



## Libero: The Paramount of Specific Fitness Exhibiter in Modern Volleyball

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### Article Info

### Abstract

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In the present study, an attempt has been made to establish that, liberos' are the paramount of specific fitness exhibitors in the modern volleyball game according to their positions in the court. Fifty two male volleyball players (N=52, average age:  $23.26 \pm 1.59$  years) from east zone inter university volleyball tournament, 2014 were purposely selected in this study. The players were categorized as middle blocker (N<sub>1</sub>=14), outside hitter (N<sub>2</sub>=14), libero (N<sub>3</sub>=12) and setter (N<sub>4</sub>=12) according to their different playing positions. As per recommendation of different nation and university coaches, specific fitness exhibitor of volleyball players were measured through standard tests i.e. explosive leg strength by standing broad jump, explosive shoulder strength by six pound medicine ball put, agility by Semo agility test, speed by 50 meter run, endurance by 600 yard run & walk and eye-hand coordination by ball transfer test respectively. One way analysis of variance (ANOVA) was used to observe differences of mean among the groups. The level of significance was set at 0.05. The results showed that there were significant differences in explosive leg strength, explosive shoulder strength, agility, speed and endurance among the different playing positions. No significant differences exist in eye-hand coordination among the different positional players. The results of this study help the coaches and trainers to set appropriate training schedules that consider playing positions in relation to their selected paramount of specific fitness exhibitors in the volleyball game. Thus, more research must be conducted in order to understand quality talent identification, team selection and preparation of a new training schedule that considers positional roles and demands of the same.

### Introduction

Various factors like physical, physiological, and psychological factors, proper application of biomechanical principles in the technique; all

influence the performance of players (Ortega et al., 2008). It is clearly evident that special physical characteristics or anthropometric profiles predict whether an athlete is fit and ready for competing in the highest levels in a specific

sport field (Ackland et al., 2003). Motor fitness factors being important, optimum physical performance of players is a combination of various motor fitness components (Lidior & Zjv 2010; Tancred, 1995). According to Kansal (1996), “the individual not only physically fit but also possesses good motor control and body coordination in addition to excelling in the specific skills of his/her game of specialization” Thakur & Sinha (2010) pointed out that, “world’s topmost sporting nations are very much conscious of fitness factors which are supposed to play a dominant role in its future performance in sports and games.

Natraj & Kumar (2006) pointed out that, “Successful performances of skill components of motor abilities contribute independently and interdependently<sup>19</sup>. The role of motor abilities for successful sports performance cannot be disputed. Strength, endurance, speed, flexibility, agility and co-coordinative abilities are the prerequisites for motor action in all sports. The improvement and maintenance of these components are very important in sports training.” All games require varied levels of abilities due to the specific nature of moments (Barrow & Magee 1979).

A volleyball squad consists of twelve players with team positions popularly defined as setters, hitters, middle blockers, and liberos. Each of these positions plays a specific role in a volleyball match (Gabbett & Georgieff, 2006)

Considering the specialized role of the different positions in volleyball and the specific tasks in it, it is more likely that differences exist in the physiologic characteristics among the playing positions in volleyball, but this is not well understood (Sheppard et al., 2009). Though several studies positions (Gualdi-Russo & Zaccagni, 2001; Duncan et al., 2006) have compared the anthropometric and physiological measurements and body composition of volleyball players with regard to their playing position; no study to the authors knowledge has been done to substantiate the paramount of specific fitness of the libero as compared to other playing positions. An understanding of the number of specific fitness exhibitors of liberos'

inter university volleyball players in terms of their different playing positions may be important for talent identification, player selection for specific positions and preparation of new training schedule in volleyball games.

### Methods and Materials

**Subjects:** A total of fifty two (52) male (mean and SD of age  $23.26 \pm 1.59$  years) inter university volleyball players from eight different universities of East Zone Inter University Volleyball Tournaments-2014, held on 25<sup>th</sup> to 30<sup>th</sup> September in the year 2014 at KIIT university, university complex, Bhubaneswar, Orissa were selected as the subjects in this study. The players were segregated according to their playing positions and roles. They were segregated as middle blocker ( $N_1=14$ ), outside hitter ( $N_2=14$ ), Libero ( $N_3=12$ ) and Setter ( $N_4=12$ ).

### Measurement of performance indicators:

The study was conducted on specific fitness exhibitor of all categories of volleyball players according to positional role by using standard tests as explosive leg strength by ‘standing broad jump’ in meter, explosive shoulder strength by ‘six pound medicine ball put’ in meter, agility by ‘Semo agility test’ in centimeter, speed by ‘50 meter run’ in second, endurance by ‘600 yard run and walk’ in minute and eye-hand coordination by ‘ball transfer test’ in second units respectively.

### Statistical analysis:

The Statistical Package for Social Studies, (Version 19, SPSS Inc., and Chicago, Illinois) was used for statistical analysis. A one-way analysis of variance was applied to find out the significant differences between different playing positions traits or characteristics. In order to determine which group was different from other groups Turkey post hoc test applied. The statistical significance was set at  $p < 0.05$

### Results

The results in table 1 represent the liberos' are the paramount of specific fitness exhibitors in the modern volleyball game in terms of other playing positions.

Table 1

Demographic characteristics of specific fitness exhibitor (Libero) in the modern volleyball game in terms of other playing positions.

Playing Position → Specific fitness exhibitor ↓	Middle Blocker	Outside Hitter	Libero	Setter	Team Average
Explosive leg strength (mt)	2.48 ± 0.06	2.47 ± 0.05	2.49 ± 0.04	2.38 ± 0.04	2.46 ± 0.06
Explosive shoulder strength (mt)	13.24 ± 0.58	13.32 ± 0.47	12.12 ± 0.59	12.08 ± 0.60	12.78 ± 0.80
Agility (sec)	12.04 ± 0.72	12.07 ± 0.59	11.24 ± 0.70	11.27 ± 0.56	11.71 ± 0.74
Speed (sec)	7.36 ± 0.19	7.35 ± 0.24	7.12 ± 0.18	7.27 ± 0.15	7.28 ± 0.21
Endurance (mt)	1.51 ± 0.11	1.49 ± 0.12	1.37 ± 0.05	1.38 ± 0.03	1.45 ± 0.11
Coordination (sec)	17.30 ± 0.36	17.32 ± 0.32	17.29 ± 0.30	17.28 ± 0.26	17.30 ± 0.31

Table 1 presents specific fitness exhibiter of different playing positions in compare with liberos' of inter university volleyball players. The mean explosive leg strength of middle blocker, outside hitter, libero, setter and team average were  $2.48 \pm 0.06$  mt,  $2.47 \pm 0.05$  mt,  $2.49 \pm 0.04$  mt,  $2.38 \pm 0.04$  mt and  $2.46 \pm 0.06$  mt respectively. The mean explosive shoulder strength of middle blocker, outside hitter, libero, setter and team average were  $13.24 \pm 0.58$  mt,  $13.32 \pm 0.47$  mt,  $12.12 \pm 0.59$  mt,  $12.08 \pm 0.60$  mt and  $12.78 \pm 0.80$  mt respectively. In agility performance indicator the mean values of middle blocker, outside hitter, libero and setter were  $12.04 \pm 0.72$  sec,  $12.07 \pm 0.59$  sec,  $11.24 \pm 0.70$  sec and  $11.27 \pm 0.56$  sec respectively, whereas the team average showed  $11.71 \pm 0.74$  sec. The

mean specific fitness exhibiter of speed of middle blocker, outside hitter, libero, setter and team average were  $7.36 \pm 0.19$  sec,  $7.35 \pm 0.24$  sec,  $7.12 \pm 0.18$  sec,  $7.27 \pm 0.15$  sec and  $7.28 \pm 0.21$  sec respectively. In endurance exhibiter the mean values of middle blocker, outside hitter, libero and setter were  $1.51 \pm 0.11$  sec,  $1.49 \pm 0.12$  sec,  $1.37 \pm 0.05$  sec and  $1.38 \pm 0.03$  sec respectively, whereas the team average shows  $1.45 \pm 0.11$  sec. The mean coordination of middle blocker, outside hitter, libero, setter and team average were  $17.30 \pm 0.36$  sec,  $17.32 \pm 0.32$  sec,  $17.29 \pm 0.30$  sec,  $17.28 \pm 0.26$  sec and  $17.30 \pm 0.31$  sec respectively. One way analysis of variance (ANOVA) represents the specific fitness exhibitors among different playing positions, F values and their significant levels in Table 2.

Table 2

ANOVA of specific fitness exhibitors among different playing positions in the game.

Specific fitness exhibitor	Sum of Squares	df	Mean Square	F	Sig.	
Explosive leg strength	Between Groups	0.090	3	0.030	9.72	<b>0.000</b>
	Within Groups	0.161	52	0.003		
	Total	0.251	55	-		
Explosive shoulder strength	Between Groups	19.364	3	6.455	20.72	<b>0.000</b>
	Within Groups	16.198	52	0.311		
	Total	35.562	55	-		
Agility	Between Groups	8.707	3	2.902	6.904	<b>0.001</b>
	Within Groups	21.859	52	0.420		
	Total	30.566	55	-		
Speed	Between Groups	0.495	3	0.165	3.974	<b>0.013</b>
	Within Groups	2.159	52	0.042		
	Total	2.654	55	-		
Endurance	Between Groups	0.207	3	0.069	7.68	<b>0.000</b>
	Within Groups	0.467	52	0.009		
	Total	0.674	55	-		
Coordination	Between Groups	0.015	3	0.005	0.04	0.986
	Within Groups	5.385	52	0.104		
	Total	5.400	55	-		

\*Significant at .05 level.

The results of some performance indicators in table 2 revealed that significant differences ( $p < 0.05$ ) were observed in explosive leg strength, explosive shoulder strength, agility, speed and endurance components. Insignificant differences were found in coordination indicators

among the different playing positions. Table 3 represented the post hoc multiple comparisons of specific fitness exhibitors among different playing positions of inter university volleyball players.

**Table 3**

Turkey post hoc multiple comparisons of specific fitness exhibitors among inter university volleyball players in terms of their playing positions.

P.I	Playing Position		M.D	'p'	P.I	Playing Position		M.D	'p'
EXPLOSIVE LEG STRENGTH	M.B	OS.H	.007	.705	Speed	M.B	OS.H	.006	1.000
	M.B	L	.009	.669		M.B	L	.240*	.021
	M.B	S	.097*	.000		M.B	S	.091	.668
	OS.H	L	.016	.418		OS.H	L	.234*	.017
	OS.H	S	.089*	.000		OS.H	S	.085	.679
	L	S	.106*	.000		L	S	.149	.288
EXPLOSIVE SHOULDER STRENGTH	M.B	OS.H	.078	.695	Endurance	M.B	OS.H	.011	.988
	M.B	L	1.125*	.000		M.B	L	.130*	.005
	M.B	S	1.160*	.000		M.B	S	.126*	.007
	OS.H	L	1.203*	.000		OS.H	L	.119*	.007
	OS.H	S	1.238*	.000		OS.H	S	.115*	.010
	L	S	.035	.879		L	S	.004	1.00
AGILITY	M.B	OS.H	.029	.999	Co- Ordination	M.B	OS.H	.020	.614
	M.B	L	.793*	.016		M.B	L	.010	.663
	M.B	S	.765*	.021		M.B	S	.021	.997
	OS.H	L	.823*	.007		OS.H	L	.031	.125
	OS.H	S	.795*	.009		OS.H	S	.042	.754
	L	S	.027	1.00		L	S	.011	.594

### Discussion of Findings

In the present study specific fitness exhibitors among inter university volleyball players in terms of their playing positions have been evaluated and compared. This study clearly indicates the existence of specific fitness exhibitors differ among the different playing positions. The results in table 3 reveals that significant differences ( $p < 0.05$ ) exist in explosive leg strength, explosive shoulder strength, agility, speed & endurance and insignificant differences observed in specific fitness exhibitors of coordination among the groups.

Among demographic specific fitness exhibitors, the explosive leg strength in table 1 shows that the middle blocker, outside hitter and libero were stronger than the setter as compared to their different playing positions. Among the middle blocker, outside hitter and libero; liberos exhibit better explosive leg strength than middle blocker and outside hitter. Table 3 indicates that significant differences exist between middle blocker and setter, outside hitter and setter &

libero and setter in explosive leg strength. No significant differences were found between middle blocker and outside hitter, middle blocker and libero & outside hitter and libero. The middle blocker, outside hitter and libero were stronger may be due to the fact that stretch-shortening and explosive repeated jumping and blocking of central blockers & outside and sudden diving movement patterns in different sides of liberos are performed during game situations whereas the setters are performed moderate level maximal jumps during game. This result is consistent with the study of Marques et al., (2009) and Sheppard et al., (2009).

The specific fitness exhibitors in table 1, of explosive shoulder strength showed that the middle blocker and outside hitter were better than libero and setter. Table 3 indicates that significant differences exist between middle blocker and libero, middle blocker and setter, outside hitter and libero & outside hitter and setter in relation to explosive shoulder strength. No significant differences were found in explosive shoulder strength between middle

blocker and outside hitter as well as libero and setter. The possible explanations for the results of explosive shoulder strength may be due to the fact that the middle blocker and outside hitter are frequently uses their explosive shoulder strength for blocking, smashing and some time for jump service, whereas the libero and setter groups are not uses their explosive shoulder strength as frequent use by middle blocker and outside hitter.

Table 3 clearly indicated that the significant mean differences exist in agility between middle blocker and libero, middle blocker and setter, outside hitter and libero & outside hitter and setter. Insignificant differences exist in agility between middle blocker and outside hitter & libero and setter categories. Performance of agility in table 1 indicates that libero and setter groups are better in comparison with middle blocker and outside hitter. The possible reasons for the results of agility may be due to the fact that the movement patterns observed for libero and setter are quicker, faster, agile and acrobatic in nature for their court movements which demand different game situations like reception of service ball, diving for drop ball, collection of deflected ball from the block and spike, quick enter and exit from back court to front court and vice-versa in compare with middle blocker and outside hitter categories. Among demographic specific fitness exhibitors, the speed in table 1 shows that the significant differences were found between middle blocker and libero & outside hitter and libero. There were no significant differences were exist between middle blocker and outside hitter, middle blocker and setter, outside hitter and setter & libero and setter in relation to playing positions of the players which is resulting as in table 1, that the libero are better in speed compare with middle blocker, outside hitter and setter in the team may be due to facts that liberos are only back court defensive players having less height, body weight and fat percent but better in explosive leg strength and agility which fulfill the favorable conditions to produce greater momentum for speed and agility in relation to volleyball game.

The specific fitness exhibitors in table 3, of endurance showed that the significant differences were found between middle blocker and libero, middle blocker and setter, outside hitter and libero & outside hitter and setter. No significant differences exist between middle blocker and outside hitter & libero and setter in relation to endurance. The libero and setter possess better endurance ability may be due to the fact that they

are actively involved much more time during the match as well as continuously executing their performances than that of middle blocker and outside hitter. Whereas in top class competition the middle blocker and outside hitter when switching over from front court to back court due to rotation order, they may have to substitute by the liberos or specific defensive players by their coaches for energy restoration of next powerful attack or strategies. In volleyball games all categories players are playing with a ball by using their respective specific skills by the application of the coordinate ability of eye-hand coordination.

Table 3 clearly indicates that no significant differences exist in eye-hand coordination between middle blocker and outside hitter, middle blocker and libero, middle blocker and setter, outside hitter and libero, outside hitter and setter & libero and setter in relation to their different playing positions. The coordination ability of each category's volleyball players according to their playing positions is more or less the same.

### Conclusion

The results of this study indicated that significant differences exist among inter university volleyball players in terms of their different playing positions for explosive leg strength, explosive shoulder strength, agility, speed and endurance of specific fitness exhibitors. Insignificant differences exist in coordination indicators among different playing positions of volleyball players. In conclusion the results of the present study confirm that in explosive leg strength; middle blocker, outside hitter and libero are comparatively stronger than setters according to their playing positions. In explosive shoulder strength middle blocker and outside hitter are performed better than the setter. Positional players of libero and setter executed better performances in agility and endurance ability in terms of different playing positions. In speed only libero are executed superior performance as compared to middle blocker, outside hitter and setter. From the findings of this study it may be concluded that "Liberos' are the paramount of specific fitness exhibitors in the modern volleyball game".

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