



THE EFFECT OF CONTROLLING THE VERTICAL AND HORIZONTAL DIMENSIONS OF THE BASE OF THE FULCRUM IN THE STAGE OF ADVANCEMENT FOR THE PERFORMANCE OF HIGHEST SPIKE IN VOLLEYBALL ON SOME BIOMECHANICAL VARIABLES

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ABSTRACT

The biomechanical analysis has a very important role in raising the level of the players, as it determines whether the performance is in accordance with the biomechanical systems and foundations to employ all the players' abilities to improve performance, which achieves a better quality of skill , The stage of advancement is the very important stage, which is no less important than the stage of flying and hitting the ball as it is the basis on which the next stages are built, The researchers noticed through experiments that the players do not pay much attention to some important variables for the stage of advancement, especially the distance between the feet, whether it is the horizontal or vertical distance, which may occur due to the rush with quick approximate steps or the lack of appropriate balance, which makes the player where to grow from the base of the fulcrum For both sides, and this in itself is a mistake that results in restoring part of the inertia of the body, especially if we take into account that these distances increase the time of rise and dissipate the forces that it produces, The study aimed to identify the differences in the values of some biomechanical variables when performing the highest spike in volleyball between the two dimensions used and the two dimensions required to perform advancement according to which are determined according to the player's physical measurements. The researchers used the descriptive approach in the style of interrelationships on a sample of the Iraqi national team players for the year (2001 - 2022) and the most important conclusions show that the two dimensions of the pivot base affect the maximum height reached by the player because the pivot base is a source of the product of strength and applications of mechanical foundations after jumping .

Keywords: Dimensional pivot base, overwhelming strike, biomechanical variables

INTRODUCTION :

Biomechanics has made great contributions to improving performance and changing many skills in proportion to the biological capabilities of the human body to employ all their abilities to improve performance, which achieves a better quality of skill and thus entails achieving the goal of that skill, which is the point and delivery of the ball to the land of the opposing team with high strength and speed, The stage of advancement is the very important stage, which is no less important than the stage of flying and hitting the ball as it is the basis on which the next

stages are built, and this is what appears among the beginners. The simple change in performance is clear during the analytical work and from the experiments it appeared that the players do not pay much attention to some important variables for the stage of advancement, especially the distance between the feet, whether it is the horizontal or vertical distance, which may occur due to the rush with quick approximate steps or the lack of appropriate balance, which makes Where does the player grow from the base of the fulcrum to the two sides, and this in itself is one of the errors that result in restoring part of the inertia of the body, especially if we take into account that these distances increase the time to rise and dissipate the forces produced by the athlete, so examining such a situation in an experimental way is the decisive element As these two courses are usually exaggerated, they may occur without the knowledge of the player, and this results in a weakness in the performance of the subsequent variables, and this is what prompted the researcher to Dr. head this problem.

The objective of the study :

-Identify the two dimensions of the pivot base for the stage of advancement when performing the skill of highest spike in volleyball, and the two dimensions required to perform the advancement according to them, which are determined according to the physical measurements of playing

-To identify the differences in the values of some biomechanical variables when performing the skill of highest spike in volleyball between the two dimensions used and the two dimensions required to perform advancement according to which are determined according to the player's physical measurements

Methods and structure of the study

Epermental approach to the problem

The descriptive approach was used in the survey method and interrelationships, as it is the most appropriate method to solve the research problem

Participants:

The research sample consisted of (6) players from the Iraqi national volleyball team for the year 2021-2022 and specialists in the highest spike in central (2,4). May affect the final results, The researchers used the coefficient of variation and it was found that the sample is homogeneous in those variables, and Table No. (1) shows this. Marwan Abdel-Majeed indicates that the sample is homogeneous if the value of the coefficient of variation is (30) or less (Marwan Abdel-Majid: 2000: 241).

Table (1)

It shows the arithmetic means, standard deviations, and coefficient of variation for some variables of the research sample

Coefficient of variation	Std. Deviation	Mean	Body measurements and age	n
1.623	3.109	191.5	Length) cm(1
7.807	6.48	83	Mass) kg(2
24.587	6.946	28.25	the age) Year(3
1.28	0.956	74.25	arm length) cm(4

1.061	1.108	104.375	man length) cm(5
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Procedure

The researchers used Arab and foreign sources and references, a Japanese-made casio exillim ex-fh20 9.1 mp digital 20 x 1000 fps video camera, a Lenovo i7 laptop, a tripod and legal flying balls. The net was raised (5) cm when performing, and the sample was photographed in the sports hall in Zubair, Basra Governorate. The horizontal distance between the camera lens and the place of performance (middle of the stage) was 7.30 meters and the height of the lens bore from the ground 1.42 m so that the field of movement appears completely for the skill of crushing beating in Both centers (2-4), and the other camera was placed in the same previous dimensions, but behind the player and perpendicular to the field of movement in order to accurately measure the horizontal distance. The variables to be studied were analyzed through the (dartfish team pro 5.5) program.

Measures:

The performance of the crushing beating was from the center (4,2). As for the procedure, which was based on choosing the ideal distance between the feet, where both Saad Hammad Al-Jumaili and Elaine Wadih Faraj agreed (Saad Hammad Al-Jumaili: 2011: 183) (Eline Wadih Faraj: 1989: 119) After the approaching steps, the jump is made from placing the feet open, as the distance of the shoulders, and it was determined by the length of the player’s feet. After the measurements for the players were taken, it was (28) cm. This dimension was called the horizontal distance between the feet and on the x-axis. As for the vertical dimension between the feet on the y-axis, it was determined (20) cm through the survey conducted by the researcher on the players that they do not perform standing up less than this distance, which is closer to what the scientific sources mention, where Elaine Wadih Faraj mentions, “The feet are either parallel or behind each other by about (15) cm (Aline Wadih Faraj: 1989). : 183)), and (6) attempts were filmed for each player in each position, three attempts in which the player performs highest spike on the force measurement platform without controlling certain dimensions, three attempts in which the player performs after controlling the vertical and horizontal dimensions of the pivot base distance, The amount of thrust after the maximum flexion of the knee joint was measured through the force-measuring platform, and it was measured after the maximum flexion to the moment of leaving the platform. It is measured through the line descending from the hip joint to the surface of the platform, and the hip height at the moment of striking was measured through the line descending from the hip joint to the surface of the ground. As for the variable of maximum contact point, the distance from the ground to the center of the ball, The speed of the ball was also measured after calculating the distance between the center of the ball from one point to another and divided by the time of the distance.

Analyses

The statistical program (spss) version 22 was used and extracted 1- Arithmetic mean 2- Standard deviations 3- The researcher extracted a t-test of the correlated samples

Results:

table (2)

Arithmetic means, standard deviations, and (t) value calculated before and after controlling the two dimensions of the pivot rule for the stage of advancement for the skill of highest spike with my center (2.4)

Sig	T	Error Std. Mean	average spreads	after control		before control		Variables	Center
				Std. Deviation	Mean	Std. Deviation	Mean		
0.000	20.44	0.708	5.840	1.287	20.360	3.4770	34.44	vertical distance	4
0.000	8.240	0.451	9.240	1.115	27.920	3.8157	33.68	horizontal distance	
0.000	11.13	0.365	5.600	1.151	19.920	2.6720	26.84	vertical distance	2
0.000	15.33	0.621	6.920	0.723	28.240	1.8547	34.24	horizontal distance	

Table No. (2) shows the results of the vertical and horizontal dimension variable of the pivot base area for the stage of advancement for the skill of crushing. The researcher used the (t) test for double samples, and it was found that there were statistically significant differences between what the player was doing and what he was asked to do in both positions (2,4) That is, the players achieved what was required of them, and these differences must have effects on the biomechanical variables, since the pivot base is a source of the output of the force and the applications of the mechanical foundations in movement after the jump player achieves.

table (3)

Arithmetic means, standard deviations, and (t) value calculated for the biomechanical variables before and after controlling the two dimensions of the pivot base for the stage of advancement for the skill of highest spike for the research sample at the center (4)

Sig	N	T	after control		before control		Measurement units	Variables	C
			Std. Deviation	Mean	Std. Deviation	Mean			
0.000	6	17.51	26.96	278.0	25.87	244.0	N/sec	Impulse after maximum flexion	1
0.000	6	9.049	0.014	0.187	0.014	0.210	Sec	Time Impulse	2
0.000	6	25.79	141.1	2459	142.1	2242	N	maximum force	3
0.000	6	16.14	1.227	69.44	1.186	66.36	Cm	Hip height off platform when Impulse starts	4

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0.000	6	11.36	0.024	1.862	0.016	1.820	meter	Maximum hip height at the moment of hitting	5
0.000	6	13.64	0.057	3.253	0.054	3.200	meter	Maximum height of the ball at the moment of hitting	6
0.000	6	8.308	2.359	28.77	2.072	25.87	m/sec	ball speed	7

table (4)

Arithmetic means, standard deviations, and (t) value calculated for biomechanical variables before and after controlling the two dimensions of the pivot base for the stage of advancement for the skill of highest spike for the research sample with a center (2)

Sig	N	T	after control		before control		Measurement units	Variables	t
			Std. Deviation	Mean	Std. Deviation	Mean			
0.000	6	9.916	24.94	282.0	19.71	256.3	N/sec	Impulse after maximum flexion	1
0.000	6	8.615	0.010	0.189	0.010	0.212	Sec	Time Impulse	2
0.000	6	10.47	171.9	2516	116.3	2293	N	maximum force	3
0.000	6	11.85	0.927	71.12	0.810	68.64	Cm	Hip height off platform when Impulse starts	4
0.000	6	13.56	0.017	1.870	0.015	1.823	meter	Maximum hip height at the moment of hitting	5
0.000	6	13.17	0.047	3.262	0.050	3.221	meter	Maximum height of the ball at the moment of hitting	6
0.000	6	9.089	1.375	26.68	1.260	24.56	m/sec	ball speed	7

In order to achieve the goal of the research, the researcher conducted statistical operations for all the sample in both centers (4,2) and there were significant differences in the biomechanical variables before and after controlling the area of the fulcrum base as in the two tables (2) (3) whose results will be discussed because these Status is a general condition of the players
Impulse after maximum flexion:

It is clear from Table (3) that the value of t (computed for this variable is greater than the tabular value, and this means that there are significant differences in the Impulse variable for the skill of highest spike from the center (4) before and after control and in favor of performance after

control, where the arithmetic mean of it after control reached (278.0) While the arithmetic mean before control is (244.0). It is clear from Table (4) that this variable also achieved significant differences in Center (2) and in favor of performance after control, where the arithmetic mean after control reached (282.0), while the arithmetic mean before control (256.3)

The researcher attributed the reason for this to the use of the typical dimensions that contributed to diapering the muscle strength from dispersion, as there were changes in the angles of the body according to this change. The knee joint works to restore part of its inertia, and making the angle suitable for the type of performance increases the amount of force in the first push because the force that the player needs to overcome part of his inertia helps the player to increase the speed (Amer Jabbar Kazem: 1998: 77) and this is one of the things The task is in the stage of advancement because the force obtained by the player at the moment of Impulse is necessary to achieve the final speed of the center of gravity of the body to obtain a better height that enables the player to perform the highest spike in the required manner.

Time Impulse

It is clear from Table (3) that the calculated value of t for this variable is greater than the tabular value, and this means that there are significant differences in the payment time variable for the skill of crushing beating from the center (4) before and after the control and in favor of the performance after the control, where the arithmetic mean of it after the control (0.187), while the arithmetic mean before the control is (0.210), and it is clear from Table (4) that this variable also achieved significant differences in the center (2) and in favor of the performance after the control, where the arithmetic mean after the control reached (0.189), while the arithmetic mean before Control (0.212)

The relationship between time and force is an integrative relationship, and that the occurrence of the Impulse in a sufficient amount with a decrease in the amount of time means an increase in the amount of force, and this means that the player does not lose a large part of the kinetic energy he gained from approaching, and the researcher believes that the reason for this is that the players have achieved what is required Of them, which led to a reduction in the amount of flexion in the angle of the knee joint, which reduces the amount of pushing time and increases the speed of getting up due to the production of a large force according to Newton's second law and that the speed of getting up means the smooth performance of the skill and the more technical performance is good "the more the economy in effort is clear" (Bastwisi Ahmed: 1996: 165)

maximum force :

It is clear from Table (3) that the value of t (computed for this variable is greater than the tabular value, and this means that there are significant differences in the maximum strength variable for the skill of highest spike from the center (4) before and after the control and in favor of the performance after the control, where the arithmetic mean reached after the control (2459) While the arithmetic mean before control (2242) and it is clear from Table (4) that this variable also achieved significant differences in the center (2) and in favor of performance after control, where the arithmetic mean after control reached (2516), while the arithmetic mean before control (2293)

The researcher believes from the above that the great value of the amount of force after control is that the players reduce the amount of flexion in the knee joint (negative work) and then the

stretching process (positive work) begins before the player loses a large part of the amount of movement and part of his inertia that affects the The amount of strength, and Hajim Shani states, “The higher the values of the knee joint angles before the moment of departure, the greater the extension of the muscles of the rising leg during the rise” (Hajim Shani Odeh: 1995: 113) and that it is necessary to achieve a very great strength in the stage of rising and maintain it until The end of the stage in order for the body to cut an accelerated path so that the player can perform the skill as required.

Hip height off platform when Impulse starts :

It is clear from Table (3) that the calculated value of t for this variable is greater than the tabular value, and this means that there are significant differences in the hip height variable from the platform at the moment of the start of the Impulse for the skill of highest spike from the center (4) before and after the control and in favor of the performance after the control. Its arithmetic mean after control is (69.44), while the arithmetic mean is before control (66.36). It is clear from table (4) that this variable also achieved significant differences in center (2) and in favor of performance after control, where the arithmetic mean after control reached (71.12).), while the arithmetic mean before the control (68.64)

From the foregoing, the researcher believes that the hip height from the platform at the moment of Impulse has achieved a height after controlling this due to the use of the required dimensions of the players, and that reducing the distance of the pivot base increases the height of the hip from the platform at the moment of push, it also contributes significantly to a breakthrough in the angle of the knee joint, and the less Flexion in the knee joint increases the height of the hip from the platform, which means a decrease in contact time on the ground and achieves the appropriate force for the motor performance required by the skill of highest spike.

Maximum hip height at the moment of hitting:

It is clear from table (3) that the calculated value of t for this variable is greater than the tabular value, and this means that there are significant differences in the variable maximum hip height at the moment of beating for the skill of highest spike from center (4) before and after control and in favor of performance after control, where the arithmetic mean reached After control (4.916), while the arithmetic mean before control (4.560). It is clear from Table (4) that this variable also achieved significant differences in Center (2) and in favor of performance after control, where the arithmetic mean after control reached (1.870), while the mean Arithmetic before control (1.823)

The stage of getting up is one of the important stages in converting the horizontal velocity to the resultant vertical velocity because after the process of getting up, it is difficult to change the path of the center of the body mass and the speed of the body in the flight phase depends on the amount of thrust, meaning that the increase in the amounts of Impulse is the reason for the body to move quickly Increasing the speed of the flight stage, and since there is a development in the angles of rise and flight, this leads to an increase in the height of the center of gravity of the body, which enables the player to perform the skill of crushing hitting well, "as the increase in the height of the center of gravity of the body upwards increases significantly from the time that is in which the athlete is in the air” (252: 1979: Northrip, John, W and other) and thus enables the player to direct the ball correctly and perform the skill as required.

Maximum height of the ball at the moment of hitting:

It is clear from Table (3) that the calculated value of t for this variable is greater than the tabular value, and this means that there are significant differences in the variable maximum height of the ball at the moment of hitting for the skill of highest spike from the center (4) overwhelming before and after control and in favor of performance after control, where the arithmetic mean reached After control (3.253), while the arithmetic mean before control (3.200), and it is clear from Table (4) that this variable also achieved significant differences in Center (2) and in favor of performance after control, where the arithmetic mean of it after control reached (3.262), while the mean Arithmetic before control (3.221)

The change that occurred in the stage of advancement is the main reason for the increase in the height of the center of body mass, because the stage of advancement is one of the very important stages that have a major role in making use of the amount of movement and obtaining a high amount of thrust by increasing the amount of force and in a short period of time, which increases the The speed of the body after getting up, and that the increase in the speed of the flight stage with the increase in the angle of rise leads to an increase in the height of the body and freedom of movement for the beating stage characterized by high speed and great strength (Bastawisi Ahmed: 1996: 165).

ball speed:

It is clear from Table (3) that the value of t (calculated for this variable is greater than the tabular value, and this means that there are significant differences in the ball speed variable for the skill of highest spike from the center (4) before and after control and in favor of performance after control, where the arithmetic mean of it after control) 28.77), while the arithmetic mean before control is (25.87), and it is clear from Table (4) that this variable also achieved significant differences in center (2) and in favor of performance after control, where the arithmetic mean after control reached (26.68), while the arithmetic mean before control (24.56).

The increase in the ball's speed is the result of the change in the stage of advancement, which increases the amount of Impulse that increases the speed of the body's flight and obtains a greater height for the center of body mass, "and thus the possibility of directing the ball correctly and at a high speed, as the speed of the ball is related to the high vertical jump." and flight time in the air" (Marek Pawel Piawinski 2008: 27). This enables the player to achieve a tight arc and increase the distance between him and the ball, and this increases the amount of kinetic energy to hit the ball through the kinetic transfer from the stem, which is an important part in adding an amount of force. Implementation of the motor duty, so the movement moves from the torso, which represents the largest part of the body, so that the torso is the center of the movement and the limbs are its ends" (Wajih Mahjoub: 1989: 134). parts of the upper body to the ball, which affects the speed of the ball." (2008:27:Marek Pawel Piawinski).

CONCLUSIONS :

- 1-It was found that the thrust is affected by the fulcrum, and the less the distance between the feet, the greater the amount of thrust
- 2- It was found that the two dimensions of the pivot base affect the maximum height reached by the player because the pivot base is a source of the product of the force and the applications of the mechanical foundations after the jump
- 3- There are differences in and from the thrust and the maximum strength variable between the two cases of performance before and after controlling the pivot base

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