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Aerobic Adaptation of Soccer Players to Selected Soccer Dribbling Drills

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Abstract

The maximal oxygen uptake (VO2max), which is required during an intensive and long duration training session for soccer players, is one of the major demands to improve the high performance. For elite soccer players, the aerobic capacity (VO2max) is an important aspect of physical and physiological fitness. The increase in maximal oxygen uptake (VO2max) causes an increase in the heart and lungs efficiencies. The repetition, interval and continuous training methods with different skill drills can improve the VO2max of soccer players. Players having the high level of VO2max can execute the most artistic dribbling skill during the intensive competition situations. The objective of the study was to investigate the aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills if any, by comparing the aerobic efficiency of experimental group to their matched control group. The hypothesis of the present study was formulated that there might be significant aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills. Thirty (N=30) male soccer players between the 20-28 years of age from different clubs of Senior State League of Manipur were selected randomly, and divided into two groups, where only the experimental group was treated with selected dribbling drills-Figure '8' Dribbling (F8D), Diagonal Shuttle Dribbling (DSD), Angular Feinting Dribbling (AFD) and Zig-Zag Feinting Dribbling (ZZFD) for six weeks. The data were collected by administering the Cooper's 12 min. Run/Walk test and to find out significant aerobic adaptation the 't' test and ANCOVA statistical techniques were employed and 0.05 level of confidence was reserved to test the hypothesis. The pre and post test means and standard deviations of Experimental Group-I were 58.07±2.84 and 59.93±2.69 respectively, and for the Control Group-II, were 58.53±2.36 and 58.73±2.19 respectively. The significant difference was found in case of experimental group as the obtained value of paired sample 't' = (-)7.30> 't'=2.145 (tabulated) at 0.05 level of confidence (two tailed test). However, no significant difference in case of control group (obtained 't' = (-)0.68 < 2.145). Further, there was found the significant difference between the experimental and control groups by employing the ANCOVA as the obtained critical F= 18.23> F=4.21(tabulated). Within this limited six weeks (42 days) training program of selected soccer dribbling drills (F8D, DSD, AFD and ZZFD), the aerobic capacity (VO2max) of the soccer players were significantly improved and adapted, and the research hypothesis was accepted.

Keywords: Soccer, Dribbling, VO2max, Cooper.

Introduction

Soccer is certainly one of the most demanding sports because of the diversity of fitness and skill aspects needed to perform best. This game is the most popular game in the world and considered as a part of life in developed countries. It is one of the most coordinated games that carries the high adrenaline actions with brief recovery period over an extended period of 90 minutes or more. In this situation, the activation of both energy systems, the aerobic and anaerobic are needed to fulfil the muscle energy demand during the game. The aerobic capacity is also a part of the fitness components, which a soccer player must have. Good fitness levels are the backbone of every soccer player. Soccer players need to improve high aerobic energy system because of the running in the game may continue for more than 90 minutes. The values of aerobic capacity may vary considerably with the health condition, weight, age, sex, body size and training programmes.

Aerobic capacity is the amount of maximal oxygen uptake, which is expressed as VO2max that the body can utilize during an exercise session. It is possible for a person to improve his or her aerobic capacity over time. For elite athletes, their aerobic capacity is an important aspect of their physical and physiological fitness. The increase in maximal oxygen uptake (VO2max) causes an increase in stroke volume of the heart, which results in increased cardiac output. Many physical and skill activities for longer duration, in terms of repetition, interval and continuous training designs can improve the aerobic capacity (VO2max) to produce the competitive qualities of soccer players. Coaches and trainers are emphasizing on the

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improvement various skill abilities and physiological work efficiencies. Dribbling is one the most important skill parameters that shows the high quality of performance in different competitive situations. During the high intensive competition situation to execute the productive dribbling skills is possible with the correlative effort of VO2max. Therefore, the present study aimed to undertake the training program of selected soccer dribbling drills for determining the aerobic (VO2max) adaptation of soccer players.

Objective

The objective of the study was to investigate the aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills if any, by comparing the aerobic efficiency of experimental group to their matched control group.

Hypothesis

The hypothesis of the present study was formulated that there might be significant aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills.

Methodology

Selection of the Subjects

For the objective of the study, thirty (N=30) male soccer players between the 20-28 years of age those represented different clubs in Senior State League of Manipur were selected as the subjects by using the simple random sampling method.

Experimental Design

The study was formulated as an experimental design. All the subjects were divided into two groups consisting of fifteen (15) subjects each based on the initial test mean, and they were designated as Experimental Group-I and Control Group-II. The Experimental treatments were assigned to Experimental Group-I only and the Control Group-II was kept control without engaging any extra specific training except their daily routine activities. The suitable training programme of selected soccer dribbling drills, a pilot study was conducted with five selected subjects, and the load intensity and duration was determined. The duration of the training program was of six weeks (42 days). The training was administered in soccer ground of Manipur University for five days (Monday, Tuesday, Thursday, Friday and Saturday) in a week.

Table I. Training Design

Week	Dribbling Drills	Time	Total	Intensity	Volume/Player
I &II	- Figure '8' Dribbling (F8D) - Diagonal Shuttle Dribbling (DSD) - Angular Feinting Dribbling (AFD) - Zig-Zag Feinting Dribbling (ZZFD)	10sec 20sec 20sec 20sec	70sec	4 Repetitions	280sec (4min) Execution time
III&IV	- Figure '8' Dribbling (F8D) - Diagonal Shuttle Dribbling (DSD) - Angular Feinting Dribbling (AFD) - Zig-Zag Feinting Dribbling (ZZFD)	10sec 20sec 20sec 20sec	70sec	6 Repetitions	420sec (7min) Execution time
V&VI	- Figure '8' Dribbling (F8D) - Diagonal Shuttle Dribbling (DSD) - Angular Feinting Dribbling (AFD) - Zig-Zag Feinting Dribbling (ZZFD)	10sec 20sec 20sec 20sec	70sec	8 Repetitions	560sec(9.33min) Execution time

The training design consisted of four (4) selected dribbling drills as Figure '8' Dribbling (F8D), Diagonal Shuttle Dribbling (DSD), Angular Feinting Dribbling (AFD) and Zig-Zag Feinting Dribbling (ZZFD). These four drills were performed consecutively in constructed four cyclic stations successively. The players were advised to execute the drills from station 1 to 4 continuously within the stipulated duration. The load intensity was increased with the adaptation of physical and physiological efficiencies i.e. 4, 6 and 8 repetitions for the weeks of I & II, III & IV, and V & VI respectively (table-1).

Collection of Data

The data pertaining to this study was collected on 30 male soccer players (Senior State League of Manipur) in the 400m standard track of Manipur University before and immediately after six (6) weeks of training program by administering the Cooper's 12 minutes Run/Walk test. The distance covered was converted into the nearest miles and the standard scores of aerobic capacity (VO2max) were calculated by employing the formula:

$$VO_{2max}\,(ml.kg.^{-1}min^{-1}) = (35.97 \times \text{distance in miles}) - 11.29$$

Findings

To determine the aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills, descriptive analysis, paired sample t-test and analysis of co-variance (ANCOVA) statistical techniques were employed. The level of significance was set at 0.05 to test the hypothesis. The data were operated by using the IBM- SPSS Version 20. The descriptive analysis of pre-test and post-test means of aerobic capacity (VO2max) for Experimental Group- I and Control Group- II are

shown in the table-II.

Table II. Descriptive analysis of experimental group-I and control group-II for VO2max

Group	N	R	Min	Max	M	SD	SE
Experimental- Pre	15	9.00	54.00	63.00	**58.07**	**2.84**	0.73
Experimental- Post	15	9.00	56.00	65.00	**59.93**	**2.69**	0.69
Control- Pre	15	7.00	55.00	62.00	**58.53**	**2.36**	0.61
Control- Post	15	6.00	55.00	61.00	**58.73**	**2.19**	0.56

Table II shows that the pre and post test means and standard deviations of Experimental Group-I were 58.07±2.84 and 59.93±2.69 respectively. The table also shows the pre and post test means and standard deviations of Control Group-II were 58.53±2.36 and 58.73±2.19 respectively. Further, the table shows the values of range (R), minimum (Min), maximum (Max) and standard error (SE). The graphical representation of pre and post test means comparison of Experimental Group-I and Control Group-II for VO2max has been shown at figure- I.

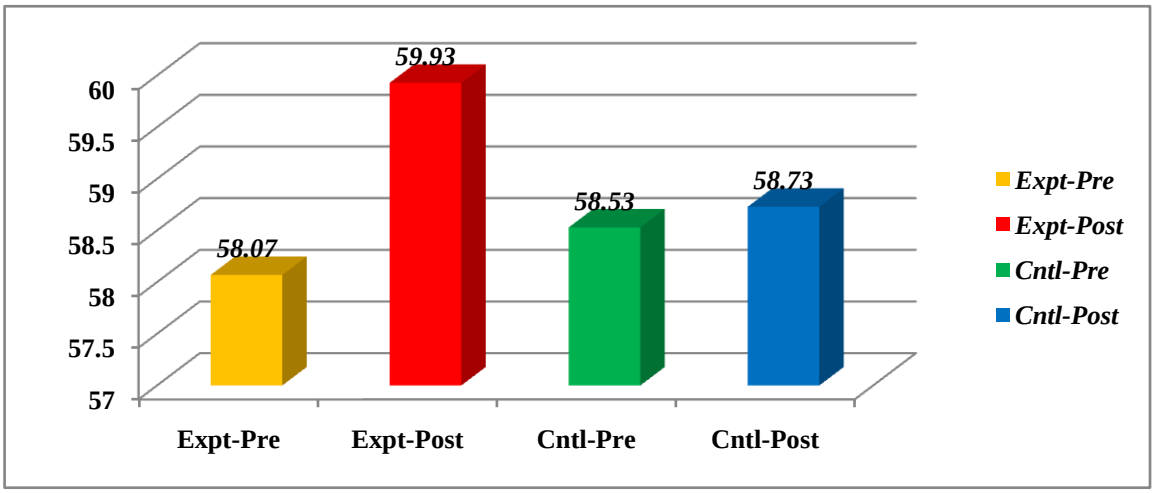

Figure I. Pre and Post Test Means Comparison of Experimental Group-I and Control Group-II for VO2max

Table III. Pre and post test means comparison of experimental and control groups for VO2max

Groups	Pre-mean	Post-mean	Paired Differences					t	df	Sig.(2-tailed)
			MD	SD	SEM	95% confidence interval of the diff.				
						Lower	Upper			
Expt. Pre-Post	58.07	59.93	-1.87	0.99	0.26	-2.42	-1.32	-7.30*	14	0.00
Cntl. Pre-Post	58.53	58.73	-0.20	1.15	0.30	-0.83	0.43	-0.68[x]	14	0.51

**Significant and [x]insignificant at 0.05 level of confidence; $t_{0.05\,(14)}$ =2.145 (two tailed) (N=15).*

Table III reveals that there is the significant difference between the pre-test and post-test means of Experimental Group-I (N=15) for VO2max as the obtained value of paired sample 't' = (-)7.30* is greater than the table value of 't' = 2.145 at 0.05 level of confidence (two tailed test). However, no significant difference was found between the pre test and post test means of Control Group-II (N=15) for VO2max as the obtained value of paired sample 't' = (-)0.68 [x] is lesser than the table value of 't' = 2.145 at 0.05 level of confidence (two tailed test). As the Experimental Group-I shown the significant aerobic adaptation of soccer players to selected soccer dribbling drills, further, the data are treated by employing the analysis of covariance (ANCOVA) to find out if there is significant difference among the pre and post means comparison between the experimental and control groups. The analysis of variance (ANCOVA) has been shown in table IV.

Table IV. Pre and post tests means comparison between experimental and control groups for VO2max

Source	Sum of Squares	df	Mean Square	F	Sig.
Group	19.02	1	19.02	18.23*	.000
Error	28.18	27	1.04		
Total	105792.00	30			

**Significant at 0.05 level, $F_{0.05\,(1,27)}$= 4.21, (N=30).*

Table IV reveals that there is the significant difference of pre- test and post- test means comparison between the experimental and control groups for aerobic capacity (VO2max) by employing the analysis of co-variance (ANCOVA) as the obtained critical value of F= 18.23 is greater than the tabulated value of F=4.21.

Discussion on Findings

Aerobic capacity (VO_2max) is the highest attainable rate of aerobic metabolism during the performance of dynamic work that exhausts the subject within 5–10 min and it is internationally accepted as an index of one's cardio-respiratory fitness (Fox EL, 1973). Tabata, et.al. (1996) found the Effect of moderate intensity endurance and high-intensity intermittent training on anaerobic capacity and VO2max. McMillan et.al. (2005) also found the high intensity 4 minutes intervals dribbling a soccer ball around a specially designed track together with regular soccer training is effective for improving the VO2max of soccer players. The Cooper Test (Cooper, 1968) was used to monitor the development of the athlete's aerobic endurance and to obtain an estimate of their VO_2 max.

In the present study, it was also found the significant aerobic (VO2max) adaptation of soccer players to the selected soccer dribbling drills. In this study, the pre and post test means and standard deviations of Experimental Group-I were 58.07±2.84 and 59.93±2.69 respectively, and for the Control Group-II, the pre and post test means and standard deviations were 58.53±2.36 and 58.73±2.19 respectively. There was found the significant difference between the pre-test and post-test means of Experimental Group-I (N=15) as the obtained value of paired sample 't' = (-)7.30 is greater than the table value of 't' = 2.145 at 0.05 level of confidence (two tailed test). However, in case of Control Group-II (N=15), no significant difference was found as the obtained value of paired sample 't' = (-)0.68 is lesser than the table value of 't' = 2.145 at 0.05 level of confidence (two tailed test). Further, there was found the significant difference of pre- test and post- test means comparison between the experimental and control groups by employing the analysis of co-variance (ANCOVA) as the obtained critical value of F= 18.23 is greater than the tabulated value of F=4.21. Therefore, within this limited six weeks (42 days) training program of selected soccer dribbling drills (F8D, DSD, AFD and ZZFD), the aerobic capacity (VO2max) of the soccer players were significantly improved and adapted.

Hypothesis Testing

The hypothesis was designed that, there might be significant aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills. The results of the study revealed that there were significant differences when compared the pre and post test means within and between Experimental and Control groups by applying the paired sample t-test and the analysis of covariance (ANCOVA) respectively. Therefore, there were significant aerobic (VO2max) adaptation of soccer players to selected soccer dribbling drills within the six weeks (42 days) training program. Hence, the research hypothesis was accepted.

Conclusions

Within the delimitations, limitations and different references, the results of present study concluded that significant aerobic (VO2max) adaptation and improvement of soccer players was estimated in Experimental Group-I statistically after the six (6) weeks training program of selected soccer dribbling drills. However, no significant improvement was found in case of Control Group-II at all.

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