



P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 4.69
IJPESH 2015; 2(1): 20-22
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www.kheljournal.com
Received: 18-06-2015
Accepted: 21-07-2015

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Effect on package of low impact plyometric exercise on selected performance related fitness variables among volleyball players

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Abstract

The purpose of this study was to find out the effect on package of low impact plyometric exercise on selected performance related fitness variables among volleyball players. To achieve the purpose of these study 20 male volleyball players who were studying in the department of Physical Education and Sports Sciences, Annamalai University during the academic year 2014-2015 were selected as subjects. The age of the subjects were ranged from 18 to 25years. The selected subjects were divided into two groups of ten subjects each. Apart from the physical education curriculum activities each of them that are Group I underwent low impact plyometric exercise on each practice session before the game and Group II has gone only for the volleyball practice without any plyometric exercise. The experimental group underwent low impact plyometric for 5 days per week for 12 weeks. The low impact plyometric exercise workout includes ankle hops in place, front to back hops over a single cone, side to side hops over a single cone, one leg front to back speed drill over a line, one leg side to side speed drill over a line, two foot scissors dot mat drill, two foot round the world dot mat drill, continuous cone hops over consecutive cones and continuous sideways cone hops over consecutive cones. Each of the above drills was done for 2 sets with 12 repetition each exercise. The data were collected on selected criterion variables namely performance related fitness variables such as strength endurance and explosive power were measured by using sit ups and sergeant jump respectively before (pre) and after the 12 weeks of training(post). Analysis of covariance was applied to find out significant difference if any between the experimental and control group.

Keywords: plyometric exercise, low impact, strength endurance, explosive power.

1. Introduction

Volleyball is a social game, where next to the good coordination and cleverness comes up to the important place team players good rapprochement and cooperation (Adams K, 2002) [1]. Modern volleyball requires for player a good physical endurance, parallel it is very important to develop speed and explosive power and force endurance. Vertical jump ability is critical for success in volleyball. Jumping is utilized during the jump set, jump serve, blocking and spiking. A successful player must not only be able to jump high but must also be able to reach that height quickly, this requires an ability to generate power in a very short time (Stojanovic, 1996) [2]. Plyometric exercises have been shown to improve jump performance in many sports. These exercises combine strength with speed of movement to produce power. By using the myostatic stretch reflex of the muscle to produce an explosive reaction, plyometric is believed to be the link between speed and strength (Stojanovic, 1996) [2]. The plyometric method is ranked among the most frequently used methods for conditioning in volleyball (Lehnert *et al.*, 2009) [3]. Plyometric is a type of exercise that's designed specifically to improve fast powerful movements. When performing plyometric movements, the muscles are loaded and then contracted in rapid sequence. Fast change of direction movements improves the elasticity and innervations of the muscles and surrounding tissues. Plyometric exercises result in volleyball players jumping higher, running faster, and hitting harder. Low impact plyometric are becoming popular exercises for volleyball players.

2. Methodology

The purpose of this study was to find out the effect on package of low impact plyometric exercise on selected performance related fitness variables among volleyball players. To achieve the purpose of these study 20 male volleyball players who were studying in the

department of Physical Education and Sports Sciences, Annamalai University during the academic year 2014-2015 were selected as subjects. The age of the subjects were ranged from 18 to 25years.

3. Training Methods

The selected subjects were divided into two groups of ten subjects each. Apart from the physical education curriculum activities each of them that are Group I underwent low impact plyometric exercise on each practice session before the game and Group II has gone only for the volleyball practice without any plyometric exercise. The experimental group underwent low impact plyometric for 5 days per week for 12 weeks. The low impact plyometric exercise workout includes ankle hops in place, front to back hops over a single cone, side to side hops over a single cone, one leg front to back speed drill over a line, one leg side to side speed drill over a line, two foot

scissors dot mat drill, two foot round the world dot mat drill, continuous cone hops over consecutive cones and continuous sideways cone hops over consecutive cones. Each of the above drills was done for 2 sets with 12 repetitions in each exercise.

4. Statistical Technique

The data were collected on selected criterion variables namely performance related variables such as strength endurance and explosive power were measured by using sit ups and sergeant jump respectively before (pre) and after the 12 weeks of training(post). Analysis of covariance was applied to find out significant difference if any between the two groups.

5. Analysis of the Data

The collected data were analyzed by using analysis of covariance and they were discussed below.

Table I: Analysis of Covariance for Pre and Post Tests Data on Strength Endurance between the two groups

	Group Without Low impact plyometric	Low impact plyometric group	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pretest Mean SD	46.5000	47.700	Between	7.200	1	7.200	2.464
	1.35401	2.002	Within	52.600	18	2.922	
Posttest Mean SD	47.100	50.200	Between	48.050	1	48.050	18.600*
	0.737	2.149	Within	46.500	18	2.583	
Adjusted Posttest Mean	47.443	49.857	Between	25.614	1	25.614	14.874*
			Within	29.275	17	1.722	

* Significant at 0.05 level. The table value required for significance at 0.05 level of confidence with degrees of freedom 1, 17 is 4.45 and degree of freedom 1, 18 is 4.41

Table II: Analysis of Covariance for Pre and Post Tests Data on Explosive Power between the two groups

	Group Without Low impact plyometric	Low impact plyometric group	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pretest Mean SD	50.400	50.300	Between	.050	1	.050	.002
	4.477	4.522	Within	364.500	18	20.250	
Posttest Mean SD	50.600	54.900	Between	92.450	1	92.450	5.312*
	3.893	4.433	Within	313.300	18	17.406	
Adjusted Posttest Mean	50.555	54.945	Between	96.382	1	96.382	126.988*
			Within	12.903	17	.759	

* Significant at 0.05 level. The table value required for significance at 0.05 level of confidence with degrees of freedom 1, 17 is 4.45 and degree of freedom 1, 18 is 4.41

From the table I and II it was cleared that the adjusted posttest mean of group1 and group2 on strength endurance (49.857vs 47.443) resulted in an F-ratio of 14.874, which shows a significant difference. The adjusted posttest means of group1 and group2 on explosive power (54.945vs50.555) resulted in an F-ratio of 126.988, which shows a significant difference.

6. Discussion

In the game of volleyball a player should have physical speed, speed endurance, strength, strength endurance, cardio-respiratory endurance, and explosive power. This game demands the involvement of whole body for attaining maximum performance. The ability to generate strength and power is a very important component for success in many sports, particularly in those involving explosive movements. Performing a low impact plyometric workout at the beginning of volleyball practice will help improve court quickness and explosive power therefore the significant difference on low impact plyometric exercise was justified as lower extremity plyometric exercises are commonly used by athletes to develop explosive speed, strength, and power (Chu D, 1992) [4]. They involve stretch-shortening cycle activity,

where eccentric muscle contraction is quickly followed by concentric contraction of the same muscle (or muscles). Plyometric training can enhance jumping performance and improve balance and neuromuscular control during landing (Koury JM, 1996) [5]. Plyometric drills may include jumps, hops, bounds, or shock drills, which vary in intensity and training often involves repeated maximum efforts (Miller M, Berry D, Buliard S, *et al.* 2002) [6]. The intensity of an exercise increases with greater ground reaction force (GRF), when jumping up or down from a higher height, and during single-leg exercises (Ebben W, 2007) [7]. Consequently, landing impacts, joint reaction forces, eccentric rate of force development (RFD), and muscle activity are important factors in assessing intensity(Ferber R, Davis IM, Hamill J, *et al.* 2008) [8]. Only a limited number of studies have compared the intensities of a range of plyometric exercises (Jensen RL, Ebben W. 2007) [7, 9]. From the supporting studies it was found that performing a low impact plyometric workout at the beginning of volleyball practice will help improve court quickness, explosive power and strength endurance among volleyball players. To make a big impact, volleyball workouts and practices should include at least 10 to 15 minutes of low impact plyometric.

7. Conclusion

From the results of the study it was concluded that there was a positive change in the performance related fitness variables such as of strength endurance and explosive power due to six weeks of package of low impact plyometric exercise such as ankle hops in place, front to back hops over a single cone, side to side hops over a single cone, one leg front to back speed drill over a line, one leg side to side speed drill over a line, two foot scissors dot mat drill, two foot round the world dot mat drill, continuous cone hops over consecutive cones and continuous sideways cone hops over consecutive cones for volleyball players. From these we also recommended that to make a big impact, volleyball practices should include at least 10 to 15 minutes of low impact plyometric

8. References

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