Original Article

The efficacy of the attack and block in game phases on male FIVB and CEV beach volleyball

GEORGE GIATSIS [1] ✉, ANA BELEN LOPEZ MARTINEZ [2], GEMMA MARIA GEA GARCÍA [2]

[1] *School of Physical Education and Sport Science, Aristotle University of Thessaloniki, Greece*
[2] *Faculty of Sports Sciences and Physical Activity, San Antonio Catholic University, Spain*

ABSTRACT

Giatsis, G., Lopez Martinez, A.B., & Gea García, G.M. (2015). The efficacy of the attack and block in game phases on male fivb and cev beach volleyball. A review. *J. Hum. Sport Exerc., 10*(2), pp.537-549. The aim of this study was to investigate the efficacy and differences of the attack, block, and reception in side out and counter-attack phases during beach volleyball games. A total of 80 games of FIVB World Tour and European Championships were analyzed. The technical skills analyzed were the type and efficacy of the attack, the type of block, and the efficacy of reception. The sample included 13.939 rallies, including attack (n=7.090), block (n=7.090), and serve reception (n=5.161). Descriptive statistics were applied in order to obtain frequencies and percentages. Inferential statistics were calculated (p<.05) through chi square tests. The results showed that the spikes were more frequent values than shots at both side out and counter-attack phases. Attack errors and kills were the more frequent values in both phases. Perfect receptions showed a kill percentage similar to situations when the reception was limited. It was concluded that players should make fewer errors when spiking, and coaches should pay more attention to fake blocks during both side out and counter-attack phases. **Key words**: TEAM PERFORMANCE, SIDE OUT, COUNTER-ATTACK PHASE, WORLD TOUR, SPIKE, SHOT

✉ **Corresponding author.** University of Thessaloniki. Department of Physical Education and Sports Science. Kanari 15, 55132 Thessaloniki, Greece
E-mail: george@giatsis.com
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INTRODUCTION

Beach volleyball (BV) was established as an Olympic sport during the 1996 Atlanta Summer Olympic Games (Couvillon 2004). Over the last 27 years, the Federation Internationale de Volleyball (FIVB) has organized world tour where the best teams from around the world participate in 11 to 20 tournaments each year (Couvillon, 2004).

BV is played two against two on an 8x16 m court (Koch & Tilp, 2009; Laios, 2008) and is characterized by its strenuous physical, technical, and tactical demands (Häyrinen & Tampouratzis, 2012). To win a match, a team must win two sets of 21 points (if necessary, a third set of 15 points is played).

BV is a sequential and cyclic, involving the repetition of technical actions until a team scores. The game is divided into two phases: side out (SO) or complex I, where a team tries to win the right to serve, and counter-attack (CA) or complex II, where a team tries to score a point after the service (Costa, Afonso, Brant & Mesquita, 2012; FIVB, 2001; Giatsis & Tzetzis, 2003; Mesquita., & Teixeira, 2004a). The following six methods of contacting the ball are used in the game: serve, serve reception, set, attack, block and dig (Giatsis & Zahariadis, 2008). The SO phase includes three basic technical skills: serve reception, setting, and attack. The CA includes block, dig, set, and attack (Costa et al., 2012; Monteiro, Mesquita & Marcelino, 2009).

Only one specialization - block and defense - exists between the players during the CA (Tili & Giatsis, 2011). During the SO, both players need to have the ability to receive, set, and attack in order to play the game successfully. A number of authors have discussed the importance of the serve reception and technical skills in BV, as these skills provide the conditions for higher attack efficacy (Homberg & Papageorgiou, 1995; Kilary & Shewman, 1999; Koch & Tilp, 2009).

According to Zhang (2000), not all actions have the same effect on the game. Serve, attack, and block allows the team to obtain a direct score point, whereas serve reception, set, and dig follow other technical actions.

In BV, the spike is usually used as a fundamental offensive tactic in the context of attack. This technique needs to be used skillfully to obtain the maximum possible points (Homberg & Papageorgiou, 1995; Mesquita, Moreno & Teixeira, 2003; Mesquita & Teixeira, 2004a, b; Kiraly & Shewman, 1999; Lacerda & Mesquita, 2003). In this context, players use the shot and the spike in their attack tactics based on the uncovered space in the opponent's court (Kiraly, 1993).

Homberg and Papageorgiou (1995) reported that spikes accounted for 65.5% of attacks among BV teams belonging to the Association of Volleyball Professionals (AVP) and 52.8% of teams' part of the German Championship. In addition, Mesquita and Teixeira (2004a,b) also reported that spikes accounted for 58% of attacks among teams in the 2002 FIVB World Tour - Men and 59% of attacks in the 2005 FIVB Grand Slam in Klagenfurt (Koch and Tilp, 2009).

After comparing six technical-tactical elements, Grgantov, Katic, and Marelic (2005) found that a good performance in serve reception is relevant to obtain points during the game. Giatsis, Papadopoulou, Dimitrov, and Likesas (2003) support these claims; they found an improved fit score, based on better conditions for the execution of service reception, on account of reducing the dimensions of the court in the game. Rongland and Grydeland (2006) found similar results with 60% of perfect receptions in world class BV.

Reduction of the court affects and improves the conditions for better performance at the serve reception, increasing the score of the game (Buscá Moras, Peña, & Rodríguez, 2012). This alteration in the game area attenuates the superiority of the attack over defense, in order to facilitate block and defense court, which leads to improved performance conditions of the attack in CA (Grgantov et al., 2005).

The results of all investigations confirmed the importance of the attack context. The authors found that efficacy is a primary factor in BV and it is dependent on factors such as block or time game (SO or CA). Mesquita and Teixeira (2004a) and Zetou and Tsigilis (2007) found that the efficacy in attacks were different during the SO and CA phases. During the SO phase, it is dependent on reception efficacy, while in the CA phase, it is dependent on other factors, such as smaller courts (Giatsis, 2003; Giatsis & Papadopoulou, 2003; Giatsis at al., 2003; Giatsis, & Tzetzis, 2003; Grgantov et al., 2005) or blocks (Giatsis, Tili & Zetou, 2011; Tili & Giatsis, 2011).

Therefore, the main objective of this study is to identify and associate the type of attack with their efficacy depending on the two phases of the game (SO and CA), and investigate the interaction between this and block and reception techniques in male FIVB and European Volleyball Confederation (CEV) beach volleyball games.

MATERIAL AND METHODS

Sample

A total of 13,939 rallies were analyzed from 80 men's BV matches from the 2008-2007 World Tour and European Championship. A total of 7090 spikes, 7 090 blocks, and 5161 receptions were analyzed. The games were part of the main draw, quarterfinals, semi-finals, and finals of the aforementioned tournaments. These games were selected according to their accessibility. The video data of the games were obtained from the researchers' own records, Eurosport and Eurosport 2 TV channels, and games recorded by a Spanish national coach.

Design and variables

An observational, descriptive and correlational design was used in this study. A category system was used as the observation instrument (Anguera, 2003). The variables studied included: a) Type of attack: spike (ball contacted with force by a player on the offensive team who intends to terminate the ball on the opponent's blocker), shot (placing a ball with a soft shot) (Mesquita & Teixeira, 2004b), and others (attacks that are performed under the net) (Palao, Manzanares & Ortega, 2009); b) Type of block opposition according to the number of blockers, verifying whether one blocker or no blocker was involved and analyzing the different actions in the block: no touch, block-out, opponent court, home court, fake block, and nothing (Palao, Manzanares & Ortega, 2009); c) Attack efficacy: error, maximum options, limit attack, no options, and kill (Coleman, Neville, & Gordon, 1969; Coleman, 1975); and d) Complex: SO (defined as where a team tries to win the right to serve), and CA (defined as where a team tries to score a point after the service) (Costa et al. 2012; FIVB, 2001; Mesquita & Teixeira, 2004a).

Attack performance was evaluated in relation to its success and the options provided to the opposing team. The statistical system of the FIVB distinguishes five levels of attack performance. The FIVB statistical system was designed by an International Coach Commission of the Fédération Internationale de Volleyball in 1979 (Díaz, 1992), and adapted by Coleman et al. (1969, 1975). The five levels of attack performance were: Error (0): failed action or action that did not allow for continuity (point for the opponent); maximum opponent attack options (1): action was easily passed and allowed the opponent to attack; limited attack options for the opponent (2): action was passed and opponent attacked with some attack options; no opponent attack options (3): action was passed but opponent could not attack (they simply passed the ball); and kill (4): scoring a point.

Analysis

The observation process comprised of five different phases: a) literature review and expert consensus to query and analyze values; b) first observation and data analysis testing; c) expert review; d) observer training test (four experienced observers, who were trained using the methodology described by Anguera (2003); and e) expert review (content validity). The values obtained were > 7.0 of qualitative and quantitative evaluation; in addition, inter-observer agreement was > .87 and intra-observer agreement was > .99 (Cohen´s Kappa).

The inter- and intra-reliability of two separate observations was calculated to guarantee sufficient quality of the observation system. An inter-reliability index of 0.87 and intrareliability index of 0.98 was found (intra-class correlation coefficient and Kappa index).

The relationship between the phase complex in the game with spike, block, and serve reception was assessed using chi-square tests. The significance level was $p < .05$. The statistical program used was SPSS 19.0.

If the overall chi-square was significant, we examined the adjusted residuals (non-parametric equivalent of z-scores) for the cell percentage of each variable. An adjusted residual score greater than 1.96 or less than -1.96 for a given variable percentage indicated that the variable differed from the overall variable percentage (Buscá et al., 2012).

We calculated Cramer V effect size (ES) to assess the meaningfulness of the observed differences between spike, block, and serve reception depending on the two phases of the game. ES were considered to be zero (<0.125), small (0.125-0.35), moderate (0.35-0.65), and large (>0.65).

RESULTS

In Table I, there was a significant association between type of attack and the complex game ($\chi 22$ = 305.479; $p < .001$, ES = .207). These results show that the spike technique is the most frequently used attack (63.6% in SO and 52.1% in CA) in contrast to the shot (34.2% in SO and 36.1% CA) and other attacks (2.2% in SO and 11.8% in CA).

Table 1. Chi square statistics comparing the type of attack in different complexes

Complex	Type of Attack			
	Spike	Shot	Other	Total
Side Out	3070 63.6% (9.2)*	1650 34.2% (-1.5)	107 2.2% (-16.9)*	4827 100%
Counter-Attack	1179 52.1% (-9.2)*	816 36.1% 1,5	268 11.8% (16.9)*	2263 100%
Total	4249 59.9%	2466 34.8%	375 5.3%	7090 100%

Note. Table 1 presents the count (*n)* and the percentage (%) within each type of attack.
Adjusted residual appear in parenthesis below each group percentage.

In relation to Table II, a relationship was found between efficacy of attack, type of attack, and the complex game (SO: $\chi 28 = 304.961$; $p < .001$, ES = .178; CA: $\chi 28 = 529.41$; $p < .001$, ES = .342). During SO, spike had a greater prevalence of errors (16.9%) in comparison to no options (7.2%) and kill (57.3%). Conversely, there was a lower prevalence of maximum options (2%) and limit attack (16.7%). In addition, shot had less prevalence of errors (9.4%), no options (5.4%) and kills (52.2%) and a greater prevalence of the maximum options (4.7%) and limit attack (28.3%).

In CA, spike had a greater prevalence of error (18.2%) and kill (51.3%). By contrast, maximum options (3.7%) and limit attack (21.3%) had less prevalence. Conversely, shot had a greater prevalence of limit attack (31.3%) and lesser prevalence of error (12.1%) and maximum options (5.4%). Finally, the prevalence of errors (22%) and maximum options (44%) was higher than limit attack (19.4%) and kill (13.4%).

Table 2. Efficacy of attack in relation of the use of the type of attack in the different complex

Complex	Efficacy of Attack					
	Error	Max Options	Limit Attack	No Options	Kill	Total
SIDE OUT						
Spike	519 16.9% (6.5)*	61 2% (-7.1)*	511 16.7% (-9.5)*	220 7.2% (2.1)*	1757 57.3% (4.7)*	3068 100%
Shot	155 9.4% (-7.2)*	78 4.7% (3.7)*	467 28.3% (9.2)*	89 5.4% (-2.4)*	861 52.2% (-2.5)*	1650 100%
Other	23 21.5% (2.1)*	25 23.4% (11.5)*	29 27.1% (1.6)	9 8.4% (0.8)	21 19.6% (-7.4)*	107 100%
Total	697 14.4%	164 3.4%	1007 20.9%	318 6.6%	2639 54.7%	4825 100%
COUNTER ATTACK						
Spike	214 18.2% (2.3)*	43 3.7% (-9.3)*	251 21.3% (-3.9)*	65 5.5% (1.6)	604 51.3% (6.3)*	1177 100%
Shot	99 12.1% (-4.2)*	44 5.4% (-4.6)*	255 31.3% (5.5)*	41 5% (0.3)	376 46.1% (0.8)	815 100%
Other	59 22% (2.6)*	118 44% (21.2)*	52 19.4% (-2.1)*	3 1.1% (-3)	36 13.4% (-11)*	268 100%
Total	372 16.5%	205 9.1%	558 24.7%	109 4.8%	1016 45%	2260 100%
ATTACK						
Spike	733 17.3% (6.3)*	104 2.4% (-12.8)*	762 18% (-10.3)*	285 6.7% (3)	2361 55.6% (8.3)*	4245 100%
Shot	254 10.3% (-8.2)*	122 4.9% (-0.7)	722 29.3% (10.7)*	130 5.3% (-1.9)*	1237 50.2% (-1.7)	2465 100%
Other	82 21.9% (3.8)*	143 38.1% (29.5)*	81 21.6% (-0.2)	12 3.2% (-2.4)*	57 15.2% (-14.5)*	375 100%
Total	1069 15.1%	369 5.2%	1565 22.1%	427 6%	3655 51.6%	7085 100%

Note. Table 2 present the count and the percentage within each type of attack. Adjusted residuals appear in parenthesis below each group percentage.

Table III presents the frequencies and percentages of the type of attack according to the complex game and its association with the opposition block. The statistical analysis verified the existence of a significant association between the complex game, type of attack, and block opposition (SO: χ210 = 335.05; p < .001, ES = .186; CA: χ210 = 305,921; *p* < .001, ES = .260).

Relative to the spike in SO, block had less prevalence regarding techniques of no touch (61.1%) and home court (8.7%). However, the prevalence of block-out (8.3%) and opponent court (12%) was greater.
Nevertheless for shot in SO, greater prevalence occurred at no touch (71.2%) than in block-out (2.9%), other court (9.5%), fake block (5.2%) and nothing (0.8%). Finally, for the «other» in SO, techniques including home court (15.9%), fake block (33.6%) and nothing (12.1%) had greater prevalence. On the other hand, only no touch (17.8%) had lesser prevalence.

During the CA phase, block-out (5.9%) and other court (11.4%) had greater prevalence in spike, while only nothing (4.7%) had lesser prevalence. During this phase, regarding shot, no touch (53.3%) and our court (9.3%) had greater prevalence. By contrast, block-out (2.9%), fake block (20.2%), and nothing (4.9%) had lesser prevalence. Finally, for others, the results were contrary. No touch (9.3%), block-out (0.4%), other court (6.3%), and our court (4.5%) had greater prevalence while fake block (61.6%) and nothing (17.9%) had lesser prevalence.

Table 3. Block in relation of the use of the type of attack in complexes.

Complex	Block						
	No Touch	Block-out	Opp Court	Home Court	Fake Block	Nothing	Total
SIDE OUT							
Spike	1891 61.6% (-4.4)*	256 8.3% (7.4)*	368 12.0% (2.1)*	267 8.7% (-2.4)*	255 8.3% (1.8)	33 1.1% (-1.2)	3070 100%
Shot	1174 71.2% (7.6)*	48 2.9% (-7.1)*	157 9.5% (-2.7)*	173 10.5% (1.7)	85 5.2% (-4.9)*	13 0.8% (-2.0)*	1650 100%
Other	19 17.8% (-10)*	4 3.7% (-1.1)	18 16.8% (1.8)	17 15.9% (2.3)*	36 33.6% (10.1)*	13 12.1% (10.4)*	107 100%
Total	3084 63,9%	308 6.4%	543 11.2%	457 9.5%	376 7.8%	59 1.2%	4827 100%
COUNTER ATTACK							
Spike	476 40.4% (-1.0)	70 5.9% (4.3)*	134 11.4% (2.2)*	85 7.2% (-.8)	358 30.4% (.0)	56 4.7% (-3.3)*	1179 100%
Shot	435 53.3% (8.7)*	24 2.9% (-2.2)*	76 9.3% (-.9)	76 9.3% (2.2)*	165 20.2% (-7.9)*	40 4.9% (-2.1)*	816 100%
Other	25 9.3% (-11.3)*	1 0.4% (-3.3)*	17 6.3% (-2.1)*	12 4.5% (-2.1)*	165 61.6% (11.8)*	48 17.9% (8.2)*	268 100%
Total	936 41,4%	95 4.2%	227 10.0%	173 7.6%	688 30.4%	144 6.4%	2263 100%
TOTAL							
Spike	2367 55.7% (-2.1)*	326 7.7% (8.8)*	502 11.8% (3.2)*	352 8.3% (-2.2)*	613 14.4% (-1.7)	89 2.1% (-4.7)*	4249 100%
Shot	1609 65.2% (10.6)*	72 2.9% (-7.3)*	233 9.4% (-2.8)*	249 10.1% (2.6)*	250 10.1% (-8.4)*	53 2.1% (-2.6)*	2466 100%
Other	44 11.7% (-18.1)*	5 1.3% (-3.7)*	35 9.3% (-1.0)	29 7.7% (-.8)	201 53.6% (21.5)*	61 16.3% (16)*	375 100%
Total	4020 56.7%	403 5.7%	770 10.9%	630 8.9%	1064 15.0%	203 2.9%	7090 100%

Note. Table 3 presents the count and the percentage within the type of attack.
Adjusted residuals appear in parenthesis below each group percentage.

Table IV presents the frequencies and percentages of the type of attack according to reception during the SO phase, and its association with efficacy of attack. The statistical analysis verified the existence of a significant association between reception in SO phase, type of attack, and efficacy of attack (Limit Reception χ28 = 84.226; ES= .144; p=.000. Perfect Reception: χ28 = 89.567; ES = .128; p=.000).

Regarding a limit reception in spikes, the errors (19.7%) and kills (52.1%) had greater prevalence, while maximum options (2.3%) and limit attack (18.2%) had lesser prevalence. Additionally, regarding a limit reception in shots, the errors (10.4%) had less prevalence, while maximum options (4.9%) and limit attack (29.9%) had greater prevalence. Finally, for limit reception in other, the prevalence of kills (26.7%) was lesser, while the prevalence of maximum options (13.3%) was higher. Perfect reception had a similar distribution between three technical actions (Table IV).

Table 4. Efficacy os attack in relation of the use os the type of attack for efficacy of reception in side out.

Side out	Efficacy of Attack					
	Error	Max Option	Limit Attack	No Option	Kill	Total
LIMITED RECEPTION						
Spike	252	29	233	100	668	1282
	19.7%	2.3%	18.2%	7.8%	52.1%	100%
	4.9*	-3.8*	-6.1*	1.2	2.2*	
Shot	74	35	212	45	343	709
	10.4%	4.9%	29.9%	6.3%	48.4%	100%
	-5.4*	2.7*	5.9*	-1.2	-1.2	
Other	11	6	13	3	12	45
	24.4%	13.3%	28.9%	6.7%	26.7%	100%
	1.4	3.7*	1	-0.2	-3.2*	
Total	337	70	458	148	1023	2036
	16.6%	3.4%	22.5%	7.3%	50.2%	100%
PERFECT RECEPTION						
Spike	266	32	278	120	1087	1783
	14.9%	1.8%	15.6%	6.7%	61%	100%
	4.6*	-3.9*	-7.1*	1.8	3*	
Shot	80	41	246	44	516	927
	8.6%	4.4%	26.5%	4.7%	55.7%	100%
	-4.7*	4.1*	6.6*	-2.1*	-2.5*	
Other	3	0	9	3	7	22
	13.%	0%	40.9%	13.6%	31.8%	100%
	0.1	-0.8	2.5*	1.5	-2.6*	
Total	349	73	533	167	1610	2732
	12.8%	2.7%	19.5%	6.1%	58.9%	100%
TOTAL						
Spike	519	61	511	220	1756	3067
	16.9%	2%	16.7%	7.2%	57.3%	100%
	6.4*	-7.2*	-9.5*	2.2*	4.7*	
Shot	155	78	465	89	861	1648
	9.4%	4.7%	28.2%	5.4%	52.2%	100%
	-7.2*	3.7*	9.1*	-2.4*	-2.5*	
Other	23	25	29	8	21	106
	21.7%	23.6%	27.4%	7.5%	19.8%	100%
	2.1*	11.6*	1.7	0.4	-7.3*	
Total	686	143	991	315	2633	4768
	14.5%	3.4%	20.8%	6.6%	54.7%	100%

Note. Table 4 presents the count and the percentage within each of attack. Adjusted residuals appear in parenthesis below each group percentage.

DISCUSSION

The purpose of this study was to identify and associate the type of attack with their efficacy depending on the two phases of the game (SO and CA), and investigate the interaction between this and block and reception techniques in men. The frequency of the type of attack among the top world beach volleyball players differs significantly at the SO and CA phase. In both phases, spikes were used 25.1% more frequently than shots. These findings are similar to those reported by Koch and Tilp (200b), Lacerda y Mesquita (2003), Mesquita, Moreno and Teixeria (2003), Mesquita and Teixeira (2004a,b), Koch and Tilp (200b), and Monteiro et al. (2009). Compared to Mesquita and Teixeira (2004a,b), the spike was the most frequently used attack (58%). Koch and Tilp (2009b) and Lacerda and Mesquita (2003) found that male players preferred spikes (59%) over shots (41%). This percentage is higher than that reported by Homberg and Papageorgiou (1995), who found that 53% of players preferred spikes when playing on a 9x9m field. One of the reasons the FIVB modified the rules in 2001 was to attenuate the superiority of attack techniques over defense techniques, making the game more attractive, as the rally duration would become longer. This suggests that the players now prefer spikes over shots as the power of these actions minimize the time for the defender to react. Mesquita and Teixeira (2004a,b) concluded that the effectiveness of the attack has increased as players have become more accustomed to the new style of the game.

In our study, the percentage of the spike in SO and CA is similar to that reported by Mesquita and Teixeira (2004a). These results show significant differences depending on the time of the game. Players used spikes rather than shots in 29.4% of cases during the SO phase. In SO, the percentage of spikes illustrate the high technical and tactical ability of the players to organize their attack after the reception. This could be because during the SO phase, the game is more visible, causing less randomness and allowing the receiving team more time to organize their attack. Therefore, it is logical that the spike is the most commonly used offensive tactic.

In addition, the spike is the dominant attack type in the CA phase with a 16% difference compared to shots. It could be assumed that the initial conditions of the set in the two phases are different. In CA, the player has to run as fast as possible after an action which could be a block or a defending position. During the SO phase, the player has more time to perform a set after the reception. Ronglan and Grydeland (2006) found that the men's BV percentage of perfect reception was about 60%, which increases the successful set. Players have more time to organize attacks and less physical demands during SO than in CA because the displacement before the attacks are smaller in SO, allowing more favorable conditions for the construction of spikes.

In this sense, Buscá et al. (2012), show that men's BV uses jump and float serve. Jump serve is slightly more prevalent; players may choose this in attempt to decrease perfect reception. This may affect the quality of the set due to the greater distance and height. These statements are supported by the kill percentage of spikes and shots found depending on the quality of reception during the SO phase (Buscá et al., 2012; Grgantov et al. 2005; Kiraly & Shewman, 1999; Homberg & Papageorgiou, 1995). Evidently, in situations where the set is poor, the attack options are minimized.

Concerning the efficacy during the SO phase, the kill percentage of spikes was 5.1 higher than shots. However, the error of spikes was 7.5% higher than that of shots. Furthermore, the percentage of the CA following the SO phase was 25.8% using a spike and 38.4% using a shot. This explains the association between spikes and the possibility of the opponent team in counterattack, where maximum options and limited options in the attack are reduced, while the opposite occurs in shots. Thus, it could be assumed that

spikes are more effective than shots as an attack option; however, there is a greater chance of giving a direct point to the opponent with this approach. The results are similar to other studies, which have analyzed attack efficacy during the SO phase (Mesquita & Teixeira, 2004a; Zetou & Tsigilis, 2007). For male players, spike is the most used and most effective technique. Mesquita and Teixeira (2004a) argued that the attack efficacy depends of efficacy reception.
In contrast with the SO phase, the efficacy of spikes and shots in CA was 9.7% lower. Specifically, both spikes and shots had 6% lower efficacy during the CA phase. The error of spikes was larger than shots by 6%. This difference is derived from the errors of the spikes. Monteiro et al. (2009) concluded that the efficacy of attack was lower in CA. The smaller court (Giatsis, 2003; Giatsis, & Papadopoulou, 2003; Giatsis at al., 2003; Giatsis, & Tzetzis, 2003; Grgantov et al., 2005) and the taller blockers (Giatsis et al., 2011; Tili & Giatsis, 2011) drive attackers to a greater number of errors with spikes while the same conditions offer a better advantage to defenders to react at shots.

When the reception was perfect compared to the limited one, the total kill percentage of the attack was 8.7% higher and errors were reduced by 3.8%. These results are similar to those reported by other researchers (Rongland & Grydeland, 2006; Lacerda & Mesquita, 2003; Michalopoulou et al., 2005). In this sense, our results reported a similar percentage with a small difference between the errors of spikes when the reception was perfect compared to the limit one (14.9% and 19.7%, respectively). It can be observed that the same happens for kill, being higher (61%) for perfect reception than limit (52.1%). It is clear that the reception quality positively affects the efficacy of the attack. Koch and Tilp (2009) revealed that the majority of receptions in male BV were perfect reception, even when the technique reception is a lateral forearm pass. Our results support these findings. On the other hand, shots showed the same performance. The perfect reception percentage error was 1.8% less than limit reception while kill was 7.3% higher than limit reception. Our results support the findings of earlier studies, such as those undertaken by Mesquita and Texeira (2004b).

Block techniques differed for all types of attacks depending on the phases of the game. Our results showed different percentages for block-out (8.3% in SO and 5.9% in CA) and blocks that were performed correctly but did not lead to a point (91% in SO and 63.2% in CA). The results reported here are similar to those reported by Kock and Tilp (2009b) who found that block techniques lead to 9% direct points and 7% block-outs. The prevalence of blocking situations may be due to the predominance of spikes over shots.

Lacerda and Mesquita (2003) found a direct association between block opposition and the possibility that the attack ends in a point. On the one hand, they found that one blocker situations prevail over no blocker situations. One blocker situations are associated with a higher probability of the attack leading to a point, while blocker situations reduce that likelihood. The situations in which the blocker does not touch the ball are reduced when the attack is spike (61.1% in SO and 40.4% in CA), while the opposite occurs for shot, with the higher percentage for the second (71.2% in SO and 53.3% in CA). This demonstrates the important role that the block has in BV. Blockers should close an area of the field, thereby increasing the chances of recovery by defending the team. In turn, the capabilities of the attacker, contributes decisively to obtaining a point. Furthermore, the 22.7% of the fake blocks that were performed more often during the CA phase illustrates that blockers use this kind of defense more frequently during this phase than in the SO phase. The results reported here are similar to those reported by other researchers.

The fake block was used more frequently on the 9x9m courts, as it is more difficult for a single defender to cover a larger space. On the 8x8m court, it is obvious that blockers need to stay closer to the net because the conditions for the opponents to perform an attack are often identical (Giatsis & Tzetzis, 2003). In the context of BV, the block-defense system forms a coherent and effective unit (Laios, 2008). Mesquita and Teixeira (2004b) reported that the majority of attacks occur in the presence of the block (84.6%), and only 15.4% of attacks were without a block; this is perhaps because tactical defense is adopted in relation to the opposing team's attack (Homberg & Papageorgiou, 1995). Active block technique is the most used technique in male BV. Koch & Tilp (2009) found that only 12% of blocks were fake blocks. According to these findings, it could be assumed that the reduced frequency of spikes in comparison to other types of attacks in the CA phase significantly differentiates the teams' defending systems.

CONCLUSIONS

In conclusion, it seems that international BV players perform 1.9 times more spikes than shots during the SO phase and 1.4 times more spikes than shots during the CA phase. The players developed more kills when using spikes but they also had a larger percentage of errors than shots during the SO phase. In contrast, during the CA phase, the performance of the attack was lower due to the increased number of errors in both types of attacks. A significant finding regarding the different defending strategies of the teams is in relation to fake blocks; results show that there are 3.9 times more fake blocks during the CA phase than in the SO phase. The perfect reception shows larger kill percentage on the attack reception in comparison to the limited one. Players need to make fewer errors when performing spikes while setters must pay a lot of attention to the "coverage" of the attacker. In addition, shots have to be as quick as possible in the uncovered area in order to minimize the defenders ability to react. The trainers need to pay considerable attention to fake blocks during the CA phase. Organized training should include one out of ten fake blocks during the SO phase and three out of ten during the CA phase.

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