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Tactic determinants of game practiced by middle attacker in men's volleyball

Determinantes táticas do jogo praticado pelo atacante central no voleibol masculino

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Abstract – Among volleyball skills, spike is responsible for the highest number of scores, and the first tempo of attack is related to the higher incidence of score a point, by hindering the defensive opponent's action. However, most of the studies show general results and do not specify the conditions and constraints of each attack zone. Thus, the aim of this study was analyzing the offensive game (complex I) performed by the middle attacker at the 2014/2015 National men's Brazilian Championship (Superliga). The sample was composed by 142 games of 12 teams, totaling 5350 receptions, setting and spikes actions. The results showed that the middle spikes occurred mostly after receptions A and B, being the most frequent attack scoring point as well as the most powerful one. Moreover, the relationship between the reception effect and setting effect was observed, showing that the best receptions influenced the setting type and the attack effect. Therefore, the middle attack had effective effect in the winning score, since it decreased the chances of opponent's defense, due to the reduced time to defensive organization. Finally, the situational constraints delimited the middle attacker actions. Based on the above, we suggest that future studies should restrict the analysis conditions and situational constraints of each specific game situation.

Key words: Analysis of Situation; Efficacy; Volleyball.

Resumo – *Dentre os fundamentos do voleibol, o ataque mostra-se como responsável pelo maior número de pontos, sendo que o ataque de primeiro tempo se relaciona com a maior ocorrência do ponto, por dificultar a ação defensiva do adversário. Contudo, a maior parte desses estudos apresentam resultados generalizados, não especificando as condições situacionais e os constrangimentos especificadores de cada zona de ataque. Assim, o presente estudo tem por objetivo analisar o jogo no complexo I praticado pelo atacante central da Superliga Brasileira de Voleibol Masculina 2014/2015. Compõem a amostra 12 equipes, sendo observados 142 jogos, totalizando 5350 ações de recepção, levantamento e ataque. Para a análise exploratória recorreu-se à estatística descritiva e para a associação entre as variáveis recorreu-se ao teste do Qui-Quadrado. Os resultados apontaram que os ataques ocorreram, em sua maioria, após recepções A e B, sendo o ponto de ataque mais recorrente, bem como os ataques potentes. Além disso, observou-se a relação entre o efeito da recepção e o tipo de levantamento com tipo de ataque, bem como relação do tipo de levantamento com o efeito do ataque. Assim, conclui-se que o jogo praticado pelo atacante central se mostrou eficiente para a conquista do ponto, uma vez que diminuiu as chances de defesa do adversário, devido a redução do tempo para a organização defensiva. Por fim, verificou-se que as restrições situacionais delimitaram a ação do jogador central, sugerindo que futuras pesquisas busquem restringir as situações de análise e os constrangimentos situacionais de cada situação específica de jogo.*

Palavras-chave: *Análise de Situação; Eficácia; Voleibol.*

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INTRODUCTION

The game analysis is one of the research areas that plays an essential role in the development of sports[1]. It searches for explanations for the emergence of behavioral patterns and is used to facilitate the description and understanding of the game contributing to promote more efficient tactical strategies by the coaches of the teams[2].

Among the volleyball actions, spike is responsible for the highest number of points[3,4], being influenced by the setting velocity i.e., the tempo of attack[1,4]. According to Marcelino et al.[4], there are three tempos of attack, namely: first tempo of attack - the attacker jumps when the setter contacts the ball and relates to the higher occurrence of points for obstructing the opponent's defensive action[1,5 6]; second tempo of attack - the attacker performs two or three steps after the setting and is associated with the point although there is reduction of this success when compared to the first tempo of attack[5,7]; third tempo of attack - the attacker waits for the ball to reach the peak of an upward trend, and only then, starts running for the spike, favors the game continuity and error of attack[6].

Another determining factor in the analysis is the skills involved in the coordinated actions of the team during the game phases. In this sense, two complexes are traditionally considered in volleyball: complex I or "side-out" (organization of the attack after receiving the serve) and complex II or transition (organization of the counterattack after defense)[8]. Studies indicate that attackers achieve greater success in "side-out" and play faster than in the counterattack[9,10]. Thus, the middle attacker plays an important role because, among spikers, he is responsible for attacking most of the fastest balls, i.e., the first time balls[7].

Studies of volleyball game analysis show, regardless of game situations, that attack has association with the quality of execution of the other fundamentals[11,12,13]. In this context, there is a relationship between reception quality and the attack effect[14,15]; the tempo of attack, the attack type and opposition faced with the attack effect[7,9] and the relationship between reception quality and the attack effect or between attack velocity and attack effect[5,14,16]. However, most of these studies have shown general results, not specifying the situational conditions and constraints specific of each attack zone. Thus, knowing that the literature indicates the trend of the fastest attacks to score, this study aimed to analyze the game in the complex I practiced by the middle attacker of the 2014/2015 National Men's Brazilian Championship (Superliga). It is noteworthy that Brazil consistently is ranked among the top three men's world volleyball teams (www.fivb.org) and most of those players participate in the Brazilian Championship (Superliga).

METHODOLOGICAL PROCEDURES

Sample

The sample was composed of 5350 reception, setting and attack actions

carried out by middle spikers during 142 games of 12 teams participating in the 2014/2015 Brazilian Men's Superliga up to the stage of quarterfinals. It was analyzed the minimum of 22 games and the maximum of 26 games of each team. Erroneous receptions were excluded from the sample, since they did not allow the continuity of action and subsequent middle attack performance.

Variables

Reception Quality: To evaluate the reception quality, the instrument proposed by Eom and Schutz[17] was adapted. The following categories were used: poor reception (C), moderate reception (B) excellent reception (A).

Setting type: corresponds to the set type for the middle attacker in relation to the distance from the setter. The categories defined by Afonso et al.[9] were used:

- Positive: the attack carried out in front and close to the setter, and the ball must be contacted at the right of the central axis of the body.
- Negative: the attack carried out in front and close to the setter, and the ball must be contacted at the left of the central axis of the body.
- Back one: the attack carried out behind and close to the setter.
- Inside shoot: the attack carried out forward and one meter away from the setter.

Among the scenes analyzed, attack carried out back and away from the setter was not found, which resulted in the absence of these categories for analysis.

Attack Type: corresponds to the attack type and direction conducted by the middle spiker. Attack type was analyzed using an adaptation of Costa et al.[18]. The following categories were used: powerful attack to position 5, powerful attack to position 6, powerful attack to position 1 and tip (ball positioned at any place of the court).

Attack effect: it was evaluated through an adaptation of the instrument proposed by Marcellin et al.[4]. Thus, the following categories were obtained for attack: error, blocked, defense and score.

Data collection procedure

All games were recorded from the top view, i.e., about 7-9 meters behind the bottom line and the camera was positioned about three meters above ground level. A Sony camera with definition of 1080p HD and frequency of 60 Hz was used and the software used for data analysis was Data Volley[4]. Observers were volleyball statisticians with minimum experience of 5 years in this specific function and had degree in Physical Education.

Statistical procedures

Descriptive statistics was used, with frequencies and respective percentages for each category of variables under study. For the association among vari-

ables, chi-square was used with Monte Carlo correction. Residual adjustments were calculated, and only values higher than |2| were considered. In the data treatment, the SPSS software (Statistical Package for Social Sciences) version 20.0 for Windows was used.

To calculate the concordance, 20% of actions were reanalyzed within fifteen days interval, exceeding the reference value of 10%[19]. Cohen's Kappa values for inter and intra-observer, respectively, were: reception effect = 0.98 and 0.96; setting type = 0.90 and 0.92; attack type = 1.00 and 1.00; attack effect = 1.00 and 1.00. In this sense, concordance values were above the reference value of 0.75 [20].

RESULTS

The inferential analysis of the reception quality with the setting type found a statistically significant association ($X^2 = 150.352$, $p < 0.001$) and the trend observed in the descriptive analysis was confirmed, since inside shoot setting was positively associated with reception C, while positive, negative and back time settings were negatively associated with reception effect.

Table 1. Association between reception quality and the setting type

			Reception quality			Total
			Reception A	Reception B	Reception C	
Setting type	Positive	Occurred	808	653	13	1474
		% Setting type	54.8%	44.3%	.9%	100,0%
		% Reception quality	28.6%	26.8%	14.3%	27,6%
		Adjusted residual	1.9	-1.1	-2.9	
	Negative	Occurred	908	807	9	1724
		% Setting type	52.7%	46.8%	.5%	100,0%
		% Reception quality	32.2%	33.1%	9.9%	32,2%
		Adjusted residual	-0.1	1.3	-4.6	
	Back one	Occurred	556	494	4	1054
		% Setting type	52.8%	46.9%	.4%	100,0%
		% Reception quality	19.7%	20.3%	4.4%	19,7%
		Adjusted residual	0.0	1.0	-3.7	
	Inside shoot	Occurred	551	482	65	1098
		% Setting type	50.2%	43.9%	5.9%	100,0%
		% Reception quality	19.5%	19.8%	71.4%	20,5%
		Adjusted residual	-1.9	-1.2	12.1*	
Total		Occurred	2823	2436	91	5350
		% of the Total	52,8%	45.5%	1.7%	100.0%

* Positive association> 2

The inferential analysis of the attack type with the setting type found a statistically significant association ($X^2 = 289.121$, $p < 0.001$). The inferential analysis found that the tip was positively associated with inside shoot and back one set and negatively associated with negative attack. The powerful attack for position 5 was positively associated with negative attack and

negatively with back one and Inside shoot set. The powerful attack for position 1 was positively associated with the negative attack and negatively associated with the positive, back one and inside shoot set. The powerful attack for position 6 was positively associated with the positive, back one and Inside shoot set and negatively to the negative attack.

Table 2. Association between attack type and setting type

			Attack type				Total
			Tip	Powerful attack for position 5	Powerful attack for position 1	Powerful attack for position 6	
Setting type	Positive	Occurred	125	568	328	453	1474
		% Setting type	8.5%	38.5%	22.3%	30.7%	100,0%
		% Attack type	27.8%	28.5%	22.9%	30.7%	27,6%
		Adjusted residual	0.1	1.2	-4.6	3.2*	
	Negative	Occurred	83	741	618	282	1724
		% Setting type	4.8%	43.0%	35.8%	16.4%	100,0%
		% Attack type	18.5%	37.2%	43.2%	19.1%	32,2%
		Adjusted residual	-6.5	6.0*	10.4*	-12.7	
	Back One	Occurred	105	318	243	388	1054
		% Setting type	10.0%	30.2%	23.1%	36.8%	100,0%
		% Attack type	23.4%	15.9%	17.0%	26.3%	19,7%
		Adjusted residual	2.1*	-5.3	-3.0	7.5*	
	Inside shoot	Occurred	136	367	241	354	1098
		% Setting type	12.4%	33.4%	21.9%	32.2%	100,0%
		% Attack type	30.3%	18.4%	16.9%	24.0%	20,5%
		Adjusted residual	5.4*	-3.0	-4.0	3.9*	
Total		Occurred	449	1994	1430	1477	5350
		% of the Total	8,4%	37.3%	26.7%	27.6%	100.0%

* Positive association> 2

Based on results of the chi-squared test shown in Table 3, statistically significant association was observed ($X^2 = 202.351$, $p < 0.001$). The inferential analysis showed that the attack score was positively associated with positive and negative attack and negatively with back one and inside shoot set. Defended attack was positively associated with back one and inside shoot set and negatively with positive and negative attack. Blocked attack was positively associated with back one and inside shoot set and negatively to negative attack. Attack error was positively associated with Inside shoot set and negatively to negative attack.

DISCUSSION

Results of the association between reception effect and setting type showed that after receptions A and B, the positive and negative settings were the most used, while after reception C, inside shoot setting was the most used. In addition, the inferential results showed that inside shoot was positively associated with reception C, while other setting types were negatively as-

Table 3. Association between attack effect and the setting type

			Attack effect				Total
			Attack score	Attack defense	Attack Block	Attack error	
Setting type	Positive	Occurred	1029	190	150	105	1474
		% Setting type	69.8%	12.9%	10.2%	7.1%	100,0%
		% Attack effect	29.6%	21.2%	24.8%	28.5%	27,6%
		Adjusted residual	4.6*	-4.7	-1.6	0.4	
	Negative	Occurred	1280	212	153	79	1724
		% Setting type	74.2%	12.3%	8.9%	4.6%	100,0%
		% Attack effect	36.8%	23.6%	25.2%	21.4%	32,2%
		Adjusted residual	9.8*	-6.1	-3.9	-4.6	
	Back One	Occurred	591	235	147	81	1054
		% Setting type	56.1%	22.3%	13.9%	7.7%	100,0%
		% Attack effect	17.0%	26.2%	24.3%	22.0%	19,7%
		Adjusted residual	-6.8	5.3*	3.0*	1.1	
	Inside shoot	Occurred	577	261	156	104	1098
		% Setting type	52.6%	23.8%	14.2%	9.5%	100,0%
		% Attack effect	16.6%	29.1%	25.7%	28.2%	20,5%
		Adjusted residual	-9.7	6.9*	3.4*	3.8*	
Total		Occurred	3477	898	606	369	5350
		% of the Total	65,0%	16.8%	11.3%	6.9%	100.0%

* Positive association> 2

sociated. This trend corroborates the study of Afonso et al.[21], who observed increased use of fast play near the setter in attacks carried out by zone 3. In another study, Marcelino et al.[22] found that the reception quality influences the distribution strategy and the fast game requires high quality of receptions.

The men's game is played faster and faster and searches for using four attackers, specifically from zone 4, zone 3, zone 6 and zone 1 or zone 2, avoiding plays that delays the attack speed[13]. In this regard, high-quality receptions allow the performance of fast play close and away from the setter as well as in front and behind the setter [22]. However, poor-quality reception, reception C, hinders the achievement of fast play near the settler due to temporal and spatial aspects[22], that is, the setter is away from the net most of the time, which hinders the distribution of positive, negative and back one sets. However, the most distant balls become viable, as there is enough space between the setter and the middle attacker for this setting, especially the inside shoot set.

Thus, the game held near the setter improved speed and accuracy, specifically positive, negative and back one set, restricting the opponent's defensive system. This trend confirms the study of Afonso and Mesquita[22], who realized that attacks performed at position 3 and in 1st tempo of attack limited the structuring of the opponent's defensive system, i.e., reduced the occurrence of double and triple blocks.

Results of the association between attack type and setting type showed that the powerful attacks were the most frequent, while tip was the less

used. These results are in agreement with other studies[6,7,12,18], which showed the importance to perform powerful attack to score point. Although tips avoid attack error and powerful attacks increase error possibility, these are necessary for the overlay to defensive systems, which are increasingly better structured[24,25].

In this sense, it was observed that due to the association between inside shoot and back one with tips, the setting distribution or quality could not allow excellent conditions for scoring point. In contrast, powerful attacks for positions 1 and 5 were positively associated to negative set, suggesting that the completion condition was excellent for this setting type. In addition, powerful attack for position 6 was positively associated with setting types back one and inside shoot, indicating that block was not formed at the moment of attack. This trend is in line with the study of Afonso et al.[9], who observed the central blocker's strategy and found that the positioning of this blocker was related to the reception quality and setting type, suggesting that the decisions that players make are dependent on signals relevant of each situation [26], particularly situational constraints. Thus, these constraints create contexts that are configured from constraints imposed on players.

The results on the attack effect showed that the point of attack was the most recurring effect, corroborating the study of Rocha and Barbanti [5], who analyzed attacks from positions 2, 3 and 4 and observed higher occurrence of attack point effect, while the attack error was the lowest frequent effect. In addition, there was association between attack effect and setting type, and positive and negative sets were positively associated with the attack point, while the other sets were associated with the game continuity or with the attack error. In this context, although other variables such as individual characteristics of the middle attacker and play combinations have not been analyzed in this study, it could be inferred that positive and negative sets were one of the most effective strategies for score point when analyzing the game played by the middle attacker. This trend was confirmed by studies in this area, demonstrating that the middle attack hinders the blocking structure and favors the attack with fewer blockers[9,22].

However, the analysis of the phenomenon only in men's teams and in the context of complex I are recognized as limitations of this study, which suggests caution in generalizing the findings.

CONCLUSIONS

It was concluded that there was association between reception effect and the setting type with attack type, as well as the setting type with the attack effect. It was also observed that among the middle spiker's attack actions, most occurred after receptions A and B and the attack point was the most recurrent. Moreover, powerful attacks were the most used, while tips while the less widely used.

In high-level men's volleyball, positive and negative balls are presented as efficient strategies to score point, as well as a part of the attack distribu-

tion strategy. Furthermore, inside shoot and back one are possibly used as game variations, suggesting that the need to use these types of setting arises from a situational demand, due to the change in the blocking structure or attack strategy. In this context, this study suggests that further studies seeking to understand the situational constraints regarding the middle attacker in the complex II should be carried out to avoid the generalization of results, and others should observe the performance of other game positions.

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