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## An analytical study of some kinematic variables for the skill of the front and back preparation (Low) and its relationship to accuracy in volleyball for the Maysan Oil youth players

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### Abstract

As a result of the great development in the game of volleyball, developed countries have developed modern skilful methods in confronting the opposing team because they are convinced that these skilful methods are no less important than physical fitness, which must be mastered to a large and high degree to make it easier for the player or team to know the tactical aspects, whether offensive or defensive. The importance of the study is the relationship of some kinematic variables to know the strengths and weaknesses in the technical performance of the preparation skill and the relationship of those variables to accuracy. As for the research problem, there is a weakness in the accuracy of the performance of some types of preparation skills, and the researcher attributes the reason for that weakness to the lack of application of the kinematic conditions that are related to the correct technical performance that the prepared player must follow, which negatively affects the accuracy of the performance of the prepared player in preparing the ball.

Objectives of the study are to identify the relationship between some biomechanical variables of skill preparation front and back (low) and accuracy in the game of volleyball, and the researcher assumed the existence of a significant correlation between some kinematic variables for the skill of preparation front and back (low) and accuracy in the game of volleyball, as well as the presence of significant differences in some kinematic variables between the preparation skill Front and back (low) in the game of volleyball. The researcher selected the research sample by the intentional method and included (5) players representing the Missan Oil Club, and the main experiment was conducted on the research sample on 3/6/2022 Hall (al-shahid Wissam Oreibi) for volleyball in the province Maysan, the researcher used two video cameras, and the results were analyzed by the computer after converting the experiment from the videotape to the computer and then to a floppy disk (CD), and the results were analyzed by the program (Kinovea). To obtain the values of the kinematic variables of the study, the researcher used a set of statistical laws to treat the values of the kinematic variables statistically, as the researcher used the statistical bag (SPSS). V22 and the torsion modulus (Pearson's) law to find the homogeneity of a sample. The researcher reached a set of results, the most important of which is the presence of significant differences in accuracy between skills preparation. The front and the back (The low). Either most important unless Conclusions They are, characterize the preparation skill anterior low The highest percentage of accuracy compared to the rest of the types, and the effect of some bio-kinematic variables on the accuracy of the preparation skill, and the presence of differences in some bio-kinematic variables between the types of preparation skill used in the study.

Recommended a set of recommendations, the most important of which is the need to emphasize increasing flexion in the joints of the body, especially the knee and hip joints, in the low preparation skill, and the team coaches should focus on training the prepared player on the front and back low preparation skill, due to the appearance of weakness in technical performance and accuracy.

**Keywords:** Biokinematics, front and back preparation skill (low), accuracy in volleyball

### Introduction

Scientific progress is one of the advantages of our present time, as it includes all aspects of life, including the mathematical aspect, which interacted with many natural and human sciences to prepare the players in comprehensive and balanced numbers in preparation for reaching higher levels in the chosen sports game, and since the preparation of the player is not

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achieved by Other than these sciences, modern methods and methods must be put in place that contribute to the development of all sports. Especially the game of volleyball requires high physical and skill preparation. As a result of the great development in the game of volleyball, developed countries have developed modern skilful methods in confronting the opposing team because they are convinced that these skilful methods are no less important than physical fitness, which must be mastered to a large and high degree to make it easier for the player or team to know the tactical aspects whether or not It was offensive or defensive, and this skill development came through the use of modern scientific methods in measuring and analyzing the technical performance performed by the players during the training period, where modern imaging devices were developed, as well as the computer, which has become of great importance in the process of analyzing the skilful performance of the players. Defending the court is an important defensive skill against powerful smashers in the front and back of the court (Taha, 1999) [7]. The skill of defending the field is to receive the ball that was hit by a crushing blow by the opposing team, or that rebounded from a blocking wall and pass it from bottom to top by directing the ball to a fellow player on the field.

### Research problem

Volleyball is a must-have game. The interdependence of its basic skill is sequential, and the dependence of each skill on the one that precedes it, making the inaccuracy in the preparation skill from the prepared player to the striking player leaves a clear impact on the performance. Where the achievement of points and the success of the crushing hit in volleyball depends on the perfect preparation by the prepared player, so the prepared player must master the preparation in a way that enables him to apply the various plans and create opportunities for the attacking player to score points after making the blocking wall and penetrating the opponent's defence and through practice and watching And the arbitration of the researcher for the volleyball game, he noticed a weakness in the accuracy of the performance of some types of preparation skill, and the researcher attributes the reason for that weakness to the lack of application of the kinematic conditions that are related to the correct technical performance that the player must follow, which negatively

affects the accuracy of the performance of the prepared player in preparing the ball.

From the foregoing, the researcher deliberately studied some of the kinematic variables of the preparation skill Front and back (low) and their relationship to accuracy to provide the opportunity for coaches and players to know the accurate information of errors in technical performance and then work to correct them and avoid their occurrence in the future.

### Search Aims

Don't know the relationship between some kinematic variables of skill preparation, Front and back (low) and accuracy in the game of volleyball.

### Search Hypotheses

There is a significant relationship between some kinematic variables of skill preparation, Front and back (low) and accuracy in the game of volleyball.

### Research areas

1. **The human field:** Naft Maysan Volleyball Club players.
2. **Time range:** 3/6/2022 to 11/6/2022.
3. **Spatial field:** Al Shahid Hall (Wissam Oreibi) for volleyball in Maysan Governorate.

### Materials and Methods

#### Research Methodology

The methodology is a term that refers to "the methods, procedures, or approaches that are used in research to collect data and access through them to results, interpretations, explanations, or predictions related to the research topic.

The researcher used the descriptive approach in the manner of studying interrelationships due to its suitability to the research problem, and the researcher chose his research sample by the intentional method because the intentional sample "is the choice in it on a free basis by the researcher and according to the nature of his research, so that this choice achieves the goal of the study or the objectives of the required study. And for ascertainment From the homogeneity of the sample in the variables that were measured, which represent some of the characteristics of the sample, the Pearson torsion coefficient was calculated, and Table (1) shows that noting that the torsion coefficient in those variables was limited to 3, so the sample is considered normally distributed.

**Table 1:** Shows the anthropometric measurements of the research sample

Name specification	1	2	3	4	5	Arithmetic mean	Standard deviation	Vein	The value of the torsion modulus
Weight in kg	89	76	86	80	79	82	5.33	76	0.427
age in years	30	28	23	27	29	27.40	2.70	23	1.33 -
Total length in cm	188	179	189	182	181	183.8	4.43	179	0.364
arm length in (cm)	83	79	82	79	81	80.80	1.78	79	0.052
man's height in (cm)	101	91	99	94	95	96	4	91	0.117

### Field research procedures

**Exploratory experience:** The researcher conducted the exploratory experiment on 1/6/2022 on a sample of the Missan Oil Youth Club, which numbered (3) players. The purpose was to identify the negative aspects and factors that impede the progress of the experiment.

**The main experiment:** The main experiment was conducted

on 3/6/2022 At the Martyr Hall (Wissam Oreibi closed sports) in Maysan Governorate at five o'clock in the afternoon on (5) players from the Missan Oil Club, the researcher used two video cameras and the results were analyzed by computer after converting the experiment from the videotape to the computer and then to a disk CD, and the results were analyzed using (Kinovea) software-the values of the biomechanical variables of the investigation.

## Results and Discussions

### Presentation, analysis and discussion of results

**Table 2:** It shows the results of the variables and their arithmetic mean and standard deviations for the sample in the preparation skill front (Lower)

Players / Variants	1	2	3	4	5	Arithmetic mean	Standard deviation
Knee angle at the moment of contact with the ball (degrees)	170	171.65	152.05	145.41	166.50	161.12	11.70
Hip angle moment of contact with the ball (degrees)	167	169	168.69	165.98	168.44	167.82	1.28
Shoulder angle at the moment of contact with the ball (degrees)	151.51	49.031	149.40	138.05	146.28	146.85	5.26
Elbow angle moment of contact with the ball (degrees)	155.21	151.82	161.43	139.38	146.71	150.91	8.37
Kick angle g Moment of touching the ball (degrees)	124.16	118.91	99.87	116.27	115.90	115.02	9.09
Ball launch angle (degrees)	75.76	74.83	68.38	69.91	71.55	72.09	3.15
launch speed (m/s)	2.89	3.20	3.5	2.99	4.01	3.31	0.45
time kick-off (sec)	0.13	0.12	0.13	0.14	0.12	0.128	0.008
The highest height of the ball above the level of the net (m)	0.61	0.53	0.44	0.50	0.54	0.52	0.06
performance time (sec)	0.95	0.93	0.85	0.86	0.92	0.95	0.044
Accuracy (%)	75.59	89.08	86.88	79.77	76.74	81.61	6.06

By observing the aforementioned results, note that there is a significant difference in the knee angle in favour of the skill of low frontal preparation. The reason for this is due to the different requirements for the height of the ball, the horizontal distance that the ball travels, and looking towards the ball.) Also, we noticed the emergence of significant differences in the angle of the ball's launch in favour of the skill of low frontal preparation. The small angle of the ball's launch leads to a large horizontal distance and vice versa. The large starting angle leads to a small horizontal distance. We also notice the ball's launch speed in the low front preparation stage, and the researcher believes that the reason

for this is due to the amount of force resulting from the amount of flexion in the joints of the body, especially the knee and hip joints (when the joints are almost completely extended, the positive force effect ends). It is also noted that the appearance of significant in accuracy in favour of the skill of the low frontal preparation, and the researcher attributes the reason for that to the low height of the ball above the level of the net and the proximity of the striking player to the prepared player, as well as the technical performance requirements that are not high in the skill of the low frontal preparation, making the percentage of accuracy be With a high level of low frontal preparation skill.

**Table 3:** It shows the results of the variables and their arithmetic mean and standard deviations for the sample in the skill of the back number (low).

Player/Variants	1	2	3	4	5	Arithmetic mean	Standard deviation (P)
Knee angle at the moment of contact with the ball (degrees)	120.60	130.21	127.11	145.05	124.62	159.51	9.36
Hip angle moment of contact with the ball (degrees)	160.30	146.16	154.28	170.90	168.35	159.99	10.15
Shoulder angle at the moment of contact with the ball (degrees)	158.33	155.14	149.39	149.89	151.90	152.93	3.77
Elbow angle moment of contact with the ball (degrees)	129.03	132.51	133.29	138.42	145.17	135.68	6.27
Wrist angle at the moment of contact with the ball (degrees)	120.15	137.29	138.61	134.85	135.50	133.28	7.48
Ball launch angle (degrees)	68.32	67.49	69.53	66.95	68.78	68.21	1.02
launch speed (m/s)	3.20	4.35	3.22	3.21	4.06	3.60	0.55
time kick-off (sec)	0.13	0.13	0.14	0.15	0.14	0.1380	0.0083
The highest height of the ball above the level of the net (m)	0.66	0.65	0.67	0.59	0.68	0.65	0.35
performance time (sec)	0.93	0.90	0.89	0.88	0.96	0.91	0.032
Accuracy (%)	43.46	45.34	52.59	64.77	43.49	49.93	9.10

Through the aforementioned results, it was noticed that there were significant differences in the angle of the shoulder in favour of the skill of the low back preparation, and the researcher believes that the reason for this is due to the landing of the prepared player to the bottom of the ball, which caused flexion in the knee joint more than the skill of the front preparation, which requires the prepared player to raise. In addition, one of the specifications of preparing the ball in the skill of the low back preparation is that the point of contact of

the ball with the hand of the prepared player is slightly behind the pelvis, as (to prepare the ball backwards, the player must move the pelvis forward slightly in front of the point of contact with the ball) As this leads to an increase in the angle of the shoulder joint. As for the rest of the variables, there were no significant differences due to the similarity of the specifications required in the technical performance between the skill of the front and back numbers, except in the points that were clarified previously.

**Table 4:** It shows the results of the relationship between some kinematic variables and the accuracy of the skill of the front preparation (low)

Accuracy of statistical means	Correlation Coefficient (Calculated Value)	The random maximum value of the correlation coefficient (Tabular Value)	Statistical Significance
Knee angle at the moment of contact with the ball	-0.3 0	0 0.81	Random
The hip angle at the moment of touching the ball	0.2 1		Random
The angle of the shoulder at the moment of contact with the ball	-0.2 5		Random
The angle of the elbow at the moment of contact with the ball	0.06 _		Random
The angle of the wrist at the moment of contact with the ball	-0.4 7		Random
The starting angle of the ball	-0.4 3		Random
Ball launch speed	0.2 1		Random
The kick-off time of the ball	-0.3 0		Random
The highest height of the ball above the level of the net	-0.7 3		Random
performance time	-0.3 8		Random

By presenting the results of the low frontal preparation, we notice that there is no significant correlation in all variables with Accuracy. The researcher found that the reason for this is the front numbers. The law does not require a great technical performance in terms of kinematic variables since the low ball height (if it was up to half a meter, and we say that the numbers are lower. (The degree of flexion depends on how high. The ball is and its trajectory and looking at the ball (Qutb & Luay Ghanem Al-Sumaida'i, 1985) [6], whereas Compatibility, timing, motor prediction, and accuracy Fluidity and adaptation to different situations during competition are characteristics to ensure optimal performance. Likewise, the proximity of the striking player to the prepared player in this type of preparation skill in terms of horizontal distance does not require the use of great force in preparing the ball, as the role of the upper limbs is more than the lower limbs in generating force. Necessary for the flexion in the

knee and hip joints to be slight, as (when the joints are almost completely extended, the effect of the positive force ends) (Gerdhokhmuth, Biomechanics and Scientific Research Methods for Sports Movements, 1978) [3]. As the nature of performance in volleyball is characterized by its fast pace and sequential skills and requires great accuracy, which requires the players to adapt and prepare for the many and changing situations, and therefore the players must have physical, skill and mental abilities commensurate with these situations, so the relatively little force will leave its obvious impact on the speed of the ball. Therefore, it came relatively few; in addition to that, it is noted that the correlation between the highest height of the ball and the accuracy was strong, but with a random indication due to the small number of sample members in the biomechanical analysis research, which leaves its impact on the weakness of the values of the correlation relationships.

**Table 5:** Shows the results of the relationship between some biomechanical variables and accuracy for the skill of the back setting (Low)

Statistical Means/Precision	Correlation coefficient (Calculated Value)	The random maximum value of the correlation coefficient (Tabular value)	Statistical Significance
Knee angle at the moment of contact with the ball	0.8 8	09 0.8	Morale
The hip angle at the moment of touching the ball	0.6 7		Random
The angle of the shoulder at the moment of contact with the ball	-0.7 9		Random
The angle of the elbow at the moment of contact with the ball	0.2 8		Random
The angle of the wrist at the moment of contact with the ball	0.2 1		Random
The starting angle of the ball	-0.7 6		Random
Ball launch speed	-0.7 5		Random
The kick-off time of the ball	0.5 4		Random
The highest height of the ball above the level of the net	-0.8 4		Morale
performance time	-93, 0		Morale

From the results, note that there is a significant positive correlation. Between the angle of the knee and the accuracy, that is, increasing the angle of the knee joint increases the level of accuracy for this type of preparation skill. It is required by the specifications of the skill of the low preparation of a small height of the ball above the level. In addition, the prepared player tries to make the starting point of the ball from his hand as close as possible to the hitting player's hand to achieve surprise and surprise the opposing team's blocking players. The purpose of this setup is to help the batter hit the ball before the opposing team's blocking wall prepares.

As for the emergence of a significant inverse correlation between the highest height of the ball above the level of the net and accuracy, the low height within limits required for this type of preparation skill increases the level of accuracy, and

this is what is observed through the higher percentage of accuracy than the rest of the types.

It is also noted that there is a significant inverse correlation between performance time and accuracy, as the shorter the performance time, in proportion to the required height, leads to a high level of accuracy and a faster, overwhelming hit required by this type of preparation skill.

## Conclusions and Recommendations

### Conclusions

1. The appearance of significance in the knee angle favours of the skill of the low anterior preparation.
2. The appearance of morale in the shoulder angle favours the skill of the low back preparation.
3. There was no significant correlation between accuracy and low frontal numbers.

**Recommendations**

1. Urging the coaches of the teams to focus on training the prepared player individually and intensively using special exercises to take the correct technical position for performance as a basic goal that leads as a result to the development of accuracy.
2. Emphasis on increasing flexion in the joints of the body, especially in the knee and hip joints, when performing the high-setting skill more than the low-setting skill in order to generate the necessary force to push the ball with the appropriate height and horizontal distance, in addition to the importance of focusing on the movement of the wrist joint in directing the ball with the required accuracy.

**Conflict of Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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