Tactical-technical performance differences between winning and losing teams in a women's beach volleyball tie-break

Diferencias de rendimiento táctico-técnico entre equipos ganadores y perdedores en un tie-break de vóley playa femenino

Authors

Vanessa da Silva Lima [1]
Antonio García-de-Alcaraz [2]
Jose Manuel Palao [3]
Alexandre Igor Araripe Medeiros [4]
Gilmário Ricarte Batista [5]

[1] State University of Ceara (Brazil)
[2] University of Almería (Spain)
[3] University of Wisconsin-Parkside (USA)
[4] Federal University of Ceara (Brazil)
[5] Federal University of Paraiba (Brazil)

Corresponding author:
Alexandre Igor Araripe Medeiros
alexandremedeiros@ufc.br

Received: 30-09-24
Accepted: 22-09-25

How to cite in APA

Lima, V. da S., García-de-Alcaraz, A., Palao, J. M., Araripe Medeiros, A. I., & Batista, G. R. (2025). Tactical-technical performance differences between winning and losing teams in a women's beach volleyball tie-break. *Retos, 73*, 1607-1617. https://doi.org/10.47197/retos.v73.110330

Abstract

Introduction and Objective. The aim of this study was to compare tactical-technical. performance indicators between winning and losing teams in the tie-break according to the final point difference.
Methodology. Game actions (n=4.872) performed in 31 tie-breaks (100%) played in balanced matches during the 2019 and 2022 World Championships were observed and analyzed. Cluster analysis established three types of tie-breaks based on the final point differences (2, 3-4, and 5 points or more). The performance indicators analyzed were the total number of points scored in each game complex, the number of points and opponents' errors, and the performance coefficient of the serve, reception, set, attack, block, and dig in each complex. A T-test and effect size was carried out to differentiate between tie-break outcomes.
Results. Overall, winners showed more KII points (attack and block), attack efficacy (side-out), and fewer attack (KIII) and block errors compared to losers. Winners and losers showed different performance patterns according to the type of tie-break: a) in side-out attack in closed sets (difference of 2 points), b) in server performance for "3–4 points" sets, and c) in counterattack in sets over 5 points of difference.
Conclusions. The smaller the difference in final points between teams, the fewer indicators differentiate between winners and losers.

Keywords

Sand sports; match analysis; performance indicators; situational variables; game pase.

Resumen

Introducción y Objetivo. El objetivo de este estudio fue comparar los indicadores de rendimiento técnico-táctico entre equipos ganadores y perdedores en el tie-break según su diferencia de puntos final.
Metodología. Se observaron y analizaron las acciones de juego (n=4,872) realizadas en 31 sets disputados en partidos equilibrados durante los Campeonatos del Mundo de 2019 y 2022 (100%). El análisis de conglomerados definió tres tipos de sets en función de la diferencia de puntos final (2, 3-4 y 5 o más puntos). Los indicadores de rendimiento analizados fueron el número total de puntos anotados en cada complejo de juego, el número de puntos y errores del oponente, y el coeficiente de rendimiento del saque, recepción, colocación, ataque, bloqueo y defensa en cada complejo. Se llevó a cabo una prueba T con un tamaño del efecto para comparar los tres tipos de sets establecidos.
Resultados. Los ganadores anotaron más puntos en KII (ataque y bloqueo), y mostraron una mayor eficacia de ataque (salida de recepción) y menor error de ataque (KIII) y bloqueo en comparación con los perdedores. Los ganadores y perdedores mostraron diferencias en el rendimiento según el tipo de tie-break: a) en ataque en salida de recepción en sets cerrados (diferencia de 2 puntos), b) en el rendimiento del saque para sets de "3-4 puntos", y c) en contraataque en sets de 5 o más puntos.
Conclusiones. A menor diferencia de puntos a final de set, menos indicadores de rendimiento diferencian ganadores de perdedores.

Palabras clave

Deportes de arena; análisis del juego; indicadores de rendimiento; variables situacionales; fase de juego.

Introduction

Beach volleyball has shown growth in scientific research related to match analysis in high-level competitions. This trend reflects interest in understanding the sport's tactical, technical, and situational demands through systematic investigation (Lima et al., 2023). In this context, researchers have adopted the concept of game complexes, such as KI (offensive sequences after serve-reception) and KII (first defensive response to opponent attacks) (Palao, López, & Ortega, 2015), with extended models including KIII and KIV to represent subsequent phases of prolonged rallies, depending on the initial complex involved (Medeiros et al., 2017).

Previous research highlights that tactical-technical- actions within the game complexes are key determinants of match outcomes in beach volleyball (Kumar et al., 2021; Medeiros et al., 2017). Attack effectiveness in side-out is a strong predictor of success, both in regular sets and tiebreaks, for men's and women's teams (Giatsis, 2023; Giatsis et al., 2023). Winning men's teams tend to score a high percentage of their points in K1, reaching 69.29% in regular sets (Palao & Ortega, 2015). In addition, other complexes also demonstrate important contributions to this, such as 65.2% in K2, 52.1% in K3, and 36.2% in K4 (Medeiros et al., 2017). The analysis of the actions within these games complexes offers a crucial framework for both scientific advancement and more effective team preparation and strategic planning in high-level competition.

Moreover, the complexity of beach volleyball is reflected in the transitions between offensive and defensive phases, which occur in highly dynamic contexts under constant pressure. From this perspective, analyzing sets based on the point difference at the end of the set represents a critical approach for identifying team performance under conditions of competitive balance (Drikos et al., 2025). Sets decided by closed margins are characterized by elevated tactical and technical demands and are often decided by specific actions executed during key moments of the match. In indoor volleyball, the closer the scoreline between teams at the end of a set, the greater the importance attributed to each point played by team becomes crucial and can determine the winner (Drikos et al., 2020). In such balanced matches, small performance variations can be decisive for the outcome. As reported by Giatsis (2023), stratifying sets based on the final point difference facilitates the identification of performance indicators that differentiate winning from losing teams, highlighting the importance of situational analysis for understanding beach volleyball.

Several studies have explored performance indicators in beach volleyball; however, few have examined the influence of score differences in decisive sets in the women's category. The tie-break—the decisive third set played to 15 points with a minimum two-point margin (Fédération Internationale de Volleyball [FIVB], 2023)—represent a critical moment in the match, during which the athletes' physical, psychological, and cognitive capacities are tested (Carlstedt, 2004). This high-pressure environment alters game dynamics and impacts key performance indicators (Alcock & Cable, 2017; Alder et al., 2019).

To better understand performance under these conditions, researchers emphasize the importance of considering other indicators in addition to single-point elements, especially if final set scores are closer or differ largely (Rodriguez-Ruiz et al., 2011). For these reasons, the analysis of the contributions of different game actions and phases to winning, according to the set status, can provide new perspectives on the game (Drikos et al., 2020).

Thus, the aim of this study was to compare tactical-technical indicators between winning and losing teams in the tie-break, according to the final point difference in high-level women's beach volleyball balanced matches. Based on the literature, it can be hypothesized that when there is higher score differences in the tie-break, more performance indicators will differentiate winners and losers. When the final score is close, fewer indicators will differentiate winners and losers.

Method

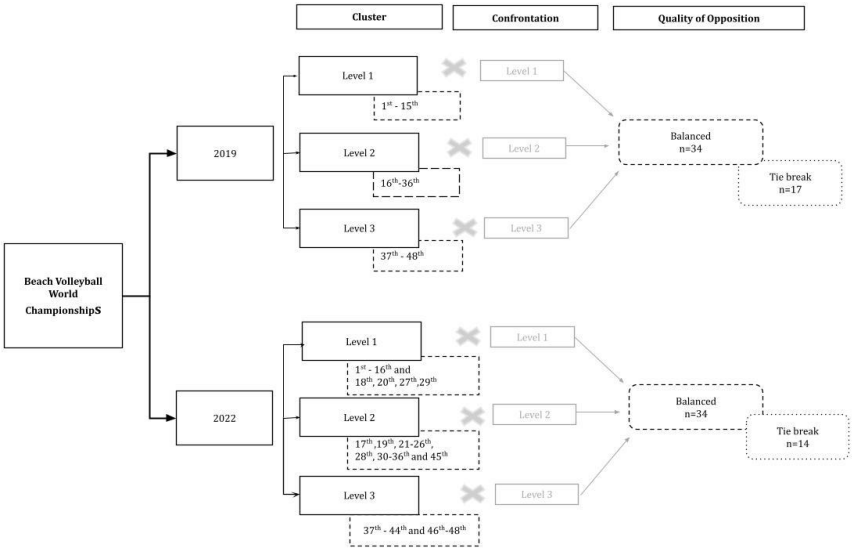
Sample

The sample included 31 tie-break sets from balanced matches of the 2019 (n=17) and the 2022 (n=14) FIVB Women's Beach Volleyball World Championships. Sets were played by 44 teams (88 players). A

total of 4,872 actions were analyzed (840 serves, 682 attacks in side-out, 428 counterattacks, 574 blocks, 716 receptions, 646 sets in side-out, 428 sets in counterattack, and 558 digs). All the tie-breaks were performed in balanced games regarding the level of confrontation (Figure 1). A balanced game was considered when the quality of both teams was similar (i.e. equality in play levels between opposing teams) (García-de-Alcaraz & Marcelino, 2017).

The teams' competitive levels were established through a two-step cluster analysis technique, with the number of clusters fixed in three (distance measure: log-likelihood; clustering criterion: Schwarz's Bayesian criterion) (Taylor et al., 2008). The variables used for the cluster calculation were the total number of matches, sets, and points played at the end of the competition. These variables composed the team classification criteria during the Word Championships.

Figure 1. Sample selection criteria used: balanced matches.



Each team's performance was analyzed according to the tie-break result (win or loss), and the final score difference (tie-break type) as: a) minimum point difference (2 points), b) medium point difference (3-4 points), and c) maximum point difference (5 points and more). This categorization was statistically accomplished through K-means clustering.

Procedure

The tactical-technical-performance indicators studied were (Medeiros et al., 2017; Palao et al., 2015):

a) Total number of points won by game phase (KI KII, KII, and KIV). The KI starts when the team receives the serve and is composed by reception, set, and attack. The KII game phase describes the situation of the opposing team in serve, block, dig, set, and attack in the counterattack. The KIII and KIV game phases are designated to all subsequent plays, depending on whether the team started the rally in KI or KII, respectively (Palao, López, & Ortega, 2015; Medeiros et al., 2017).

b) Total number of points by the team and errors points by game action, according to the game phase: total attack (KI+KII+KIII+KIV), attack in side-out (KI), attack in counterattack (KII+KIII+KIV), attack on each complex in the counterattack, total block (KII+KIII+KIV), block on each complex in the counterattack, serve, and other errors.

c) Performance coefficient of game actions by game phases: serve, attack in side-out (KI), attack in counterattack (KII+KIII+KIV), block (KII+KIII+KIV), reception, set in side-out (KI), set in counterattack (KII+KIII+KIV), and dig (KII+KIII+KIV). The terminal actions (serve, attack, and block) were evaluated with a five-level scale to categorize the performance (Medeiros et al., 2017; Palao et al., 2015): error (0), maximum opponent attack options (1), opponent limited attack options or team limited attack options (2), no opponent attack options (3) and points (4). The continuity actions (reception, set, and dig) were

evaluated with a scale of four levels to categorize the performance: error (0), no attack options (1), limited attack options (2), and maximum team attack options (3). The performance coefficient for each action was calculated as the sum of the actions from each category multiplied by the value of each category and divided by the total number of actions.

The tie-breaks were recorded on video with a digital camera positioned in the grandstand for a full-court frontal view (approximately 10-metre distance from the baseline). Actions were analyzed by an observer, who was a sports training postgraduate, with academic training in beach volleyball, and experience as a beach volleyball player. The main observer (well-trained, following Anguera (2003) criteria for three two-hour sessions) reanalyzed random sets (over 10% of the total analyzed sets) (Tabachnick & Fidell, 1989) after a three-week period of observations guarantee observation reliability. Aiming inter-observer reliability testing, two experts (more than ten years of experience in beach volleyball match analysis) observed the same matches. Intra- and inter-observer agreements were assessed through Cohen's Kappa values. Intra- and inter-reliability values were over 0.85 elucidated for all the variables (Fleiss & Cohen, 1973; McHugh, 2012). All observed data were organized in spreadsheets.

Data analysis

Descriptive statistics were used to characterize the tactical-technical performance indicators according to tie-break results and the final score difference. The Shapiro-Wilk test was used to assess the normality of distribution. The independent samples T-test was used to compare the tactical-technical performance indicators between winners and losers according to the types of tie breaks (score differences). Due to the normal distribution of some variables, the homogeneity of variance test was considered in the independent samples T-test. The alpha level was set at 0.05. Statistical analyses were performed using the SPSS 22.0® program (Statistical Package for the Social Sciences, SPSS Inc). Effect sizes (ES) at 95% confidence intervals (CI) using standardized differences in means (SDMs) were calculated for the magnitude of change, which was labeled as 001-.04 (small effect), .05-.07 (medium effect), .08-1.1 (large effect), and ≥1.2 (very large effect) (Sawilowsky, 2009). The different versions of effect size measures in the d family were used (Lakens, 2013). The ES was reported using Glass' Δ for unequal variances, Cohen's d for equal variances, and Hedge's g to correct bias in small samples. The ES was performed in a Microsoft Excel® supplementary spreadsheet by Lakens (2013).

Results

Table 1 shows the significant differences between teams who won and teams who lost the tie-break in terms of the total number of points scored in the game phases, the total number of points and errors, and the team performance coefficients. Winning teams performed significantly better in the KII (very large effect) compared to losing teams. Teams that won scored significantly more points in counterattack (total, KII, and KIV), and block (total and KII), whereas losing teams performed more errors in the counterattack of KIII and blocks (total). For the performance coefficient of game actions, winning teams had significantly higher coefficients of efficacy in attack (side-out and counterattack), and block.

Table 1. Descriptive and inferential analysis of tactical-technical performance indicators for tiebreak result (loss vs. win).

		Loss	Win				
		M ± SD		*p*-value	ES	95% CI	
Number of points per game phases	KI	5.4 ± 1.7	5.5 ± 2.1	.792	0.07 ◁	-0.43	0.57
	KII	1.6 ± 1.2	3.4 ± 1.8	.000**	1.47 ◁	0.91	2.03
	KIII	1.4 ± 1,9	1.3 ± 0.9	.801	0.07 ◁	-0.43	0.57
	KIV	0.4 ± 0,7	0.7 ± 0.8	.058	0.49 ◁	-0.02	0.99
Number of points and errors	Serve aces	0.4 ± 0.7	0.5 ± 0.7	.708	0.10 ◁	-0.40	0.59
	Serve errors	2.0 ± 1.3	1.4 ± 1.3	.072	0.46 ◁	-0.04	0.97
	Attack points (side-out)	5.4 ± 1.7	5.5 ± 2.1	.792	0.07 ◁	-0.43	0.57
	Attack errors (side-out)	1.2 ± 1.3	0.8 ± 0,9	.196	0.33 ◁	-0.17	0.83
	Attack points (counterattack)	2.1 ± 1.4	3.4 ±1.4	.001**	0.92 ◁	0.40	1.45
	Attack points KII	0.7 ± 0.7	1.6 ± 1.1	.000**	1.18 △	0.64	1.72
	Attack points KIII	1.1 ± 1.0	1.2 ± 0.8	.790	0.07 ◁	-0.43	0.57
	Attack points KIV	0.3 ± 0.5	0,7±0,8	.044*	0.67 △	0.16	1.18
	Attack errors (counterattack)	2.0 ± 1.5	1.4 ± 1.1	.068	0.29 ◁	-0.21	0.79
	Attack errors KII	0.3 ± 0.5	0.3 ± 0.5	1.000	0.00 ◁	-0.50	0.50
	Attack errors KIII	0.4 ± 0.7	0.1 ± 0.3	.044*	0.97 △	0.44	1.49
	Attack errors KIV	0,1 ± 0.3	0,1 ± 0.3	.399	0.22 ◁	-0.28	0.72

	Block points	0.7± 0.7	1.4 ± 1,3	.015*	0.64 ɖ	0.13	1.15
	Block points KII	0.4 ± 0.6	1.1 ± 1,0	.001**	0.92 ɖ	0.40	1.44
	Block points KIII	0.2 ± 0.5	0.1 ± 0,3	.375	0.23 ɖ	-0.27	0.73
	Block points KIV	0.1 ± 0.3	0.1 ± 0,3	1.000	0.00 ɖ	-0.50	0.50
	Block errors	0.6 ± 0.8	0.2 ± 0,5	.027*	0.78 Δ	0.26	1.29
	Block errors KII	0.5 ± 0,8	0,2 ± 0,5	.062	0.78 Δ	0.26	1.29
	Block errors KIII	0.1 ± 0.2	0.0 ± 0.1	.561	0.15 Δ	-0.35	0.65
	Block errors KIV	0.0 ± 0.1	0.0 ± 0.1	1.00	0.00 ɖ	-0.50	0.50
	Other errors	2.5± 2.0	2.0 ± 1,6	.318	0.26 ɖ	-0.24	0.76
Performance Coefficient	Serve	1.4 ± 0.3	1.5±0.2	.134	0.39 ɖ	-0.12	0.89
	Reception_	1.8 ±0.5	1.9±0.5	.437	0.20 ɖ	-0.30	0.70
	Set (side-out)	2.5±0.2	2.5±0.2	.683	0.10 ɖ	-0.39	0.60
	Attack (side-out)	2.5±0.4	2.9±0.4	.001**	0.89 ɖ	0.37	1.41
	Block	2.1 ±0.4	2.4± 0.4	.018*	0.62 ɖ	0.11	1.13
	Dig	1.7±0,4	1.9±0,4	.078	0.46 ɖ	-0.05	0.96
	Set (counterattack)	2.2±0.3	2.2±0.3	.739	0.08 ɖ	-0.41	0.58
	Attack (counterattack)	2.3±0.6	2.6±0.6	.039*	0.54 ɖ	0.03	1.04

M±SD: Mean ± Standard Deviation; ES: effect size; CI: confidence interval; ** p < 0.05; **p < 0.01;* ɖCohen's; Δ Glass'
Effect size: .001-.04 = small effect, .05-.07 = medium effect, .08-1.1 = large effect. ≥1.2 = very large effect

Table 2 presents the descriptive (mean ± standard deviation and percentages) of total number of points won in the game phases, total number of points and errors, and team performance coefficients, according to tie-break result (set won vs. set lost) and the final score difference (minimum, medium and maximum point differences).

Table 2. Tactical-technical performance indicators according to the types of tiebreaks (according to their final point difference).

	2 points difference (n=11)		3-4 points difference (n=9)		≥5 points difference (n=11)	
	Loss	Win	Loss	Win	Loss	Win
Points per game phases						
KI	5.8 ± 1.8	7.4 ± 2.3	5.9 ± 2.0	4.7 ± 1.0	4.5 ± 1.0	4.3 ± 1.0
KII	2.3 ± 1.4	3.5 ± 1.5	1.3 ± 0.7	2.4 ± 1.3*	1.1 ± 1.1	4.0 ± 2.1**
KIII	1.4 ± 1.2	1.6 ± 1.2	1.4 ± 1.3	1.2 ± 0.7	1.4 ± 0.8	1.1 ± 0.7
KIV	0.6 ± 0.8	0.5 ± 0.5	0.0 ± 0.0	0.8 ±0.7**	0.5 ± 0.7	1.0 ± 1.0
Points and errors per single-action						
Serve aces	0.6 ± 0.8	0.4 ± 0.5	0.3 ± 0.5	0.3 ± 0.5	0.4 ± 0.7	0.8± 0.9
Serve errors	1.6 ± 1.4	2.0 ± 1.7	3.2 ± 1.0	1.2 ±0.8**	1.6 ± 0.8	1.0 ± 1.1
Attack points (total)	8.4 ± 1.8	10.6±2.2*	8.2 ± 1.6	7.78 ± 1.9	6.0±1.0	8.1 ± 1.7**
Attack points (side-out)	5.8 ± 1.8	7.4 ± 2.3	5.9 ± 2.0	4.7 ± 1.0	4.5 ± 1.0	4.3 ± 1.0
Attack errors (side-out)	1.4 ± 1.4	1.3 ± 1.0	0.9 ± 1.1	0.9 ± 1.1	1.4 ± 1.5*	0.4 ± 0.7
Attack points (counterattack)	2.5 ± 1.8	3.3 ± 1.3	2.3 ± 1.4	3.1 ± 1.5	1.5 ± 0.8	3.8 ± 1.4**
Attack points KII	0.8 ± 1.0	1.5 ± 0.8	0.9 ± 0.3	1.1 ± 1.2	0.5 ± 0.7	2.0 ± 1.2**
Attack errors (counterattack)	0.5 ± 0.5	0.5 ± 0.5	0.9 ± 1.2	0.8 ± 0.8	1.0 ± 0.9	0.5 ± 0.7
Block points	1.1 ± 0.7	1.9 ± 1.7	0.1 ± 0.3	0.8 ± 0.7*	0.8 ± 0.8	1.5 ± 1.4
Block points KII	0.8 ± 0.8	1.5 ± 1.2	0.1 ± 0.3	0.8±0.73*	0.2 ± 0.4	1.2 ± 1.2*
Block errors	0.5 ± 0.5	0.3 ± 0.6	0.6 ± 0.7	0.3 ± 0.5	0.8 ± 1.1	0.1 ± 0.3*
Other errors	2.7 ± 2.3	2.4 ± 2.0	2.7 ± 1.7	2.2 ± 1.2	2.1 ± 1.8	1.5 ± 1.3
Performance Coefficients						
Serve	1.5 ± 0.2	1.4 ± 0,2	1.3 ± 0.3	1.6 ± 0.2*	1.6 ± 0.3	1.6 ± 0.2
Reception	1.8 ± 0.5	2.0 ± 0.5	1.7 ± 0.4	1.9 ± 0.7	1.9 ± 0.5	1.8 ± 0.5
Set (side-out)	2.6 ± 0.1	2.4 ± 0.2	2.5 ± 0.1	2.7 ± 0.3	2.4 ± 0.2	2.5 ± 0.2
Attack (side-out)	2.5 ± 0.3	2.8±0.2**	2,7 ± 0.5	2.9 ± 0.5	2.4 ± 0.5	3.0 ± 0.4**
Block	2.3 ± 0.5	2.5 ± 0.5	1.9 ± 0.2	2.2 ±0.2**	2.1 ± 0.4	2.3 ± 0.3
Dig	1.7 ± 0.4	1.9 ± 0.5	1.6 ± 0.4	1.7 ± 0.3	1.7 ± 0.3	1.8 ± 0.2
Set (counterattack)	2.3 ± 0.4	2.3 ± 0.3	2.2 ± 0.2	2.1 ± 0.4	2.3 ± 0.3	2.2 ± 0.3
Attack (counterattack)	2.4 ± 0.8	2.7 ± 0.4	2.3 ± 0.6	2.4 ± 0.8	2.2 ± 0.4	2.7 ± 0.4 **

SD: Mean ± Standard Deviation; * p < 0.05; **p < 0.01.

Figures 2, 3, and 4 present the effect size with the 95%CI for these variables. In the tie-break with a minimum difference in the final score (2 points), winners performed more points in KI and KII compared with tie-break losers. In addition, winning teams scored significantly more points in total actions of attack (side-out + counterattack) and block compared to losing teams. Only the attack points impacted significantly on the outcome, with a large effect (Figure 3a). Considering the performance coefficient (Figure 4a), winning teams were significantly superior with a large effect only for the attack in side-out. The winning team for tie-break sets which finished with a medium score difference (3-4 points) outperformed in KII and KIV (large effect) (Figure 2b), scoring more points from blocks (very large effect) and blocks in KII (Figure 3b). Also, more points from the opponent's

serve error (very large difference) were scored for winners. In terms of performance coefficient, the winning team showed significantly higher values with a very large effect in serve and block actions (Figure 4b). Regarding tie-break sets with a maximum score difference (≥ 5 points), winning teams performed better in KII (very large effect) and KIV (medium differences) compared to losing teams (Figure 2c). Moreover, winners scored significantly more attack points in total, and counterattack points in KII phase and in total. Moreover, more points in block in the KII were also observed, as well as fewer errors in block. As in the previous types of tie-break sets, points and error variables were found to have large and very large effects (Figure 3c). The winning teams also showed better attack efficacy in both side-out and counterattack phases.

Figure 2. Effect estimates assessing the number of points obtained in team game phases for all types of tiebreaks for the factor tie-break result.

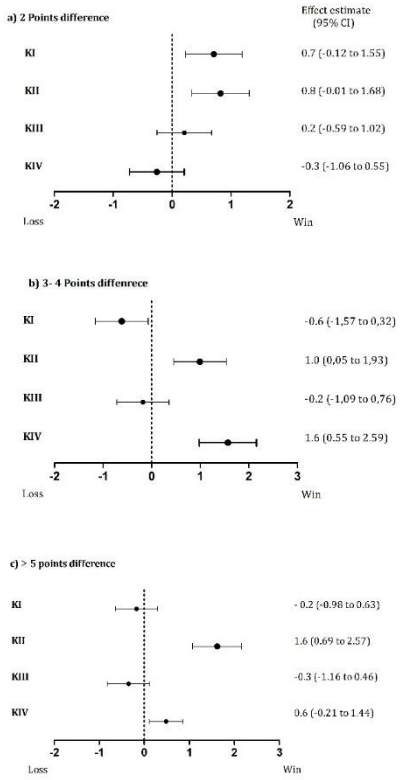
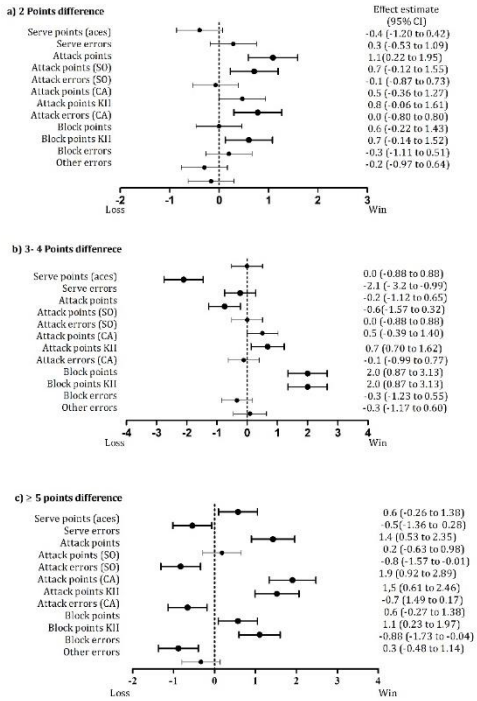
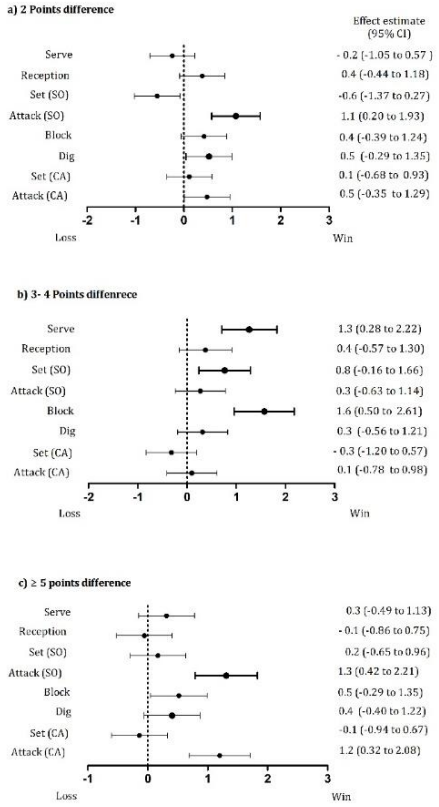


Figure 3. Effect estimates assessing teams' total number of points and errors for of all types of tiebreaks for the factor tie-break result. Effect size: .001-.04 = small effect, .05-.07 = medium effect, .08-1.1 = large effect. ≥.12 = very large.



Note: SO = side-out; CA=counterattack.

Figure 4. Effect estimates assessing team performance coefficients for all types of tiebreaks for the tie-break result factor. Effect size: .001-.04 = small effect, .05-.07 = medium effect, .08-1.1 = large effect. ≥.12 = very large.



Note: SO = side-out; CA=counterattack.

Discussion

Overall, without considering the final score difference, winning teams scored more points in KII and KIV complex phases, in attack and block actions, had block errors, and had higher efficacy values for block, side-out attack, and counterattack. Losing teams scored fewer points and had less side-out attack efficacy. These findings show that attack, block, and counterattack (KII) are crucial game actions for success in the tie-break in balanced matches. These findings corroborate the literature on the importance of side-out attacks (Giatsis & Panagiotis, 2008; Michalopoulou et al., 2005; Ronglan & Grydeland, 2006), block, and counterattack attacks in winning women's volleyball sets (Giatsis et al., 2023; Kumar et al., 2021; Medeiros et al., 2017; Palao et al., 2015). Specifically, in the tie-break set, the results confirm that block points per set point contribute equally to the attack in the probability of winning (Giatsis et al., 2023).

Contrary to previous works, this study did not find significant differences in serve aces between tie-break sets won or lost between balance teams (Kumar et al., 2021). This may be due to the adaptation of high-level teams' receivers throughout the game, the quality of balanced opposition in the sample, and the critical moment of the decisive set. High-level teams are increasingly familiar with the opponent's serve during matches (Palao et al., 2015), allowing them to maximize their performance in the side-out (Giatsis et al., 2015). Game-critical situations with high mental stress influence players' serve performance. Players earn fewer serving points when facing critical situations (Meffert et al., 2018).

In the closed tie-break (with a minimum margin of 2 points), winning teams scored more side-out attacks and higher side-out efficacy. In tie-breaks with a three-four-point score difference, winning teams had more points in KII and KIV, fewer serve errors, and more efficacy of serve and block actions than losing teams. In unbalanced tie-breaks (5 points or more), winning teams had more points in KII, block points in KII, opponent errors (attack and block), and efficacy of side-out attacks and counterattacks. The findings confirm the tendencies found in indoor volleyball that the number of significant performance indicators reduced as the difference in points between teams decreases (Drikos et al., 2020). Attack points were crucial in equal sets. In this type of tie-break, the side-out attack points provide the minimum difference needed to win a balanced set. These results emphasize the importance of side-out maintaining the difference in points obtained in the counterattack. The more difficult the set, the more decisive the team's ability to perform the attack actions and side-out is. These results confirm the findings from previous research both in regular (21 points) and tie-break (15 points) sets (Giatsis, 2023; Giatsis et al., 2023; Palao et al., 2015).

In sets with a difference of 3-4 points, the importance of the attack and side-out reduces. Winners earn fewer points than losers in side-out and win more points from opponent serve errors and blocks than losers. A similar tendency was found by previous research in unbalanced regular sets with a difference of five or more points (Giatsis et al., 2023). This highlights the importance of balancing the risk taken in serving and of blocking the opponent's attacks as ways to undo the tie in the games. The service errors and lower serve efficacy of the loser teams facilitated the winning side-out efficacy. In addition, the higher winner's serve efficacy may assist their block efficacy. This showed that serve strategies focused on controlling the serve risk with a tactical connection with the block could increase the probability of winning the set. The team behind the score often tries to reduce the score difference by risking with harder serves, but then ending up with more errors. It is also possible that momentary equilibrium on the tie-break scoreline can involve high-pressure situations, leading athletes to make unusual errors (Zhang et al., 2018). Thus, strategically executing serves can restrain the opponent's offense (Kumar et al., 2021) and favor counterattack actions by winning teams (Palao et al., 2015). Due to the nature of the game (rules), winning teams perform more serves and they perform less side-out phase than losing teams. In this scenario, losing teams usually score more points in side-out than winning teams, while winning teams get more points by opponent errors, blocks, and counterattacks. These findings are similar to the trend observed in indoor volleyball (Rodriguez-Ruiz et al., 2011).

In unbalanced tie-breaks (margin of ≥ 5 points), winners obtained more points in attack, counterattack, block, opponents' attack errors, and opponents' block errors. Winners had higher efficacy in side-out and counterattack phases. Losers had more errors in attack and block. Losing teams had less efficacy in side-out and counterattack phases, which allowed for better counterattacking by the winning teams.

These findings are similar to the tendencies found in indoor volleyball (Drikos et al., 2020). They confirm the importance of making fewer mistakes in side-out actions and having a better attack side-out and block efficacy to win the tie-break (Kumar et al., 2021; Palao et al., 2015).

The data found allows us to better understand the game dynamics in beach volleyball tie-break. The number of indicators that differentiate winners from losers increases with the increase in the score difference. When there is a smaller final point difference between teams, winning teams achieve solid and efficient side-outs and execute more counterattacks. Losing teams make more mistakes in serving, blocking, and attacking as the differences in the score increase. When the difference in the score is small, the game must be played “safely” and "strategically" from the server’s position, transferring the probability of making an unforced error to the receiving team in their side-out and increasing the change of blocking. This approach is based on the score difference in a tie-break and seeks to expand the applicability of this type of research.

Taking into consideration the type of confrontation, the analysis of differences between winning and losing teams regarding the way they score points considering only equal-level teams presents itself as a limitation of this study. This could lead to a reduction in practical implications because it does not characterize all the context of the possible realities of the game. In future studies, different kinds of research may be needed to analyze tie breaks in moderate and unbalanced matches. These future studies should also analyze different moments of the set (e.g., initial and final phases) when considering tactical-technical performance and the result of the tie-break should be studied. Therefore, more studies that combine other contextual variables at critical moments are needed to understand beach volleyball game patterns.

Conclusions

The tactical-technical performance of winning teams changes according to the type of tie-break. The importance and efficacy of the different actions change relate to the set status. As a reference, closed sets have fewer tactical-technical indicators that differentiate winners from losers. Winning teams had solid and efficient side-outs, and they balanced better the serve risk (balance points and errors), which allowed them to execute more counterattacks. Data shows that monitoring the number of points and errors obtained in the tie-break context provides information about the game dynamics.

Practical applications

These results can be used as reference values to monitor, guide, or carry out goal-setting interventions in the studied population. For example, coaches could offer several offensive scenarios to enhance players’ ability to resolve possible situations in different tie-break contexts. Coaches could offer reference rules or criteria to guide their actions and risks in these types of situations (e.g., reference values for side-out or amount of serve errors). Regarding monitoring teams' performance, data show that assessing the different phases of the game could provide information about the way teams are performing (e.g., side-out and counterattack).

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Authors' and translators' details:

Vanessa da Silva Lima	vanessadasilva.lima@uece.br	Author
Antonio García-de-Alcaraz	antoniovoleibol@hotmail.com	Author
Jose Manuel Palao	palaojm@gmail.com	Author
Alexandre Igor Araripe Medeiros	alexandremedeiros@ufc.br	Author/translate
Gilmário Ricarte Batista5	cajagr@gmail.com	Author