

Anaerobic Capacity and Its Relationship to the Skill Performance Accuracy of Volleyball Blocking for Students

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ABSTRACT

Original research paper

This research examines the sport of volleyball, which is distinguished by its reliance on movements characterized by both high speed and precision. The importance of this study lies in its attempt to clarify the role of anaerobic capacity and its relationship to the accuracy of executing the blocking skill. It also seeks to highlight how this physiological component can be effectively integrated into training and learning programs to enhance overall athletic performance.

The core problem addressed in this study is to determine the levels of anaerobic capacity among the selected participants and to explore the extent to which these levels influence the accuracy of performing the blocking skill. The researcher hypothesized the existence of a statistically significant relationship between anaerobic capacity and the precision of blocking performance.

To achieve this, the research sample was deliberately selected from the volleyball team of the College of Physical Education and Sports Sciences at the University of Kufa for the academic year 2024–2025, consisting of ten players. Specific tests were administered to assess anaerobic capacity and technical performance. The collected data were then analyzed statistically using the Statistical Package for the Social Sciences (SPSS).

The findings revealed a clear positive correlation between anaerobic capacity and the accuracy of blocking performance. Based on these results, the study recommends incorporating anaerobic endurance training into educational and training programs to strengthen the factors contributing to the rapid execution of technical skills, particularly blocking.

Keywords: Anaerobic Capacity, Performance Accuracy, Volleyball Skills.

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Chapter One

1. Research Definition

1.1 Introduction and Importance of the Research

Scientific progress and research methods are among the features of our current era. Reliance on scientific foundations has now become a way of life in general, due to the belief of human society in the necessity of this to contribute to the progress of humanity in all aspects of human life, as sports express physical or skill effort that is practiced according to

agreed-upon rules for entertainment, competition, or self-confidence, and the different goals associated with it., Due to the difference in the quality of performance in Volleyball and its connection to the playing positions as well as the duties accompanying the game plans, the individual differences and the difference in abilities between the players of the team have special importance in the process of preparing and planning for the training season and the units and periods that make it up. As a result of this game being distinguished by strong and fast performance that requires the maximum or less than maximum strength characterized by speed and usually It appears in paragraphs and strikes when performing

the process of attacking or defending the field, and since this game is not limited to a time, it requires the player to maintain his level consistently throughout the match, and the science of sports training is of great importance because it is considered one of the sciences that appeared in light of technical development and its connection. With the theories and rules of other sciences, this connection is due to the growth in physical and skill performance to achieve better accomplishments. Volleyball is considered one of the games in which the development of the level of performance of its players is linked to functional, physical, tactical, psychological and other abilities, which makes researchers and coaches adopt modern training methods and identify the levels and abilities of the players in terms of function, skill and tactics by observing the training status of the players. Appropriate tests and measurements should be used to determine their levels, thereby enhancing the performance of these abilities to achieve optimal results. The importance of this research is evident in its ability to address and describe the relationship between anaerobic capacity and the accuracy of performing the blocking wall skill.

1.2 Research Problem

A volleyball player needs to be at a skill and physical level that enables him to perform all the required skills in different playing situations in a good way, especially those skills that are described as defensive and offensive skills at the same time, the most important of which is the blocking wall skill and its accuracy, which depends in its performance on the performance technique of a fast nature that is linked to the ability to play on The player's possession.

As the researcher is a player on the college volleyball team and constantly follows the game, she noticed a problem that lies in the difference in skill performance levels among players during one-half of the game. The rest of the half of the match, which negatively affects the decision of points and the game, and the reason, as the researcher sees it, is due to the lack of Possessing anaerobic capacity and the appearance of rapid fatigue, which prompted the researcher to delve into studying this problem and trying to find some solutions to it by knowing the relationship between anaerobic capacity and the accuracy of performing the block wall skill as a means of learning how to deal with the situation and provide the requirements of the Overall improvement in performance.

1.3 Research Objectives

1. To determine the levels of anaerobic capacity (leg explosive power) and the degree of accuracy in performing the blocking skill in volleyball among the participants included in the research sample.
2. To examine the relationship between anaerobic capacity and the precision of executing the blocking skill in volleyball.

1.4 Research Hypotheses

3. There is a statistically significant correlation between anaerobic capacity and skill performance levels among volleyball players.
4. A statistically significant association exists between anaerobic capacity and the accuracy of blocking skill execution in volleyball.

1.5 Research areas

1.5.1 Human Domain/ National team players / College of Physical Education and Sports Sciences / University of Kufa.

1.5.2 Spatial domain/ The Great Hall / College of Physical Education and Sports Sciences / University of Kufa

1.5.3 Time domain/ 15-11-2024 / 27-3-2025

Chapter Two

2. Research Methodology and Field Procedures

2.1 Research Methodology

In line with the nature of the research problem and the objectives of the study, the researcher adopted the descriptive approach using slope and correlation analyses. This methodological choice was made to accurately examine the relationships between the studied variables and to achieve the intended research goals.

2.2 Research Sample

The research population consisted of students representing the volleyball team of the College of Physical Education and Sports Sciences at the University of Kufa. The total number of participants was 12 students for the academic year 2024–2025. All members of the population were selected to participate in the study and undergo the required tests and measurements.

2.2.1 Sample Homogeneity

Prior to conducting the main experiment, the researcher performed a homogeneity test to ensure consistency among the participants with respect to key variables, including height, body mass, and age. This step was taken to minimize the impact of individual differences and enhance the reliability of the results.

Table (1)

It shows the homogeneity of the sample in terms of (height -mass - age)

Variables	Unit of measurement	arithmetic mean	standard deviation	The mediator	Coefficient of skewness
height	poison	181	2.36	181.00	0.407
The mass	kg	77.10	1.791	76.50	0.394
the age	year	18.90	0.737	19.0	0.166

2.3 The Researcher Used the Following Devices and Tools:

- Measuring tape (cm)
- whistle
- balls air planeLegal number (5)
- colored ribbon
- Colored chalk
- Medical scale
- smooth wall. To conduct a Sargent test
- Statistical bag programs)

2.4 Field Research Procedures

2.4.1 Identification of Research Variables and Their Tests

To accurately determine the study variables, the researcher conducted a review of relevant literature and sought the opinions of experts and specialists in the fields of Sports Physiology and Volleyball through structured interviews. Based on these consultations and academic references, the main variables of the study were defined as anaerobic capacity and the accuracy of blocking skill performance.

Subsequently, the researcher selected a set of standardized tests, drawn from scientifically validated sources, to measure these variables with high reliability and validity.

2.4.2 Sargent's vertical jump test (to measure the explosive power of the legs)

Test name: Babel Test to measure the explosive power of the leg muscles (Three-step vertical jump test).⁽¹⁾

- **Purpose of the test:** To assess the explosive strength of the leg muscles by measuring the maximum vertical jump achieved after a three-step approach.
- **Equipment and tools:** Medical scale measuring tape wall with measurement scale chalk.

Performance description: After recording the participant's body mass, the student stands next to the wall and fully extends the marked arm to make a fingertip mark on the wall or board without lifting the heels off the ground. This initial mark represents the standing reach height. When the participant is ready at the starting line, they accelerate over three controlled steps toward the jumping area. Upon arrival, they perform a double-leg vertical jump to the maximum height possible, touching the wall with chalk-dusted fingers to leave a visible mark at the highest point reached. Each participant is allowed two attempts, and the best score is recorded. Any invalid attempt must be repeated to ensure accuracy.

Registration: The recorded values include both body weight and jump height. The data are processed using the standard

equation for calculating explosive power. If the mass is recorded in kilograms, the numerator of the equation is multiplied by 9.8 to convert it to Newtons.

$$\text{Power (watts)} = \frac{\text{Mass} \times \text{Jump Height} \times 9.8 \times 2}{\sqrt{\frac{\text{Jump height} \times 2}{9.8}}}$$

2.4.3 Volleyball block wall accuracy test:

Test name: Accuracy of blocking skill.⁽²⁾

- **The aim of the test:** To evaluate the accuracy of the blocking skill in volleyball.
- **Equipment used:** Official volleyball court, five (5) standard volleyballs, and colored tape to divide the opposite court into specific target zones.
- **Performance specifications:** The participant stands at the center position (3), directly in front of the net, maintaining a distance of approximately (50) cm from it, and assumes the ready position for blocking. From the opposite court, the instructor performs the spiking (smash) skill toward the net. Upon hearing the auditory signal, the participant executes the blocking skill, aiming to accurately intercept the ball as illustrated in Figure (1).

Terms of performance: Each participant is granted (5) consecutive attempts. For each attempt, the smash must be performed correctly to ensure the validity of the effort. Points are awarded based on the landing location of the ball as follows:

- Center area: 2 points.
- Zone 3: 3 points.
- Middle target zone: 4 points.
- Outside the designated areas: 0 points.

Registration: The scores obtained by the participant across the five attempts are recorded. The maximum achievable score in this test is **15 points**.

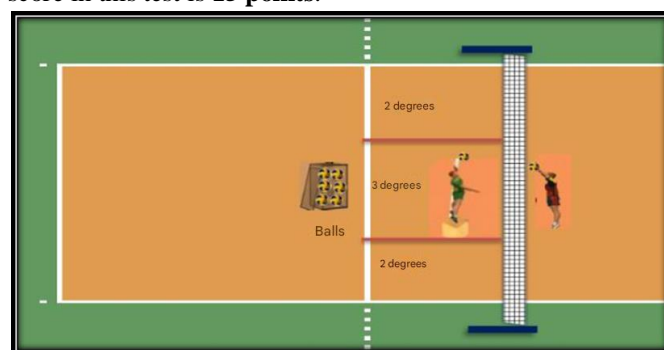


Figure No. (1)

2.5 Exploratory Experiment: -

He did research and conducted a pilot study on a sample of two students from the original community and one from

(1) Hussein Mardan et al. (2001). *The Babylon Test for Measuring the Anaerobic Muscular Power of the Leg Muscles*. *Al-Qadisiyah Journal for Sports Education Sciences*, Vol. 1, No. 3, pp. 107–116.

(2) Naheda Abdul Zaid et al. (previously cited source), p. 112.

outside the research sample, on Sunday, dated 7/2/2025, to reveal the following:

- 1- Verifying the efficiency of the devices and tools used.
- 2- Sample level and its ability to perform tests.
- 3- Efficiency of the support team.
- 4- Identify the negatives and difficulties that the researcher may face. And.

2.6 Main Research Experiment

The main experiment was conducted on Tuesday, corresponding to (11/2/2025). At precisely 11:00 a.m., in the closed hall of the College of Physical Education and Sports Sciences at the University of Kufa, all tests related to measuring the study variables were conducted, followed by data collection and preparation for statistical processing.

2.7 Statistical Methods: -

Use the researcher and Statistical program (SPSS) to process the data, which are:

- Arithmetic mean
- Standard deviation
- The mediator
- Coefficient of skewness
- Simple correlation coefficient (Pearson)

Chapter Three

3. Presentation, Analysis and Discussion of Research Results

3.1 Presentation and analysis of the results of the explosive power of the legs and the accuracy of the blocking wall skill in volleyball

Table (2)

Shows the mean, standard deviation, median, and skewness coefficient of the men's explosive power and blocking skill

Statistical transactions Variables	Unit of measurement	arithmetic mean	standard deviation	The mediator	Coefficient of skewness
anaerobic capacity (explosive power of men)	Watts	22,012	0.568	21,769	0.351
Firewall skill	degree	12,900	0.875	13.00	0.223

Through data on display in Table (2) We observed that the arithmetic mean of the anaerobic capacity test for students representing the volleyball team at the College of Physical Education and Sports Sciences, University of Kufa, was (22.012) points, with a standard deviation of (0.568) and a median value of (21.769). The skewness coefficient was (0.351), indicating a normal distribution trend.

In comparison, the arithmetic mean for the volleyball blocking skill test reached (12.900) points, with a standard deviation of (0.875) and a median value of (13.00). The skewness coefficient for this test was (0.223) points, also suggesting a distribution close to normal.

3.2 Presentation and analysis of the results of the correlation between the explosive power of the legs and the accuracy of the blocking skill in volleyball

Table (3)

Shows arithmetic means, standard deviations, and the coefficient of correlation between the explosive power of men and the accuracy of performance skill firewall

Variables Statistics Tests	C-	+ - A	Pearson's correlation coefficient (r)	Test significance level	Statistical significance (significance of correlation)
Explosive power test for men (watts)	22,012	0.568	0.802	0.005	moral
Wall Skill Accuracy Test (Score)	12,900	0.875			

Degree of freedom (8) at a significance level of (0.05) Table value (r) = (0.63)

From the data presented in the table above, it is evident that the correlation coefficient between the two variables (anaerobic capacity and the accuracy of the blocking skill) in volleyball reached (0.802). This value exceeds the critical table value of (0.63) at a significance level of (0.05), with a significance value of (sig = 0.005).

These results clearly indicate the existence of a statistically significant positive correlation between anaerobic capacity and the accuracy of blocking skill performance in volleyball among the students representing the university team.

3.3 Discussion of the Results:

The data shown in Table 3 shows that: Anaerobic capacity (explosive capacity of the legs) is of great importance, especially at the beginning of motor learning. It is a sound beginning built on solid scientific foundations, as well as a preparation for training for most skills due to its great importance. The researcher believes that the reason for the emergence of the moral connection is that anaerobic capacity is one of the essential abilities in many basic skills within sports activities, especially in the subject of research, as the higher the anaerobic capacity, the better the accuracy in the skill performance of the block wall.

In volleyball, therefore, the performance of this skill will be mastered correctly. Through the results that have been reached, we find that the relationship between anaerobic capacity and the blocking wall skill will help players to get acceptable performance if they work on it and focus on

performing a lot of learning skills and training on them under the concept of variable anaerobic capacity. This relationship confirms that Sargent's vertical jump has a clear relationship with the anaerobic capacity that the player performs during the vertical jump process. The result of the similarity between Sargent's vertical jump and blocking skill showed a significant relationship because the blocking process is evaluated based on anaerobic capacity and thus shows a strong relationship, as we mentioned.

Note that the requirements of a volleyball player depend on anaerobic capacity, as anaerobic capacity constitutes 85% of the total energy production system in volleyball, while aerobic capacity constitutes 15% of the total energy production system in volleyball. ⁽³⁾

Explosive power displays basic physical abilities, and this ability is considered the decisive factor in various skills, including the blocking wall skill, in which the player must achieve the highest possible vertical distance. The choice of anaerobic power depends on the weight, the gravitational constant, and the jump distance achieved by the player. Increasing mass increases oxygen consumption. Therefore, the researcher emphasizes giving special training in anaerobic power to the player to achieve the best results.

Level and advance him in achieving high skills during performance. So the movements of jumping, leaping, rising, and ascending are classified.

Chapter Four

4. Conclusions and Recommendations

4.1 Conclusions

In light of the results obtained, the researcher reached the following conclusions:

1. The results of the tests conducted showed a strong positive correlation between anaerobic capacity (explosive leg power) and the accuracy of the blocking skill in volleyball among the students in the research sample.
2. There is a direct relationship between anaerobic capacity (explosive leg power) and the accuracy of the blocking skill in volleyball.
3. Enhancing explosive power leads to improved performance outcomes, particularly in the precision of the blocking skill and other related volleyball techniques.

4.2 Recommendations:

- 1- Emphasis on developing motor abilities and capabilities, including anaerobic capacity, due to its importance in enhancing the motor performance aspects of various skills among students.

- 2- Educational and training units should be enhanced with anaerobic endurance exercises that develop fast-paced skill performance factors for various skills.
- 3- Conducting similar studies aimed at investigating how to improve and develop other physical and motor abilities and other sports and games that serve to advance the level of performance in all its aspects.

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(3) Amr Allah Al-Basati: *Foundations and Rules of Sports Training and its Applications*, Alexandria, 1998, p. 79

Appendix (1)

Names of experts for personal interviews and technical performance evaluation of the skill

T	Expert's name	The adjective	Workplace
1	Prof. Dr. Basem Hassan Ghazi	Volleyball teacher	College of Physical Education / University of Kufa
2	Asst. Prof. Dr. Muslim Muhammad Sabit	Teacher / Racket Games	College of Physical Education / University of Kufa
3	Prof. Hatem Falih Hafez	Volleyball teacher	College of Physical Education / University of Kufa
4	Asst. Prof. Dr. Mahmoud Al-Kufi	Volleyball teacher	College of Physical Education / University of Kufa
5	Asst. Prof. Dr. Ghaith Mohammed	Volleyball teacher	College of Physical Education / University of Kufa
6	Dr. Afrah Baqir Jalil	Volleyball teacher	College of Physical Education / University of Kufa
	M.M. Ali Ahmed Saleh	Volleyball teacher	College of Physical Education / University of Kufa

Appendix (2)

Approved form for evaluating the technical performance of the firewall skill

T	Attempts the name	First	Second	Third	Fourth	Fifth	The total
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Appendix (3)
Pole Vault Test Evaluation Form Y Sargent

T	The name	Height from standing	First attempt	Second attempt
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				