Ciencia
y Deporte

Original article

Statistics as a tool for monitoring the results of beach volleyball

[*La estadística como herramienta para el control de resultado deportivo del voleibol de playa*]

[*Estatística como ferramenta de monitoramento de resultados do vôlei de praia*]

Yadel Camilo Mestre ¹* , *Carlos Rogelio Villegas Rodríguez* ²

¹Cerro Pelado Sports Initiation School. Camagüey, Cuba.

² University of Camagüey. Faculty of Physical Culture. Department of Physical Culture. Camagüey. Cuba.

* Corresponding author: yadelcamilo75@gmail.com

ABSTRACT

Introduction: The need to systematize the monitoring of technical and tactical preparation in beach volleyball athletes at the "Cerro Pelado" EIDE motivated this research. Coaches lacked an adequate statistical method for this purpose.

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Objective: was to demonstrate the importance of using a statistical system for the control and analysis of athletic performance in school beach volleyball athletes from the Eide "Cerro Pelado".

Materials and methods: The research was conducted during the 2018–2022 academic years. Various research methods were employed, including analytical-synthetic, inductive-deductive, documentary analysis, and observation of training units and competitions. These methods identified the insufficient use of statistical control specific to beach volleyball. To address this issue, a study of existing tools and systems for collecting statistical information was conducted, which served as the basis for designing a method tailored to the characteristics of beach volleyball. Furthermore, a statistical method designed specifically for this discipline was introduced, and the data were analyzed along with the method's functional and non-functional requirements. Data collection techniques were used to validate its relevance.

Results: throughout the study, an insufficient use of specific statistical control in beach volleyball was detected and the implementation of the adapted statistical method and the analysis of the data allowed to corroborate the relevance of its application, demonstrating its usefulness for the control and analysis of sports performance, which translates into a better competitive performance of the team, as evidenced by the results achieved in school competitions.

Conclusions: The implementation of an adapted statistical method is essential to systematize the control and analysis of technical-tactical preparation in school beach volleyball athletes, thus significantly improving the ability of coaches to evaluate and optimize the performance of their athletes.

Keywords: beach volleyball, game control, statistical method.

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RESUMEN

Introducción: la necesidad de sistematizar el control de la preparación técnico-táctica en atletas de voleibol de playa en la Eide "Cerro Pelado" motivó esta investigación. Los entrenadores carecían de un método estadístico adecuado para este fin.

Objetivo: fue demostrar la importancia de utilizar un sistema estadístico para el control y análisis del rendimiento deportivo en atletas escolares de voleibol de playa de la Eide "Cerro Pelado".

Materiales y métodos: la investigación se llevó a cabo durante los cursos escolares de 2018 a 2022. Se emplearon diversos métodos de investigación, incluyendo el analítico-sintético, el inductivo-deductivo, el análisis documental y la observación de unidades de entrenamiento y competencias. Estos métodos permitieron identificar el uso insuficiente de control estadístico específico para el voleibol de playa. Para abordar este problema, se realizó un estudio de herramientas y sistemas existentes para recopilar información estadística, lo que sirvió de base para concebir un método adaptado a las características del voleibol de playa. Además, se introdujo un método estadístico diseñado específicamente para esta disciplina y se analizaron los datos junto con los requisitos funcionales y no funcionales del método. Se utilizaron técnicas de recopilación de información para validar su pertinencia.

Resultados: a lo largo del estudio, se detectó un insuficiente uso del control estadístico específico en el voleibol de playa y la implementación del método estadístico adaptado y el análisis de los datos permitieron corroborar la pertinencia de su aplicación, demostrando su utilidad para el control y análisis del rendimiento deportivo, lo que se traduce en un mejor desempeño competitivo del equipo, como lo evidencian los resultados alcanzados en las competiciones escolares.

Conclusiones: la implementación de un método estadístico adaptado es fundamental para sistematizar el control y análisis de la preparación técnico-táctica en atletas escolares de voleibol de playa por lo que mejora significativamente la capacidad de los entrenadores para evaluar y optimizar el rendimiento de sus atletas.

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RESUMO

Introdução: A necessidade de sistematizar o monitoramento da preparação técnica e tática dos atletas de vôlei de praia da Escola de Vôlei de Praia "Cerro Pelado" motivou esta pesquisa. Os treinadores não dispunham de um método estatístico adequado para esse fim.

Objetivo: Demonstrar a importância da utilização de um sistema estatístico para o monitoramento e análise do desempenho esportivo dos atletas escolares de vôlei de praia da Escola de Vôlei de Praia "Cerro Pelado".

Materiais e Métodos: A pesquisa foi realizada durante o ano letivo de 2018-2022. Diversos métodos de pesquisa foram empregados, incluindo analítico-sintético, indutivo-dedutivo, análise documental e observação de unidades de treinamento e competições. Esses métodos identificaram a insuficiência do uso do monitoramento estatístico específico para o vôlei de praia. Para solucionar esse problema, foi realizado um estudo das ferramentas e sistemas existentes de coleta de informações estatísticas, que serviram de base para o desenvolvimento de um método adaptado às características do vôlei de praia. Além disso, foi introduzido um método estatístico desenvolvido especificamente para essa modalidade, e os dados foram analisados em conjunto com os requisitos funcionais e não funcionais do método. Técnicas de coleta de dados foram utilizadas para validar sua relevância.

Resultados: Ao longo do estudo, foi detectada a insuficiência do uso de controle estatístico específico no vôlei de praia. A implementação do método estatístico adaptado e a análise dos dados confirmaram sua relevância, demonstrando sua utilidade para o controle e análise do desempenho atlético. Isso se traduz em melhor desempenho competitivo da equipe, evidenciado pelos resultados alcançados nas competições escolares.

Conclusões: A implementação de um método estatístico adaptado é essencial para sistematizar o controle e a análise da preparação técnica e tática em atletas escolares de

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vôlei de praia, melhorando significativamente a capacidade dos treinadores de avaliar e otimizar o desempenho de seus atletas.

Palavras-chave: vôlei de praia, controle de jogo, método estatístico.

INTRODUCTION

Beach volleyball, formally organized in the 1950s in California, United States, has experienced remarkable growth and professionalization over the years. Initially featuring men's events, the sport saw the development of more detailed rules in 1965 under the California Beach Volleyball Association (CBVA). The founding of the Association of Beach Volleyball Professionals (AVP) in 1984, for both men and women, and the creation of a specific department within the International Volleyball Federation (FIVB) in 1987, marked important milestones in its global organization, establishing relationships with national federations, sponsors, and specialized media.

A momentous achievement was its inclusion in the Official Program of the Olympic Games on May 17, 1995 (Agüero Alfonso & Alayo Noa, 2013). Beach volleyball has been officially practiced in Cuba since 1987, with notable participation in world circuits and international tournaments.

In contemporary sports, specificity in training control is crucial, adapting to the characteristics of each discipline and the role of the players. However, volleyball, in particular, presents challenges in the use of reliable tests for effective control (Albóniga The growing demands of high-level competition in this sport underscore the importance of solid development of technical and tactical skills from the initiation stage (Griego *et al.,* 2018, 2021; Cairo *et al.,* 2022). In fact, fostering these conditions from the players' inception is a primary task for coaches.

The analysis of technical and tactical performance is an indispensable component in the management of sports training (Griego *et al.,* 2022). Despite its relevance, the scientific literature presents little research in the introductory categories of volleyball, which

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highlights the need to study basic indicators as a basis for future research of greater scope (Calero-Morales *et al.,* 2023). Authors such as Muazu *et al.* (2019) have identified 20 indicators that differentiate performance in soccer, while in volleyball it is common to analyze the effectiveness of actions in the competitive activity, including contextual variables relevant to the measurement of individual performance (López *et al.,* 2022). The technical-tactical performance of the volleyball player, the object of our interest, is a key factor in decision-making, since skills in team sports are determined by technique and the ability to choose the correct action based on the game situation. Playing well in team sports involves selecting the relevant action and executing it efficiently and consistently.

Nowadays, individual statistics are so important that high-level players are valued according to their performance percentages, showing the need to analyze their statistics in order to improve (Villamea, 2010). Systems such as Navelo Control, developed by Navelo -Cabello *et al.* (2023), collect and process game data, allowing coaches and managers to evaluate player performance through frequencies, percentages and coefficients. The International Volleyball Federation (FIVB) also provides statistical data of players in international tournaments on its website (Villamea , 2010).

Despite these advances, statistical control in beach volleyball in Cuba, especially in school competitions, presents significant challenges, requiring multiple people and material resources that are not always available. This prompts the search for more efficient alternatives. Although there are options such as the Scoring Protocol developed by Cairo et al. (2015), which allows for the measurement of averages for complexes I and II, serves per game, and actual game times, its focus is primarily physical and does not provide tangible results of technical performance in the game. Another tool, the Volleyball and Beach Volleyball Referee Record (Calero Morales *et al.,* 2009), allows for an approach to athletic performance. However, its use requires coaches to master the scoring protocol and adapt the data, which makes it difficult to directly extract individual results, which is crucial in beach volleyball.

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Technical-tactical analysis is essential for performance in volleyball, especially at the high level, where the differences between victory and defeat are minimal (Drikos *et al.*, 2021; Marzano- Felisatti Statistical indicators of performance, effectiveness, efficiency and error, whether individual or group, are valid only if they contribute to improving performance. It is common to attempt to analyze the results of beach volleyball with an approach similar to indoor volleyball, which often leads to misinterpretations. These misinterpretations encouraged the idea of developing a statistical system that responds and allows monitoring and analysis of the sporting results of beach volleyball players in the *Eide* Camagüeyana, therefore, the objective of the present research is to show, through the use of the statistical method, the importance of its use for the control and analysis of the sporting results in school athletes of beach volleyball of the Eide "Cerro Pelado"

MATERIALS AND METHODS

To carry out this research, a combination of theoretical, empirical, and mathematical-statistical methods was used, ensuring a deep understanding and rigorous analysis of the data.

Theoretical level:

- Analytical-synthetic: This method was crucial to characterize the object of study and to analyze and synthesize the vast information collected from the statistical system, specialized literature and reviewed documentation.
- Inductive-deductive: used to interpret empirical data, allowing for the establishment of links, connections and coherent relationships between the knowledge acquired and the different phases of the research.

Empirical level:

- Document analysis: This method provided essential information from various sources, guiding our understanding of the research's background, current situation, and future projections. It was essential for collecting and analyzing data extracted directly from the statistical system.
- Structured participant observation: This observation was carried out during the competitions, specifically when the statistical system was being filled out throughout each game, ensuring real-time data collection.

Statistical mathematical method:

- Descriptive statistics: Descriptive statistics were used to process the information obtained and, mainly, to calculate the average results in the key aspects evaluated in the research.

Information processing

The information was meticulously extracted from the statistical sheets of all men's matches played in the 2019 and 2022 School Games. These data were captured in the models designed for this study (Appendices 1 and 2) and subsequently processed using descriptive statistics, with a primary focus on calculating the mean for each variable of interest.

RESULTS AND DISCUSSION

Each coach can track data of interest, during or after a match, for their own team or their opponent's.

It was considered that in order to decide which statistics to keep during the match, it is essential to choose information that is useful at that moment, such as the opponent's

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attack, direction, distribution, etc., and to leave the individual statistics for analysis after the match with each player.

It will also depend on how many assistants each coaching staff has available.

Based on the aforementioned considerations and taking into account our needs, it was proposed to establish a system for monitoring technical and tactical performance with statistical support that would somehow meet the objective that had been set.

Individual statistics: to do this, it was proposed to collect data from each player in each action they perform and give it a notation according to the result of the same.

The player actions we suggest can be evaluated are:

- Throw, reception, pass/set, attack, block and defense.

In order to organize these actions, the decision was made to divide them according to the match situation:

- Point system.
- Exchange of serve system.

Where: In the point system, all actions in which the team itself has possession of the serve were taken into account. In the exchange of serve system, actions in which the opponent has possession of the serve and would be able to score on the board were taken into account (Table 1).

Table 1. - Considering these two options, individual statistics can be divided into:

Point System (K2)	Exchange of Serve System (K1)
Take out	Reception
Blockade	Placed / Pass
Defense	Stroke
Placed / Pass	Blockade
Stroke	Defense
K2	K1

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It is important to note that it is always important to consider all actions that are not evaluated as the culmination of a game action, as they may represent the highest percentage of executions of the same action.

That's why each action was divided into three evaluation options:

- Positive: whenever the game action ends in favor of the team itself.
- Neutral: as long as the game action allows its continuity.
- Negative: whenever the game action ends against the team itself.

This latter term was given to defensive actions that involve 50% of an athlete's technical action and 50% of their partner's participation; in terms of tactical action and its effectiveness, ineffectiveness, or neutralization. After explaining to the player how they will be evaluated in matches and having put it into practice in some preparation matches, each player was given the exact number of actions they performed during the match, as close to the end of the match as they could recall, and the percentages were left for the coaching staff to evaluate later. These percentages allowed the coach to measure each player's progress and to confer individually with each of them to analyze their weaknesses and progress in each game action evaluated.

The way to have a parameter to measure each player's progress in terms of how they perform in each match and to be able to average them, are the percentages of effectiveness, efficiency, and error. By calculating percentages, it allows for a common measure for each sporting event that does not depend on the number of actions a player performs. To illustrate, if a player attacks a total of fifty balls in a single serve in one match, and in the following match attacks a total of ten balls in the same situation, how would the player's progress in this action be measured, if not for the percentages that indicate effectiveness, efficiency, and error?

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To achieve this, and as previously stated, values were assigned to each game action, according to the data we collected in order to obtain the necessary information to determine effectiveness, efficiency, and error:

- Effectiveness: is the percentage with which the player performed all positive actions.
- Error: is the percentage with which the player performed all negative actions.
- Efficiency: This is the percentage of how beneficial the player's work was on the evaluated action. The following data was used to calculate these percentages:
- Effectiveness: is the percentage that represents the total of positive actions between the sum of the total of positive and negative actions.

For example, the evaluated action being the Serve (obviously within the point system).

- Total number of balls with which he made service points (positive serves).

- Total number of balls with which the opponent kept the ball in play (face-offs).
- Total number of balls in which the serve was missed (negative serves).
- Total serves (sum of all serves).

So, to perform the calculations, equations 1, 2, 3 and 4 are set out:

$$\text{Eficacia} = \text{Total de saques positivo x 100 /total de saques realizados}(1)$$

$$\text{Error} = \text{Total de saques negativo x 100/Total de saques realizados}(2)$$

$$\text{Eficiencia} = \text{Total de saques positivo Tolal de saques negativo x 100/}$$
$$\text{Total de saques realizados}(3)$$

$$\text{Efectividad} = \text{total acciones positivas (Total de acciones positivas +}$$
$$\text{Total acciones negativas))}(4)$$

Once the initial results are obtained, it is important to enter them into each player's database, where their progress can be observed over the course of the year and it is possible to determine what a given player's average score is in reception, serving, blocking, etc.

It also serves to show the player their development in terms of the practical results of their actions, allowing them to know where they need to improve and where they are doing well.

Possible parameters for evaluating each player. The following can be used as a measure to evaluate each player in each game action:

Take out:

- Positive serve: all serves in which a direct point is made.
- Negative serve: all serves that are missed.
- Neutral serve: all serves that allow the opposing team to continue playing.

Blocking:

- Positive blocking: all blocking actions that, after being performed, cause the ball to bounce in the opponent's court or occasionally rebound against an opponent.
- Sticky Block: All blocking actions that, after being performed, cause the ball to bounce in our field or hit our hands and leave the field of play.
- Neutral Block: All blocking actions that, after being performed, allow the ball to remain in play by either team.

Stroke:

- Positive attack: all attacking actions that after being carried out, the ball bounces in the opponent's field or hits the block and the opponent cannot continue playing the ball.

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- Negative attack: all attacking actions that, after being carried out, cause the ball to bounce outside the playing field, remain in the net, or allow a positive blocking action.

- Neutral attack: all attacking actions that, after being carried out, the ball can remain in play by either team.

Reception:

- Positive reception: all reception actions in which the balls are perfectly placed to the setter, according to the set-up zone.

- Negative reception: all reception actions in which the serve is positive, since a direct point was made to the receiver.

- Neutral reception: All reception actions in which the balls are placed to the setter in a less perfect position with respect to the setter's set-up zone, meaning that the setter can reach it in a forced manner, hitting from below, etc.

Defense:

- Positive defense: all defensive actions that, in the face of a powerful attack or a set or a deflection in the block, recover the ball and allow us to rebuild our attack.

- Negative defense: all defensive actions, even if they are in the right place, do not allow the game action to continue.

- Neutral defense: all defensive actions that allow us to continue the game action without setting up our attack and without making positional errors.

- Parallel Defense: All defensive actions in which the pair performs tactical attack actions on the second contact with the ball, with 50% of one athlete's technical action and 50% of their partner's participation; Likewise, the effectiveness, ineffectiveness, or neutralization of the tactical action will be measured.

Setup/Passing

In setup/passing, precision is fundamentally evaluated, since the tactical part will depend exclusively on how the match is prepared.

In all cases, it is important to be clear about the parameters, which may or may not be these, so that the measurement is valid.

In particular, I take into account the referee's decision and not my own observation. (Figures 1, 2, and 3; Tables 2 and 3).

Statistical System Camagüey Sharks event				
Teams	**Points Set 1**			
Teams	**Set 2 Points**			
Teams	**Set 3 Points**			
Individual Performance Date				
Take out	**Receipt**	**Happens**	**Stroke**	**K1**
+ - / + -	/ + - /	+ - /	+ - /	+ - /
Name and Surname	**Blockade**	**Defense**	**K2**	
	+ - /	+ - /	+ - /	
Position				
Individual performance Date				
Take out	**Receipt**	**Happens**	**Stroke**	**K1**

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+	-	/	+	/	+	-	/	+	-	/
		/	+							
			-							

Name and Surname	Blockade	Defense	K2
	+ - /	+ - /	+ - /
Position			

Fig. 1. - *Template showing the general compilation of the game phases to be evaluated in a beach volleyball match.*

Statistical system of sharks of Camagüey Event																								
Teams Points Set 1																							**Total**	
Cmg	1			1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	21	
HAB		1	1	1		1	1		1		1		1				1	1	1		1	1	1	14
Teams Set 2 Points																							**Total**	
Cmg			1	1		1			1		1		1	1	1	1	1	1	1	1	1	1	24	
HAB	1	1	1	1	1	1	1	1	1	1		1	1	1		1	1	1	1	1	1	1	26	
Teams Set 3 Points																							**Total**	
Cmg	1	1	1	1	1	1	1	1	1	1		1	1	1	1								15	
HAB	1	1	1	1	1	1	1	1	1	1		1	1	1									13	

Take out			Receipt		Happens			Stroke			K1			
+	-	/	+	-	+	-	/	+	-	/	+	-		/
	1	19	10		10			17	1	8	10	3		2

Name and Surname	Blockade	Defense	K-2

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Leandro Vidal Mayari	+	-	/		-	/	+		/
				+				-	
Position	9	7	3	0	1	8	13	15	3
Universal									

Take out			Receipt			Happens			Stroke			K1		
+	-	/	+	--	/	+	-	/	+	-	/	+	-	/
2	1	12	3	0	0	20	0	0	6	2	4	0	0	0

Name and Surname	Blockade			Defense			K2		
	+	-	/	-	/		+	-	/
Brian Tamayo Soria				+					
Position	3	3	7	3	7	2	2	4	3
Universal									

Fig. 2. -. *General compilation of individual character of the game phases to be evaluated in a beach volleyball match*

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Summary Serve		T	Summary Pass		T	K1 Summary		T	Block Summary		T
Effectiveness	0.0		Effectiveness	100		Effectiveness	66.7		Effectiveness	0.0	
Mistake	5	20	Mistake	0	10	Mistake	20.0	15	Mistake	11.1	9
Efficiency	-5.0		Efficiency	100		Efficiency	46.67		Efficiency	-11.1	
Effectiveness	**0**		**Effectiveness**	**100.0**		**Effectiveness**	**76.9**		**Effectiveness**	**0.0**	

Leandro Vidal Mayari

Receipt Summary		T	Attack Summary		T	Defense Summary		T	K2 Summary		T
Effectiveness	100.00		Effectiveness	0.00		Effectiveness	47,368		Effectiveness	41.9355	
Mistake	0.00	10	Mistake	11.11	9	Mistake	36,842	19	Mistake	48.3871	31
Efficiency	100.00		Efficiency	-11.11		Efficiency	10.526		Efficiency	-6.4516	
Effectiveness	**100.00**		**Effectiveness**	**0.00**		**Effectiveness**	**56.25**		**Effectiveness**	**46.4286**	

Fig. 3. – *General compilation of the results of the game of the athlete Leandro Vidal Mayari*

Table 2. - *Defense*

Effectiveness	100.0
Mistake	0.0
Efficiency	100.0
Effectiveness	**100**

Legend: *Effectiveness = (Total positive actions/ Total actions) * 100*

*Error = (Total negative actions/ Total actions) * 100*

*Efficiency = ((Total positive actions - Total negative actions) / Total actions) * 100*

*Effectiveness = (Total positive actions/ (Total positive actions + Total negative actions)) * 100*

Table 3.- *Final result*

Equipment	T. Pts .	TF	TC	Coef	SF	Coef
Cmg	113	60		1.132		2
HAB	113	53		0.883		0.5

Legend: *Effectiveness = % representing the total of positive actions among the total of actions*
Error = % representing the total of negative actions among the total of actions
Efficiency = % representing the difference between negative and positive actions among the total of actions
Effectiveness = % representing the total of positive actions among the sum of the total of positive and negative actions

In order to assess the technical-tactical performance of male beach volleyball athletes in the period 2019-2022, its assessment has been intended based on the particularities of complexes 1 and 2, for this purpose, what happened in 2019 is presented as an example in the following way:

Figure 1 shows the data obtained by our team regarding the national championship in this category, in the province of Ciego de Ávila.

On the offensive side, Complex 1 (K1) showed that the team executed a total of 348 actions, 84 of which were receiving the ball: 78 were positive (+), 0 were neutral, and 6 were negative (-). Passing performed a total of 180 actions, 180 of which were positive (+), 0 were neutral (/), and 0 were negative (-). The attack performed as follows: 180 actions, 138 of which were positive (+), 18 were neutral (/), and 24 were negative (-). Taking into account that the formula used is based on the number of positive actions (+) minus the sum of the neutral actions (/) plus the negative actions (-) per 100 of the total number of actions for that complex, the result of the sporting performance was 92%, a figure considered excellent.

In the same order, but for *Complex* 2 (K2), it can be observed that the team executed a total of 372 actions in the serve, of which 210 were positive (+), 198 neutral (/), and 12 negatives (-). In the blocking, the team executed a total of 50 actions, of which 8 were

positive (+), 24 neutral (/), and 18 negatives (-). For the defense of the field, the team executed a total of 180 actions in the serve, of which 72 were positive (+), 30 neutral (/), and 78 negatives (-). In the case of the pass, the team executed a total of 180 actions, of which 180 were positive (+), 0 neutral (/), and 0 negative (-). Finally, in the attack, the team executed a total of 180 actions, of which 98 were positive (+), 47 were neutral (/), and 35 were negative (-).

The above means that for complex 2(K 2), based on the results obtained, it can be stated that the complex had a behavior of 73 %, which is considered good.

Figure 3 shows, as an example, the performance of athlete Leandro Vidal Mayarí in the Camagüey vs. Havana game. This is based on the collection and evaluation of statistics on his technical and tactical performance as a player and his contribution to his teams, based on the relationship established between effectiveness and efficiency in the K1, where his Effectiveness was 66.7%; and his Efficiency was 46.67%; all of which allowed for an effectiveness of 76.9%. The experience in using athlete performance monitoring allowed for a restructuring of sports training planning by adjusting the contents of the training planning to the characteristics of the athletes based on their performance in different passages of the game on one side of the field or the other. By accessing the average number of general actions per player and team, both ours and our opponents', it allowed us to assess how to conduct physical preparation while also having a more accurate assessment of when in preparation people were in the best condition to play and reducing forced and unforced technical-tactical errors both offensively and defensively.

In general, its implementation through training units and preparatory competitions enabled a more organized training system. Its use yielded the following results:

- Year 2019 Bronze, National School Championship.
- Year 2022 Silver, National School Championship.
- Year 2022 and 2023, 5th, II, First Category National Circuit.

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The results presented above allowed us to verify the relevance of the applied statistical system.

CONCLUSIONS

The implementation of an adapted statistical method is essential for the systematization of technical and tactical control: It is confirmed that the lack of a specific statistical control for beach volleyball represents a key need for coaches. The proposed method, which classifies game actions into "Point System" (K2) and "Serve Exchange System" (K1) and evaluates actions with "Positive," "Neutral," and "Negative" results, proved to be a relevant and useful tool for this purpose.

The statistical system facilitates individualized assessment and monitoring of athletes' progress. By providing clear metrics such as effectiveness, error, efficiency, and effectiveness for each game action (serving, receiving, passing, attacking, blocking, defending), the method allows coaches to measure each player's individual development. This is crucial for identifying strengths and weaknesses and providing accurate and timely feedback that contributes to performance improvement.

The application of the statistical method allows for precise restructuring of training planning. The results obtained through this statistical control provide tangible data that allows training content to be tailored to the athletes' specific characteristics and needs. This includes optimizing physical preparation and reducing technical and tactical errors, both offensive and defensive, which translates into improved competitive performance for the team, as evidenced by the results achieved in school competitions.

Statistical analysis of technical and tactical performance validates its direct impact on sporting results. Experience with the statistical system demonstrates that, by accessing average data on actions per player and team, coaches can make informed decisions about training direction and game strategy. Examples of results achieved in competitions, such

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as medals in national school championships, corroborate the effectiveness of the method as a valuable tool for optimizing performance and contributing to sporting success.

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