurrent training groups, since, the mean difference 0.65 is lesser than the confident interval value of 1.16 at 0.05 level of significance. Hence, it was concluded that due to the effect of resistance training and concurrent training the passing skill performances of the subjects was significantly improved however, no significant differences existed between resistance training and concurrent training groups in improving passing skill performances.

The pre, post and adjusted post test mean values of experimental and control groups on dribbling and passing skill performances is graphically represented in figure-I & II.

Figure I & II: Diagram Showing the Mean Values on Dribbling and Passing Skill Performances of Experimental and Control Groups

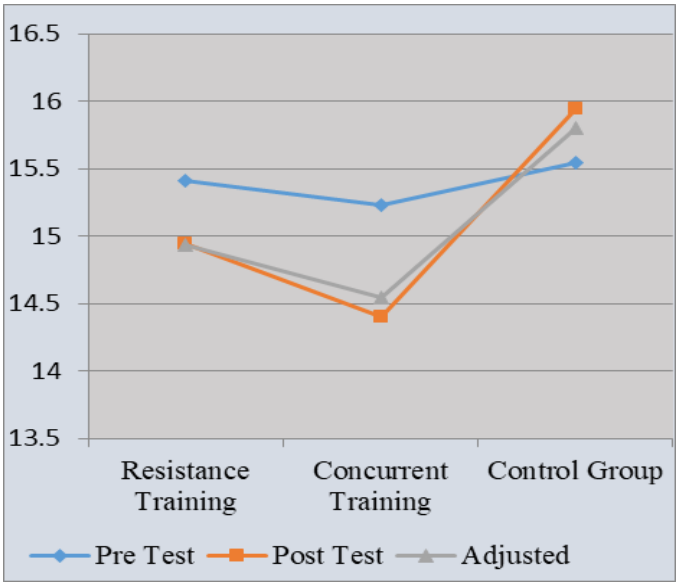

Fig 2: Dribbling Skill Performance

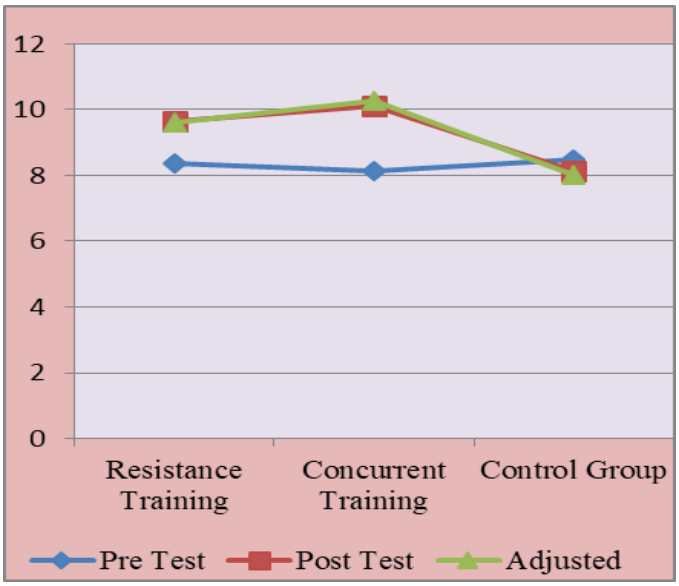

Fig 2: Passing Skill Performance

Discussion

Football is a passing and running game of an unpredictable and constantly changing pattern, demanding an awareness of other players and an ability to make quick decision and act upon them without delay. Soccer is a highly athletic sport requiring significant conditioning. Combined with excellent ball-handling skills, they need endurance to outlast the clock and become a top player. Proper cardiovascular training is needed to optimize performance and maintain stamina.

The sport of football is unique and demanding excellent physical fitness and excellent technique. Without strong technical skills a player will not be able to score goals or defend effectively. Physical fitness for soccer is specific and consists of several key elements. Fitness alone is not enough to guarantee success. Players must develop expertise in performing the various football skills, basic technique include passing, shooting, dribbling, heading, receiving and shielding. There is no substitute for skill and to acquire skills need dedication.

The results of the present study reveal that both resistance and concurrent training groups have significantly altered the football skill performances, however, concurrent training had high impact to increase the skill performance of the football players. The above findings are in consonance with the findings of Rahnama *et al.*, (2009) found significant improvement on passing skill performance. Burak (2015) [2] also found significant improvement on passing ability of young soccer players.

Vanttinen *et al.*, (2010) found that there was a significant improvement on skill performance variable dribbling. Taskin and Halil (2009) found improvement in speed dribbling ability of professional football players. Tomas *et al.*, (2016) observed that there was a significant improvement on skill performance variable dribbling and shooting. Impellizzeri *et al.*, (2008) [6] demonstrated that junior soccer players may benefit from aerobic training to attenuate the decline in short-passing ability caused by a short bout of intermittent activities completed at the same pre training workload. A number of studies demonstrate the effectiveness of concurrent resistance and aerobic training compared to isolated resistance and aerobic training. Starting a workout routine that includes high intensity integral training with a variety of resistance and aerobic training will also help to improve football skill performances.

Conclusion

Due to the effect of resistance training and concurrent training the dribbling and passing skill performances of the football players were significantly improved however, concurrent training was significantly better than resistance training in improving dribbling skill performances whereas no significant differences were found between resistance training and concurrent training in improving passing skill performances. As a results of resistance and concurrent training 3.05% and 5.45% of improvement in dribbling skill performance were found. In the case of passing skill performance 14.92% and 24.60% improvement were found due to resistance and concurrent training.

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