International Journal of Physiotherapy and Research,
Int J Physiother Res 2014, Vol 2(6):793-98. ISSN 2321-1822
DOI: 10.16965/ijpr.2014.695

Original Article

EFFECTS OF PLYOMETRIC VERSUS PILATES EXERCISES ON THE MUSCULAR ABILITY AND COMPONENTS OF JUMPING TO VOLLEYBALL PLAYERS: A COMPARATIVE STUDY

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ABSTRACT

Background: The ability to jump plays an effective and important role in volleyball, Because jump skills are greatly complicated that it is nearly the outcome of vertical force and horizontal speed besides harmony and synchronization of the work of arms and feet. There is also total harmony related to the skill and plan achievement during attack and block.
The purpose of this study was to examine the Effect of Plyometric VS. Pilates Exercises on the Muscular Ability and Components of Jumping in Volleyball Players.
Study Design: Experimental design.
Methods: 30 subjects were selected randomly from the population using simple random sampling procedure and were divided into two equal groups. Group A was given plyomeric training And Group B was given Pilate training. Outcome measures were taken before and after the Program Schedule of 3 Sessions alternately in 1 week for 6 weeks.
Outcome measures: Vertical Jump height, Block jump, and the attack jump, Agility T test,
Results: In Group-A (plyometric) and Group-B (Pilate), all data was expressed as mean ± , SD and was statistically analyzed using paired 't' test and independent 't' test to determine the statistical difference among the parameters at 0.5% level of significance. Statistical data of agility t test, vertical jump height, the Block jump, and the attack jump in volley ball players showed that, there was no significantly differennce between groups. And both were effective with $p<0.05$; i.e 95% of significance.
Conclusion: In this study, we concluded that both groups (A & B) were effective in agility t test, improving vertical jump height, the Block jump, and the attack jump in volley ball players. But we recommend use of plyomertic training in volleyball players.
KEYWORDS: Volleyball players, Plyometric training, Pilate training.

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Access this Article online

Quick Response code

DOI: 10.16965/ijpr.2014.695

International Journal of Physiotherapy and Research
ISSN 2321- 1822
www.ijmhr.org/ijpr.html

Received: 04-11-2014	Accepted : 17-11-2014
Peer Review: 04-11-2014	Published (O): 11-12-2014
Revised: 10-11-2014	Published (P): 11-12-2014

INTRODUCTION

The widespread of volleyball all over the world has the greatest effect in promoting the level of players considerably in all sides of preparation especially the physical one. It was necessary to use advanced techniques enabling players to reach highest level technically or physically besides coaches getting ample information about their players through the continuation of developing the level and its follow-up.[1]

Volleyball skills aren't easy enough and need very long time for perfection. They need training

based on special scientific bases especially we take into account the speed of the ball, the smallest area of the court and the necessity that every player should defend and attack at any time on changing the position with every point he scores. [2]

The ability to jump plays an effective and important role in volleyball, it has to be said that its development leads to showing its effectiveness when the competitors are on equal level.[3] Because jump skills are greatly complicated that it is nearly the outcome of vertical force and horizontal speed besides harmony and synchronization of the work of arms and feet (swings and pushing). There is also total harmony related to the skill and plan achievement during attack and block.

It has become necessary that perfecting jump (which is a skill in its self) should develop the use of Fartleks and Plyometrics and Pilates and others through non stop continuous training that's because it is one of the most important necessities and requirements of the game.[4]

Pilates technique is regarded one of the modern techniques in training in general and volleyball training in particular. [5]

Pilates technique is regarded of exercises that helps to give the right form of body without prominent muscles and strengthen weak muscles. He looks upon it as an exercise which helps elongate the short muscles through concentrating on one muscular set without causing intense of other muscles of the body.[6,7,8]

Therefore, these exercises focus on structure correctly with following rationed technique of breathing thus an individual feeling of his body is improved. One of the basic principles of the Pilates technique is the correct breathing accompanying every exercise brings out expansion of the two sides and the relaxation of abdominal muscles with breathing in and controlling the abdominal muscles and intensifying them towards the back on breathing out.

Pilates Exercises: It is a set of exercises defined to build muscular power, flexibility, muscular endurance and achieving the whole bodily balance through motor performance with the technique suitable breathing to re improve the relation between mind and body.[8]

Plyometrics, also known as "jump training" or "plyos", are exercises based around having muscles exert maximum force in as short a time as possible, with the goal of increasing both speed and power. This training focuses on learning to move from a muscle extension to a contraction in a rapid or "explosive" way, for example with specialized repeated jumping. Plyometrics are primarily used by athletes to improve performance, and are used in the fitness field to a much lesser degree.

The effects of plyometric training, also referred to as ballistic training or stretch-shortening exercise, have been studied rather extensively in both athletic and nonathletic populations. Benefits from this type of training include improved measures of muscular strength and power , joint function and stability, reduced incidence of serious knee injuries, and running economy . That have employed jump-specific plyometric exercises (i.e., depth jumps or drop jumps) have reported significant improvements in vertical jump.[8, 9, 10] These increases in have been associated with factors such as increased power output and maximum rate of force development as well as increased muscle fiber size characteristics likely attributed to the stretch reflex, high eccentric loading, and explosive nature of plyometric exercises.

There is a no of evidence which is more effective exercises among Pilates and plyometric for athletes. And there is no evidence which training more effective for jumping and volleyball players.

Thus, the purpose of this study was to examine the Effect of Plyometric VS. Pilates Exercises on the Muscular Ability and Components of Jumping to Volleyball Players.

MATERIALS AND METHODS

Study design: Experimental Study (Comparative).

Source of Data: Study was conducted at parul institute of physiotherapy and parul group of institutes. And parul fitness center.

Sample Size & Technique: Convenient Sampling Method, Study was done on 30 subjects who

were fulfilling the inclusion and exclusion criteria in volleyball players.

Materials Used:

· Swiss ball

· foam rollers,

· Pilates circle.

· Balance boards.

· Box drill.

· Medicine ball (2kg, 3kg, 5kg).

· Stop watch.

· Measure tap. (centi)

Inclusion Criteria:

· Age group : 18 to 25 years

· College level volleyball players.

· Without musculo-skeletal, metabolic,

· cardiovascular/respiratory, hematological or endocrine disorders

Exclusion Criteria:

· Any muscle skeletal injury and disorder.

· Presence of cardio vascular disease

· Except college level volley ball players.

· Any participant who has a musculoskeletal injury in the last six-months or a leg length discrepancy (< 3cm)

METHODOLOGY

There were 30 Subjects who fulfiled inclusion and exclusion criteria were selected from the population and divided into two Groups(A&B).

Subjects will be explained about the Research and treatment protocol. Inform consent form was be signed by the subject before the treatment started.

Subjects were screened using an Assessment Form and Outcome measures before and after the Program Schedule of 3 Sessions alternately in 1 week up to 6week.

The components of the training course being used:

· Duration of training course is six weeks

· Weekly training units were four.

· Time of unit was determined by matching to the number of training units.

· Warming-up before the beginning of every training unit.

· Relief at the end of every training unit.

Warming-up in all training units:[18]

· Doing 10 laps around the court.

· Running with rotating arms forward around the court.

· Jump with rotation arms backward around the court.

· Jump aside the face towards around the court.

· Jump aside the face outside around the court.

· Running with high lifting of the knees around the court.

· Running with the touch of rump with heels around the court.

· Forward jump around the court.

· Forward jump without bending knees around the court.

· Running with pushing legs forward.

Relaxation:[18]

· (Lying down opening the legs) deep breath (fast breathing in followed slow breathing out).

· (Lying down) bending the two legs against the thighs.

GROUP A

· 15 subjects under plyometric training.[19]

· Lower body plyometric

· Upper body plyometric

· Trunk plyometric .

GROUP B

15 subjects under pilate training [5,6,18].

· (Linear sitting) lifting legs upwards.

· (Balance sitting) exchanging the opening of legs.

· (Lying down aside) lifting arms and legs backward.

· (Lying down arms aside) gathering legs with clapping backward. .

· (Resting heels on a box and shoulders on another) with lowering rump. ,

· (Leaning lying down) exchange lifting legs upwards.

· (Leaning lying down) exchange lifting the arm with the leg adversely.

· (Lying down arms upward) exchange lifting the

leg.

· (Lying down lift) the arm backward with lifting the adverse leg backward and upward.

· (Leaning lying down) lift the leg aside.

· (Leaning lying down on the arm) the upper leg forward and upward.

· (Lying down two arms aside) lifting the legs upward and backward.

· (Lying down two arms aside) lifting the legs forward, upward and backward with opening.

· (Lying down squatting) lifting pelvis forward and upward then lifting the leg forward and upward.

Outcomes were assessed pre and post to the whole treatment protocol of 6 week. The variables in this study included of vertical jump, the Block jump, and the attack jump, agility t test and 2 anthropometric measures, body height (BH), and body weight (BW).

Before testing, the athletes were suggested to be properly but not excessively hydrated. Each subject underwent all the tests during 1 session. The Body height and weight the participants were tested before the warm-up when they were in shorts and with no shoes. For the rest of the testing, the subjects wore volleyball shorts and shirts and their standard playing shoes. After a warm-up and 1 minute of hamstring stretches, each subject performed 3 trials for each of the 3 types of jump, agility t test.

Data Analysis:

Data was computed and analysis using SPSS 17.0 software. Mean and Standards deviation were calculated for age, Muscular ability of Sargent (Vertical Jump distance), the Block jump, and the attack jump, Agility T test Pre and Post value.

RESULTS AND TABLES

In Group-A and Group-B, all data was expressed as mean ± , SD and was statistically analyzed using paired 't' test and independent 't' test to determine the statistical difference among the parameters at 0.5% level of significance. Paired't' test was used to examine the changes in dependent variables from baseline to after completion of intervention in each group.

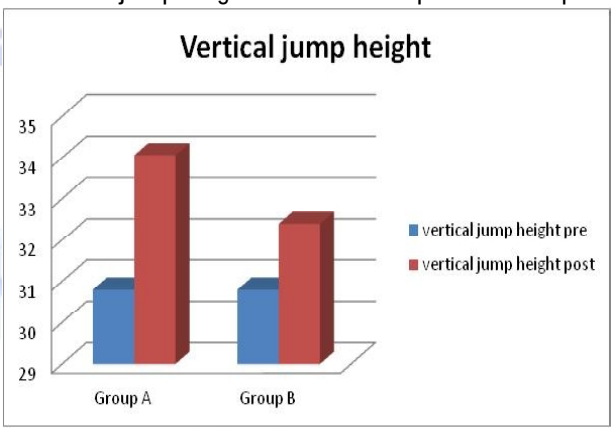
In Group A mean age was 22.53 year, and Group B mean age was 22.60 years.

Here table showed baseline data almost same there were significance difference.

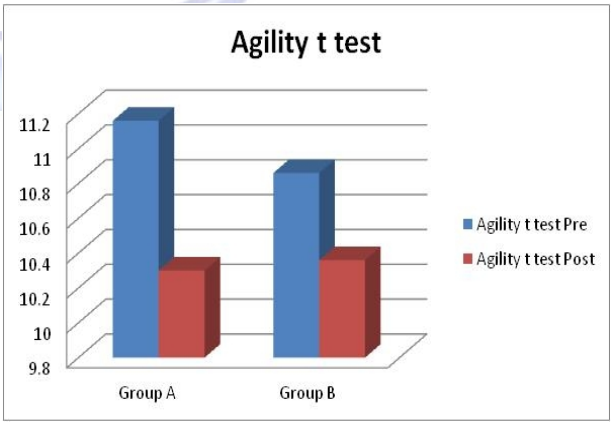
Table 1: Comparison of Pre and Post-test values of Vertical jump height, Agility t test, Attack jump, Block jump in Group A and Group B.

	Group A					Group B			
		Mean	SD	p value	t value	Mean	SD	p value	t value
Vertical jump height	pre	30.8	3.098	0	14.317	30.8	3.338	0	8.29
	post	34.06	2.865			32.4	3.439		
Agility t test	pre	11.16	0.449	0	5.49	10.86	1.093	0.026	2.485
	post	10.3	0.591			10.36	0.766		
Attack jump height	pre	48.8	3.8	0	6.439	48.26	2.05	0	4.785
	post	50.73	3.36			49.73	2.05		
Block jump height	pre	17.13	3.2	0	8.473	17.13	3.2	0	5.392
	post	19.06	3.55			19.06	3.55		

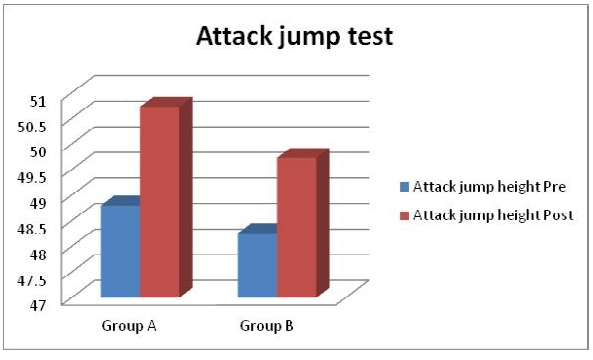
Graph 1: Showing the Pre-test and Post-test differences in Vertical jump height scores in Group A and Group B.



Graph 2: Showing the Pre-test and Post-test differences in Agility t test scores in Group A and Group B.



Graph 3: Showing the Pre-test and Post-test diffeences in Attack jump test scores in Group A and Group B.



Graph 4: Showing the Pre-test and Post-test diffeences in Block jump test scores in Group A and Group B.

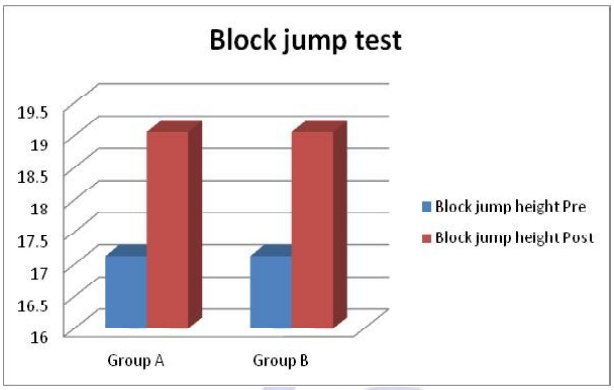


Table 2: Comparison of Pre test and Post test diffeences in Vertical jump height, Agility t test, Attack jump, Block jump scores in Group A and Group B.

Mean of differences Pre test and Post test		Mean	SD	t value	p value
Vertical jump height	Group A	3.266	0.88372	2.351	0.026
	Group B	2.4	1.12122		
Agility t test	Group A	0.8667	0.6114	1.434	0.163
	Group B	0.5	0.7792		
Attack jump height	Group A	1.9333	1.16292	1.088	0.286
	Group B	1.4667	1.18723		
Block jump height	Group A	1.9333	0.88372	2.301	0.029
	Group B	1.2	0.86189		

The results, thus indicate that both the groups improved in Muscular ability of Sargent (Vertical Jump distance), the Block jump, and the attack jump, Agility T test but, there was no significant difference between plyometric (Group A) and Pilates (Group B) for volleyball players.

DISCUSSION

These finding showed that Both Groups i.e plyometric (Group A) and Pilates (Group B) for volleyball players improved jumping as well as agility to their sports, Vertical Jump distance, the Block jump, and the attack jump, Agility T test.

Here plyometric (Group A) training examined the effect of plyometric training on 6week. 15 moderately to well-trained male volleyball players endurance added 2 sessions of high volume–low intensity plyometric training per week during 6 weeks to their usual endurance training. It was improve agility t test. and plyometric training were attribute to change in the mechanical properties of muscle tendon complex rather than to muscle activation strategies recent meta-analysis examining the effectiveness of plyometric training for improving vertical jump height Jump distance, the Block jump, and the attack jump reported.[11]

Here concluded that plyometric training was more effective than regular practice of volley ball in improving strength balance, jumping power, and sports specific skill of volley ball players[19].

Pilates exercises led to improvement of nervous system in functioning muscles work between working muscles in motor performance[7]. Pilates training examined the effect of Pilates training on 6week. 15 moderately to well-trained male volleyball players endurance, It was improve agility t test, improving vertical jump height Jump distance, the Block jump, and the attack jump.[18]

Here both groups were more effective in volley ball players .hence Nevertheless even when both groups (A & B) were effective in agility t test, improving vertical jump height Jump distance, the Block jump, and the attack jump in volley ball players.

CONCLUSION

In this study, we conclude that both groups (A & B) were effective in agility t test, improving vertical jump height Jump distance, the Block jump, and the attack jump in volley ball players. But we used recommended plyomertic training in volleyball players.

Limitations of study:

· The study was not conducted on a large scale and study sample was considerably less.

· Psychological and environmental factors were not taken into consideration.

· Only males were included as subjects in the study.

Conflicts of interest: None

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How to cite this article:

Sandipkumar Parekh, Keyur Patel, Jyoti Chauhan. EFFECTS OF PLYOMETRIC VERSUS PILATES EXERCISES ON THE MUSCULAR ABILITY AND COMPONENTS OF JUMPING TO VOLLEYBALL PLAYERS: A COMPARATIVE STUDY. Int J Physiother Res 2014;2(6):793-798. **DOI:** 10.16965/ijpr.2014.695