

PC010

Effect of Soccer Specific High and Low Intensity Aerobic Training on Cardiorespiratory Endurance

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Abstract

Intensity and demand during soccer match increasing due to the advancement of the prodigious sports training inventions. Acclimatise to the demand of the competitions needs training modifications to tolerate extreme pressure during the competition. The objective of this study was to find out the effect of High and Low intensity aerobic training on Cardiorespiratory Endurance. To achieve the purpose forty five (N=45) soccer players were selected from Jaffna, Sri Lanka, and their age were ranged between 18 to 24 years. The subjects were divided at random in to three groups of fifteen each, group I underwent High Intensity Training [(HIT) (n=15, 50-60 min / day / three days / week over the period of twelve weeks)], group II underwent Low Intensity Training [(LIT) (n=15, 50-60 / day / three days / week over the period of twelve weeks)], and group III acted as control. Exercise intensity starts from 60% and 80% of the maximum heart rate of the LIT and HIT respectively. 2% rule was implemented in every two weeks. Cardiorespiratory endurance was assessed by using Cooper's 12 min run or walk test. Data were collected on cardiorespiratory endurance before and after the training period, and were subjected to statistical treatment using analysis of covariance (ANCOVA). In all the cases 0.05 level of confidence was fixed to test the significance. When the obtain 'F' ratio was significant. Scheffe's post hog test was used to find out the paired mean difference. Within the limitations set for this study, it was concluded, that both the experimental group were significantly improved cardiorespiratory endurance than the control. However High Intensity Aerobic training shows better effect (F=6.41) than the Low Intensity training. Hence, it was recommended that include of small sided games during High Intensity Aerobic training may supports to the players to improve physiological status, ability to tolerate different positional demand and reduce monotonous*

Keywords: High Intensity Aerobic, Low Intensity Aerobic, cardiorespiratory endurance.

Introduction

Soccer is beautiful complex game which leads the peoples to sit on the pin point throughout the match. The physical and physiological work rate in a soccer match is very high and needs subsequent changes in sprinting, jogging, high intensity running throughout the game. In a match, 70% of the times the players are jog/ walk, but the match is decided/ tempered by balance 20% high intensity running and 10% sprinting. But the beauty of the soccer match and high work rate demands are endured by high intensity running and sprinting. Majority of the research reveals that the high intensity aerobic training enriches the quality of the game and increases the chances of winning the game. But the aim of this study was to find out how players get benefited from this training and the amount of training load necessary to improve cardiorespiratory endurance. Hence the objective of the study was to find out the effect of soccer specific high intensity and low intensity aerobic training on cardiorespiratory Endurance.

Endurance refers to the capacity of retaining performance quality in particular duration. The performance of endurance attributes to the central nervous system function, maximum oxygen uptake and the body's energy reserves and utilization. In several ballgames, skills, anthropometric characteristics and physical performance

of an individual player are the most important factors that contribute to the competitive success of a whole team. Physiological and physical changes are take place according to the energy system based training. In respect to the physical performance the endurance requirements of contact games seems to be rather similar (Hakkinen, 1989, Viitasalo et al., 1987).

Interval training: Interval training is a type of physical training that involves bursts of high-intensity work interspersed with periods of low-intensity work. The high-intensity periods are typically at or close to anaerobic exercise, while the recovery periods may involve either complete rest or activity of lower intensity. *High Intensity Training:* HIT is the concept where one performs a short burst of high-intensity (or max-intensity) exercise followed by a brief low-intensity activity, repeatedly, until too exhausted to continue. HIT requires that you perform 20 minutes or more, depending on your sports, at an intensity level well above aerobic threshold and the intensity at 90-95 percentage and ending 100% MHR. (Benson,R., and Connolly, D.2011) *Low Intensity Training:* LIT means the work outs are practiced within the 60-75 percent maximum heart zone often called Low intensity training.

High intensity aerobic training is a form of cardiovascular exercise. Usual high intensity aerobic training sessions may vary from 9-20 minutes. These short, intense workouts provide improved athletic capacity and condition, improved glucose metabolism, and improved fat burning. *Cardio-respiratory Endurance:* This is the quality that enables one to continue engaging in reasonably vigorous physical activities for extended periods of time and where the required cardio-respiratory adjustments to the activity is built up.(Uppal, 2000). Hence the purpose of the study was to find out the Effect of soccer specific high intensity and low intensity aerobic training on cardiorespiratory endurance.

Methodology

To achieve the purpose forty five (N=45) soccer players were selected from Jaffna, Sri Lanka, and their age were ranged between 18 to 24 years. The subjects were divided at random in to three groups of fifteen each, group I underwent High Intensity Training [(HIT) (n=15, 50-60 min / day / three days / week over the period of twelve weeks)], group II underwent Low Intensity Training [(LIT) (n=15, 50-60 / day / three days / week over the period of twelve weeks)], and group III acted as control. Exercise intensity starts from 50% and 80% of the maximum heart rate of the LIT and HIT respectively. 2% rule was implemented in every two weeks. Cardiorespiratory endurance was assessed by using Cooper's 12 min run or walk test (Mackenzie, B. 1997). Data were collected on cardiorespiratory endurance before and after the training period, and were subjected to statistical treatment using analysis of covariance (ANCOVA). In all the cases 0.05 level of confidence was fixed to test the significance. When the obtain 'F' ratio was significant. Scheffe's post hoc test was used to find out the paired mean difference.

Justification for selection of training method

Small sided games are played in a smaller pitch with controlled rules and regulations compare to regular football. These types of games are structured for the purpose of skill and tactical development. The traditional fitness training can be best for all level soccer players. But now new innovations are raised to develop fitness through structured and controlled small sided games. The small sided games are suitable to enhance the tactical, technical and teamwork ability as well as to improve game plan for the next upcoming match.

During this small sided games the coach can increase or decrease intensity by reduce or increase pitch size, number of players, and playing rules (eg. Number of touches). Traditional fitness training can be a best method to improve fitness, but the intention of the present study was to encourage the players to adapt to all fitness improvements through structured small sided games which will reduce the time allocation to traditional fitness training and coach can stress his game plan through structured small sided games.

Load Dynamics

The load dynamics of the present study is expressed below. The duration of the high intensity training performed accordingly.

HIT- The small sided game performed by 2 V 2 + one neutral player (30 m × 20 m grid). And the duration was (5 × 70 sec + 3 min repetition recovery) 3 set (5 min set recovery). Pitch size may change for the purpose to increase heart rate.

LIT- The small sided game performed by 7 V 7 with one Neutral Player (60m × 40 m Grid). And the duration was (3 × 4 min + 4 min repetition recovery) 3 set (4 min set recovery). The Exercise intensity starts from 50% and 80% of the maximum heart rate of the LIT and HIT respectively. 2% rule was implemented in every two weeks and intensity was assessed by using polar infrared heart rate monitor.

Results

Table - I Analysis of Covariance on Cardiorespiratory Endurance of High and Low Intensity Training and Control Groups

	Low Intensity Aerobic training	High Intensity Aerobic training	Control Group	S o V	Sum of Squares	df	Mean squares	'F' ratio
Pre test Mean	2460.01	2462.66	2446.67	B	2204.44	2	1101.22	0.30
SD	73.38	58.12	46.08	W	152426.66	42	3629.20	
Post test Mean	2537.66	2541.33	2452.67	B	75501.11	2	37750.55	6.95*
SD	75.89	64.90	79.41	W	227910.00	42	5426.42	
Adjusted Post test Mean	2536.82	2539.86	2454.97	B	68592.40	2	34296.20	6.41*
				W	219393.37	41	5351.05	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 is 3.22 and degree of freedom 2 and 41 is 3.23.) *Significant at .05 level of confidence.

Table I shows, The obtained 'F' ratio value is 6.41 of cardiorespiratory endurance was greater than the required table value at 0.05 level of confidence. The results of the cardiorespiratory endurance shows that significant differences exist among the adjusted post test means of High intensity training, Low intensity training and control groups.

Table - II Scheffe's Post HOC Test for the Differences Among Paired Means of High and Low Intensity Training and Control Groups on Cardiorespiratory Endurance

High Intensity Training	Low Intensity Training	Control Group	Mean difference	Confidence interval
2536.82	2539.86		3.04	67.88
2536.82		2454.97	81.85*	67.88
	2539.86	2454.97	84.89*	67.88

*Significant as lead of confidence

From table II - there were no significant differences between High intensity training and low intensity training. However there was a significant difference between High intensity training and control group and also there was a significant difference between Low intensity training and control groups on cardiorespiratory endurance.

Discussion

The common conclusion of the research findings is that as number of players increase, heart rate during practice decrease. However the pitch size also partially influence in intensity. In practice small number of players relatively more time handling the ball and engage supporting play, tackling and man marking. (Platt D. etal, 2005, and Grant A. etal, 1999). In the present study both high and low intensity training improves cardiorespiratory endurance. But the high intensity most influence on soccer game and this type of training may contribute to enhance the ability to handle extreme game pressure. A variety of small sided games drills and traditional running have been designed to train metabolic systems essential to soccer. These mainly targets on the development of the aerobic and anaerobic systems. As a consequence the manipulation of running speeds during practices is important.

Many athletes attribute their success to interval training. With the spacing of exercise and rest periods, a tremendous amount of work can be accomplished that would not normally be completed in a workout in which the exercise was performed continuously. Repeated exercise bouts can vary from a few seconds to several minutes or more depending on the desired outcome. The interval training prescription can be modified in terms of intensity and duration of the exercise interval, the length and type of relief interval, the number of work intervals and the number of repetition blocks or set per work out.

Jan Percival concluded that every individual has different level of fitness, which may change from time to time, it may also change from place to place and sometimes it may changes with work or situation also. Physical fitness variables are very important to soccer player and form a condition for higher performance. Mal stated that the components of physical fitness like strength, speed, endurance, flexibility and the various coordinative abilities are essential for a high technique and tactical efficiency. Depending upon the demand of the game, each factor of physical fitness should be optimally developed. The present study reveals that there was a significant difference on cardiorespiratory endurance between the High intensity training group and control group, also Low intensity training group and control group due to the effect of twelve weeks of high, low intensity aerobic training. However there was no significant difference between the high and low intensity aerobic training groups on cardiorespiratory endurance may due to the previous fitness status of the soccer players.

Conclusion

It was concluded that High intensity aerobic training is essential to improve cardiorespiratory endurance as well as ability to tolerate higher game pressure.

Recommendation

Small sided games during High Intensity Aerobic training may supports to the players to improve physiological status, ability to tolerate different positional demand and reduce monotonous.

Implication

High intensity aerobic training may effective when it applied with game / sport oriented training. Further advance scientific research needed for this study.

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