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Effect of plyometric training on physiological variables of adolescent male tennis players

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Abstract

The study was designed to investigate the effect of Plyometric training on physiological variables of adolescent male tennis players. To investigate the study, thirty adolescent male tennis players were randomly selected from National Sports School, Ajjanoor, Coimbatore and their age were ranged between 14 and 17 years. The subjects were randomly assigned to two equal groups (n=15). All the subjects were divided in to two groups with 15 subjects each as experimental and control group. Group-I underwent Plyometric training for a period of twelve weeks and group-II acted as control who did not participate in any special training other than the regular routine. The physiological variables such as resting heart rate and breath holding time were selected as dependent variables. Pre and post-test random group design was used for this study. The dependent 't' test was applied to determine the difference between the means of two group. To find out whether there was any significant difference between the experimental and control groups. To test the level of significant of difference between the means 0.05level of confidence was fixed. The result of the study shows that, there was a significant improvement takes place on resting heart rate and breath holding time of adolescent male tennis players due to the effect of twelve weeks of Plyometric training. And also concluded that, there was a significant difference exists between experimental and control groups in resting heart rate and breathe holding time. The control group did not improve the selected criterion variables.

Keywords: Plyometric training, resting heart rate, breath holding time

Introduction

Tennis is a racket sport. It can be played by individually against a single opponent or between two teams (doubles). Players use a racket that strung with cord to strike the ball around a net and into opponent's court. It is characterized by quick start and stops, changes of direction, multi-directional movements and stamina. It requires short explosive burst of energy with repeatedly during the match. Unlike many other sports, it does not have time limits on matches. It lasts one hour to five hours. In this context, it requires tennis athletes to be highly trained on physiological aspects. Hence, it requires solid understanding of the physiological variables in terms of the design and implementation of the training to enhance successful performance without any injury risk (Kovacs 2006) [4].

In the physiological aspects, resting heart rate and breath holding time are play predominant role in long lasting matches. Resting heart rate indicate the count of heart beats per minutes to maintain body function at rest and Breath holding time indicate the ability to hold breath without inhale and exhale after full inhalation (Chaterjee (2003) [5]. These variables need to be well understood in terms of the injury, sustainability and high performance to design suitable training method. Thus, the researcher interested to investigate these variables to improve the player's performance.

Plyometric training

Plyometric is a type of exercise training designed to produce fast, powerful movements, and improve the functions of the nervous system, generally for the purpose of improving performance in sports. It is a popular form of training used to improve the athletic performance. It involves muscle stretch immediately followed by the shortening of the muscle unit. The process of muscle lengthening after the rapid shortening during stretch-shortening cycle is integral to plyometric exercise (Chu Donald 2013) [6].

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Despite the important role of plyometric exercise, the information about this kind of exercise on the cardiovascular system, especially on resting heart rate and breath holding time is not completely understood (Kenny, 1993) [7]. Thus, this study reveals the effect of Plyometric training on physiological variable of adolescent male tennis players. Plyometric has been shown across the literature to be beneficial to a variety of athletes. Benefits range from injury prevention, power development and sprint performance amongst others.

Methodology

The purpose of the study was to find out the effect of Plyometric training. To achieve the purpose of the study, thirty adolescent male tennis players were adolescent male tennis players from National Sports School, aijanoor, Coimbatore. The subjects were randomly assigned in to two equal groups namely, Plyometric training group (PTG) (n=15) and Control group (CG) (n=15). A pilot study was conducted to assess the initial capacity of the subjects in order to fix the load. The respective training was given to the experimental group the 3 days per weeks (alternate days) for the training period of twelve weeks. The control group was not given any sort of training except their routine.

Design

Table 1: Computation of ‘t’ ratio on experimental group and control group selected physiological variables of adolescent male tennis players

Group	Variables		Mean	N	Std. deviation	Std. error mean	t ratio
Experimental Group	Resting heart rate	Pre	74.14	15	2.14	0.17	*3.88
		Post	73.48	15	2.29		
	Breath Holding Time	Pre	23.11	15	2.89	0.09	*4.85
		Post	23.59	15	2.97		
Control group	Resting heart rate	Pre	74.12	15	2.29	0.31	0.316
		Post	74.02	15	1.85		
	Breath Holding Time	Pre	23.04	15	2.29	0.10	0.30
		Post	23.01	15	2.25		

*Significant level 0.05 level degree of freedom (2.14, 1 and 14)

Table I reveals the computation of mean, standard deviation and ‘t’ ratio on selected physiological variables namely resting heart rate, breath holding time of experimental group. The obtained ‘t’ ratio on resting heart rate and breathe holding time were 3.88, 4.85 respectively. The required table value was 2.14 for the degrees of freedom 1 and 14 at the 0.05 level of significance. Since the obtained ‘t’ values were greater than the table value it was found to be statistically significant.

To evaluate physiological variable resting heart rate was tested by radial pulse count and breath holding time was tested by digital stop watch in seconds. The parameters were measured at baseline and after twelve weeks of Plyometric training were examined.

Training protocol

The training programme was conducted for 45 minutes for session in a day, 3 days in a week for a period of twelve weeks duration. These 45 minutes included 10 minutes warm up, Plyometric training for 25 minutes and 10 minutes warm down. Every three weeks of training 5% of intensity of load was increased from 65% to 80% of work load. The volume of Plyometric training prescribed based on the number of sets and repetitions. The equivalent in Plyometric training is the length of the time each action in total 3 day per weeks (Monday, Wednesday and Friday).

Statistical analysis

The collected data before and after training period of twelve weeks on the above said variables due to the effect of Plyometric training was statistically analysed with ‘t’ test to find out the significant improvement between pre and post-test. In all cases the criterion for statistical significance was set at 0.05 level of confidence. (P<0.05)

Further the computation of mean, standard deviation and ‘t’ ratio on selected physiological variables namely resting heart rate and breath holding time of control group. The obtained ‘t’ ratio on resting heart rate and breathe holding timewere0.31, 0.30 respectively. The required table value was 2.14 for the degrees of freedom 1 and 14 at the 0.05 level of significance. Since the obtained ‘t’ values were lesser than the table value it was found to be statistically not significant.



Fig 1: Shows control group and experimental group

Discussion and Findings

The result of the present showed the effect of Plyometric training on physiological variables of adolescent male tennis players. And there was a difference between experimental group and control group. The findings of the present study are in line with investigator referred in this study. Heart rate is increased due to the Plyometric exercise after six week training period (Shunmuganathan 2018) ^[1]. Resting heart rate and breath holding time had significant improvement by the influence of the Plyometric training in the volley ball players (Anitha 2017) ^[2]. Plyometric training had observed changes in resting heart rate and breath holding time among the volley ball players with the limitation of player's diet, life style, climate (Vishnu Raj R 2017) ^[3]. (P. Senthil 2015) ^[8] revealed that the resting pulse rate reduced by the Plyometric training after the 12 weeks period. According to the Rajaram Shankar Rare 2019 ^[9], Plyometric training had greater influence on the resting pulse rate improvement of the state level rowing sculling players. From the result of the present study, it is speculated that the observed changes in Breath Holding Time, Resting Heart Rate may properly designed Plyometric training which are suitable for adolescent male tennis players.

Conclusion

From the result of the study, the investigator concluded that the Plyometric training produced the changes and improvement between the experimental and control group on the resting heart rate and breathe holding time of the adolescent male tennis players. Experimental group players had improvement after twelve weeks training period and control group does not have any improvement.

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