

# Effect of Sand Training on Jumping Abilities of Junior Volleyball Players

Rajkumar Sharma<sup>1\*</sup> Devarishi Kumar Chaubey<sup>2</sup>

1. Sports Authority of India coaching centre, Department of sports and youth welfare, District Sports Complex, Bilaspur (Chhattisgarh) India
2. Department of Physical Education, Dr. C. V. Raman University, Kota- Bilaspur (CG) India

\*E-mail of the Corresponding Author- [Sharmagym59@yahoo.co.in](mailto:Sharmagym59@yahoo.co.in)

## Abstract

The purpose of the study was to determine the effect of sand training on jumping abilities of junior volleyball players. For this purpose, thirty junior volleyball players enrolled in the S.A. I. training centre for volleyball at Rajnandgaon (CG) under the day boarding scheme, age ranging from 16 to 19 years, were selected as the subjects of the study. Subjects were divided randomly in two equal groups Group-A (n=15) and Group-B (n=15). Group-A went for a program selected for sand training for a period of 6 weeks and group 'B' was the control group. The subjects of the control group and experimental group had trained volleyball prior to the experimental program for a period of two and four years respectively. Measurement for various variables taken at the beginning (Pre-test) and at the end of experimental period after 6 weeks Post-test). The Mean, S.D. and t-test were computed by the investigator for the collected data. The difference of pre-test and post-test scores were taken into account. The level of significance was set at .05 level of confidence. The analysis of data revealed that the six-week sand training program has an effect on the statistically relevant increase in the explosive type strength of the leg muscles, which in turn leads to an increase in the vertical jump of a block, spike and the long jump. The technical and tactical training program to a lesser extent in comparison to the experimental group has an effect on the development of explosive type strength.

**Keywords:** Sand training, Explosive strength, Jumping ability, Junior Volleyball players

## 1. Introduction

Sand training is a gentle on the joints but murder on the muscles way of improving your vertical jump. The softness of the sand, like the trampoline mat, absorbs and disperses your downward force which takes away any plyometric advantages of the stretch shorten cycle. The sand also makes your muscles work that much harder to actually get any height on your jump. A recent Italian study showed that athletes who trained on sand showed a greater average improvement in their standing vertical jump than those athletes who trained on grass. This type of training is more a muscle centric method of developing your vertical jump. The best way to use it is there if to focus on the joint friendly characteristics of the sand to train in a ballistic loaded manner.

Markovic (2007) explained that the positive effect of strength and suppleness training on the vertical component of the jump had pointed out the significance of power of legs and efficiency of the jump, especially its vertical component. Tillman et.al.(2004) has analyzed the technique of jump-off and landing in top female volleyball. A number of jumps under competition conditions has been quantified, which is followed by determining different landing techniques. Komi and Bosco(1978) noted that men and women volleyball players attained the greatest jump heights in the depth jump condition, followed by the countermovement jump and squat jump conditions. Dursenev and Raevsky (1978) felt that depth jumps from two meters or higher were superior for improving muscle strength. Impellizzeri et. al. (2008) concluded that plyometric training on sand improved both jumping and sprinting ability and induced less muscle soreness. A grass surface seems to be superior in enhancing counter movement jump performance while the sand surface showed a greater improvement in squat jump. Gehri et. al.(1998) suggested to include plyometric depth jump training as part of the athlete's overall program for improving vertical jumping ability and concentric contractile performance. Kumar & Kumar (2005) proved that circuit training programs are more effective in improving the jumping abilities of the subjects because it is more saturated with depth jumping exercises. Stojanovic & Kostic (2002) concluded that the exercise model for the development of the vertical jump has contributed to the relevant difference in the increase of the vertical jump in comparison to the control group, which had used technically tactical contents to develop the vertical jump.

Considering the importance of explosive strength of leg in volleyball, the study was carried out to see the effect

of sand training on jumping abilities of junior male volleyball players.

## 2. Methodology

### 2.1 Sample

The sample consisted of 30 junior volleyball players enrolled in the S.A. I. training centre for volleyball training, Rajnandgaon (C.G.) under the day boarding scheme, age ranging 16 to 19 years, were selected as the subjects of the study. Subjects were divided randomly in two equal groups (n=15) and Group-B (n=15). Group - A went for a program selected for sand training, having an average height ( $186.35 \pm 8.52$ ) and body weight ( $70.57 \pm 8.98$ ). and Group-B was the control group, having an average body height ( $177.35 \pm 64.80$ ) and average body weight ( $68.91 \pm 6.48$ ). Group-A followed the sand training program for a period of 6 weeks. Measurement for various variables taken at the beginning (Pre-test) and at the end of experimental period after 6 weeks (Post-test).

### 2.2 Training program

Prior to the realization of the training program by the experimental group, the volleyball players were trained for three weeks using a preliminary period training program for a duration of 90 to 120 minutes. The basic aim during this period was to increase the basic abilities for aerobic capacities, endurance and strength. The initial measuring took place following the completion of this phase of the preliminary period. The final measuring took place three days after the completion of the experimental program. After the preliminary period, the experimental group was trained for a period of six weeks using a sand training model, which included the use of a sand training method for the development of explosive leg strength. A total of 15 training sessions took place. The number of training sessions per week was as follows: 2-2-3-2-3-3 The set of models for the development of explosive leg strength consisted of five exercises which were realized following a 30 minutes warm-up. During this period, the control group plays the technical and technical skills of volleyball. The details of training program are given in Table 1.

### 2.3 Description of Tests

#### 2.3.1 Block Jump (BJ)

The examinee stands facing the wall and resting both outstretched arms on the board next to the fixed measuring tape, so that they are on the same level. After noting the height within reach for the block jump, the examinee takes off with both feet, and touches the board that is next to the steel measuring tape with the fingers of both hands, which have previously been coated with magnesium. The evaluator should be standing on the wooden case so that his head is at level with the height within reach of that jump, so as to increase the accuracy of the results. Three jumps are made. Marking: the height within reach for that jump is measured in centimeters, and then the height within reach is subtracted from it, and we get the height of that jump.

#### 2.3.2 Spike Jump (SJ)

Examinee stands facing the wall and resting both outstretched arms on the board next to the fixed measuring tape, so that they are on the same level. After noting the height within reach for the spike jump, the examinee takes a step back, and with a running start of just one step, takes off with both feet, and touches the board that is next to the steel measuring tape with the fingers of both hands, which have previously been coated with magnesium. The evaluator should be standing on the wooden case so that his head is at level with the height within reach of that jump, so as to increase the accuracy of the results. Three jumps are made. Marking: the height within reach for that jump is measured in centimeters, and then the height within reach is subtracted from it, and we get the height of that jump.

#### 2.3.3 Standing Broad Jump (SBJ)

The subject stands behind a takeoff line with his feet several inches apart. Before, jumping the student dips at the knees and swings the arms backward. She then jumps forward by simultaneously extending the knees and swinging the arms forward. Two trials are permitted. Measurement was from the closest heel mark to the takeoff line. Marking: The score was the best of three distances recorded in centimeters and inches.

## 3. Results and Discussion

### 3.1 Results

The Mean, S.D. and 't' test were computed by the investigator for the collected data through SPSS 16.0 program. The difference of pre-test and post-test scores were taken into account. The level of significance was set at .05 level of confidence and the data pertaining to this have been presented in Table 2 & 3. The mean scores of various jumping abilities on pre-test and post-test of experimental and control group of male junior volleyball players have been depicted in Figure 1.

The statistically significant difference was found between the pre-test and post test means of block jump of

experimental group, as the obtained t-value of 8.29 was higher than the calculated value of  $t_{.05(14)}=2.14$ . Similarly, the significant difference was also not found between the pre-test and post-test means of block jump of control group, as the obtained t-value of 0.13 was much less than the calculated value of  $t_{.05(14)}=2.14$  (Table 3). This suggests that there is no effect of treatment on the Block jump test performance, i.e. explosive strength of the legs. This implies that both the groups are homogeneous with respect to block jump performance at pre-test and post-test point of view.

In case of Spike Jump, there was statistically significant difference between the pre-test and post test means of spike jump of experimental group, as the obtained t-value of 7.54 was higher than the calculated value of  $t_{.05(14)}=2.14$ . Similarly, the significant difference was also not found between the pre-test and post-test means of spike jump of control group, as the obtained t-value of 0.87 was much less than the calculated value of  $t_{.05(14)}=2.14$ . This suggests that there is no effect of treatment on the spike jump test performance i.e. explosive strength of the legs. This implies that both the groups are homogeneous with respect to block jump performance at pre-test and post point of view.

In case of Standing broad jump, there were statistically significant differences between the pre-test and post test means of standing broad jump of experimental group and control groups, as the obtained t-values of 8.56 and 2.54 respectively were higher than the calculated value of  $t_{.05(14)}=2.14$ . This suggests that there is an effect of treatment on the standing broad jump test performance i.e. explosive strength of the legs of the subjects.

### 3.2 Discussion

Results of the analysis of the differences between the initial and final measuring of the experimental group by t-test indicated that the players of the experimental group had greatly improved their results in the block and spike jumps, as well as in the long jump during the six week period. The greatest growth increase of 8.67% was found in the block jump, then in the spike jump 7.16%, while the smallest in the standing broad jump 3.63% (Table 3). The volleyball players of the control group at the final measuring also scored a numerically better set of results in all the tests, but these values were lower compared to the players of the experimental group. The greatest growth increase was found in the standing broad jump and it was 2.54%, then in the spike jump 2.22%, while the smallest was in the block jump 1.66% (Table 3).

It is emphasized in the statistical analysis discussion that by using the set of sand training on the experimental group and the technical and tactical exercises on the control group, an increase in the explosive type strength of the leg muscles was brought about. The explosive type strength brought about an increase in the high jump as well as the long jump ability. This research was supported by Chu (1991).

The experimental group achieved an increase in the vertical jump of the spike and block which was in the 4.46 and 4.59 range. Similar results in the research into the development of the vertical jump are to be found in the work of whose examinees increased their vertical jump by 5.2 cm over and eight-week period.

## 4. Practical Application

These results demonstrate that sand training can be used in sports to improve the vertical jump such as basketball, high jump in athletics, and volleyball etc. The athletes who trained on sand showed a greater average improvement in their standing vertical jump than those athletes who trained on grass. This type of training is more a muscle centric method of developing your vertical jump. The best way to use it is there if to focus on the joint friendly characteristics of the sand to train in a ballistic loaded manner.

It appeared that six weeks of training, with two to three sessions per week were sufficient to significantly increase the vertical jumping ability, a main parameter in those sports where an athlete have need the jumping performance. But that in fact, the time dedicated to the sand training could actually improve later performances.

## 5. Conclusions

Within the frame-work of the present investigation, the following conclusions may be drawn:

The six-week sand training program have an effect on the statistically relevant increase in the explosive type strength of the leg muscles, which in turn leads to an increase in the vertical jump of a block, spike and the long jump.

The technical and tactical training program to a lesser extent in comparison to the experimental group, have an effect on the development of explosive type strength

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**Table 1. Training Program for Development of Jumping Abilities of Junior Volleyball Players**

Week	Training Sessions	Load	Event	Sets	Jumps	Height of Box
1,	1 and 2	70 %	Squat jump with sand bag Depth jump Box jump sideways Tuck Jump Vertical jumps	02 02 02 02 02	07 10 30 Sec. 09 08	----- 40 Cm. 30 Cm ----- -----
2,	3 and 4	80 %	Squat jump with sand bag Depth jump Box jump sideways Tuck Jump Vertical jumps	03 03 03 03 03	06 10 30 Sec. 10 09	----- 50 Cm. 30 Cm ----- -----
3,	5, 6, & 7	90 %	Squat jump with sand bag Depth jump Box jump sideways Tuck Jump Vertical jumps	04 03 03 03 03	06 10 60 Sec. 12 11	----- 60 Cm. 30 Cm ----- -----
4,	8 and 9	80 %	Squat jump with sand bag Depth jump Box jump sideways Tuck Jump Vertical jumps	03 03 03 03 03	06 10 60 Sec. 10 9	----- 50 Cm. 30 Cm ----- -----
5,	10, 11, & 12	90 %	Squat jump with sand bag Depth jump Box jump sideways Tuck Jump Vertical jumps	04 03 03 03 03	06 10 90 Sec. 11 11	----- 60 Cm. 30 Cm ----- -----
6,	13, 14, & 15	100 %	Squat jump with sand bag Depth jump Box jump sideways Tuck Jump Vertical jumps	04 03 03 03 03	06 10 90 Sec. 13 12	----- 70 Cm. 30 Cm ----- -----

Note: weight of Sand beg will be minimum 10% of total body weight.

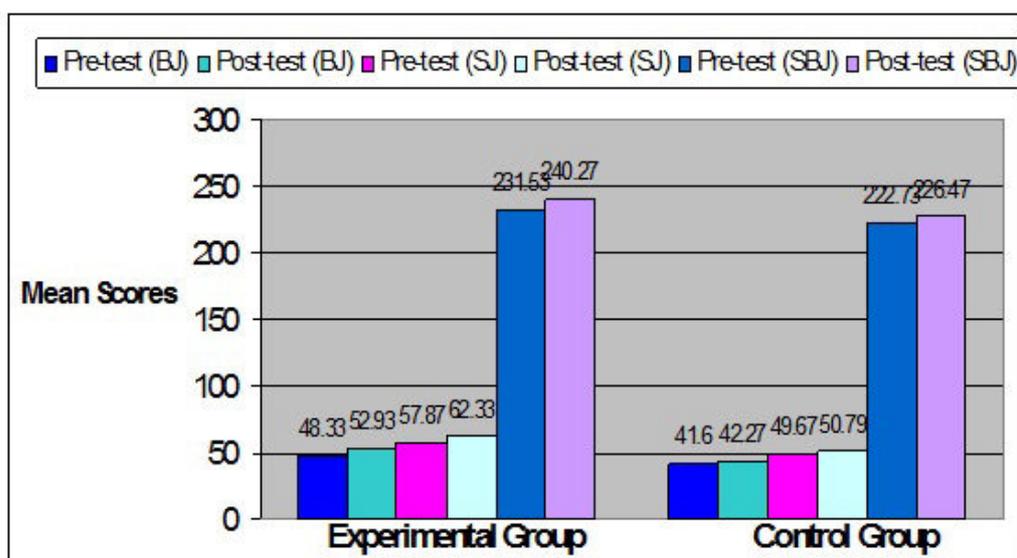
**Table 2. Descriptive Statistics of Jumping Abilities of Male Junior Volleyball Players of Experimental and Control Groups on Pre-test and Post-test**

Test Variables	Treatment	Experimental Group		Control Group	
		M	± SD	M	± SD
<b>Block jump</b>	<b>Pre-test</b>	<b>48.33</b>	<b>± 01.35</b>	<b>41.60</b>	<b>± 02.04</b>
	<b>Post-test</b>	<b>52.93</b>	<b>± 01.23</b>	<b>42.27</b>	<b>± 01.95</b>
<b>Spike jump</b>	<b>Pre-test</b>	<b>57.87</b>	<b>± 01.08</b>	<b>49.67</b>	<b>± 03.37</b>
	<b>Post-test</b>	<b>62.33</b>	<b>± 01.56</b>	<b>50.79</b>	<b>± 02.97</b>
<b>Standing broad jump</b>	<b>Pre-test</b>	<b>231.53</b>	<b>± 07.77</b>	<b>222.73</b>	<b>± 11.54</b>
	<b>Post-test</b>	<b>240.27</b>	<b>± 06.71</b>	<b>226.47</b>	<b>± 10.36</b>

**Table 3. Significance of Difference between Pre-test and Post-test Mean Scores of Block, Spike and Standing Broad Jump on Experimental and Control Group of Junior Volleyball Players**

Test Variables	Groups	Test	Mean	t-value	Growth %
Block Jump	Experimental Group	Pre-test	48.33	8.29*	8.67
		Post-test	52.93		
Block Jump	Control Group	Pre-test	41.57	0.13	1.66
		Post-test	42.27		
Spike Jump	Experimental Group	Pre-test	57.87	7.54*	7.16
		Post-test	62.33		
Spike Jump	Control Group	Pre-test	49.67	0.87	2.22
		Post-test	50.79		
Standing Broad Jump	Experimental Group	Pre-test	231.53	8.56*	3.63
		Post-test	240.27		
Standing Broad Jump	Control Group	Pre-test	222.37	2.54*	1.65
		Post-test	226.47		

\*Significant level at 0.05.,  $t_{05}(14) = 2.14$



**Figure 1: Mean Scores of Block Jump, Spike Jump and Standing Broad Jump on Pre-test and Post-test of Experimental and Control Group Male Junior Volleyball Players**

BIOGRAPHY

1. PLACE: Bilaspur (Chhattisgarh) India

2. DATE OF BIRTH: 01-03-1959

3. AUTHOR'S EDUCATIONAL BACKGROUND:

(i) EDUCATIONAL QUALIFICATIONS:

S.NO.	COURSE OF STUDY	BOARD/ UNIVERSITY	YEAR	OBTAINED MARKS	% OF MARKS
1.	High School	U.P. Board Allahabad	1974	262/500	52.4 %
2.	Intermediate	~ do ~	1977	291/500	58.2 %
3.	B.Sc. (Bio.)	Meerut University	1980	563/1000	56.3%
4.	M. Sc. (Organic Chemistry)	~ do ~	1983	567/1000	56.7 %

(ii) PROFESSIONAL QUALIFICATIONS

COURSE OF STUDY	BOARD/ UNIVERSITY	YEAR	OBTAINED MARKS	% OF MARKS	Remarks
Diploma in Coaching (Gym.)	N.S.N.I.S. Patiala(Pb)	1981-82	652/1000	65.2	Gold Medal In Sport Medicine
B.P.Ed.	G.G.D. University, Bilaspur (C.G.)	1992-93	869/1200	74.4	Gold Medal
M.P.Ed.	G.G.D. University, Bilaspur (C.G.)	1995-96	1751/2550	70.4	Gold Medal
D.S.M.	V.I.T. Midanapur (W.B)	1997	727/1200	60.5	First
D.S.Mgt.	V.I.T. Midanapur(W.B)	1998	787/1200	65.5	First
Ph.D.	G.G.D. University, Bilaspur (C.G.)	2001	"Comparative Analysis of Leadership Preferences of Male and Female Indian Gymnasts of Different Levels"		

5. THE AUTHOR'S MAJOR FIELD OF STUDY : **Teaching, Coaching and Training –Physical Education and Sports**