

DIFFERENCES IN GAME PATTERNS BETWEEN MALE AND FEMALE YOUTH VOLLEYBALL

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Abstract:

Volleyball presents diversified competitive demands according to age group and sex, namely concerning the efficacy of game actions, but few studies have compared male and female volleyball. Also, a great body of research has been conducted with adult teams, but only a few studies have been conducted with younger age groups. Hence, it is the purpose of this paper to analyze the differences between male and female youth volleyball, considering game complex, serve type, attack tempo, attack type, and attack effectiveness, as literature has suggested the existence of differences in these parameters. Nineteen volleyball matches of the Youth World Championships of 2007 were analyzed (11 male, 8 female), totaling 1,816 serve actions and 1,914 attack actions. Multinomial logistic regression was applied to analyze the game actions that could differentiate male and female game profiles. Three variables showed significant differences between male and female volleyball: serve type, attack tempo, and attack type. There was a predominance of ground serves, placed attacks and slower attack plays in women's volleyball, therefore promoting a higher occurrence of counterattacks. Future research should consider additional variables, such as match status and the opponents' level, both possibly influencing the attack tactics used by the teams, as well as their performance.

Key words: performance, notational analysis, gender specificity

Introduction

A broad scope of research has been conducted in order to understand the dynamics of the game of volleyball (Araújo, Mesquita, & Marcelino, 2009; Bergeles, Barzouka, & Elissavet, 2009; Drikos, Kountouris, Laios, & Laios, 2009; Marcelino, Mesquita, Palao, & Sampaio, 2009; Mesquita & César, 2007; Monteiro, Mesquita, & Marcelino, 2009; Palao, Santos, & Ureña, 2007; Rocha & Barbanti, 2006; Zetou, Tsigilis, Moustakidis, & Komninakidou 2006). When analyzing the logic of the game, two major game complexes should be distinguished: complex I or side-out, which comprises serve-reception, setting and attack, and complex II or side-out transition, which comprises serve, block, low defence and counterattack (Palao, Santos, & Ureña, 2004). In complex I, the teams face the opponent's serve, which is generally more predictable than the attack, therefore they can better organize themselves. This allows the team to organize quicker and stronger attacks (Afonso, Mesquita, & Palao, 2005; Castro & Mesquita, 2008). Conversely, in transition teams often perform

slower and more secure offenses, thus allowing the opponent a better defensive organization (Afonso, et al., 2005; Mesquita, Manso, & Palao, 2007; César & Mesquita, 2006).

Volleyball is characterized by diversified competitive demands according to age and sex as regards efficacy of the game actions (Palao, Manzanares, & Ortega, 2009). Notwithstanding, few studies have compared male and female volleyball (Palao, et al., 2009; Palao, et al., 2004). This may produce a pernicious effect, as the majority of studies have been conducted with male volleyball. Therefore, information given to women teams' coaches is likely to influence them in a non-specific manner. The risk is to train and develop methods that mirror the male game, but which do not adjust to the women's game. A better knowledge of the specificities of men's and women's volleyball, with a thorough awareness of the differences that distinguish them, will be more useful for coaches and athletes alike. Although some thoughts regarding this theme have emerged in literature, scientific research has been scarce.

Published studies show some differences between the men's and the women's game. In the first analysis, the uttermost differences rely on men applying more powerful jump serves (Palao, et al., 2009; Agelonidis, 2004; Rocha & Barbanti, 2004), quicker attack tempos (Castro & Mesquita, 2008; Afonso, et. al., 2005; Palao, et al., 2004), stronger attacks (Costa, Ferreira, Junqueira, Afonso, & Mesquita, 2011), and playing less often in complex II. Women predominantly use ground serves (Palao, et al., 2009), develop slower attack plays (César & Mesquita, 2006; Palao, et al., 2004), use placed attacks more often (Costa, Mesquita, Greco, Ferreira, & Moraes, in press), and provide longer rallies, therefore playing more often in complex II (Bergeles, et al., 2009).

Moreover, research conducted on these variables has addressed adult teams playing at the highest levels, while there is scarcity of research with younger age groups. Nevertheless, data from such groups would be relevant for the training process. As such, it is our purpose to analyze the differences between male and female youth volleyball teams of elite level, considering game complex, serve type, attack tempo, attack type, and attack effectiveness. The choice of variables relates to the previously found differences between the men's and the women's volleyball, and it also regards the fact that the actions of serving and attacking are the most correlated with the final victory in volleyball (Marcelino, Mesquita, & Afonso, 2008).

Methods

Sample

Nineteen volleyball matches between youth (cadet) national teams were analyzed (11 matches for 11 male teams, 8 matches for 7 female teams) on the basis of video recordings. The matches were part of the 2007 World Championships (qualification round, semi-finals and finals). In each match, both teams were analyzed. For males, two matches per team were analyzed. For females, each team was analyzed between one and two times. The analysis embraced 1,816 serve actions and 1,914 attack actions in total.

Variables

The analyzed variables comprised game complex, serve type, attack tempo, attack type, and attack effectiveness. Regarding the *game complex*, the proposal of Eom and Schutz (1992) was followed: a) complex I or side-out: game complex encompassing serve-reception, setting, and attack; b) complex II or transition: game complex encompassing serve, block, low defense, and counterattack.

For the evaluation of *serve type*, the proposals of Palao et al. (2009), Gambardella (1997) and Wise (2002) were combined. Therefore, a serve was

divided according to foot contact (ground serve, or simply serve vs. jump serve), ball trajectory (powerful, floating), and tactics (power vs. placing the ball in a specific location). As such, five categories were established: a) powerful jump serve (implies ball rotation); b) placed jump serve (similar to the powerful jump serve, but with much less power); c) tense float jump serve (without ball rotation and passing close to the net); d) place float jump serve (when passing through the net, it is not very close to it); and e) ground serve (serve without jumping).

Attack tempo corresponds to the timing of the attack action, considering the attacker, the setter, and the ball. An adaptation of the categories defined by Afonso, Mesquita, Marcelino, and Silva (2010) was used: tempo 1 (the attacker jumps during or slightly after the set, possibly taking one last step after the set), tempo 2 (the attacker takes two or three steps after the set), and tempo 3 (the attacker waits until the set is accomplished, and only then starts a three-step approach).

Attack type was analyzed following the suggestion of Costa et al. (2011): powerful attack – powerful hit on the ball, imprinting a downward trajectory; placed attack – there is a control of the power applied to the ball, directing the hit to an unguarded defensive location.

Attack effectiveness was evaluated using the adapted instrument of Eom and Schutz (1992), and it considered six categories: 0 – attack error; 1 – blocked attack; 2 – continuity with organized counterattack; 3 – continuity with the ball kept in the attacking team (after bouncing off the block); 4 – continuity with no organized attack; 5 – attack point.

Statistical analyses

Descriptive statistics were applied in order to determine frequencies and percentages of occurrence of the variables. Multinomial logistic regression was applied to construct models that could predict the differences between the male and the female performance. In the first step, the variables were tested individually, in order to identify the existence of significant association with the response variable (crude odds ratio). If that presupposition has been verified, that variable is then included in the adjusted model (adjusted odds ratio). The level of significance was established to be at .05. SPSS 17.0 for Windows was used for data analysis.

An experienced researcher and international level volleyball coach conducted the initial data analysis. Two additional researchers and national level coaches conducted secondary observations of the data. For reliability calculations, 35% of the actions were reanalyzed, therefore surpassing the reference of 10% (Tabachnick & Fidell, 2000). Cohen's Kappa varied between .83 and 1.00 for inter-observer reliability, and between .82 and 1.00 for intra-observer reliability. Hence, all values ful-

filled the criterion of .75 suggested in the literature (Fleiss, 2003).

Results

Table 1 presents the descriptive results for the analyzed variables.

As is apparent, female teams play more often in complex II, and less in complex I. Male teams used jump serves more frequently, with the exception of the tense floating jump serve, while female teams used ground serves more often. As for attack tempo, 1st and 2nd tempos were used more often in male teams, while 3rd tempo was more typical of female teams. As regards attack type, men used potent attacks more often than women. As for the effect of the attack, there was a predominance of continuity situations in female teams.

Table 2 presents the results regarding the differences between male and female youth volleyball. Only the game complex and attack effectiveness did not present the predictive power for differentiating male and female games. Hence, both genders presented similar values of attack effectiveness and played similar percentages in complexes I and II.

Within the serve type, female youth volleyball presented a lower likelihood of performing all forms of jump serves, when compared to male volleyball. Otherwise, the ground serve was highly predominant in female teams, happening in 87.9% of the situations.

Concerning attack tempo, in female volleyball 1st and 2nd tempos were less frequently used than 3rd

tempos, comparatively to male volleyball. Therefore, male teams were more likely to run quicker attack plays. As for the attack type, again females were less likely to apply powerful attacks than males.

Discussion and conclusions

Our purpose was to analyze the differences in game regularities between male and female youth volleyball teams. Three variables showed significant differences: serve type, attack tempo, and attack type allowed a discrimination of both genres. Although game complex did not present statistical significance, there was a trend in the females playing technique more often in complex II than in side-out, and the opposite for males. These results corroborate those of Bergeles et al. (2009), for adult's volleyball, although the authors have used chi-square testing. The predominance of ground serves (Palao, et al., 2009), placed attacks (Costa, et al., in press) and slower attacks plays (César & Mesquita, 2006) was confirmed in our study, and induced a more balanced relationship between the attack and the defense in women's volleyball, therefore promoting a higher occurrence of counterattacks, so that complex II emerged more frequently.

As males usually display more power, powerful jump serves come more naturally. Nonetheless, females were expected to have used float jump serves more often. Despite that, the less frequent appliance of quick attacks in female teams may induce

Table 1. Descriptive data concerning variables under analysis

Variables	Categories	Frequency		%	
		Female	Male	Female	Male
Game complex	Complex I	698	863	59.5	66.1
	Complex II	476	443	40.5	33.9
Serve type	Power jump serve	134	444	17.1	42.9
	Placed jump serve	57	151	7.3	15.6
	Tense floating jump serve	132	107	16.9	10.3
	Placed floating jump serve	162	291	20.7	28.1
	Ground serve	297	41	38.0	4.0
Attack tempo	1 st tempo	169	247	16.4	21.3
	2 nd tempo	362	515	35.2	44.4
	3 rd tempo	497	399	48.3	34.4
Attack type	Potent attack	717	929	69.7	80.0
	Placed attack	311	232	30.3	20.0
Effect of the attack	Error	112	113	10.9	9.7
	Blocked	92	112	8.9	9.6
	Continuity: defense with organized counterattack	136	133	13.2	11.5
	Continuity: rebound on the block back our team	76	46	7.4	4.0
	Continuity: defense without organized counterattack	231	217	22.5	18.7
	Point	381	540	37.1	46.5

Table 2. Adjusted model for male and female actions

Game variables	Male (%)	Female (%)	OR Crude	OR Adjusted	p
Female ^a					
Game complex					
Complex I	55.3	44.7	0.75 (0.64-0.89) ^c	0.89 (0.72-1.10) ^c	.27
Complex II ^b	48.2	51.8			
Serve					
Power jump serve	76.8	23.2	0.04 (0.03-0.06)	0.05 (0.03-0.07)	<.001
Placed jump serve	72.6	27.4	0.05 (0.03-0.08)	0.05 (0.03-0.08)	<.001
Tense float jump serve	44.8	55.2	0.17 (0.11-0.26)	0.16 (0.01-0.27)	<.001
Placed float jump serve	64.2	35.8	0.08 (0.05-0.11)	0.08 (0.05-0.13)	<.001
Ground serve ^b	12.1	87.9			
Attack tempo					
1 st tempo	59.4	40.6	0.55 (0.43-0.70)	0.41 (0.29-0.59)	<.001
2 nd tempo	58.7	41.3	0.56 (0.47-0.68)	0.43 (0.31-0.60)	<.001
3 rd tempo ^b	44.5	55.5			
Attack type					
Powerful	54.7	45.3	0.57 (0.47-0.71)	0.50 (0.35-0.71)	<.001
Placed ^b	40.9	59.1			
Attack effectiveness					
0	49.8	50.2	1.41 (1.06-1.86)	0.93 (0.60-1.45)	.76
1	54.9	45.1	1.15 (0.85-1.56)	0.75 (0.47-1.22)	.25
2	50.2	49.8	1.39 (1.06-1.81)	0.77 (0.46-1.30)	.33
3	37.7	62.3	2.31 (1.56-3.40)	1.37 (0.78-2.41)	.27
4	49.6	50.4	1.42 (1.13-1.78)	0.89 (0.62-1.26)	.49
5 ^b	58.3	41.7			

^a Reference category for the response variable

^b Reference category for predictor variables

^c Numbers in brackets refer to the 95% confidence interval

a smaller risk in serve actions, thus investing more effort in defense and counterattack. On the other hand, in men's volleyball powerful serves were needed in order to diminish the likelihood of the opponent being able to run quick attack plays. This correlates well with the tendencies found by Zetou et al. (2006), where they realized that, in top-level men's volleyball, serve aggressiveness was highly related to scoring the point. Regarding female volleyball, Palao et al. (2009) found that ground serve was the most common occurrence. Despite this, a more frequent utilization of jump float serves could improve serve effectiveness in female volleyball, and that should warrant further research. In principle, jump float serves could afford faster and lower serve trajectories, impairing performance in reception. It would, therefore, be expected that national teams would apply this type of serve more often.

With respect to attack tempo, men's volleyball presented faster attacks. Patsiaouras, Kostantinos, Athanasios, & Kokaridas (2009) have analyzed World League matches (men), and have perceived that deploying fast attacks was a predictor of win-

ning the match. In female volleyball, attack tempos should be faster than in male volleyball. Since the attack is not so powerful, there is a greater balance between defense and attack, that being the reason why women play more often in complex II. This should lead female teams to use more speed in order to counterbalance their lesser power. However, match analysis has revealed the inverse. Despite this apparent contradiction, male's block may be more aggressive than in the female game, and that would warrant the need to accelerate the game, attempting to avoid well-formed blocks, therefore justifying why males used faster attack sequences than females.

Finally, male volleyball was more likely to use powerful attacks, while female volleyball used placed attacks more often. Again, this should promote the construction of fast and diversified attacks sequences, unbalancing the opponent's defense through speed and delusion. However, it was the opposite: males, who attack more powerfully, also attack at faster tempos. Therefore, it is suggested that blocking may need to improve in fe-

male volleyball. Additionally, female teams playing faster attack sequences may be able to create stronger imbalances in defense, thus augmenting their chances to win.

In conclusion, three variables showed significant differences between youth male and female volleyball: serve type, attack tempo, and attack type. There was a predominance of ground serves, placed attacks and slower attack plays in women's volleyball, therefore promoting a higher occurrence of counterattacks. Conversely, youth male volleyball is characterized by a higher occurrence of powerful jump serves, as well as faster and more powerful attacks. This suggests that volleyball train-

ing should follow quite distinct trends for men and women, starting at young ages. The game features are substantially divergent according to gender, with implications for technical and tactical preparation. Furthermore, the more frequent occurrence of counterattack in girls' volleyball suggests that the relationship between active play and pauses between plays will be smaller than in boys' volleyball; subsequently, even physical preparation should differ according to gender. Future research should consider other variables, as match status and quality of the opponents, both of which may influence the attack strategies used by the teams, as well as their performance.

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RAZLIKE U OBRASCIMA ODBOJKAŠKE IGRE IZMEĐU MUŠKIH I ŽENSKIH ODBOJKAŠA MLADIH UZRASTA

Odbojka postavlja raznolike natjecateljske zahtjeve prema sportašima različite dobi i spola, osobito s aspekta učinkovitosti akcija u igri, ali malo je dosadašnjih istraživanja usporedilo mušku i žensku odbojku. Također, brojna su istraživanja do sada provedena na odraslima, a tek je nekoliko istraživanja provedeno na mlađim dobnim kategorijama. Zbog toga je svrha ovog istraživanja analizirati razlike između muške i ženske odbojke s obzirom na kompleks igre, vrstu servisa, tempo napada, vrstu napada i učinkovitost napada budući da literatura sugerira postojanje razlika u navedenim parametrima. Analizirano je 19 odbojkaških susreta (11 muških i 8 ženskih) odigranih na Svjetskom prvenstvu za mlade (kadete) 2007. godine, u kojima je zabilježeno ukupno 1.816 servisa i 1.914 akcija napada. Multinomialna logistička regresijska analiza pri-

mijenjena je za analizu akcija u igri koje bi mogle razlikovati muške i ženske profile igre. Statistički značajna razlika između muške i ženske odbojke zabilježena je u tri varijable: vrsta servisa, tempo napada i vrsta napada. U ženskoj odbojci su prevladavali servisi sa zemlje, plasirani napadi i sporiji napadi, zbog čega je zabilježeno i učestalije odigravanje protunapada. Buduća istraživanja trebala bi analizirati i neke dodatne varijable, kao što su status rezultata u susretu i kvaliteta protivnika budući da bi obje navedene varijable mogle utjecati na odabir taktike napada koju koriste ekipe kao i na njihovu izvedbu.

Ključne riječi: izvedba, notacijska analiza, spolne razlike