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## ORIGINAL

### ANALYSIS OF THE LÍBERO'S INFLUENCE IN DIFFERENT MATCH PHASES IN VOLLEYBALL

### ANÁLISIS DE LA INFLUENCIA DEL LÍBERO EN DIFERENTES FASES DEL JUEGO EN VOLEIBOL

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## ABSTRACT

The aim of the study was to analyse the libero's participation and their influence in the attack and defence phases in men's elite volleyball. The sample of this study was composed by 1101 pass and defence game actions of the four highest-placed teams in the 2008 Beijing Olympic Games. The study's variables include team classification, receiving/defending player, pass/defence zone, pass/defence effectiveness, setting effectiveness, attack/counterattack zone, attack/counterattack time, and attack/counterattack effectiveness. These variables were measured by both indirect and external systematic observation. A descriptive statistical study was used, followed by inferential statistical techniques based on contingency tables, Chi-square tests, and Cramer's V values. The results revealed that there were significant associations during the defensive stage of the game between the defending player and the defensive phase, the libero's defence predominating in zone 5; the defending player and

defence efficiency, which is improved by the libero; the defending player and counterattack, as attacks increased in zone 6 when the libero was defending.

**KEY WORDS:** match analysis, high-level, libero, volleyball.

## RESUMEN

El objetivo del estudio fue analizar la participación y la influencia del jugador líbero en la fase de ataque y en la fase de defensa en voleibol masculino de alto nivel. La muestra de estudio estuvo compuesta por 1101 acciones de juego de recepción y defensa, de los cuatro equipos masculinos mejor clasificados en los JJOO de Pekin 2008. Las variables consideradas en el estudio fueron: clasificación del equipo, jugador receptor/defensa, zona de recepción/defensa, eficacia de recepción/defensa, eficacia de la colocación, zona de ataque/contraataque, tiempo de ataque/contraataque, eficacia de ataque/contraataque. La medida de dichas variables se realizó mediante la observación sistemática, indirecta y externa. Se recurrió a la estadística descriptiva y, posteriormente, se utilizaron técnicas de estadística inferencial, basada en tablas de contingencia, valores de Chi-cuadrado y V de Cramer. Los resultados mostraron que, en la fase de defensa, hubo asociaciones significativas entre: el jugador que defiende y la zona de defensa, predominando la defensa del líbero en zona 5; el jugador que defiende y la eficacia de la defensa, siendo mejorada por parte del líbero; el jugador que defiende y la zona de contraataque, incrementándose los ataques por zona 6 cuando defiende el líbero.

**PALABRAS CLAVES:** análisis del juego, alto nivel, líbero, voleibol.

## INTRODUCTION

In order to promote the understanding of the structure and dynamics of volleyball training, the game is traditionally divided into two phases or game complexes (Mesquita, 2005). On the one hand, there is an attack after receiving a serve (complex KI) which consists of the actions that pursue scoring a point when the opponent is serving, also known as serve recovery. On the other hand, there is the blocking of the serve (complex KII) in order to score a point when the ball is not in our adversary's possession. According to Monge (2003), these two phases of the game, offence and defence, are closely linked to the attack, as both attack or counterattack are organised through them. Thus, in the case of complex KI, the attack starts at reception, whereas in the case of complex KII the counterattack starts from defending the attack.

Receiving a serve is the first component of the game that takes place in the complex KI sequence. Since this is the first contact for a team to build its attack, its quality is extremely important for the team's success (Ribeiro, 2004), for the reason that if the pass were not done properly, the quality of the setter's pass, which is the second contact of the team, would be affected restricting the attack.

If the pass is not good enough, the chances of fast or multiple attacks are limited, making it easier for the opponents' defence (Fiedler, 1982; Ureña, 1992; Ureña, 1998; Ureña, Calvo and Lozano, 2002; Palao, Santos and Ureña, 2006; Wegrich, 1992). However, a perfect pass does not mean scoring an automatic point (Pratas, 1998), and a bad pass does not mean a side-out either.

The defensive stage is the key to winning a volleyball game. Therefore, the teams that are better at defending are likely to attack more effectively. Liskevych and Neville (1992) state that, although the attack catches the audience's attention, it is defence that truly helps win games and tournaments.

A comprehensive analysis of the evolution of the rules of volleyball allows us to see that its changes have been especially important over the last 10-12 years, helping this sport to have its own characteristics, and thus becoming a complex system in the quest of a greater specialisation on the players' part and a bigger improvement of its game strategies.

In a study carried out by Ureña et al. (2000) it was pointed out that the new rules introduced in 1998 favoured defence rather than attack. The changes that most affected the game in the defence phase were specially the introduction of the "libero" and the "scoring system". Regarding the scoring system, it was modified in order to reduce the length of the matches, FIVB removed what had always been known as "change of service", introducing the "Rally Point System" in which there is a point in every game move. As far as the inclusion of the libero is concerned, they were introduced in order to unbalance attack supremacy over defence, and their main role was to give quality to the first contact. However, in their adaptation, many teams used them not only in defence but also in passes, so their inclusion in the game could play a completely different role than the one that was initially pursued. As a result, several studies have been pursued with the goal of analysing the libero's intervention and influence on pass or defence. These studies' results, including the analysis of the same gameplay, pass, or defence are not always coincident.

On the one hand, the involvement of the specialist defensive player is having much more impact on serve passes than on defence (Bellendier, 2003; Murphy, 1999; Peña, 2000 and Zimmermann, 1999), favouring complex KI (Gonzalez Ureña Santos, Llop and Navarro, 2002) as well as the formation of the attack by increasing the offensive ability of the receiving team (Alley, 2006).

On the other hand, some research focuses on studying court defence (Mesquita, Manso and Palao, 2007). Along these lines, Mesquita et al. (2007) verified that the quality of court defence generates better conditions in a player's setting, and a greater ability to use faster attack times (Mesquita et al., 2002) – that being increased by the libero behind the court defence in zone 6, to perceive and better assess the game situation, or in zone 5, an area where most of the attacks (Velasco, 2001) are addressed at.

The introduction of the libero favours both the offensive stage and the defence stage of the game. Consequently, Freitas (2000) considered that it created a higher-quality of passes, an increase pressure on the serving player, an enhanced second-line attack, and a rise in combined defensive play.

Due to the scarce research that has analysed both game complexes, the aim of this study was to analyse the libero's influence and participation in the offensive phases (complex I) and defensive phases (complex II) in men's elite volleyball. The main purpose was to try to confirm if, by including a libero in the game, the initial intention of strengthening the defensive stage has been achieved, or if their contribution has become more noticeable in the offensive stage of the game instead.

## METHOD

### *Participants*

The study sample consisted of a total of 1,101 game actions (508 receptions and 593 defence moves) performed by the 4 best male teams in the 2008 Beijing Olympics (U.S.A., Brazil, Russia, and Italy). A total of sixteen sets in four games (finals, third and fourth placing game, and semi-finals) were analysed for this study.

### *Variables*

By means of systematic observation of reception and defence, a measurement of the following variables was carried out, showing the degree of openness in each one of them:

Team Classification (TC): The highest-placed teams in the 2008 Beijing Olympics. Four teams are differentiated, ranked according to their placing in these Olympic Games (USA, Brazil, Russia and Italy): first place or winner, second place or runner-up, third place, and fourth place.

Receiver/Defender (R / D): Defined as the game role for the player to whom the serve or the attack is aimed at. Two game functions can be differentiated: when the serve or attack is controlled and received or defended by the libero, and when the serve or attack is controlled and received or defended by other players with different roles than that of the libero's.

Pass/defence area (PA / DA): Defined as the area where the reception/serve defence/attack is performed. There are six game zones: zone 1, where the pass or defence is performed within the three meters wide and six meters long zone at the right rear end of the court; zone 2, where the pass or defence is performed within the three meters wide and three meters long area at the right front end of the court; zone 3, where the pass or defence is performed within the three meters wide and three meters long area in the central front end of the court; zone 4, there the pass or defence is performed within the three meters

wide and three meters long area in the left front end of the court; zone 5; where the pass or defence is performed within the three meters wide and six meters long area in the left rear end of the court, and zone 6, where the pass or reception is performed within the three meters wide and six meters long area in the central rear end of the court.

Pass/defence effectiveness (PE / DE): Understood as the performance obtained with the pass or the defence. FIVB's statistical system adapted by Coleman (1975) has been used for effectiveness assessment, with the following values. Error (0): the receiver or the defender controls the ball so poorly that their teammates cannot keep up or continue with the game, which gives the serving team one point. The defending player does not touch the ball and it hits the floor, which gives the opponent one point. Weak (1): it is a pass or defence that blocks an attack, which means sending a free ball. The receiving or defending player controls the ball, but it goes straight to the opponent's side. Acceptable (2): the pass or defence reduces the team's attacking chances, thus not allowing fast moves. Good (3): the pass or defence allows for any kind of attack. Excellent (4): the pass or defence allows a jump pass, without involving the setter moving around, which increases a better condition for a game with three attack times.

Setting effectiveness (SE): Setting performance in relation to the number of blockers (Mesquita et al., 2007). FIVB's statistical system has been used for its assessment. Error (0): the setter fouls by making contact, or their contact does not allow the continuity of the game. No attack (1): the placement allows for continuity, but makes it impossible for the play to end in attack. Imprecise setting (2): it allows the attack, but not in its best conditions. Acceptable (3): a precise setting and it allows a good attack, but only when there is a double or triple block. Good (4): a precise setting that allows a good attack facing an individual block, or no block at all.

Attack/counterattack zone (AZ / CZ): It is the net area or attack line where the attack or counterattack is executed, and it is divided into three sections with a length of three meters each. Zone 2: the attack or counterattack is executed within the three meters wide net area placed on the right side of the court. Zone 3: the attack or counterattack is executed in the three meters wide net area placed in the central part of the court. Zone 4: the attack or counterattack is executed in the three meters wide net area placed on the left side of the court. Zone 5: the attack or counterattack is executed in the three meters wide attack line area placed at the central part of the court. Zone 6: the attack or counterattack is executed in the six meters wide attack line area placed at the central part of the court. Zone 1: the attack or counterattack if executed in the six meters wide attack line area placed at the right side of the court.

Attack/counterattack time (AT / CT): Attack and counterattack speed, understood as the relationship established between the moment in which the setter touches the ball and the opponent's jump. The classification of the attack and counterattack time is divided into three moments, using Selinger's criteria

(1992): First moment (1): the spiker is jumping when the setter hits the ball. Second moment (2): the spiker is at his second-to-last step of their race when the setter hits the ball. Third moment (3): the spiker has not yet begun to run when the setter hits the ball.

Attack/counterattack effectiveness (AE / AE): Understood as the performance obtained with the attack or counterattack. FIVB's statistical system has been used for the assessment of its effectiveness. Error (0): the player makes a bad hit, which scores a point for the opposing team. Bad (1): the opponent takes control of the ball, giving them many chances to prepare a good counterattack. The opponent blocks the ball by sending it to the attacking team's side, but they cannot control it in order to make another hit. Weak (2): the opponent controls the offensive, allowing the other team a chance for a limited counterattack. Strong (3): the opponent cannot control the ball, and sends it to the other team as a free-ball. The ball then is blocked by the opponents, and the attacking team has a chance to prepare themselves for a good hit. Direct (4): the opponent touches the ball, but they cannot control it, therefore, the attacking team scores a point.

#### *Measure instruments*

This research paper primarily focused on the passes and defensive moves after an opponent's serve, attack, or counterattack. Both direct and indirect observations were employed in this analysis. The previously explained variables were analysed through a systematic observation of passes and defensive moves.

This research was carried out by watching different DVD recordings of the television broadcasts of these 2008 Beijing Olympics' volleyball games. The camera was placed on one of the sides of the court. Nevertheless, television broadcasts showed repeated game plays from different points of views.

#### *Monitoring reliability*

An experienced volleyball watcher underwent a training process in order to make sure that the monitoring of these game plays was trustworthy. The watcher went over 10% of the total sample, as stated by Tabachnick and Fidell (2007). Inter-rater values of Cohen's kappa above .81 were obtained for this monitoring in the fourth training session, which is considered as an almost-perfect agreement (Landid and Koch, 1977). The same data codification was carried out twice in order to ensure the reliability of the measurement, with a ten-day interval between them, thus obtaining Cohen's kappa values above .81.

#### *Statistical Methods*

Descriptive statistical approaches were used to work with this data during the first stage of the research. Subsequently, inferential statistics methods were

used, with an emphasis on contingency tables, chi-square values, and Cramer's V. These analyses allowed us to identify the likely associations between our research's variables and the defending or attacking player in the different stages of the game.

The level of statistical significance considered was  $p \leq 0.05$ , or confidence level of 95%.

## RESULTS

The descriptive analysis of the attack phase of the game revealed that out of 502 receptions (table 1), the winning team received the most, 30.9%, as well as the fourth-placer's libero received them the most frequently, 40.6% and 39.1%. However, there were some technical difficulties during the recording, and one match set between the runner-up team and the third-place was not analysed. Therefore, this data must be seen with some reservations.

Regarding inferential analysis, table 1 shows the data related to the analysis of the relationship between the receiving player and team classification. This analysis proved a significant association between both variables ( $\chi^2 = 8.297$ , Cramer's  $V = .129$ ,  $p = .040$ ), the libero being a strong positive association for the highest-placed team and other players from the third-placer. Cells that contribute negatively to this are the opposite ones.

**Table 1.** Receiving player and team placement contingency table

		Team				
		Winner	Runner-up	Third-placer	Fourth-placer	
Receiving player	Libero	Count	63	32	40	36
		Expected frequency	52.8	35.8	51.1	31.3
		% Within team	40.6%	30.5%	26.7%	39.1%
		Adjusted residuals	2.1 *	-.9	-2.3 *	1.1
	Another player	Count	92	73	110	56
		Expected frequency	102.2	69.2	98.9	60.7
		% Within team	59,4%	69,5%	73,3%	60,9%
		Adjusted residues	-2.1 *	.9	2.3 *	-1.1
Overall	Count	155	105	150	92	
	Expected frequency	155.0%	105.0%	150.0%	9.0%	
	% Overall	30.9%	20.9%	29.9%	18.3%	

No cells (0%) have an expected frequency less than 5, and the minimal expected frequency is 31.34

Overall, the libero received the ball less frequently than the other players, with a total of 34.1%, whereas the combined total of the other players was 65.9%. There were no significant differences between the receiving player and reception effectiveness.

As for the other variables, reception effectiveness and most frequent setting was effectiveness 3, with a total of 41.4% and 52.9%. These results show that the attack zone with the highest number of hits was zone 4, with a total of 40%, followed by zone 3, 23.6%, and zone 1, 21%. The inferential analysis revealed that there is no significant association between the receiving player and reception effectiveness, as well as setting effectiveness and attack zone.

The second touch attack was the most used, 46.8%. Furthermore, attack effectiveness 4 was the most frequent with a total of 53.7%. Finally, there were no significant differences between attack time and attack effectiveness in relation to the receiving player.

Regarding the descriptive analysis of the defensive stage of the game, the libero defended less frequently, 22.1%, than other players, 77.9%. The winning team defended the most with a total of 33.8%. There was no significant association between the defending player and team placement.

As far as court defence is concerned, zones 1 and 6 were the most defended, 29.2% and 28.3% (table 2). An inferential analysis helps us confirm a significant association between the defending player and the defence zone ( $\chi^2 = 49.230$ ; Cramer's  $V = .291$ ,  $p = .000$ ). The cells that contribute positively to this association are libero and defence zone 5, another player and defence zone 1, and another player and defence zone 3. The negative associations are the ones not mentioned.



**Table 2.** Defending player and backcourt contingency table

		Defence zone						
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	
Receiving player Overall	Libero	Count		4	3	7	57	41
		Expected frequency	37.6	6.0	8.0	10.0	31.0	36.5
		% Player in defence	13.2%	3.1%	2.3%	5.4%	44.2%	31.8%
		% in the backcourt	10.0%	14.8%	8.3%	15.6%	40.7%	24.8%
		Adjusted residues	-4.5 *	-.9	-2.1 *	-1.1	6.1 *	1.0
		Another player	Count	153	23	33	38	83
		Expected frequency	132.4	21.0	28.0	35.0	109.0	128.5
		% Player in defence	33.7%	5.1%	7.3%	8.4%	18.3%	27.3%
		% in the backcourt	90.0%	85.2%	91.7%	84.4%	59.3%	75.2%
		Adjusted residuals	4.5 *	.9	2.1 *	1.1	-6.1 *	-1.0
Overall		Count		27	36	45	140	165
		Expected frequency	170.0	27.0	36.0	45.0	140.0	165.0
		% Overall		4.6%	6.2%	7.7%	24.0%	28.3%

No cells (0%) have an expected frequency less than 5, and the minimal expected frequency is 5.97.

Table 3 shows that the defence effectiveness 0 was the most frequent, with a total of 42.4%, followed by effectiveness 2 with 33.5%. The next table shows the data relationship between defending player and defence effectiveness, which appears to be quite significant ( $\chi^2 = 16.060$ ; Cramer's  $V = .166$   $p = .003$ ). The cells that contribute positively to this association are libero and effectiveness 4, and another player and effectiveness 0. There is a negative association in the opposite cells to the ones previously mentioned.

**Table 3.** Player defending and defence effectiveness contingency table

		Defence effectiveness					
		0	1	2	3	4	
Receiving player	Libero	Count	37	11	49	16	16
		Expected frequency	54.7	9.5	43.2	12.0	9.5
		% within defence effectiveness	15.0%	25.6%	25.1%	29.6%	37.2%
		% Player in defence	28.7%	8.5%	38.0%	12.4%	12.4%
		Adjusted residues	-3.6 *	.6	1,2	1.4	2.5 *
	Another player	Count	210	32	146	38	27
		Expected frequency	192.3	33.5	151.8	42.0	33.5
		% within defence effectiveness	46.4%	7.1%	32.2%	8.4%	6.0%
		% Player in defence	85.0%	74.4%	74.9%	70.4	62.8%
		Adjusted residues	3.6 *	-.6	-1.2	-1.4	-2.5 *
Overall	Count	247	43	195	54	43	
	Expected frequency	247.0	43.0	195.0	54.0	43.0	
	% Overall	42.4%	7.4%	33.5%	9.3%	7.4%	

No cells (0%) have an expected frequency less than 5, and the minimal expected frequency is 9.53.

Setting effectiveness 2 was the most frequent with a total of 45.4%, followed by effectiveness 3, 32.2%. A slight error in setting was obtained, 1.6%, but there was no significant association between the defending player and setting effectiveness.

The zone with the highest number of counterattacks after a defence action was zone 4, with a total of 50.5%, followed by zone 1, 21.4%, and zone 2, 11.9%. The least counterattacked was zone 6, 6.4%. Finally, zone 3 received 9.5% of counterattacks, while zone 5 had none.

Inferential analysis (table 4) displays a significant association between the defending player and the counterattack area ( $\chi^2 = 10,664$ ; Cramer's  $V = .190$ ,  $p = .031$ ). The cells that contribute positively to this association are libero and zone 6. Another player and zone 6 contribute negatively to this.

**Table 4.** Defending player and counterattack area contingency table

		Counterattack area					
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 6	
Receiving player	Libero	Count	23	5	8	35	9
		Expected frequency	17.1	9.5	7.9	40.4	5.2
		% In counterattack area	36.5%	14.3%	27.6%	23.5%	47.4%
		Adjusted residues	1.9	-1.8	.1	-1.4	2.1 *
		<hr/>					
	Another player	Count	40	30	21	114	10
		Expected frequency	45.9	25.5	21.1	108.6	13.8
		% In counterattack area	63.5%	85.7%	72.4%	76.5%	52.6%
		Adjusted residues	-1.9	1.8	.0	1.4	-2.1 *
		<hr/>					
Overall	Count	63	35	29	149	19	
	Expected frequency	63.0	35.0	29.0	149.0	19.0	
	% Overall	21.4%	11.9%	9.8%	50.5%	6.4%	

No cells (0%) have an expected frequency less than 5, and the minimal expected frequency is 5.15.

It was perceived that 57.4% of counterattacks were conducted throughout the third part of the game, and 31.4% during the second. Nonetheless, effectiveness 4 was the most frequent in counterattacks, with a total of 31.5%, followed by effectiveness 2, 27.4%. There were no significant differences between the defending player and counterattack time, or defending player and counterattack effectiveness.

## DISCUSSION

In relation to the attack phase of the game, this research shows that libero defends less frequently, 34.1%, than other players, 65.9%. This may be explained due to the fact that the opponents' servers do not aim at the libero, since they are specialized in passing and defending, and have been proved to improve the quality of serves (Afonso et al. 2012). Similar findings were obtained by Ureña et al. (2002) in the Liga Española Masculina de División de Honor, where a total of 32.9% of receptions were executed by liberos, and 67.1% by the other players. Almost identical results were obtained by João, Mesquita, Sampaio and Moutinho (2006) in the 2001 Men's World League where 33.8% of the receptions were executed by liberos, and 66.2% by other players. Callejón and Hernández (2009) obtained similar findings on the 2003 World League, and in the final stage of the European Volleyball Tournament of the same year. Therefore, it can be stated that liberos do not have a high degree of participation in the game during the reception stage of the serve (De Hoyo, Sañudo and Paris, 2007; González et al., 2002, João et al., 2006; Maia

and Mesquita, 2006). Regarding inferential analysis, a significant association between the receiving player and team classification was found. The winning team's libero contributes greatly to this association, with figures that go beyond expected, even though the data should be analysed with some reservations. Lozano's research (2007) also showed a significant association between team placement and receiving ability, asserting that the higher the level in the competition, the more chances for liberos to participate in the reception. On the other hand, the lower the level, the less chances for liberos to participate in the reception.

The most used areas for serve reception were zone 6, 51.4%, followed by zone 5, 30.5%. These results are very close to those found by Maia et al., (2006) in the 2005 Women's European Volleyball Tournament, where the most requested zone was zone 6 with a total of 48.5%, followed by zone 5, with 28.4% of receptions. Similarly, these zones have been proven as the most used by serve receptions in specialized research (Alley et al, 2009; Mesquita, et al., 2007; Zimmermann, 1999). A high percentage of usage zone 6 for serve reception has also been found in other research, such as Lima, Mesquita and Pereira (2008); Lozano Calvo, Cervello and Ureña (2003); Moreno, Garcia, Moreno, Molina and Santos (2007), proving that players choose to make a safe or less risky hit than those sent to the sides of the court. Regarding inferential analysis, there is no significant association between the receiving player and the reception area.

Good effectiveness of reception, which allowed for all attacks (41.4%), was obtained in most game plays. In contrast, an excellent degree of effectiveness was found at a much lower rate, 15.7%. This could be due to risk management that professional male volleyball teams employ as a strategy in critical moments of a match (Marcelino, Mesquita and Sampaio, 2011). Furthermore, Rocha and Barbatani's research (2004) obtained very similar findings. On the other hand, other research has shown higher values than ours which allow all attack moves (Moraes, Mesquita and Costa, 2008; Palao et al., 2006). Moreover, inferential analysis showed that there is no significant association between the receiving player and reception effectiveness, but other research did confirm that the libero, unlike other players, has influence on the increase of serve reception quality (Alley, 2006; Alley et al, 2009; João et al 2006; Lozano, 2007; Maia et al., 2006).

Regarding player setting, the most precise and frequent combination in this research was that of an attacker facing two or three blockers with a total of 52.9%, followed by a non-precise setting of 24.1% game plays. This data is similar to that obtained by Lozano (2007) in the Women's Superliga. Inferential analysis did not show a significant association between the receiving player and setting effectiveness, which leads us to believe that liberos and other players' receptions do not have an impact on the previous player's setting.

The court zone which was most used when attacking was zone 4, 40%, followed by zones 3 and 1, 23.6% and 21%. In other research regarding high-

level volleyball, both male and female teams, zone 4 was also the most used when attacking (Afonso and Mesquita, 2005; Lozano, 2007; Palao et al., 2006). Inferential analysis did not reveal any significant association between the attack zone and the receiving player.

As far as attacking time is concerned, the second part of the game presented a high percentage of attacks, 46.8%, which is similar to the data gathered by Palao et al., (2006). However, this differs from Lozano's data (2007) from a different sample that consisted of Spanish female teams, in which the third part of the game was the most used. Inferential analysis did not show any significant association between attack time and receiving player.

The data obtained regarding attack effectiveness certifies that an important number of attacks culminate in straight scores (53.7%). However, the percentage of error found in attacks, 13.3%, is also relevant for this matter. There is other research which has obtained close values to ours regarding excellent effectiveness in attack, i.e. those game plays that result in straight scores (Frönher and Zimmermann, 1996; Rocha et al., 2004). On the other hand, there is other research that displays lower values (Mesquita et al., 2007; Monteiro, Mesquita, Marcelino, 2009). Inferential analysis revealed no significant association between the receiving player and attack effectiveness.

Therefore, we can conclude that liberos, besides having little participation in serve reception, do not have a great impact either on its performance or the result of the match (De Hoyo et al., 2007; João et al., 2006; Lozano, 2007; Murphy, 1999; Peña, 2000; Ureña et al, 2000, 2001, 2002. Zimmermann, 1999).

Regarding the defence stage of the game, the participation of liberos is lower than in the attacking stage (Bellendier, 2003; Mesquita et al, 2007) with zones 1 and 6 being the most requested zones in defence with 29.2%, and 28.3%, respectively, followed by zone 5, 24%. The front attack lines, on the other hand, were barely used for court defence. Nevertheless, inferential analysis shows a significant association between the defence zone and defending player, with liberos being a pronounced positive influence in zone 5, and other players in zone 1. Similar results were obtained in previous research (Bellendier, 2003; Mesquita et al., 2007; Zimmermann, 1999). Along these lines, Callejón's research (2006) highlighted that the liberos' defence zone is clearly defined, zone 5 being the most frequently defended with a total of 71.1%, whereas zone 6 represented only 15.9% of the sample. These results can be explained from a tactic point of view, as liberos are placed in zone 5 in order to cover a larger defence area, thus paying a closer attention to double-hit attacks (Zimmermann, 1999), as well as the area where most attacks are aimed at (Velasco, 2001).

As to defence effectiveness, results showed a high percentage of error, 42.4% for missing points and 33.5% for defensive moves that allowed for a counterattack without full attack chances. This could be related to the fact that attacks in the defence stage tend to be more unpredictable for the reason that different possible combinations can be formed to stop the defence and the time

and space for the last hit being unknown, since it is very hard to know when it will be finished as well as the zone where it will start. These results are similar to those obtained by Callejón (2006), but differ, at the same time, from others that were also carried out in professional volleyball, which showed a higher percentage of errors in defence (Moreno, Moreno, Julian and Del Villar, 2005 were obtained; Rocha et al., 2004). This data allows us to confirm the supremacy of attacks in comparison with defence in professional men's volleyball (Beal, 1989; Fröhner and Zimmermann, 1996; Ureña., 1998; Mesquita et al, 2007; Palao et, 2005; Zimmermann, 1999). However, liberos show lower rates of error than other players in our research.

Thus, an inferential analysis showed a significant association between the defending player and defensive effectiveness, with an increase in the number of excellent defence plays after a libero's contribution. On the other hand, the other players' defence produced a higher number of errors in defence (losing a point). Mesquita et al. (2007) and Palao et al. (2006) confirmed this in their research, showing an increase in the number of excellent defence plays after a libero's contribution. This data shows that the libero's participation in defence plays increases its performance, and as a consequence, could also influence the development of the ensuing plays. In addition, Monteiro et al. (2007) proved this in their research on the 2007 Volleyball World Cup, showing that although defence effectiveness is not greatly associated with the total result of the game, winning teams make fewer errors in defence plays.

The most frequently zone used for counterattacks was zone 4, with a total of 50.4% of game plays. These results are close to those obtained by Mesquita et al. (2007), Palao et al. (2006), and Zimmerman (1999) in which a predominance of zone 4 for counterattacks is found, although with lower percentages than those obtained in our research. The inferential analysis shows a significant association between the counterattack zone and the defending player, owing to the libero's participation in defence. This could be due to the fact that when liberos make quality defence plays, normally in zone 5, they usually help to perform fast combination hits with the zone 6 player, pay or pipe, thus creating a sense of confusion in the opponent's defence.

## **CONCLUSIONS**

In professional men's volleyball, the introduction of liberos has helped to increase defence effectiveness and, therefore, it also balances out the offensive and defensive stages of the games, which was a role that was intended for this player when first introduced in the game.

A libero's participation in defence is considerably higher than the other player's in zone 5 – a quite relevant zone for court defence (Alley, 2006; Velasco, 2001; Zimmermann, 1999).

Despite a visible lack of influence in counterattack effectiveness on the libero's part, they do have some appreciably impact in the defence of the following

counterattack zone, increasing the number of counterattacks in zone 6 after a libero's defence. This may be related to their defensive quality, as well as their frequent intervention area, zone 5, which makes the use of fast combination hits possible creating uncertainty and defensive difficulties for the opponent.

## REFERENCES

- Afonso, J., Esteves, F., Araújo, R., and Thomas, L. (2012). Tactical determinants of setting zone in elite men's volleyball. *Journal of Sports Science and Medicine*, 11, 64-70.
- Afonso, J., and Mesquita, I. (2005). Regularidades do ataque em função das zonas de receção e distribuição: estudo realizado em Voleibol masculino de alto nível. In J. Pinto (Ed.), *Estudos* 5, 175-183. Porto: CEJD (FCDEF-UP).
- Beal, D. (1989). Basic Team System and Tactics. In FIVB (Ed.), *Coaches Manual I*. Lausanne: FIVB.
- Bellendier, J. (2003). Una visión analítico-descriptiva del Mundial de Voleibol "Argentina 2002". *Lecturas de Educación Física y Deporte*, 9(60).
- Callejón, D. (2006). Estudio y análisis de la participación técnico-táctica del jugador líbero en el voleibol masculino de alto rendimiento. Tesis Doctoral. Universidad Politécnica de Madrid, Madrid.
- Callejón, D., and Hernández, C. (2009). Estudio y análisis de la recepción en el Voleibol Masculino de Alto Rendimiento. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte*, 6, 34-51.
- Coleman, J. (1975). A statistical evaluation of selected volleyball techniques at the 1974 world's volleyball championships, Ph.D.Thesis, Brigham Young University, Provo, Utah.
- De Hoyo, M., Sañudo, B., y París, F. (2007). La recepción del saque en el voleibol masculino de categoría juvenil: papel del líbero. *Educación Física, Salud y Deporte*. Tomo XXI, 3.
- F.I.V.B. (2009). Reglas oficiales de voleibol 2009-2012. Federación Internacional de Voleibol.
- Fiedler, M. (1982). *Voleibol moderno*. Buenos Aires: Stadium.
- Freitas, B. (2000). O Voleibol de Alta Competição. Paper presented at the Seminário Internacional de Voleibol, Lisboa.
- Fröhner, B., and Zimmermann, B. (1996). Selected aspects of developments in men's volleyball. *The coach*, 4(96), 12-13.
- González, C., Ureña, A., Santos, J. P., Llop, F., y Navarro, F. (2002). El líbero, análisis de las características de su juego en la competición de voleibol. *Motricidad*, 8, 141-159.
- João, P. V., Mesquita, I., Sampaio, J., and Mouthinho, C. (2006). Análise comparativa entre o jogador líbero e os recebedores prioritários na organização ofensiva, a partir da receção ao serviço, em voleibol. *Revista Portuguesa Ciências Desporto*, 6(3), 318-328.
- Lozano, C. (2007). Incidencia del saque y los elementos de la fase de juego del K1 sobre el rendimiento de la misma en voleibol femenino español de alto nivel. Tesis Doctoral. Universidad de Granada, Granada.
- Lyskevich, T., Neville, B., and Wegrich, R. (1992). Defensa del suelo: defensa de la parte superior de la pista. In B. Bertucci (Ed.), *Guía de Voleibol de la Asociación de Entrenadores Americanos de Voleibol* (pp. 281-327). Barcelona: Paidotribo.



- Maia, N., and Mesquita, I. (2006). Estudo das zonas e eficácia da receção em função do jogador recebedor no voleibol sênior feminino. *Revista Brasileira de Educação Física e Esporte*, 20, 257-270.
- Marcelino, R., Mesquita, I., and Sampaio, J. (2011). Effects of quality of opposition and match status on technical and tactical performances in elite volleyball. *Journal of Sports Sciences*, 29(7), 733-741.  
<http://dx.doi.org/10.1080/02640414.2011.552516>
- Mesquita, I. (2005). A contextualização do treino no Voleibol: a contribuição do construtivismo. In D. Araújo (Ed.), *O contexto da decisão. A ação tática no Desporto* (pp. 355-378). Lisboa: Visão e contextos.
- Mesquita, I., Guerra, I., and Araújo, V. (2002). *Processo de formação do jovem jogador de Voleibol*. Lisboa: Editora Centro de Estudos e Formação Desportiva.
- Mesquita, I., Manso, F. D., and Palao, F. M. (2007). Defensive participation and efficacy of the libero in volleyball. *Journal of Human Movement Studies*, 52, 95-107.
- Monge, M. (2003). Propuesta estructural del desarrollo del juego en voleibol. In I. Mesquita, C. Moutinho and R. Faria (Eds.), *Investigação em voleibol: estudos ibéricos* (pp. 142-149). FCDEF-UP.
- Monteiro, R., Mesquita, I., and Marcelino, R. (2009). Relationship between the set outcome and the dig and attack efficacy in elite male Volleyball game. *International Journal of Performance Analysis in Sport*, 3(9), 294 - 305.
- Moraes, J., Mesquita, I., and Costa, G. (2008). Análise do jogo: tendências do saque e da receção no voleibol de elevado rendimento. Paper presented at the Congresso de Ciências do Desporto e Educação Física dos países de Língua Portuguesa.
- Moreno, A., Moreno, P., Julián Clemente, J., y Del Villar, F. (2005). Estudio de la relación entre la eficacia de las acciones de primer contacto y la eficacia del ataque en voleibol masculino de alto nivel. *Kronos*, 4, 57-61.
- Moreno, M. P., Garcia, A., Moreno, A., Molina, J. J., y Santos, J. A. (2007). Estudio de la dirección del saque en la superliga masculina de voleibol. *Motricidad. European Journal of Human Movement*, 18, 111-134.
- Murphy, P. (1999). Some impressions about the libero player. *The coach*, 1(99), 14-15.
- Palao, J. M., Santos, J. A., and Ureña, A. (2006). Effect of reception and dig efficacy on spike performance and manner of execution in volleyball. *Journal of Human Movement Studies*, 51, 221-238.
- Palao, J. M., Santos, J. A., and Ureña, A. (2005). The effect of the setter's position on the spike in volleyball. *Journal of Human Movement Studies*, 48(1), 25-40.
- Peña, J. (2000). El líbero: la nueva figura del voleibol de elite contemporano. *Voleibol Set*, 6, 22-24.
- Pratas, C. (1998). Serviço e técnicas defensivas. *Manual de treinadores* (Vol. 1). Federação Portuguesa de Voleibol.
- Ribeiro, J. (2004). *Conhecendo o voleibol*. Brasil: Editora Sprint Lda.
- Rocha, C., and Barbanti, V. (2004). Uma análise dos fatores que influenciam o ataque no Voleibol masculino de alto nível. *Revista Brasileira de Educação Física e Esportes*, 18(4), 303-314.

- Ureña, A. (1992). Técnica en F.A.Vb. Manual del preparador de voleibol. Puerto Santa María: F.A.Vb.
- Ureña, A. (1998). Incidencia de la función ofensiva sobre el rendimiento de la recepción del saque en voleibol. Tesis Doctoral. Universidad de Granada, Granada.
- Ureña, A., Calvo, R., and Gallardo, C. (2000). Estudio de las variables que afectan al rendimiento de la recepción del saque en voleibol: análisis del Equipo Nacional Masculino de España. Lecturas de Educación Física y Deporte, 5(20).
- Ureña, A., Calvo, R. M., y Lozano, C. (2002). Estudio de la recepción del saque en el voleibol masculino español de elite tras la incorporación del jugador líbero. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, 2(4), 37-49.
- Ureña, A., Santos, J. A., Martínez, M., Calvo, R., Hernández, E., y Oña, A. (2001). El principio de variabilidad como factor determinante en la táctica individual del saque en voleibol masculino de nivel internacional. Motricidad. European Journal of Human Movement, 7, 63-74.
- Van der Mars H (1989). Observer Reliability: Issues and Procedures. In Analysing Physical Education and Sport Instruction I (2nd ed): 53-79. P. Darts, D. Zakrajsek and V. Mancini (Eds). Champaign IL: Human Kinetics.
- Velasco, J. (2001). IV Seminário Internacional de Treinadores de Voleibol da AVL. Lisboa: AVL.
- Wegrich, R. (1992). Recepción del servicio. In B. Bertucci (Ed.), Guía de voleibol de la Asociación de Entrenadores Americanos (pp. 143-168). Barcelona: Paidotribo.
- Zimmermann, B. (1999). Changes and potential possibilities with the introduction of liberos in Men's World Class Volleyball. The Coach, 1(99), 4-12.

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