Original Article

Way of scoring of Spanish first Division volleyball teams in relation to winning/losing, home/away, final classification, and type of confrontation

JOSÉ MANUEL PALAO [1] ✉ , POLICARPO MANZANARES [2], DAVID VALADÉS [3]

[1] Faculty of Sport Science, University of Murcia, Spain

[2] Faculty of physical activity and Sport Sciences, San Antonio Catholic University of Murcia, Spain

[3] Faculty of Medicine and Health Sciences, University of Alcalá, Madrid, Spain

ABSTRACT

Palao, J.M., Manzanares, P., & Valadés, D. (2015). Way of scoring of Spanish first Division volleyball teams in relation to winning/losing, home/away, final classification, and type of confrontation. *J. Hum. Sport Exerc., 10*(1), pp36-46. The aim of this study was to assess the way volleyball teams score with regard to: whether or not they won the game, whether they were the home or away team, the level of the opposing teams, and the type of confrontation. The sample was composed of 118,083 plays from 794 men's volleyball matches and 125,751 plays from 719 women's matches of Spain's first division clubs (from the 2002-2003 season to the 2006-2007 season). The variables studied were: the way points were obtained in each play, being the home or away team, the level of the teams, the result of the match, and the type of confrontation between the teams with regard to their level. The results demonstrate that for both men's and women's teams, the majority of the points were obtained in attack and by opponent errors. Differences were found with regard to the way points were obtained when winning or losing the match was taken into account as well as when considering the level of the teams. This paper discusses the differences found with regard to whether the team is home or visiting and the type of confrontation. **Key words**: TEAM SPORT, PERFORMANCE, MONITORING, MATCH ANALYSIS

INTRODUCTION

In volleyball, the game actions have different effects on the final result. The cyclic character of the game sequences and the possibility for only three ball contacts means that the game actions in which there is contact with the ball are differentiated between actions of continuity and terminal actions. Actions of continuity attempt to neutralise the opponent's actions and organize one's own attack. Actions of continuity include: reception, set, and dig. Terminal actions attempt to obtain a point and/or make the opponent's actions more difficult. Terminal actions include: serve, attack, and block.

Studies that assess technical and tactical indicators of volleyball performance demonstrate how terminal actions are more correlated to the result of the match and/or the performance of teams (Eom & Schultz, 1992; Drikos et al., 2009; Palao et al., 2004a). The effect of each action on the result of the match varies with regard to the level and gender of players (García de Alcaraz et al., 2013; Palao et al., 2009). Thus, at formative stages or at lower levels, the serve and errors have more importance in the game, while for the high-performance game, this importance is less so; however, the importance of the attack increases considerably (García de Alcaraz et al., 2013;). By gender, the block in high performance volleyball has greater importance in the men's game than in the women's game (Palao et al., 2004b; Palao et al., 2009).

The actions of continuity are correlated to the result when their execution affects the terminal actions and/or because a high number of errors are correlated with losing the play (García de Alcaraz et al., 2013; Palao et al., 2004b). This tendency is observed in the high performance game for the reception and set when receiving as well as for the set when defending (Eom & Schultz, 1992).

Monitoring how points are obtained in volleyball is necessary for decision making during a match as well as for later establishing objectives in training sessions and matches. In this regard, the study by Zhang (2000) provided reference values regarding the weight of the different actions in the score after the modifications to the regulations of the scoring system (rally-point system) (FIVB, 1999). These reference values should take into consideration the aspects or variables that affect a team's performance throughout the season, such as for example, playing at home or away or the level of the opponent. Concerning playing at home or away, in volleyball, home teams win 55.7% of matches (Gómez et al., 2011). The reasoning for this home advantage may be due to a greater performance in the actions of attack and block in different sets of the match as a consequence of home teams assuming more risk (Marcelino et al., 2009).

The majority of the studies that analyse the technical and tactical indicators of performance have grouped the total team values (Zhang, 2000) or have only taken the result of the match into consideration (win or loss) (Mesquita et al., 2013). However, in these studies, the level of the teams and the types of confrontation between them has not been included. In the bibliographic review that was done, few studies were found that analysed performance indicators and took into consideration the level of the teams (e.g. Díaz, 1996; Marcelino et al., 2008; Palao et al., 2004a). The differences between teams of distinct levels can affect the way teams play, according to the type of confrontation (e.g. level of the team and level of the opponent) (Palao et al., 2004a). This analysis combined with the result of the match can allow for better comprehension of team performance in competition. This plan, together with reference values, can allow a more individualised focus that is adapted to the characteristics of the teams, which will bring the results of research studies closer to the reality of the teams and their rivals. The aim of this study was to analyse the way volleyball teams obtain points with respect to whether they win or lose the match, whether they play as the home or away team, the level of the teams, and the type of confrontation.

MATERIAL AND METHODS

The sample was composed of 118,083 plays from 794 matches played by 60 men's teams and 125,751 plays from 719 matches played by 60 women's teams from the first division of Spain's volleyball league ("Superliga", 2002-2003 season to the 2006-2007 season) (Table 3). The match information was obtained from the match reports of the various championships' databases on the Spanish Volleyball Federation's web page (www.rfevb.com). The information was collected by a delegate of the home team for each confrontation, and the delegate was trained by the Spanish Volleyball Federation.

A descriptive and correlational study design was utilised. The variables were: the way the point was obtained in each play (point from a serve, spike, block, or error (error in serving, spiking, blocking, or other), status as home or away team, the level of the teams (level 1, classified 1st-4th; level 2, classified 5th-8th; level 3, classified 9th – last), the match result, and the type of confrontation between the teams with regard to team levels (level 1 vs. level 1, level 1 vs. level 2, level 1 vs. level 3, level 2 vs. level 2, level 2 vs. level 3, and level 3 vs. level 3).

The data from the match reports were introduced in a spreadsheet. Ten percent of the match reports were randomly reviewed to check for errors in the data entry. If in the group of match reports that were reviewed, there was an error percentage greater than 5%, the errors were rectified and another 10% of the un-reviewed match reports were randomly checked. It was not necessary to repeat this process. From the data that were obtained from the match report for each set, the proportion of points was calculated, and the data from the matches of three, four, and five sets were homogenised. The values were expressed in percentages and in proportions of 25 points. Establishing the levels was done from the final classification of the competition.

A descriptive and inferential analysis was done with the SPSS 15.0 statistics program, with the level of significance set at $p < .05$. An ANOVA was utilised to determine whether the variables were normal regarding types of confrontation, and it was differentiated by gender. To analyse the continuous parametric variables, an ANOVA with a post-hoc Scheffe of multiple comparison was utilised, in function of the confrontations, level, being the home or away team, and type of confrontation. To analyse the continuous non-parametric variables, a one-way ANOVA with a post-hoc Dunnett T3 test of multiple comparison was utilised in function of the confrontations.

RESULTS

The majority of the points achieved both by winning and losing men's teams were by the actions of attack and by opponent errors (Table 1). The number of points scored through blocks and serves is fewer than or equal to 3 points per set. Winning men's teams earned a significantly higher number of points through every way to earn points ($p < .000$).

Table 1. Points earned in each set through the various actions by winning and losing men's teams

Result	Actions	Mean	SD	%	Min	5th Percentile	25th Percentile	75th Percentile	95th Percentile	Max
Win	Attack	13,2**	2,7	53	7	9	11	15	18	23
	Block	2,9**	1	12	0	1	2	3	5	8
	Serve	1,4**	0,8	5	0	0	1	2	3	5
	Rival error	7,6**	2	30	1	5	6	9	11	15
	Total	25	3,4	100	-	-	-	-	-	-
Loss	Attack	11,7**	1,1	54	3	7	8	14	17	21
	Block	2,1**	0,7	10	0	1	1	3	4	12
	Serve	0,9**	1,9	4	0	0	0	1	2	4
	Rival error	6,9**	2,7	32	2	4	5	8	10	15
	Total	21,5	1	100	-	-	-	-	-	-

* p<.05; ** p<.005

The majority of the points obtained both by women's winning and losing teams were attack points and points earned through opponent errors (Table 2). The number of points scored though blocks and serves was fewer than or equal to 3 points per set. Winning women's teams had a significantly higher number of points achieved in all ways points can be earned. The level of significance was p<.000 for attacks, blocks, and opponent errors, and p<.033 for serves.

Table 2. Points earned in each set through the various actions by winning and losing women's teams

Result	Actions	Mean	SD	%	Min	5th Percentile	25th Percentile	75th Percentile	95th Percentile	Max
Win	Attack	13,9**	2,8	56	7	10	12	16	18	23
	Block	3,0**	1,2	12	0	1	2	4	5	12
	Serve	1,5*	0,8	6	0	0	1	2	3	5
	Rival error	6,5**	1,8	26	2	4	5	8	10	14
	Total	25	3,5	100	-	-	-	-	-	-
Loss	Attack	11,4**	1,1	55	3	6	8	14	17	25
	Block	2,2**	0,6	11	0	1	1	3	4	6
	Serve	1,0*	1,9	5	0	0	1	1	2	4
	Rival error	5,9**	2,8	29	1	3	4	7	9	15
	Total	20,3	1,2	100	-	-	-	-	-	-

* p<.05; ** p<.005

Regarding the "home or away" variable, for the men's game (Table 3), for winning home teams, a higher number of points were achieved for every way points can possibly be earned (attacks, serves, blocks, and opponent errors) (*p*<.000) when compared to losing teams. For visiting winning teams, a higher number of points earned in attack, serve, and opponent errors (*p*<.000) was found, and there was a tendency toward significance for the number of points earned through blocks (*p*<.057).

Table 3. Points earned per set through the various actions by winning and losing men's teams in function of whether the winning team played at home or away

Result	Actions	Home		Away	
		Points per set	Percentage	Points per set	Percentage
Win	Attack	13,3**	53,3	13,0**	52
	Block	3,0**	11,9	2,8$^{\Theta}$	11
	Serve	1,4**	5,8	1,3**	5
	Rival error	7,3**	29	7,9**	32
	Total	25	100	25	100
Loss	Attack	10,9**	53,4	11,5**	55
	Block	1,9**	9,4	2,1$^{\Theta}$	10
	Serve	0,8**	3,9	0,9**	5
	Rival error	6,8**	33,3	6,2**	30
	Total	20,5	100	20,7	100

** $p<.000$; $^{\Theta} p<.057$

Concerning the "home or away" variable, for the women's game (Table 4), for winning home and away teams, a higher number of points was earned through attacks, serves, and opponent errors ($p<.000$) when compared to losing teams.

Table 4. Points earned per set through the various actions by winning and losing women's teams in function of whether the winning team played at home or away

Result	Actions	Home		Away	
		Points per set	Percentage	Points per set	Percentage
Win	Attack	13,9**	55,6	13,9**	55
	Block	3,1	12,3	2,9	12
	Serve	1,6**	6,5	1,4**	6
	Rival error	6,4**	25,6	6,8**	27
	Total	25	100	25	100
Loss	Attack	10,8**	55,1	11,0**	56
	Block	2,1	10,5	2,1	11
	Serve	0,9**	4,8	1,1**	5
	Rival error	5,8**	29,6	5,6**	28
	Total	19,6	100	19,8	100

** $p<.000$

Pertaining the level of the teams, in the men's game, with regard to totals, there were significant differences between the points earned by level 1 teams for attack, block, and serve and those earned by level 3 teams ($p<.002$) and for blocks when compared to level 2 teams ($p<.010$). Differences between level 2 and level 3 teams were found in relation to attack points. Differences were not found in opponent errors. With regard to winning or losing the set (Table 5), for level 1, when teams win, they earn a higher number of block and serve points ($p<.000$). For levels 2 and 3, when the teams win, they earn a higher number of points in all ways they can earn points (attacks, blocks, serves, and opponent errors) ($p<.000$).

Table 5. Points earned per set through the various actions by winning and losing men's teams in function of the level of the teams

		Level 1		Level 2		Level 3	
Result	Actions	Points per set	Percentage	Points per set	Percentage	Points per set	Percentage
Win	Attack	13,2	53	13,1*	52	13,2*	53
	Block	2,9*	11	2,8*	11	3,0*	12
	Serve	1,4*	5	1,4*	6	1,3*	5
	Rival error	7,5	30	7,6*	31	7,5*	30
	Total	25	100	25	100	25	100
Loss	Attack	12,3	56	11,7*	54	11,4*	54
	Block	2,1*	10	2,0*	9	2,1*	10
	Serve	0,8*	4	0,9*	4	0,9*	4
	Rival error	6,6	30	6,9*	32	6,8*	32
	Total	21,8	100	21,5	100	21,2	100

*p<.05; **p<.005

In function of the team's level, for women's volleyball and with regard to totals, significant differences between the points earned by level 1 teams in attack, block, and serve were found with regard to level 3 teams ($p<.001$) and between level 1 and level 2 teams in the block ($p<.001$). Likewise, there were significant differences between teams of level 2 and level 3 regarding the attack and block ($p<.05$). No differences were found regarding opponent errors. In function of winning or losing the set (Table 6), for level 1, when the teams win, they have a higher number of points from attacks ($p<.000$), blocks ($p<.007$), and serves ($p<.05$). For levels 2 and 3, when teams win, they earn a higher number of points from attacks and serves ($p<.001$).

Table 6. Points earned per set through the various actions by winning and losing women's teams in function of the level of the teams

		Level 1		Level 2		Level 3	
Result	Actions	Points per set	Percentage	Points per set	Percentage	Points per set	Percentage
Win	Attack	13,9**	56	13,9**	56	13,8**	55
	Block	3,2*	13	2,9	12	2,7	11
	Serve	1,5*	6	1,5**	6	1,6**	6
	Rival error	6,4	26	6,6	26	7	28
	Total	25	100	25	100	25	100
Loss	Attack	12,3**	58	11,5**	56	11**	54
	Block	2,7*	13	2,2	11	2	10
	Serve	0,8*	4	1,1**	5	1,1**	5
	Rival error	5,4	26	5,8	28	6,1	30
	Total	21,2	100	20,5	100	20,2	100

*p<.05; **p<.005

Regarding the level of confrontation (Table 7), for the men's game, the tendency varied according to the confrontation. For all types of confrontation, winning teams earned a significantly higher number of points from attacks and errors than losing teams. For confrontations in which level 3 teams are involved, winning teams also earned a significantly higher number of points from blocks and serves.

Table 7. Points earned in each set through the various actions by winning and losing men's teams in function of the type of confrontation

Result	Actions	1 x 1	1 x 2	1 x 3	2 x 2	2 x 3	3 x 3	Mean
Win	Attack	13,5**	13,4**	13,0**	13,1**	13,2**	13,1**	13,2**
	Block	2,9	2,8	2,9**	2,8	2,9**	3,0*	2,9**
	Serve	1,2	1,3	1,6*	1,4	1,4*	1,4*	1,4**
	Rival error	7,4**	7,4**	7,7**	7,7*	7,5**	7,5**	7,6**
	Total	25	25	25	25	25	25	25
Loss	Attack	12,4**	12,4*	11,1**	10,9**	11,5**	11,7**	11,7**
	Block	2	2	2,0**	2	2,1**	2,2**	2,1**
	Serve	0,8	0,9	0,8*	1	0,9*	1,0*	0,9**
	Rival error	6,5**	7,5**	7,2**	6,7*	6,8**	6,6**	6,9**
	Total	21,8	22,8	21,2	20,7	21,1	21,5	21,5

* p<.05; ** p<.005

For all types of confrontation, winning women's teams earned a significantly higher number of points from attacks, blocks, and errors than losing teams (Table 8). This tendency was not observed in the 1 vs. 1 or 1 vs. 3 confrontations with regard to block points. For 1 vs. 3 confrontations, winning teams also earned a significantly higher number of serve points.

Table 8. Points earned in each set through the various actions by winning and losing women's teams in function of the type of confrontation

Result	Actions	1 x 1	1 x 2	1 x 3	2 x 2	2 x 3	3 x 3	Mean
Win	Attack	14,0**	14,1**	13,7**	14,3**	13,7**	13,7**	13,9**
	Block	3,5	3,2**	3	3,1*	2,8**	2,7*	3,0**
	Serve	1,3	1,6	1,6*	1,5	1,6	1,7	1,5*
	Rival error	6,3**	6,2**	6,6**	6,3**	6,9**	6,8**	6,5**
	Total	25	25	25	25	25	25	25
Loss	Attack	11,4**	11,4**	11,3**	11,8**	11,1**	11,2**	11,4**
	Block	2,6	2,1**	2	2,4*	2,1**	2,1*	2,2**
	Serve	0,8	1	1,1*	1	1,1	1,1	1,0*
	Rival error	5,1**	5,7**	6,4**	5,9**	6,3**	6,1**	5,9**
	Total	19,3	20,1	20,8	21	20,6	20,2	20,3

* p<.05; ** p<.000

DISCUSSION

The present study assesses the way men's and women's first division volleyball teams in Spain earn points. Attacking was the way the greatest number of points was earned both in quantity and proportion, followed by opponent errors. The number of points earned through serves and blocks is low. This is logical, since the attack action is the one that finalises the collective actions in the game of volleyball, and opponent errors include errors in serve, reception, setting, attack, block, defence, and other individual and collective errors carried out by the opponent team. This tendency is found for all teams, men's and women's, as well as winning and losing teams.

For the men's game, as an outline, winning men's teams earn 13 points from attacks, 7-8 points from opponent errors, 3 points from blocks, and 1-2 serve points per set. If these values are compared with losing teams, it is observed that winning teams earn one point more in every way they can earn points (attacking, blocking, serving, and opponent errors). The results demonstrate that the differences between winning and losing teams appear in every way teams can earn points. These tendencies were also found in women's volleyball, although with a different proportion of points per set. Winning women's teams earn 14 points through attacks, 6-7 points through opponent errors, 3 points through blocks, and 1-2 service points per set. If these values are compared with those of losing teams, it is observed that losing teams earn 2-3 fewer points in attack, one fewer in block, and one fewer in serve and opponent errors.

The data are similar to those found in previous studies (Zhang, 2000). However, these studies express the way of scoring in means and proportion of points (percentages). The analysis carried out in the present study demonstrates that the normalised number of points per set can provide information regarding how the teams act in competition. The normalisation of the data per set demonstrates the importance of each action in winning the set. The use of proportionality (percentages) when comparing winning and losing teams gives the fictitious perception that for losing teams the attack has greater importance. These results recommend the use of normalised values to establish the teams´ technical and tactical objectives for monitoring training sessions as well as competition, instead of using percentages.

The results of this study can be used as reference values for competition both with regard to values of central tendency as well as dispersion of the data. These values, along with the analysis of the specific characteristics of the team, can serve as a starting point to establish objectives that are specific, attainable, and challenging for each team. However, the way a team scores gives a limited picture of the team's game. Therefore, it is recommended that other ways of evaluating the efficacy of the game actions be used, both regarding the individuals (e.g. assessment of the efficacy of techniques) and the team (e.g. efficacy of the game complexes) (Eom & Schultz, 1992; Grgantov et al., 1998; Palao et al., 2004a; Palao, 2004).

By gender, when comparing the way women's and men's winning teams score points, several aspects can be highlighted: a) women's teams earn more points through attacks and blocks than men's teams, and b) men's teams earn more points through opponent errors. Points earned through serves are similar for men and women. These results demonstrate how for high performance volleyball, the importance of the serve with regard to scoring is smaller, as this action is neutralised by the receivers. The higher number of attack and block points may be related to the greater continuity in the women's game (Palao et al., 2009). The greater number of points due to error may be related to players taking higher risks in the men's game (Palao et al., 2004b; Palao, 2004).

Regarding whether the team is home or away, similar tendencies were observed whether or not this variable was taken into account. However, the importance of the block decreases when it is taken into account. The number of points earned is similar for home and away teams. These data demonstrate that the way points are scored in volleyball is constant and the differences between winning and losing teams is as well. These values are not in agreement with those found by Marcelino et al. (2009), who found that home teams had higher performance thanks to the actions of attack and block. Nonetheless, the way the actions are analysed may be the reason for these differences. The study by Marcelino et al. (2009) analysed the actions in regard to whether they earned a point, provided continuity, or involved an error. In the present study, the errors were grouped, and only the points earned through attacks and blocks were considered. Another possible difference is the level of the sample. In the present study, Spain's club competition (in the regular league) was analysed, and in the study by Marcelino et al. (2009) the World League's national team competition was analysed. Studies that look closer at these differences, keeping in mind the type and duration of the displacements, the possible previous training, the characteristics of the facility, fan attendance and their actions, etc., are needed (Loughead et al., 2003; Wallace et al., 2005).

Regarding the level of the teams, differences were observed in function of the level. Both for the men's and women's game, the higher level teams scored more points through the actions that directly depend on them (attack, block, and serve). It should be highlighted that when the differences are compared between winning and losing teams of the various levels, higher-level teams are differentiated in blocking and serving. These results are likely due to the fact that when the teams are similar (very high level, similar attack), the actions of blocking and serving are the actions that create imbalance in the game. The block is also the element that differentiates the teams of higher level with the rest of the teams in the Olympic Games (Palao et al., 2004a). For the game level that was analysed, the serve is also an element that creates imbalance. For the rest of the levels, for both the men's and women's game, the tendency was for winning teams to earn more points in attack, block, and serve. The greater the difference between the teams' levels, the more differences that were found in the way they score points. Taking into consideration the type of confrontation, the tendencies that were found are similar to those found by level. Small variations were found in function of the type of confrontation, within the aforementioned pattern regarding the number of points earned by the various actions.

The results of the present study demonstrate the differences between winning and losing teams with regard to the way they score points. This tendency is maintained whether the team played at home or away, whatever the level of the team's game (higher-level teams won more matches), and whatever the type of confrontation. The results may be utilised as reference values to guide the analysis of the team's actions in competition. Employing the ranges of points earned by winning teams is recommended. Thus, the specific values needed to win a set would be the following:

- For men's volleyball, 11-15 points in attack, 2-3 points in block, 1-2 service points, and 6-9 points in opponent errors.
- For women's volleyball, 12-16 points in attack, 2-4 points in block, 1-2 service points, and 5-8 points in opponent errors.

CONCLUSIONS

The present study demonstrates reference values regarding the ways to score. Both for women's and men's volleyball, the majority of the points are earned through attack and opponent error. The results demonstrate how the normalisation of the points with regard to the set (25 points to earn in each set) is a suitable criterion to establish reference values and match objectives. Differences have been found in the way points are earned in function of winning or losing the match as well as the level of the teams. These differences mean that it is necessary to differentiate one's own level and the level of rivals to establish a plan for obtaining training and match objectives. Future studies that provide reference values regarding the efficacy of the individual and collective game actions that allow coaches and researchers to analyse the game and plan objectives for studies utilising objective information are necessary. These studies should include those variables that affect the development of the game actions and should be carried out in the various levels of competition, age divisions, and for both the men's and women's game.

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