

ANALYSIS OF SOCCER SPECIFIC TRAINING INDUCED ADAPTATION ON CARDIOVASCULAR ENDURANCE LEG STRENGTH AND PLAYING ABILITY AMONG TEENAGE BOYS

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Abstract

The aim of this study was to examine the effects of soccer specific training on cardiovascular endurance, leg strength and playing ability among teenage boys. Forty male football players of American College Higher Secondary School, Madurai (Age 16.52 ± 0.99 : Height 167.55 ± 6.67 : Weight 70.15 ± 6.42 : BMI 24.93 ± 0.56) were randomly assigned into either Experimental group (Exp: N=20: Age 16.85 ± 0.99 : Height 165.85 ± 6.17 : Weight 68.30 ± 6.31 : BMI 24.77 ± 0.59) or Control group (Con: N=20: Age 16.41 ± 1.01 : Height 169.25 ± 6.87 : Weight 72.00 ± 6.12 : BMI 25.09 ± 0.49). The experimental group participated in the soccer specific training program for 12 weeks (three sessions a week) whereas the control group maintained their regular routine activities. All the subjects were evaluated before (pre) and after (post) the training period on the selected fitness related variables namely leg strength, cardiovascular efficiency and playing ability. The obtained data were statistically analyzed using ANCOVA to find out significant difference if any. The results show a significant improvement in cardiovascular endurance, leg strength and playing ability. In conclusion, the soccer training program resulted in positive changes in the selected variables among teenage boys.

Key words: *Soccer specific training, Cardio vascular endurance, Leg strength, Playing ability Teenage boys*

INTRODUCTION

Soccer performance has dramatically progressed over the past few years. Performance levels which are unimaginable before are now common and the number of athletes capable of outstanding results is increasing. One factor is that soccer is a challenging field, and intense

motivation has encouraged long, hard hours of work. Also, coaching has become more sophisticated, partially from the assistance of sport specialists and scientists. A broader base of knowledge about athletes and players now exists, which is reflected in training methodology. Most scientific knowledge, whether from experience or research, aims to understand and improve the effects of exercise on the body. Theoretically, training induced muscle adaptations are divergent and can even be antagonistic to improvements in strength^{5,6,7} or endurance.^{8,9} Research from several sciences enriches the theory and methodology of training, which has become a branch of science. The player is the subject of the science of training.

Strength training has been reported to cause muscle fiber hypertrophy, associated with an increase in contractile protein, proportional to an increase in maximal contractile force.¹⁰ Strength training also reduces mitochondrial density and decreases the activity of oxidative enzymes, which can impede endurance capacity, but has minimal effect on capillary density or the conversion from fast (type II) to slow twitch (type I) fiber types.^{8,10} The development of the various components of muscular strength is now integrated into the training programs of various endurance disciplines. Various studies have shown the benefit of adding strength training to improve endurance performance.¹⁻⁴ Speed and strength are integral components of fitness found in varying degrees in virtually all athletic movements. Simply put the combination of speed and strength is power. For many years coaches and athletes have sought to improve power in order to enhance performance.

Soccer, the game evokes an outpouring passion and emotion unparalleled within the realm of sport. Soccer is a common language among peoples of diverse backgrounds and heritages, a bridge that spans economic, political, cultural and religious barriers. Known as "football" throughout most of the world, soccer is the national sport of many countries in Asia, Africa, Europe and South America. Football is fast, quick, aggressive and attractive. There are four physical abilities, which are relevant to an understanding of the nature of football skill. They are speed, strength, endurance and mobility. The greater or lesser degree of proficiency is possible within each one of them. It has been found that male elite soccer players cover 8–12 km during a game, depending on team role,¹¹⁻¹³ nutritional status,^{14,15} and aerobic capacity.^{16,17} Within this aerobic context a sprint bout occurs about every 90 seconds,² each lasting an average of two to four seconds.^{11,12,18} Sprinting constitutes 1–11% of the total distance covered in a match,^{11,12}

corresponding to 0.5–3.0% of effective playing time—that is, the time when the ball is in play.^{11,18–20}

Recent studies shows that improvement in aerobic capacity in elite junior soccer players increased the distance covered, the play intensity, the number of sprints, and ball involvement during a game.¹⁷ During a game, professional soccer players perform about 50 turns, comprising sustained forceful contractions to maintain balance and control of the ball against defensive pressure²¹. Although it has been suggested that these abilities are concerned with the quantities of work done in soccer, they can affect all other levels of skill response. Each level may determine the degree of proficiency shown at other levels. They can therefore affect the quality of movement both above and below the level of skill. With the modern game becoming more and more physical and fast, never has the need for a player to have good all-round ability and acceptable technique been greater. Therefore the objective of this study was to examine the effects of soccer specific training on leg strength, cardiovascular endurance and playing ability among teen age boys.

METHODS

Subjects and Variables

Forty male football players of American College Higher Secondary School, Madurai (Age 16.52 ± 0.99 : Height 167.55 ± 6.67 : Weight 70.15 ± 6.42 : BMI 24.93 ± 0.56) were randomly assigned into either Experimental group (Exp:N=20: Age 16.85 ± 0.99 : Height 165.85 ± 6.17 : Weight 68.30 ± 6.31 : BMI 24.77 ± 0.59) or Control group (Con:N=20: Age 16.41 ± 1.01 : Height 169.25 ± 6.87 : Weight 72.00 ± 6.12 : BMI 25.09 ± 0.49). The experimental group participated in the soccer specific training program for 12 weeks (three sessions a week) whereas the control group maintained their regular routine activities. All the subjects were evaluated before (pre) and after (post) the training period on the selected fitness related variables namely leg strength, cardiovascular efficiency and playing ability. They were all beginners in football and they did not do any physical activity outside of their studies. All subjects gave written consent after having being informed about the study protocol, without being informed of the goal of this present study.

Training Programme

The experimental group participated in the soccer Training program for 12 weeks (three sessions a week) whereas the control group maintained their regular routine activities. The criterion variables selected for this study were leg Strength, Cardiovascular Endurance, , and playing ability. The subjects of both the groups were tested on selected variables 24 hours before and after the training period. The selected variables were measured before(Pre) and after(Post) for both the groups using standard tests and procedures. The experimental group trained three non-alternative days in a week for 12 weeks. The training includes a combination of general and specific conditioning, plyometrics, drills with and without ball ect. The duration of the sessions was 60 min which includes 5 min each for warm-up and warm down. Excluding this 10 min the active training duration was 50 min.

Statistical Technique

The data collected from experimental and control groups prior to and after completion of the training period on selected variables were statistically examined for significant differences if any, by applying analysis of covariance (ANCOVA). The pre test and posttest means of experimental and control groups were tested for significance by applying ANOVA. As both the groups (EXP and CON) were selected from the same population and no attempt was made to equate the groups on the selected dependent variables or any other common variables, initial differences may exist, and there is a possibility of affecting the posttest mean. For eliminating any possible influence of pre test means the adjusted post test means of experimental and control group were tested for significance by using ANCOVA. All the data were analyzed using SPSS statistical package. The level of confidence was fixed at 0.05 level of significance as the number of subjects was limited and also as the selected variables might fluctuate due to various extraneous factors.

Results

The data collected from experimental and control groups prior to and after completion of the training period on selected variables were statistically examined for significant differences if any, by applying analysis of covariance (ANCOVA) and the obtained results are given in table number-I.

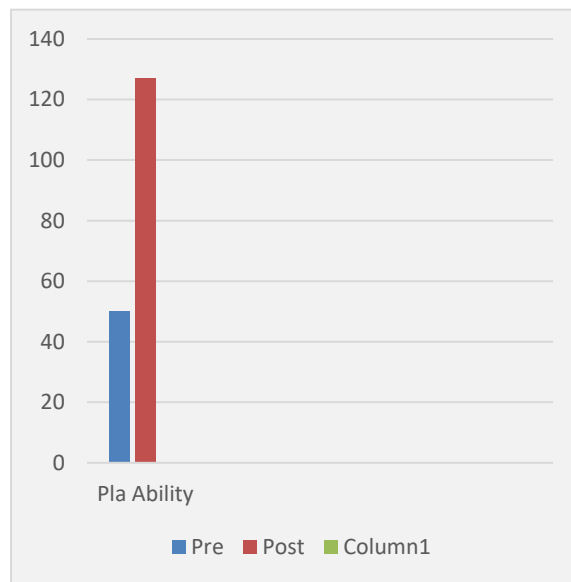
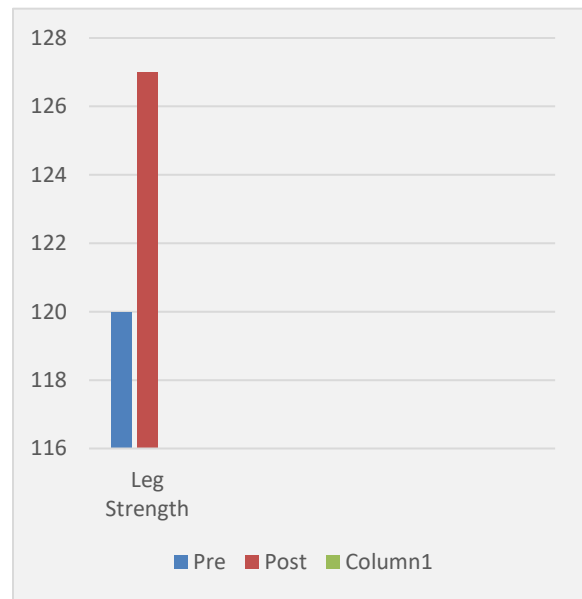
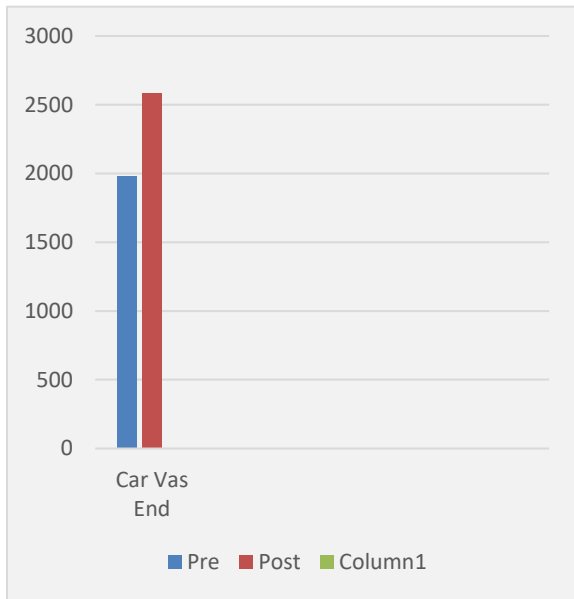
Table-1
Analysis of Covariance for the Selected Variables among Experimental & Control Groups
With Percentage of Gain

	ConGroup	Exp Group	SOV	SOS	df	MS	F-Ratio	
CAR. VAS. ENDURANCE	PRE TEST	1980(108.72)	1982(110.91)	B	40	1	40	0.003
				W	458320	38	12061	
	POST TEST	1989(111.14)	2585(119.09)	B	3552160	1	3552160	267.72* (P ≤0.05)
				W	504190.00	38	13268.15	
	AD PO TEST	1921	2680	B	3527235	1	3527235	9451.55* (P ≤0.05)
				W	13808	37		
GAIN	0.01↑	0.19↓						
% OF GAIN	0.00%	6.39%↓						
LEG STRENGTH	PRE TEST	120.70(2.88)	119.85(3.35)	B	7.225	1	7.225	0.741
				W	37.75	38	9.76	
	POST TEST	121.45(2.78)	127.35(2.93)	B	348.10	1	348.10	42.74 (P ≤0.05)
				W	3.9.50	38	8.145	
	AD PO TEST	117.61	122.35	B	435.14	1	435.14	1273.03* (P ≤0.05)
				W	12.65	37	0.342	
GAIN	0.01↑	0.05↑						
% OF GAIN	0.00%	3.03%↑						
PLAYING ABILITY	PRE TEST	49.05(2.39)	49.70(2.40)	B	4.23	1	4.23	0.74
				W	217.15	38	5.714	
	POST TEST	49.70(2.47)	67.00(5.11)	B	2992.90	1	2992.90	185.77* (P ≤0.05)
				W	612.20	38	16.11	
	AD PO TEST	47.46	69.14	B	2649.22	1	2649.22	432.24* (P ≤0.05)
				W	226.78	37	6.13	
GAIN	0.65↑	17.30↑						
% OF GAIN	0.13%↑	34.80%↑						

Table.1 shows the Cardiovascular Endurance, Leg Strength and Playing ability among the Experimental and control group before (Pre) and after (post) the soccer training period. There was a significant change in Cardiovascular Endurance, Leg Strength and Playing ability ($P \leq 0.05$). The pre test means of all the variables does not show any significant difference. After the training the Experimental group (1982 ± 110.91 vs 2585 ± 119.09) shows an increase of 603 (30.4%) in Cardiovascular Endurance. In the case of Leg strength the Experimental group (119.85 ± 3.35 vs 127.35 ± 2.93) shows a increase of 7.5 (6.23%). Playing ability for the experimental group (49.70 ± 2.40 vs 67.00 ± 5.11) shows a increase of 17.30 (34.80%) which was significant whereas the control group shows no significant difference in all the above-mentioned variables.

The mean values on leg strength, cardiovascular efficiency and playing ability of the experimental group is given in figure-I.

Figure- I: Mean Values on Leg Strength, Cardiovascular Efficiency and Playing Ability



DISCUSSION

Today's soccer performers must be "complete athletics". They have to be quick off the mark and over 10-20 yards. They need excellent levels of both aerobic and anaerobic endurance to last the duration. They have the upper body strength to resist challenges. Upper body strength

is required for shielding the ball, holding off opponents, throw-ins and also contributes to overall power and explosiveness. Lower body strength is required for kicking, jumping, tackling, twisting and turning and also forms the foundation for explosive speed. In soccer, good maximal strength is beneficial for holding off opponents and shielding the ball.

For the longest time a lot of the training done for soccer have been centered around aerobic conditioning, while overlooking important aspects like, strength, speed and power, agility and flexibility. Most players on the pitch run a great deal in the game (estimates of between 11-13km during a 90 minute game), so endurance training is very important but should not be done exclusively at the expense of the other aspects of conditioning. Strength training for any sport is vital to the overall success of a player. With a good foundation to build on, soccer players fully prepared to move into building maximal strength. The benefit of soccer specific training is not only to provide the players with the necessary skills and strength but also help to keep them intact for the entire session of the play.

CONCLUSION

On the basis of the findings it was concluded that Soccer training program could produce favorable changes in Cardiovascular Endurance, Leg strength and Playing ability. Physical activity should be viewed as providing stimuli that promote specific and varied adaptations depending on the type, intensity and duration of exercise performed. Even though it has been suggested that the total work load (training volume and duration of participation) is the key factor that determines the effect of exercise training on performance there is a need for more information. The football specific training program adopted in this study has specific components aimed at factors which can contribute to better playing abilities. Further studies are needed to clarify the effects of different types of training with variations in duration and intensity on performance related variables among different games in general and football in particular.

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