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## A STUDY OF VERTICAL JUMP PERFORMANCE AMONG U-19 VOLLEYBALL PLAYERS BY PLAYING POSITIONS

**Dr. Vishaw Gaurav, Ph.D.<sup>a</sup>, Dr. Amandeep Singh, Ph.D.<sup>b,\*</sup>, Sandeep<sup>b</sup>**

<sup>a</sup>Department of Education, Government of Punjab, Punjab-144615, India.

<sup>b</sup>Department of Physical Education, Guru Nanak Dev University, Amritsar, Punjab 143005, India.

\*Corresponding Author Ph: 094633-10537; Email: [amandeep.physical@gndu.ac.in](mailto:amandeep.physical@gndu.ac.in)

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**Abstract:** The purpose of this study was to compare the vertical jump performance among under-19 age group male volleyball players by playing positions. A sample of Forty eight (N = 48) male volleyball players (mean  $\pm$  SD: age  $18.35 \pm 0.56$  years, height  $182.23 \pm 5.12$  cm, weight  $75.56 \pm 5.77$  kg, BMI  $22.67 \pm 1.26$ ), which includes twelve each blockers, setters, liberos and spikers, who participated in inter-district school competitions, was selected from various schools affiliated to Punjab School Education Board. All the participants were informed about aim and methodology of the study and they volunteered to participate in this study. Vertical jump test was conducted to see the vertical jump performance of the subjects. One way Analysis of Variance (ANOVA) was applied to find out the significance of differences with regard to vertical jump performance among blockers, setters, liberos and spikers. Scheffe's post-hoc test (SPHT) was applied to see the direction and significance of differences where 'F' value found statistically significant. The level of significance was set at 0.05. While comparing the means; it revealed that blockers had better explosive leg power than their counterparts, while liberos had shown less explosive leg power than their counterparts. Further, significant differences were found between blockers and liberos with regard to power ( $p < 0.05$ ).

**Keywords:** Vertical jump, volleyball, blockers, setters, liberos, spikers.

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### Introduction

Volleyball is an intermittent sport that requires players to compete in frequent short bouts of high- intensity exercise, followed by periods of low-intensity activity [1-3]. One of the main physical characteristic required in volleyball is lower limb muscle power, expressed by the numerous jumps performed during the games, which are important both for the attacking and blocking actions [4-6]. Volleyball requires a lot of jumping. The players jump to spike and block in the game, so jumping is a very important physical performance [7].



Vertical jump is a necessary component in performing spike and block as well as jumping service skills in volleyball game. Volleyball players' excellent performances are widely associated with efficiency of jumping or lower extremity explosive power which finally introduce vertical jump as one of the most important characteristics of physical fitness in volleyball players [8]. A volleyball team comprises 12 players with team positions broadly defined as setters, spikers, blockers and liberos. Each of these positions plays a specific role in a volleyball match [9]. An understanding of the vertical jump performance among U-19 volleyball players may be important for talent identification for specific positions in the team. Therefore, the aim of this study was to examine the positional differences in vertical jump performance of U-19 volleyball players by specific playing positions.

## **MATERIALS AND METHODS**

### **Subjects:**

A sample of Forty eight (N = 48) male volleyball players (mean  $\pm$  SD: age  $18.35 \pm 0.56$  years, height  $182.23 \pm 5.12$  cm, weight  $75.56 \pm 5.77$  kg, BMI  $22.67 \pm 1.26$ ), which includes twelve each blockers, setters, liberos and spikers, who participated in inter-district school competitions, was selected from various schools affiliated to Punjab School Education Board. All the participants were informed about aim and methodology of the study and they volunteered to participate in this study. The purposive sampling technique was used to select the subjects.

### **Methodology:**

Height measurements were taken by using the standard anthropometric rod to the nearest 0.5 cm. Full attentions given make sure that players' body was fully upright and their mandible was parallel to the ground. Taken values recorded as cm. The subject's weights were measured with portable weighing machine to the nearest 0.5 kg. During measurements players were on bare feet and with underwear and measurements recorded as kg. BMI was calculated by the formula of; Body Mass Index =  $\text{Weight}/\text{Height}^2$ . Vertical jump test was conducted to see the vertical jump performance of the subjects.

### **Statistical Analysis:**

Values are presented as mean values and SD. One-way analysis of variance (ANOVA) was employed. Following the detection of a significant mean effect, Scheffe's post-hoc analysis was performed to locate where specific mean differences were laid. Data was analyzed using SPSS Version 16.0 (Statistical Package for the Social Sciences, version 16.0, SPSS Inc, Chicago, IL,



USA).

**RESULTS**

**Table: 1. Demographic Characteristics of Male Volleyball Players of different Playing Positions.**

Playing Positions	Age (yrs)		Height (cm)		Weight (Kg)		BMI	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Blockers	18.25	0.75	185.33	4.60	82.75	4.18	24.10	1.11
Setters	18.33	0.49	181.50	4.66	71.92	5.81	21.79	0.83
Liberos	18.42	0.51	176.00	8.30	65.00	8.72	20.94	1.96
Spikers	18.42	0.51	186.08	2.94	82.58	4.36	23.85	1.16
<b>Total</b>	<b>18.35</b>	<b>0.56</b>	<b>182.23</b>	<b>5.12</b>	<b>75.56</b>	<b>5.77</b>	<b>22.67</b>	<b>1.26</b>

**Table: 2 Mean and SD values of Male Volleyball Players of different Playing Positions with regard to the variable Power.**

Variable	Playing Positions	N	Mean	SD
<b>POWER</b>	Blockers	12	58.58	9.77
	Setters	12	52.00	2.33
	Liberos	12	50.83	4.06
	Spikers	12	57.33	6.11

Table 1 depicts the demographic characteristics of male volleyball players of different playing positions i.e. blockers, setters, liberos and spikers. Table 2 showed that while comparing the means, it revealed that blockers had better explosive leg power than their counterparts, while liberos had shown less explosive leg power than their counterparts.

**Table: 3. Analysis of Variance (ANOVA) among Male Volleyball Players of Different Playing Positions with regards to the Variable Power.**

Variables	Source of variance	Sum of Squares	df	Mean Square	F-value	Sig.
<b>Power</b>	Between Groups	531.063	3	177.021	4.573*	0.007
	Within Groups	1703.250	44	38.710		
	Total	2234.312	47			

\*Significant at .05 level of Confidence

$F_{.05} (3,44) = 2.82$



It is evident from table-3 of Analysis of Variance (ANOVA) results that significant differences were found among male volleyball players of different playing positions i.e. blockers, setters, liberos and spikers with regard to the variable power( $p < 0.05$ ).

Since the obtained F-values were found significant, therefore, the Post-hoc test (Scheffe's) was applied to see the direction and significance of difference between paired means of male volleyball players of different playing positions i.e. blockers, setters, liberos and spikers with regards to the variable power. The results of Post-hoc test (Scheffe's) have been presented in table-4 below.

**Table: 4. Comparison of Mean Values of Post-Hoc Test (Scheffe's) among Male Volleyball Players of different Playing Positions with regards to the variable Power.**

Variables	Playing Positions				Mean Difference	Sig.
	Blockers	Setters	Liberos	Spikers		
Power	58.58	52.00			6.58	0.09
	58.58		50.83		7.75*	0.03
	58.58			57.33	1.25	0.97
		52.00	50.83		1.16	0.97
		52.00		57.33	5.33	0.23
			50.83	57.33	6.50	0.10

**\*Significant at .05 level of Confidence**

A glance at table-4 showed that blockers have exhibited statistically significant( $p < 0.05$ ) differences with liberos but insignificant ( $p > 0.05$ ) differences with setters and spikers with regard to the variable power. However, setters have shown statistically insignificant ( $p > 0.05$ ) differences with liberos and spikers on the variable power. It is concluded that blockers had better explosive leg power than their counterparts, while liberos had shown less explosive leg power than their counterparts.

## DISCUSSION

The demographic characteristics show that the mean height of volleyball players ( $182.23 \pm 5.12$ cm) in the present study is greater than the volleyball players of West Bengal, India ( $173.10 \pm 4.19$  cm) reported by Bandyopadhyaya (2007) [10], but lesser than the English volleyball players ( $191.00 \pm 5.0$  cm) studied by Duncan et al. (2003) [11] and Brazilian national volleyball team ( $197.0 \pm 8.0$  cm) studied by Petroski et al. (2013) [12]. The taller player in volleyball has an advantage because they can easier control both, defensive and offensive actions over the top of



the net. Stamm et al.(2003) concluded that height is a significant factor in the performance of game elements, particularly for attack and block (71-83%). Thus, selection criteria can explain the observed results, as there has been a tendency to recruit the tallest players in this sport [13, 14]. Volleyball requires a broad The comparison were made among different playing positions in relation to power it was found that there were significant difference among the different playing positions of volleyball players. These findings are in conformity with the results reported in many previous studies conducted on volleyball players across the different playing positions [15, 16] but not in line with those of reported by repertoire of jump skills in different playing positions of the game. Explosive power of the legs is of the utmost importance in volleyball sports. It is mainly used during serving, setting, attacks and blocks, which are essential for scoring a point. Vertical jump performance is one of the best indications of lower limbs muscle power [17]. According to results of the present study blockers had better explosive leg power than their counterparts, while liberos had shown less explosive leg power than their counterparts. There is great similarity between vertical jumping of blockers and spikers which are not noticeable in liberos. The differences in parameters could be explained through game's position of players. The main purpose of volleyball players is achieving greater height on the net [18]. Liberos as the backline players participate in receive and digging during the match but blockers and spikers play in front of the net, performing spike and block. It is clear that higher jumping is not advantage for liberos whereas it is necessary for spikers and blockers.

## **CONCLUSIONS**

Maximum vertical jump is one of the necessary components in performing spike and block skills in volleyball. It is concluded that blockers had better explosive leg power than their counterparts, while liberos had shown less explosive leg power than their counterparts. It is clear that higher jumping is not advantage for liberos whereas it is necessary for blockers, spikers and setters.

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## REFERENCES

- [1] U. Kunstlinger, H.G. Ludwig, and J. Stegemann, Metabolic changes during volleyball matches, *International Journal of Sports Medicine*, 8 (1987) 315- 322.
- [2] J.T. Viitasalo, H. Rusko, O. Pajala, P. Rahkila, M. Ahila, and H. Montonen, Endurance requirements in volleyball, *Canadian Journal of Sport Sciences*, 12 (1987) 194-201.
- [3] T. Gabbett, and B. Georgieff, Physiological and anthropometric characteristics of junior national, state, and novice volleyball players, *Journal of Strength and Conditioning Research*, 21 (2007) 902–908.
- [4] J.M. Sheppard, T. Gabbett, K.L. Taylor, J. Dorman, A.J. Lebedew, and R. Borgeaud, Development of a repeated-effort test for elite men's volleyball, *International Journal of Sports Physiology and Performance* 2 (2007) 292-304.
- [5] J.M. Sheppard, J.B. Cronin, T.J. Gabbett, M.R. Mcguigan, N. Etxebarria and R.U. Newton, Relative importance of strength, power, and anthropometric measures to jump performance of elite volleyball players, *Journal of Strength and Conditioning Research* 22 (2008) 758- 765.
- [6] J.M. Sheppard, T.J. Gabbett, and L.C. Stanganelli, An analysis of playing positions in elite men's volleyball: considerations for competition demands and physiologic characteristics, *Journal of Strength and Conditioning Research* 23 (2009) 1858-1866.
- [7] B.S. Zhong and F.Z. Huang, Multi-index comprehensive evaluation on the physical fitness of young Chinese volleyball players, *China Volleyball*, (1989) 41-43.
- [8] Y. Zhang, (2010) An investigation on the anthropometry profile and its relationship with physical performance of elite Chinese women volleyball players', MSc thesis, Southern Cross University, Lismore, NSW.
- [9] T. Gabbett, and B. Georgieff, Changes in skill and physical fitness following training in talent-identified volleyball players, *Journal of Strength and Conditioning Research*, 20 (2006) 29–35.
- [10] A. Bandyopadhyaya, Anthropometry and body composition in soccer and volleyball players in West Bengal, India, *Journal of Physiological Anthropology*, 26 (2007) 501-505.
- [11] M.J. Duncan, L. Woodfield and Y. AL-Nakeeb, Anthropometric and physiological characteristics of junior elite volleyball players, *British Journal of Sports Medicine*, 40 (2006) 640-651.
- [12] E.L. Petroski, J.D. Fraro, Y.L. Fidelix, D.A.S. Silva, C.S. Pires-neto, A.C. Dourado, M.A. Rocha, L.C.R. Stanganelli, and P. Oncken, F.S. Viera, Anthropometric, morphological and somatotype characteristics of athletes of the Brazilian Men's volleyball team: an 11-year descriptive study, *Brazilian Journal of Kinanthropometry and Human Performance*, 15 (2013)



184-192.

- [13] R. Stamm, G. Veldre, M. Stamm, K. Thomson, H. Kaarma, J. Loko, S. Koskel, Dependence of young female volley ballers performance on their body build, physical abilities, and psycho-physiological properties, *Journal of Sports Medicine and Physical Fitness*, 43 (2003) 291-299.
- [14] V. Jankovic, and N. Marelic Odbojka (Volleyball), Fakultet za fizičku kulturu (Faculty of Physical Education Zagreb), (1995) 7-9.
- [15] K. Sotiropoulos, I. Smilios, M. Christou, A. Spaias, H. Douda, and S. P. Tokmakidis, Jumping ability, reactive strength and anthropometric characteristics of elite junior women volleyball players, *Inquiries in Sport & Physical Education*, 7 (2009) 81-89.
- [16] N. Trajkovic, Z. Milanovic, G. Sporis, and M. Radisavljevic, Positional differences in body composition and jumping performance of among youth elite volleyball players, *Acta Kinesiologica*, 5 (2011) 62-66.
- [17] C.A. Bosco (2007) força muscular: aspectos fisiológicos e aplicações práticas. São Paulo: Phorte Editora.
- [18] M. Stec, & V. Smulsky, The estimation criteria of jump actions of high performance female volleyball players, *Research Yearbook*, 13 (2007) 77-81.

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