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Comparative study of the values of the biokinematic variables of the arm and the horizontal distance of the ball from the longitudinal axis of the body between the numbers of high and medium height volleyballs

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Abstract

The study of some biokinematic variables gives us the opportunity to discover the shortcomings in the technical performance of the skill of preparation and why kinematic variables are logical indicators that contribute to and affect motor performance, as well as the comparison of skill performance between high and medium altitudes in order to improve performance and reach the best skill performance of young prepared players in volleyball. The study aimed to identify the differences between some biokinematic variables of the arm and the horizontal distance of the ball from the longitudinal axis of the body between the numbers of high and medium height volleyball.

The researcher also used the descriptive approach in the method of correlational relations, and the research community included the 32 young players prepared in the Iraqi Premier League for the season (2023-2024). As for the research sample, it was chosen in a deliberate manner and their number was (10 young preparers) players representing clubs (Bahri , South Gas, Industry, Marshlands , Muqdadiya), where they constitute(31.25%) of the total community. The main experiment was conducted for the period from 14/11/2023 to 20/11/2023 at 2:00 pm. Three attempts were given for each type of preparation skill used(high and medium) and the data were processed statistically . Among them, the researcher reached the most

important conclusions, which is the emergence of differences between the skill of high frontal and medium height numbers in (the variable of the angle of the elbow, the angle of the ball, the variable of the performance time). The differences were in favor of the skill of high height numbers, while the differences were in favor of the skill of medium height frontal numbers in the variable of the horizontal distance between the ball and the longitudinal axis of the body and the speed of the ball. The recommendations were to emphasize moving away as much as possible from high height numbers and the use of medium height numbers in training units and competitions in order to reduce the performance time and reach the batter's hand for as long as possible .

Research introduction

1-1 Introduction and Importance of the Research

The world is moving at an accelerated pace in the development and growth in all fields and through continuous and fruitful work and research, which indicates progress in sports science, and let the advancement of this aspiration of the whole world, which makes man more ambitious and be an effective element in this light-paced world .This is what motivates man to interact and contribute to the development of each within his field. One of these fields is the sports field. Interest in sports events has increased significantly until it has become a distinctive feature of social development that people are proud of as a result of countries receiving the medals and titles obtained by athletes, which sports have the largest role in this field, which people and countries are proud of. The achievement of the same goal is sought by all countries, as these achievements have become indicative of the advancement and progress of peoples because of their advanced social and civilizational return, and this

requires integrated preparation that takes into account many aspects that contribute to the arrival of teams or players to higher levels.

Achieving optimal performance in mathematical skills requires attention in all scientific aspects, including in the field of (bay and miyak), which witnessed the development of a great deal in terms of science and work in terms of the movement of the body and in terms of what is agreed upon and applied to the work of the skill and the use of the best methods to be followed to serve the skill performance, which enables the player to invest his forces that will be used in time and economy in the effort by applying the laws of the body, which vary according to the characteristics of the body on which it is applied and under different circumstances .

The performance and nature of the game of volleyball is characterized by the speed of the performance of the crushing batting, which is the important interval in achieving victory, and the main factor for its success is the preparation is the spirit of crushing batting, because the success of the crushing batting needs to be prepared with a high degree of accuracy in terms of distance, proximity and height , and the skill of preparation is one of the most important skills of modern volleyball, as this skill is the link between defensive and offensive skills by preparing and preparing the balls for attacking players, as well as trying to correct the weak reception and turn it into a successful preparation to win points. Therefore, the skill of preparation is of great importance in determining the result of the game as it is the key to play, so it requires the study of skill and the preparation of specialized training programs to raise the skill level. It also requires a careful study of the biomechanical aspects of the exact parts of the preparation skill to take advantage of it to improve the aspects of skill performance and emphasize those results in the training programs and units to reach

the highest accuracy in the preparation process and thus obtain a successful and successful crushing attack .

From the above, the importance of research is evident, as the study of some biokinematic variables gives us the opportunity to discover the shortcomings in the technical performance of the skill of preparation. Kinematic variables are logical indicators that contribute to and affect motor performance,as well as comparison in skill performance between high and medium altitudes in order to improve performance and reach the best skill performance for prepared players in volleyball.

1-2 Research Problem

The development of the game of volleyball, especially in the recent era, and its expansion in a dynamic manner that results in a high level of skill performance. This development can only be achieved through the adoption of modern methods of training based mainly on the kinetic analysis of the mechanical aspects of skill performance, especially with the development of devices and programs specialized in biomechanical analysis that give trainers and teachers real indicators Accurate skill performance as well as technical errors are studied in the best ways to overcome them and reach performance. The skill of preparation in the flying ball is one of the most important skills, which depends mainly on accuracy in its performance because it is an important determinant in determining the extent of the success of the overwhelming batting and thus becomes an important determinant in determining the result of the game. The study of the kinematic variables of this skill is one of the important foundations that directly affect accuracy as well as the difference between the heights in the performance of the skill. The problem of research lies in the study of the kinematic variables of the skill of preparation with high and medium quality as well as the

comparison between the skill performance of high and medium height of the skill. of the volleyball game.

Research objectives

1. Identify the kinematic variables of the skill of high and medium height numbers in volleyball.

2.Comparing the values of some kinematic variables between the skill performance of high and medium height numbers in volleyball .

1-4 Research Hypotheses

There are significant differences in the values of some kinematic variables between the skill performance of high and medium height volleyball numbers.

1-5 Research Areas

Human field: Youngplayers in the Iraqi Volleyball League clubs

Spatial scope: Sports halls for clubs participating in the Iraqi League

Time Range: From 15/9/2023 to 25/12/2023

2- Research methodology and field procedures

2-1 Research Methodology

The researcher used the descriptive approach in the method of correlational relations to suit it with the nature of the study, as each research has a scientific approach in which it is possible to reach the best way to solve the problem that the research consists of (93:1).

2-2 Research Population and Sample

The research community included the 32 players prepared in the Iraqi League for the season (2023-2024). As for the research sample, it was selected on the scientific basis in order to accurately represent the community, as identifying the

sample well and appropriately for the nature of the community and the study to be conducted gives results as close as possible to what is in the community(24:6)' and it was selected in a deliberate way and their number was (10) players clubs , where they make up a percentage of (31.25) of the total community where the sample is representative of the original community.

The researcher conducted homogeneity for the sample members with the following variables (height , weight , age) that may affect the results of the main experiment. The researcher used the coefficient of difference, which whenever it is less than 30%, the sample is homogeneous (161:11). It was found that all variables achieved a coefficient of difference of less than 30%, which means that the sample is homogeneous in those variables , and as shown in Table (1), which shows the homogeneity of the sample members.

Table (I)

Shows the arithmetic media, standard deviations and values of the coefficient of variation in the research sample

#	Orthopaedic measurements	Unit of Measurement	Arithmetical mean (Maths.)	Standard deviation (Maths.)	Coefficient of variation
1	Height	poison	186	4/166	239
2	Block	kg	82	920	6
3	Age	Year	25	162	648

2-3 Used means, tools and appliances

2-3-1 Means of collecting information

- Arabic Resources
- World Wide Network

2-3-2 Appliances and tools used

1. Video camera (2) type (sony) with a frequency of (100images/s)
3. Drawing scale
4. Electronic Calculator
5. HP computer with processor speed (cor i7)
6. Software and applications used in the computer
7. Camera tripod (2)
8. CD-DVD
9. Medical scale to measure weight
10. Measuring tape with a length of (20) m.
11. 24 Legal Volleyballs
12. Legal volleyball court
13. Colored adhesive tape

2-4 Tests Used

2-4-1 Testing the performance accuracy of the volleyball preparation skill (182:7)

Objective of the test : Measure the accuracy of the preparation skill.

Tools Used

A carrier at the end of which there is a loop and the loop is not fixed, as it can be made horizontal and vertical, as well as the height of the loop can be controlled, (24) legal volleyballs, a registration form.

Method statement of Performance

The laboratory player stands facing the stand , and the coach throws the ball at the prepared player to prepare the ball towards the ring , trying to pass it inside the ring, as shown in Figure (1) , giving each player (3) attempts .

Registration

- The ball away from the ring (2) points .
- Touching the ball for the loop (3) points .
- Passing the ball inside the ring (5) points .

* The maximum score of the test is (15) points .

2-5 Scientific Basis for the Modified Skill Test:

2.5.1Validity of the test:

The researcher used the guaranteed honesty and to ensure that the test achieves the desired goal, the test was presented to ensure the validity of the test to experts and specialists in the field of tests and volleyball. They stated that each test measures the quality or ability that was developed to measure it, and on this basis the validity of the tests was confirmed and approved in the research , and this is confirmed by Mustafa Sibahi "that honesty is an estimate to know whether the test measures what we want to measure with it, and nothing but what we want to measure with it"(26:9).

2-5-2 **Test stability:**

Since stability means " which gives similar results or the same results if applied more than once in similar circumstances" (145:10).Therefore, the researcher took advantage of the results of the exploratory experiment and after (7) days the test was repeated and then the results were statistically processed using a simple correlation coefficient, including the researcher concluded that the test has a high morale, which indicates

that the test has a high degree of stability . As in Table (2)

Table (2)

Statistical Parameters / Test Name	Quiz 1		RETAKE QUIZ		Correlation coefficient (Maths.)	Significance
	Arithmetical mean (Maths.)	Standard deviation (Maths.)	Arithmetical mean (Maths.)	Standard deviation (Maths.)		
Volleyball Setup Skill Performance Accuracy	11.3	3.465	10.6	3.025	.839	corporate

2-5-3 Objectivity of the test:

Objectivity means "all tests that take out the corrector's opinion or judgment, from the correction process because the answer is specific and it is not affected by the subjective and personal factors of the corrector and means that the ability to judge something does not differ.... Or on a specific topic "(131:8), and the test used in the research has a high degree of objectivity because it is clear and easy to understand and apply by the sample and far from self-assessment and the method of registration is clear and this is confirmed by (Durgham Abdul Sada) "describing the capabilities of the individual as they actually exist and not as we want them to be .One of the most important qualities of a good test is that it is objective to measure the phenomenon that was originally prepared to measure it, that there is a full understanding by all those examined of what they will do, that there is one explanation for all, and that

there is no opportunity to understand another meaning other than what is intended(51:5).

2-6 Kinematic Analysis

The researcher used a Japanese-made (Sony) video camera with a frequency of (25) images/ second to film the research sample in the exploratory and main experiments.

The camera was placed on the left side of the player at a distance of (9 m) and the height of the lens from the ground (1.30m) from the ground. The researcher used a drawing scale with a length of (1m) and then the photographed material was transferred from the camera to a computer type (HP) (core i7) to convert the video formats to suit the analysis program.

The kinetic analysis program (dart fish 2005), which is installed on the computer (HP), one of the programs specialized in kinetic analysis, was used to analyze the video clips in order to extract the kinematic variables.

2-7 Exploratory experiment

The experiment was conducted on Thursday, 12/10/2023, on the hall of Shatra Sports Club, during which the devices and tools used in the news were confirmed, and the distance of the camera from the player and the height of the lens from the ground were confirmed, including the extraction of the results of the biokinematic variables, as well as the distribution of the duties of the auxiliary work.

2.8 Key Experience:

The main experiment for the period from 14/11/2023 to 20/11/2023 was conducted on the halls of clubs (Bahri , South Gas, Industry, Marshes , Muqdadiya) at 2:00 pm. Three attempts were given for each type of preparation skill used(

high and medium) in the search, then the best attempt was selected from the three attempts for each player .

Study variables

1. The **angle of the shoulder is the moment the ball is touched**: it is the angle between the torso and the humerus.
2. The **angle of the elbow at the moment of touching the ball**: It is the angle that is confined between the humerus and the forearm.
3. **The horizontal distance between the ball and the longitudinal axis of the body** : It is the horizontal distance that is between the longitudinal axis of the body and the center of the ball.
4. The **starting angle of the ball**: It is the angle confined to the track of the ball for five consecutive images from the last moment of touching the ball with the horizontal line Telmar at the center of the ball the last moment of touching.
5. **The speed of the ball's start**: It is measured from the moment the ball is left to a distance of 1 meter divided by the time it takes .
6. **Performance time**: Calculated from the moment the ball leaves the preparer's hand to the moment it reaches the ring

2-10 Statistical Methods

1. The researcher used the statistical program spss version 20
2. Arithmetical mean (Maths.)
3. Standard deviation (Maths.)

4. T-test for associated samples
5. Coefficient of Variation(161:11)

Presentation and Analysis of the Results.

3-1 Presentation and analysis of the computational media, standard deviations and differences in some biokinematic variables of the skills of high and medium height numbers.

Table (3)

Variables	Skill of high preparation in front		Front Average Numbers Skill		calculated T
	Arithmetical mean (Maths.)	Standard deviation (Maths.)	Arithmetical mean (Maths.)	Standard deviation (Maths.)	
Shoulder Angle Moment Touch Ball	141	419	139	8.99	0.495
Angle of elbow Moment of ball touch	133	227	725	7.025	3.383

Horizontal distance between the sphere and the longitudinal axis of the body	0.16	0.03	0.21	.036	2.542
Velocity of the ball	5.01	1.136	6.3	1.136	**2.169**
Starting angle of the ball	52-85	987	38.80	654	498
Performance Time	2.70	0.737	1.43	.347	4.395

3. Discussion of the results

Through the above results, it is noted that there are no significant differences in the angle of the shoulder at the moment of touching the ball, while there are significant differences in the angle of the elbow. The researcher believes that the reason for the lack of differences in the angle of the shoulder is the similarity of performance at the

angle of the shoulder, while it appeared at the angle of the elbow, due to the difference in the requirements of the height of the ball, the horizontal distance and the speed of the ball travelled by the ball, which is greater in the skill of medium-height forward preparation, so it requires flexion , as "the degree of flexion depends on the height of the ball and its path and looking towards the ball"(161:2).

There were also significant differences in the angle of departure of the ball and in the interest of the skill of high forward preparation. The reason for this is due to the difference in the maximum height reached by the ball, as the angle of departure is the one that determines the course of the ball, where the lower the angle of departure, the less the vertical distance and the greater the horizontal distance and vice versa, as confirmed by the express Abdul Karim and Wahbi Alwan, "as the angle of departure is one of the factors that affect the achievement of horizontal and vertical distance." (125:4) For this same reason, significant differences emerged in the horizontal distance between the ball and the longitudinal axis of the body in favor of the skill of medium-height forward preparation.

It is also noted that there are significant differences in the speed of the ball's launch. The researcher believes that this is due to the amount of force resulting from the amount of flexion in the joints of the body and that the force exerted from bending and extending the joints of the body, which led to the conversion of the potential energy in the body into high kinetic energy that affected the speed of the ball. This energy was greater in the skill of medium-high numbers than in the skill of high-altitude numbers. Therefore, the force generated in the skill of medium height forward preparation is greater as this force will leave its impact on the speed of movement because "speed is the movement of the result of the force with its relationship to the time variable and is linked to the movement of the center of gravity, the greater the

force exerted, the faster the movement according to it" (27:3) , so this speed of movement will turn into the ball.

There are also significant differences in the performance time in favor of the high forward preparation skill, due to the high height of the ball above the level of the net and the large vertical and horizontal distance traveled by the ball in the high forward preparation skill, which led to an increase in the performance time.

From the above, the researcher believes that good preparation plays a great and distinct role in determining the victory in the game, because the success of the overwhelming batting skill is linked to good preparation and is also linked to the level of performance of the prepared player. Whenever he is at a high level of performance, his team can thwart the defensive plans (the block wall and the defense of the pitch) of the opposing team, as good preparation gives the team the opportunity to make different offensive combinations that weaken the block wall. The preparation has evolved a lot from what it was before , as well as the prepared player preparing the ball from jumping to reduce the time period before the opposing team prepares to defend and then make a quick attack. The accuracy of the preparation is the main element of the good high front numbers, and without mastering it, it is not possible to continue playing. The prepared player needs continuous training until

As well as being able to master this skill and perform it with high accuracy in all stages of the game and using every type or form of preparation at the right moment.

Conclusions and recommendations:

1- . Lack of appearance in the differences between the skill of high anterior high and medium height preparation in the angle variable of the shoulder joint,

while the differences were in favor of the skill of high preparation in the angle variable of the elbow.

2- The moral differences between the skill of high front and medium height numbers were in favor of the skill of medium height numbers in the horizontal distance between the ball and the longitudinal axis of the body and the speed of the ball

3- The moral differences between the skill of high frontal numbers and medium height were in favor of the skill of high frontal numbers in the corner of the ball, and in favor of the skill of high numbers in the performance time variable.

4- The medium-high preparation skill was characterized by a shorter time than the high-high preparation skill.

4-2 Recommendations:

1- Emphasis on moving away as much as possible from high altitude numbers and using medium high numbers in training units and competitions

2- Emphasis on reducing the performance time and getting the ball to the batter's hand for as long as possible .

3- The need to emphasize that the performance of the preparation skill is always jumping in the training units and competitions.

4- The researcher recommends the trainers and researchers to take advantage of the results reached to identify the differences between high and medium height numbers as well as the fine details of technical performance.

5- Paying attention to building basic skills according to correct scientific foundations, which saves effort and time and improves performance better in the future.

6- The need to emphasize the knowledge of trainers and workers in the field of training to know the mechanical aspects of the skill of preparation .

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