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A high intensity interval training profile for performance variables of collegiate volleyball players

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Abstract
Background: To achieve the purpose of the study high intensity training was given to improve performance related variables of collegiate volleyball players.
Objectives: To observe the effect of regular high intensity training on speed, explosive power, flexibility, of collegiate volleyball players.
Material and Method: The study was carried out with forty (40) male volleyball players aged between 17 to 25 years. Subjects were divided into two groups randomly named as Group-I Experimental training group and Group-II control group, twenty subjects (20) in each group. The variable selected for the study were Performance fitness parameters namely speed, leg explosive power and flexibility were measured. All the subjects were tested on selected variables, before and after the high intensity interval training program. In order to find out the significant improvement data was analyzed using paired 't' test.
Results: It was observed that there was a significant improvement in the HIIT group as compared to control group in speed (8.84 ± 0.75), leg explosive power (1.51 ± 0.18) and flexibility (25.60 ± 2.41).
Conclusion: The findings suggest that HIIT helps to enhance performance variables in collegiate volleyball players.

Keywords: Volleyball players, high intensity interval training, performance variables

Introduction
Volleyball began to develop as a sport in the late 19th century and has been an Olympic sport since 1964. The game is often classified as one of the most popular sport activities in the world with more than 900 million participants on a global basis and with competitive tournaments taking place in the 218 National associations. Volleyball is a high-intensity intermittent sport with frequent explosive movements, where trained players, for example, have been shown to perform; 115 jumps and 85 hits in a game (Medeiros *et al*. 2014) [7]. Volleyball players have been demonstrated to cover; 1200 and; 1750 m in total in a 3-set and 4-set game, respectively (Mroczek *et. al.*, 2011), which is markedly less compared with other team sports Moreover, the exercise periods in volleyball are relatively short, lasting only; 9 seconds on average interspersed by; 12-second recovery intervals and display work to- rest ratios ranging between 1:1.6 and 2.2 (Sheppard *et. al.*, 2009), which also differs markedly from other team sports. Physical fitness is of paramount importance in this game. The physiological loading of a volleyball game is moderate. Cardiovascular loading during an elite volleyball game has been shown to be 75% HR max on average (40). High-intensity interval training is a form of interval training, a cardiovascular exercise strategy alternating short periods of intense anaerobic exercise with less intense recovery periods, until too exhausted to continue. Though there is no universal HIIT session duration, these intense workouts typically last under 30 minutes, with times varying based on a participant's current fitness level (Dohiit 2017). The intensity of HIIT also depends on the duration of the session. High intensity interval training workouts provide improved athletic capacity and condition as well as improved glucose metabolism (Jenkins 2002).Generally, high intensity interval exercise, like exercise with Tabata protocol which consists of eight sets of exercise at the intensity of 170% of VO2max with 10-s rest (Tabata *et al*., 1996). This is because of HIIT workouts tend to burn more calories than traditional workouts, especially after the workout. A well-rounded physical activity program includes aerobic exercise and strength training exercise, but not necessarily in the same session.

This blend helps maintain or improve cardio respiratory and muscular fitness and overall health and function. Regular physical activity will provide more health benefits than sporadic, high intensity workouts, so choose exercises you are likely to enjoy and that you can incorporate into your schedule (Kravitz, 2011) [5]. Since, the health related aspects play a crucial role in the performance of the players. We have found that so many studies suggested to high intensity interval training for various game. Recommend the use of HIIT to improve physical fitness. High intensity interval training for volleyball practises should consist of a careful balance of cardio, strength training and plyometric. Therefore, the scholar made an attempt to investigate the influence of high intensity interval training on performance variables among collegiate volleyball players.

Methodology

To achieve the purpose of the study, 40 male volleyball players aged between 17 to 25 years, male volleyball players were selected from the Karpagam and Rathinam Educational Institutions. They were divided into two groups. Group I was considered as an experimental group and group II acted as the control group. All the participants of experimental group underwent 16 weeks of high intensity training along with their usual activities. Outcomes were measured at baseline and after the 16 weeks of intervention. The control group was not administered with specific training program other than their daily routine. Speed was measured by 50 m dash test in seconds, Leg explosive power was measured by standing broad jump in meters and Flexibility was measured by sit and reach test in centimetres, the test was assessed in prior and after the training period and recorded as pre and post test data respectively.. The pre and post test data were collected on fitness performance variables due to the influence of high intensity interval training and was analysed by computing mean and standard deviation in order to find out the significant improvement paired 't' test was applied.

Table 1: Descriptive Analysis of the Pre and Post Test Data and 'T' Ratio on Performance Variables of Experimental and Control Groups

Variables	Groups	Test	Mean	Standard deviation	Mean difference	't' ratio
Speed (in sec) N=20	Experimental Group	Pre	9.67	0.82	0.83	7.17*
		Post	8.84	0.75		
	Control Group	Pre	9.53	1.16	0.04	0.48
		Post	9.49	1.22		
Leg Explosive Power (in mts) N=20	Experimental Group	Pre	1.42	0.19	0.09	5.90*
		Post	1.51	0.18		
	Control Group	Pre	1.40	0.14	0.00	1.10
		Post	1.39	0.14		
Flexibility (in cm) N=20	Experimental Group	Pre	20.90	2.59	4.7	16.15*
		Post	25.60	2.41		
	Control Group	Pre	19.95	3.66	0.3	0.92
		Post	19.65	3.34		

Table t ratio at 0.05 level of confidence for 19 df = 2.093

As per table I, the obtained t - ratio on speed 7.17, leg explosive power 5.90, and flexibility16.15 for the experimental group respectively. The experimental group showed the greater t value than the required table value of 2.09 at 0.05 level of confidence, hence it was found to be significant. At the same time the control group't' – value on speed 0.48, leg explosive power 1.10 and flexibility 0.92respectively. The control group't' value is lesser than the table value it was found that there is no significant improvement on found. From the results of the table it was inferred that the high intensity training on experimental group showed significant improvement on speed, leg explosive power and flexibility of the collegiate volley ball players.

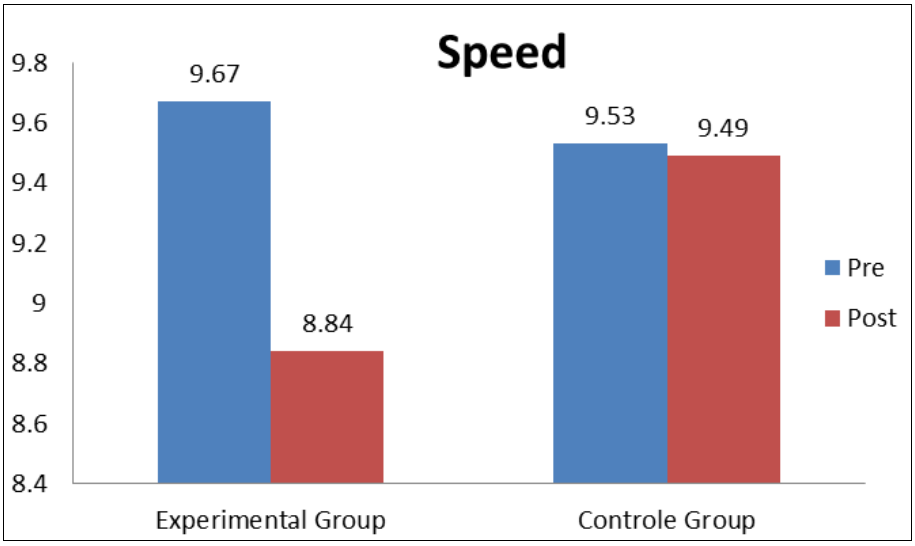

Fig 1: Bar Diagram Showing Means on Speed of Volleyball Players

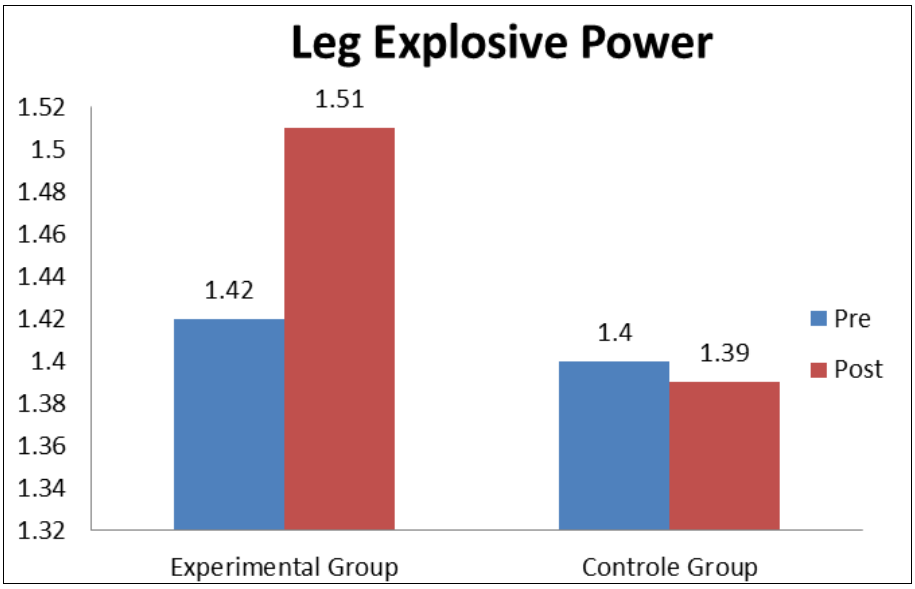

Fig 2: Bar Diagram Showing Means on Leg Explosive Power Volleyball Players

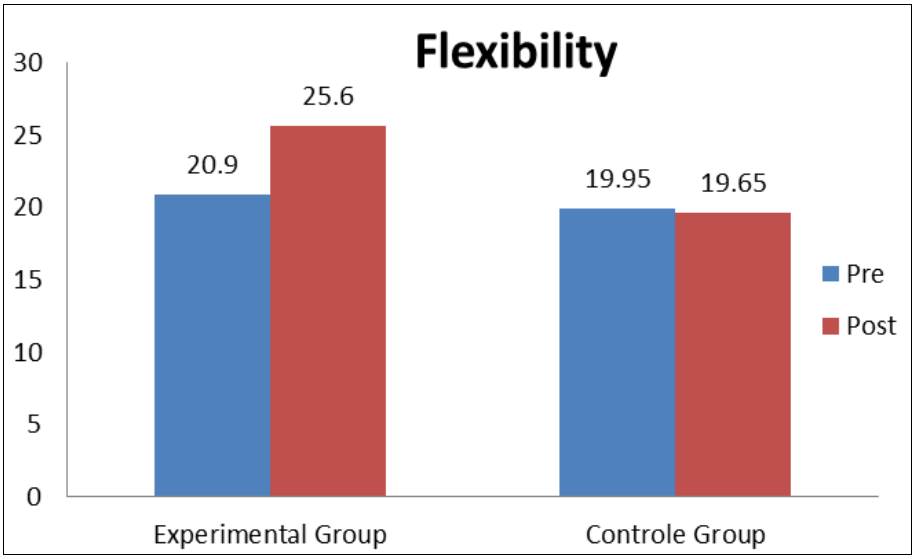

Fig 3: Bar Diagram Showing Means on Flexibility of Volleyball Players

Results and Discussion

The results clearly indicated that the speed, leg explosive power and flexibility of experimental group improved due to the influence of 16 weeks high intensity interval training programme. Speed and leg explosive power is an important component of high-intensity performance in team sports and includes variables such as acceleration, decelerations, and explosive strength capacity during directional changes and also which are important fitness performance parameters in the volleyball players. Since the game of volleyball required strength, explosive power of lower body and the core body region (Bangsbo *et al.*, 2012) [9]. Therefore, this study aimed to provide scientific training techniques for improve performance variables of collegiate volleyball players. HIIT workouts provide physical capacity and conditioning as well as improved glucose metabolism and also in improving muscle and bone mass. This also improves blood vessels function and markers of blood vessel health. This HIIT training is referred to as a "base fitness level". It is a constant aerobic training for several weeks that produces muscular adaptations, which improve oxygen transport to the muscles, so as each and every cell gets energy. Through this training, depending upon the training programme adopted, the components like strength, endurance and explosive power all developed. In this study the subjects who underwent high intensity training were able to improve their performance fitness. Therefore, it is found a positive relationship between HIIT improvements of performance fitness.

Conclusion

Twelve weeks of high intensity interval training programme produced significant improvements in the speed, leg explosive power and flexibility of collegiate volleyball players. High intensity interval training is an appropriate training protocol to bring out desirable changes over performance fitness variables for collegiate volleyball players.

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