



Evaluation of some biomechanical indicators of the spiking skill performance of local players and professional volleyball players in the Premier League

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Abstract

The purpose of this paper is to identifying the differences between the values of some biomechanical indicators of the skill of spiking in volleyball between local players and professional players in Premier League clubs , and identifying the relationship between some biomechanical indicators and the performance accuracy of some offensive skills in volleyball among local and professional players in the Iraqi Premier League clubs. The researchers used the descriptive method in the survey method, the comparative method, and the correlations, which is consistent with the nature of the research problem. research community represented by the players of the Iraqi Premier League clubs in volleyball who qualified for the Golden Square, which numbered (56) players for the sports season (2022/2023), was identified. As for the research sample, it was chosen by the intentional method as well, and they are the players of the clubs (Erbil, South Gas, Peshmerga, Al-Shorta), and their number is (12) players (6) professional players (6) local players, and they represent (21.42%) of the community. the origin. One of the most important results reached by the researcher is that: The values of the momentum index and kinetic energy achieved by the professional players are due to the mass and velocity index, as the mass and velocity values of the professional players were higher than the local players in the spiking skill. One of the most important recommendations recommended by the researchers is that: Necessity of emphasizing by the coaches on developing the values of the biomechanical indicators of the skill of spiking for the local players. Which showed a clear decrease in all biomechanical indicators compared to professional players.

Keywords: biomechanical indicators, spiking skill performance, volleyball players



Introduction:

Scientific development in the whole field requires knowledge of the correct scientific foundations or steps that help develop in the sports field by drawing the correct steps and goals that enable coaches and experts to reach the best results and achievements.

Biomechanics is one of the important sciences in the sports field that helps coaches and experts through study and analysis to know the strengths and weaknesses of the players as well as getting them to the correct and good mechanical conditions through studying the evaluation of biomechanical indicators and striving to develop these indicators through good training and exercises according to Mechanical foundations that give a good explanation for the skill of spiking at the moment of ascent and jump, and that the impact of the mechanical aspects in the field of movement will appear clearly in the skill of spiking, as these skills are characterized by strength, quantity, direction, or speed, and their impact on the body, as well as the necessary angles that the player uses in order to fit into the skillful sides And my plan.

And the game of volleyball is one of the games that require study and research in all its skills, due to the large number of variables that occur in the matches, as it needs a large number of exercises and exercises that help correct skills and reduce the number of mistakes, and thus this is reflected positively on the team's results.

Among these skills is the spiking skill, as it is one of the basic and important offensive skills in modern volleyball at the Arab and international level, because they are decisive in scoring points and the result of the half and the match through high and medium spiking types from the front row and the back row, as the offensive combinations that they perform from the high players from the front line And the back line witnessed a big jump in confusing the opposing team's defenses, and therefore the spiking skill is the first weapon in the game of volleyball, and in it requires that performance be governed by mechanical characteristics and be the main determinant of the success of the skill and the spiking skill is characterized by players who must have mechanical indicators as well as variables that help them from Reaching a good performance in terms of steps and upgrading, and to reach the highest height when hitting the ball and crushing it in the opposing team's court with strength and high speed so that he can easily score points.

Hence the importance of the research to study the evaluation of mechanical indicators because of their great positive impact in the implementation of the performance of spiking for the Premier League players to get accurate information about the mechanical indicators between the types of offensive skills through good performance, as it helps coaches to know the good mechanical performance of the players and with minimal effort It is possible for him to perform these skills and thus work on correcting and developing these indicators by developing exercises that contribute to correcting the mechanical performance that contributes to a high percentage of these indicators according to mechanical information, as well as



developing these biomechanical indicators to reach the best mechanical conditions at the moment of ascent and with the least effort.

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Research problem:

Achieving good technical performance according to the evaluation of the biomechanical indicators of spiking is one of the basic goals that, if achieved in performance, will lead to the success of the accuracy of performing this skill. in performance accuracy.

Through the researcher's observation that he is a volleyball player for the motor performance of the skill (spiking) in the Premier League matches, by photographing this skill and analyzing it, he found that there is a weakness in these important indicators, which in turn contribute to mastering the skill of spiking because these skills need timing and fluidity of movement and control of the angle and direction The ball and avoiding the attack and defense of the opposing team, so the researcher decided to study the evaluation of the biomechanical indicators of the skill of spiking for this skill completely without fragmentation and to know the percentages of its contribution to the accuracy of the four stages, which are the stage of approaching, upgrading, or blocking and landing.

Research objective:

- To identify the differences between the values of some biomechanical indicators of the skill of spiking in volleyball between local players and professional players in Premier League clubs.
- Identifying the relationship between some biomechanical indicators and the performance accuracy of some offensive skills in volleyball among local and professional players in the Iraqi Premier League clubs.

Research hypotheses:

- There are statistically significant differences in the values of some biomechanical indicators of the skill of spiking in volleyball between local players and professional players in Premier League clubs.

Research fields:

- Human field: Iraqi volleyball league players for the 2022-2023 season
- Time field: (23/1/2022) to (29/1/2023)
- Spatial field: The closed sports hall in the Basra Governorate, the district of Zubair



Research methodology and field procedures:

Research Methodology:

The nature of the problem presented is what determines the nature of the approach used, and "the scientific method is a method of thinking and action that the researcher adopts to organize the subject of the research." (Elia and others. 2000)(7) Therefore, the researchers used the descriptive method in the survey method, the comparative method, and the correlations, which is consistent with the nature of the research problem.

Community and sample research:

The research community is "the total vocabulary that the researcher aims to study in order to achieve the results of the study, and he can generalize the results of the study to all of his vocabulary." (Hamid. 2000)(4), As for the research sample, it "represents a number of individuals or things that are chosen according to a specific rule or style from the statistical community that represents this community." (Al-Fartousi. 2007)(1) . Hence, the research community represented by the players of the Iraqi Premier League clubs in volleyball who qualified for the Golden Square, which numbered (56) players for the sports season (2022/2023), was identified. As for the research sample, it was chosen by the intentional method as well, and they are the players of the clubs (Erbil, South Gas, Peshmerga, Al-Shorta), and their number is (12) players (6) professional players (6) local players, and they represent (21.42%) of the community. the origin.

Sample homogeneity:

In order to achieve homogeneity among the members of the research sample, and to avoid the influence of factors that may affect the results of the experiment in terms of individual differences in the sample, the researcher conducted homogeneity for some anthropometric specifications and measurements that may have an impact on the experimental variable, and among these measurements: (chronological age, training age, mass, and height), and the coefficient of variation was extracted by means of the arithmetic mean and standard deviation of anthropometric measurements to ensure the homogeneity of the sample. Where the values of all measurements showed between (1-30%), which indicates the homogeneity of the sample. In addition, because one of the characteristics of the typical equinox curve is that the coefficient of variation is between (1-30) and not more than (30%), which makes the research sample highly homogeneous in physical measurements (anthropometrics).



Table (1) shows the homogeneity of the sample for local players

No.	Measures	Measuring unit	Mean	Std. Deviations	Coefficient of Variation	Type sig
١	Mass	kg	85.250	3.575	4.193	Homogeneous
٢	Age	year	30.375	2.386	7.855	Homogeneous
٣	training age	year	17.125	1.031	6.020	homogeneous
٤	Height	Cm	187.375	3.020	1.611	homogeneous
٥	arm length	Cm	83.625	1.685	2.014	homogeneous
٦	trunk length	Cm	60.500	3.162	5.226	homogeneous
٧	legs length	Cm	111.375	3.377	4.193	homogeneous

Table (2) shows the homogeneity of the sample for professional players

No.	Measures	Measuring unit	Mean	Std. Deviations	Coefficient of Variation	Type sig
١	Mass	Kg	91.666	2.581	2.815	homogeneous
٢	Age	year	30.833	1.700	5.513	homogeneous
٣	training age	year	19.500	1.311	6.723	homogeneous
٤	Height	Cm	199.833	2.483	1.242	homogeneous
٥	arm length	Cm	87.333	1.211	1.386	homogeneous
٦	trunk length	Cm	64.833	3.188	4.917	homogeneous
٧	legs length	Cm	115.666	1.966	1.699	homogeneous

Field research procedures:

These procedures aim to introduce all the procedures that the researcher has accomplished, in order to prepare for collecting the necessary data to answer the research objectives and verify the validity of the hypotheses.

Tests and variables used in the research:

Test the accuracy of higher diagonal spiking by volleyball (Al-Ajili. 2017)(5)

- Purpose of the test: Measure the accuracy of spiking in the diagonal direction for specific areas.
- Tools: The legal volleyball court is planned as in Figure (2), (5) volleyballs, colored adhesive tape to divide the court opposite the tested player into two equal triangles, then the inner triangle is divided into three areas, each area measuring (3) meters.
- Performance specifications: The tester is spiking the diagonal towards the inner triangle of the grid side.
- Terms of performance:
 - Each lab has five attempts.
 - Preparation must be good in every attempt.
 - Scores are calculated according to the fall of the ball:
 - Zone A (3) degrees.
 - Zone B (1) degree.
 - Zone C (5) degrees.
 - Outside these areas, the laboratory gets a (zero).
- Registration: The tester records the grades obtained in the five attempts, meaning that the final score for this test is (25) degrees.

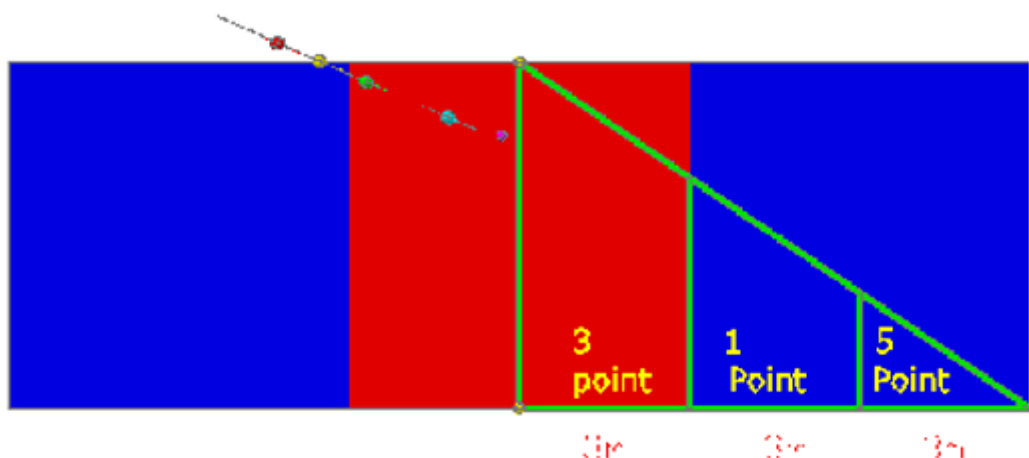


Figure (1) shows the diagonal spiking accuracy testing with a volleyball



Study variables:

Biomechanical indicators:

- Push indicator: “The area under the curve is in a different unit. They both express the same situation. Since the area under the curve is instantaneous force amounts, they are summed and averaged, then multiplied by the total time. The push is equal to the force rate per time.” (Mardan and Rahman. 2018)(2).
- Momentum indicator: is one of the physical quantities that means the product of the player's mass multiplied by his velocity (Hossam El-Din. 1994)(10)..
- The kinetic energy index is the energy that the body possesses in a certain position during flight, and it is the result of multiplying half of the player's mass by the square of the velocity of its center of mass (Al-Sumaidaie. 1987)(3).

Exploratory experiences:

First Exploratory experiences:

The exploratory experiment is a "practical training for the researcher to find out for himself the negatives and positives that he encounters during the test in order to avoid them" (Al-Mandalawi and others. 1989)(6) in order to overcome the difficulties and obstacles that the researcher may face during the implementation of the main experiment. For the purpose of standing on the performance of the devices used and testing them, the exploratory experiment was conducted on Thursday corresponding to (13/1/2023) at ten o'clock in the closed sports hall of the College of Physical Education and Sports Sciences, Thi Qar University, where the test was applied to a sample of (8) players They represent the Al-Furat Sports Club. The force measurement platform and cameras were used. The aim of the experiment was to identify the following:

- The time period for the test.
- Adequacy of auxiliary work staff.
- The work and efficiency of the devices and tools used.
- Appropriate dimensions for cameras and imaging clarity.

The most important results of the Exploratory experiment:

- The possibility of conducting tests, knowing the time it takes, the suitability of the tests for the sample, and the adequacy of the auxiliary work staff.
- The field of motion for the cameras appears clearly from the beginning of the movement to its end.
- The lighting is sufficient to ensure the clarity of the image accurately.



Second Exploratory experiment:

A second exploratory experiment was conducted on Tuesday corresponding to (18/1/2023) at eleven o'clock in the morning in the gymnasium in the College of Physical Education and Sports Sciences, Thi Qar University, where the test was applied to a sample of (8) players representing the Marsh Sports Club, The purpose of this experiment was to find scientific coefficients for the test.

Main experience:

The main experiment was conducted on Saturday corresponding to (4/2/2023) after the end of the exploratory experiment and to ensure the validity of the devices and tools. Where this experiment was conducted on the sports hall in Al-Zubair district, Basra governorate, as well as the police club hall in Baghdad governorate. The test was applied to the research sample, with the help of the assistant work team, with (3) attempts for each offensive skill, including the sending skill, the diagonal spiking, and the offensive blocking wall. The experiment was filmed with side cameras.

Where the cameras are placed on the right side, he performs the skill of spiking, diagonal spiking, and the offensive blocking wall, and the platform is placed in the place designated for the test, if it is moved according to the skill that the player performs.

Statistical methods: The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Results and discussion:

Presentation and analyzing the results of biomechanical indicators for the skill of spiking among local and professional players:

Table (3) shows the differences in the values of the biomechanical indicators of the skill of spiking in volleyball between local and professional players of the Iraqi Premier League in volleyball

No.	Variables	Measuring unit	local players		Professional players		T value	Level Sig	Type Sig
			Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
١	Push	N/sec	346.052	17.593	390.882	14.039	5.121	٠.٠٠٠	Sig
٢	Momentum	m/sec	354.362	16.487	407.000	14.618	6.193	٠.٠٠٠	Sig



٣	kinetic energy	Joule	735.525	40.400	912.375	33.908	8.655	٠.٠٠٠	Sig
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Discussing the results of differences in the values of some biomechanical indicators of volleyball spiking skill between local players and professional players in the Iraqi Premier League:

The results extracted for the members of the research sample of the biomechanical indicators in Table (3) showed significant differences in most of the values of the biomechanical indicators of the skill of spiking in volleyball, where the value of ((t) was significant at the significance level (0.05) and for all biomechanical indicators of the skill of spiking in volleyball among local players And the professional players, as indicated in the table above, in the payment index, the differences were significant and in favor of the professional players, and the researcher attributes to the amount of the achieved payment is the result of the amount of force produced by the player’s body, so the payment is the product of the work of force, where the payment is directly proportional to the force, that is, the less the force, the less the payment While the thrust is inversely proportional to the mass, i.e. the thrust increases with the increase in the mass, and the thrust is expressed in overcoming the external resistances that hinder the body or the weight of the body for itself. For an object of known mass, it will lead to an increase in propulsion. This change is either the result of a large force that works for a short period of time, or a small force that works for a long time. In many games, increasing the force requires an increase in speed, and this leads to a decrease in the time of exerting force and thus negatively affects the propulsion and in order to maintain The player on the amount of thrust must increase the amount of force so that it exceeds the amount of decrease in time (Dayikh, and Odeh. 2020)(11)

That is, when the player performs the movement without the ball, he exerts more force than the force he exerts while he is completely spiking, and therefore the push is greater when the player performs the movement without the ball, because force is the basis of the push As Salman Ali Hassan and Awatef Muhammad Labib indicate that speed is a movement resulting from Force and its relation to the variable of time, and as the force increases, the speed increases accordingly (Dayikh, and Odeh. 2020)(11) (Suleiman Ali Hassan and the emotions of Muhammad Labib)(9).

As for the momentum indicator, the differences were significant and in favor of the professional players. The researcher attributes the amount of momentum achieved as a result of the speed being higher than the speed of the local players, in addition to the large mass of the professional players, which is greater than the mass of the local players. The momentum or the amount of movement is the product of multiplying the mass by the speed. At every moment of time, that is, at the moment of touching the foot and at the moment of leaving it, and these moments must occur during the movement of the body, whether when running or when jumping to perform various motor skills was it done well or badly (Al-Fadhli. 2009)(8).



Increasing the amount of this speed means increasing the amount of the player's outcome during flight, meaning that the flight achieved is a result of the player's speed while approaching, which leads to achieving an appropriate height for the center of gravity of the body, and the higher the vertical jump height, the greater the degree of control and control of the ball and directing it in the appropriate place in the stadium opposing team.

As for the kinetic energy index, the researcher attributes this to the rate of speed achieved by the professional players, which is greater than the speed of the local players, as well as to the largest mass of the professional players, which positively affected the results of the kinetic energy values, as the kinetic energy generated by the professional players was higher and greater than the energy of the local players. Thus, the increase in height is the center of gravity of the body and its survival in the flight phase for a longer period. This is a result of the large kinetic energy and the amount of thrust achieved to reach the highest possible point and in the least possible time, and the speed of the penultimate step and the last step (and the rise, which leads to an improvement in the starting speed associated with the speed of approach, where the more The speed of approach increased, the speed of departure increased, which has an impact on achievement, and this was confirmed by (Al-Sumaidaie. 1987)(3). An athlete who gets good results in the vertical distance is determined by the horizontal speed he gains from the approach.

Conclusions and Recommendations:

Conclusions:

- The significant differences that appeared in the push indicator are due to two main indicators, namely strength and time, as the values of strength and time in the research sample are better for professional players in the high crushing skill.
- The values of the momentum index and the kinetic energy achieved by the professional players are due to the mass and velocity index, as the mass and velocity values of the professional players were higher than the local players in the high crushing skill.

Recommendations:

- Emphasis on paying attention to the values of biomechanical indicators that help local players to reach the highest height during the performance of the high crushing hitting skill in volleyball for the purpose of achieving good results compared to professional players.

The necessity of emphasizing by the trainers on developing the values of the biomechanical indicators of the high crushing skill of the local players, which showed a clear decrease in all biomechanical indicators compared to the professional players.



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