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The vertical and horizontal dimensions of the base of the fulcrum in the stage of advancement for the performance of highest spike in volleyball and its relationship to some biomechanical variables

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***Abstract*---**It is very important to exploit all means, studies and scientific research in upgrading these competitive sports activities, and biomechanical science has made great contributions to this development, as it has played a crucial role in improving performance, so trainers must follow the scientific bases that achieve the goal of skill, and to be the stage of advancement of the important stages on which the rest of the stages are built. The importance of research was demonstrated in subjecting this stage to study and analysis and the different effects it has on the variables of biomechanical performance and movement. The study aimed to identify the relationship between the vertical and horizontal dimensions of the base of the fulcrum in the stage of advancement and some biomechanical variables when performing the highest spike of two centers (2,4). The problem of research, this distance is usually exaggerated, which may occur without the knowledge of the player, and this results in a weakness in the performance of subsequent variables as the basic rule for achieving a better force is to approach the angle of advancement as much as possible to the vertical despite the presence of speed approaching, but the horizontal vehicle should decrease the outcome of the flight better. This prompted the researchers to study this problem. The researchers used the descriptive approach in the style of mutual relations on a sample of the players of the Iraqi national team for the year (2001-2022). The most important conclusions are that the two dimensions of the base of the fulcrum the biomechanical performance variables.

Keywords---Dimensional the base of the fulcrum, overwhelming strike, biomechanical variables.

Introduction

Biomechanic science has made great contributions to the upgrading of sports activities, as it has played a crucial role in improving performance and changing many skills in proportion to the biological abilities of the human body, and volleyball is a living example of the clear development in performance, especially the skill of highest spike multiplication of all kinds according to the center of the game and according to the height of numbers, Changes continue to occur in some details of skill and the effort of athletes to employ all their abilities in improving performance, which achieves a better quality of skill and therefore entails achieving the goal of skill that is the point and delivering the ball to the field of the opposing team with high strength and speed and indicates (Coleman SGG, Benham AS, Northcott SR 1993) that in order to reach the achievement of achievement must have high skills in attack that the performance of highest spike usually consists of different stages.

As known in the field of biomechanics and the stage of advancement is a very important stage which is no less important than the stage of flying and hitting the ball being the basis on which the next stages are built, and this is what appears in the beginners and for this stage a certain mechanism must be reached and in the best way in order for the player to reach his maximum height and perform the skill of highest spike beating in the required manner, "as the increase in the height of the center of gravity of the body upwards greatly increases the time in which the athlete is in In the Air (Northrip, John, W and other 1979: 252:) 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 the time of flight in the air" (Marek Pawel Piawinski 2008: 27), The lack of clarity of vision for this case may be a reason for the occurrence of some biokinetic values for the later stages of skill performance, so understanding this situation and the resulting changes, whether from researchers, coaches and players, will contribute in one way or another to the development of the skill performance of highest spike What is happening at international levels, and this will not happen unless this stage is subjected to a deep study in order to raise the
level of our players at all levels.

The objective of the study:

Knowing the two dimensions of the fulcrum base
-Recognizing the relationship between the two dimensions of the fulcrum base and some biomechanical variables when performing the skill of highest spike with volleyball in my center (2,4).

Methods and structure of the study

Epermental approach to the problem

The descriptive approach was used in the style of correlative relations, 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) were chosen in a deliberate way to achieve the objectives of the research and in order to be sure of the homogeneity of the sample in some variables that may affect the final results, the researchers used the coefficient of variation, It was found that the sample is homogeneous in those variables, and Table No. (1) explains this, and Marwan Abdul Majeed indicates that the sample is homogeneous if the value of the coefficient of variation is (30 or less) (Marwan Abdul Majeed: 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	ت
1.623	3.109	193	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	103.375	man length) cm(	5

Procedure

The researchers used Arab and foreign sources and references and a Japanese-made video camera number (2) casio exillim ex-fh20 9.1 mp digital 20x 1000 fps and dell inspiron cor i7 laptop and three carrier and legal volleyballs, and the researchers used a Swedish-made power measurement platform with a wooden track at the same height as the platform, the network was raised (5) cm at performance and the sample was photographed in the Chamber of Representatives of the Olympic Committee , The horizontal distance between the camera lens and the performance place (mid-platform) was 7.30 meters and the height of the lens's core from the ground was 1.42 m so that the field of motion fully shows the skill of overwhelming strike multiplication in both centers (2-4), the other camera was placed in the same dimensions as before but behind the

player and vertical on the field of motion in order to measure the horizontal distance accurately. The variables to be studied were analyzed through(dartfish team pro 5.5.) The power measurement platform, which is Swedish-made and contains four weight sensors and measures the strength up to (7848) Newton operated by volt (220-180) volts, contains the signal collector and signal reader and the data is transmitted by conductive strains From the platform to the computer after the installation of the program for the platform (Logger) the program is run and the player performs the skill on the special track of movement (wood flat) height (5) cm high and width of the power measurement platform (1.20) and used to measure the amount of Impulse and the amount of Maximum force.

Measures

After ascertaining the validity of the tools and devices used the researchers conducted the experiment and filmed (5) attempts in each center (2,4) for each player and was used camera (Web km) connecting with the calculator, and be towards the platform so that the player's foot appears on the platform while getting up to synchronize the moment of Impulse, and in order to calculate the Impulse accurately, All 60 attempts were analysed and the vertical distance (distance between the feet and the cylindrical axis) and horizontal distance were calculated. It is (the distance between the feet and on the sadistic axis) and measured from the front foot to the front of the back foot in order to recognize the relationship between these dimensions and some important biomechanical variables, which the researchers believe affect performance and are affected by these dimensions, which is the Impulse after the maximum bend of the knee joint, and was calculated by calculating the rate of strength at the time of its impact, The maximum strength recorded on the curve was also calculated at the moment of absorption, and the increase of this amount means that the player does not lose a large part of the amount of movement he gained from approaching, as well as the time of advancement was calculated from the moment of the first touch of the foot with the ground until the last contact with the ground and through the number of images on the speed of the camera, As for the angle of take off, it was measured through the line connecting the fulcrum of the feet of the take off and the center of the body with the horizontal plane of the ground, as well as the variable of maximum flexion of the angle of the knee joint at the moment of Impulse and it was measured through the line drawn from the knee joint along the thigh and the line drawn from the knee along the leg, As for the angle of flight, it was measured by the line drawn from the hip joint after leaving the ground and parallel to the ground, and the line drawn from the hip joint with the transmission line of the center of gravity of the body from its flight.

Analyses

The statistical program (spss) version 22 was used and extracted 1- Arithmetic mean 2- Standard deviations 3- Pearson correlation coefficient

Results

Table (2)
Arithmetic means and standard deviations of the two dimensions of the fulcrum base and some values of the biokinetic variables for the highest spike from centers (4) and (2)

highest spike center(2)		highest spike center(4)		Variables
Std. Deviation	Mean	Std. Deviation	Mean	
2.756	28.000	2.786	33.833	vertical distance
4.370	34.500	4.501	32.666	horizontal distance
32.445	255.50	29.732	249.00	Impulse after maximum flexion
177.36	2322.0	115.77	2272.1	maximum force
0.025	0.3467	0.020	0.3500	time of take off
1.516	78.50	0.983	75.833	angle of take off
3.098	126.00	3.098	124.00	Maximum flexion of the knee joint at the moment of pushing

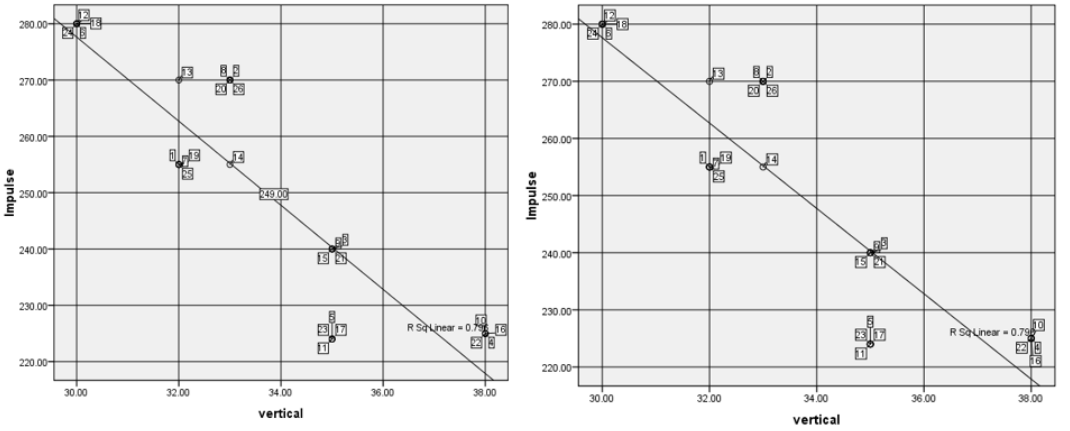
Table (3)
The relationship between the dimensions of the pivot base and the values of some biomechanical variables for the highest spike from centers (4) and (2)

N	Correlations				play center	Measurement units	Variables	ت
	sig	horizontal distance	sig	vertical distance				
30	0.011	-0.455-*	0.000	-0.892-**	4	Degree	Impulse after maximum flexion	1
30	0.000	-0.718-**	0.000	-0.935-**	2			
30	0.013	-0.447-*	0.000	-0.977-**	4	sec	maximum force	2
30	0.000	-0.772-**	0.000	-0.862-*	2			
30	0.007	0.485**	0.000	0.870**	4	Degree	rise time	3
30	0.000	0.755**	0.000	0.927**	2			
30	0.034	-0.388-*	0.000	-0.888-**	4	Degree	rise angle	4
30	0.082	-0.323-	0.000	-0.861-**	2			
30	0.704	-0.072-	0.001	-0.593-**	4	Degree	Maximum flexion of the knee joint at the moment of pushing	5
30	0.215	-0.233--	0.000	-0.820-**	2			

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)..

In order to achieve the goal of the research, the relationship between the two dimensions of the fulcrum base and some biomechanical variables was studied through the Pearson correlation coefficient as shown in Table (3). It has been

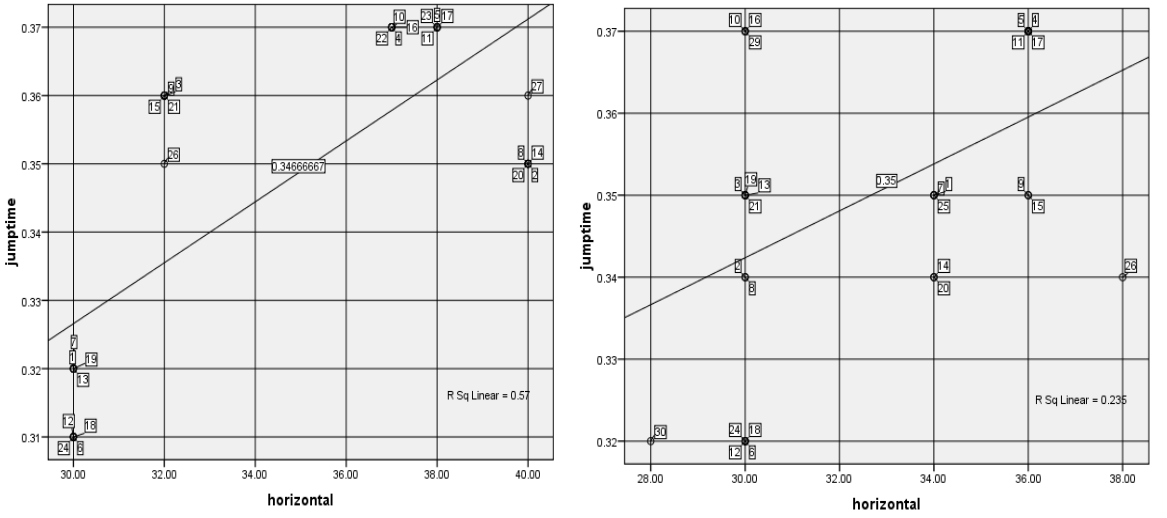
shown that there is a correlation between the two dimensions of the fulcrmbase and the variable Impulse, and this relationship is very realistic, as the consequences of some simple particles of change in performance are clear during the analytical work and that the increase in the distance of the pivot base that may occur due to the rush with quick approximation steps or lack of access The appropriate balance negatively affects performance because it increases the time to rise and returns part of the inertia of the body, and this negatively affects the amount of force and the amount of Impulse , And that this variable is directly affected by the angle of the knee joint, if it is necessary in the process of getting up to have a little flexion in the knee joint in order to shorten the time of getting up and avoid losing a large amount of the horizontal velocity it gained from approaching in addition to that, increasing the amount of flexion in
the knee joint It will increase the load on the knee joints, which will affect the amount of strength. Sawsan Abdel Moneim remembers, “The greater the muscle strength and the greater the body weight, the acceleration is positive.” (Sawsan Abdel Moneim: 1977: 248)



shape (1)
Shows the relationship between the vertical distance of the pivot base when standing up and Impulse and the distribution of the sample to the two centers of play

And that the outputs of force and Impulse are an important factor in achieving a great height at the moment of hitting the ball. (Samozino P, Edouard P, Sangnier S, Brughelli M, Gimenez P, Morin J-B 2013: 505-510) indicates that what the lower limbs do and that the vertical force has Great effect to get high jump. It was also found that there is a correlation between the two dimensions of the fulcrum base and the variable of maximum strength, that the vertical dimension of the pivot base affects the amount of flexion in the knee joint, which reduces the time to rise and thus preserves the amount of movement that the body gained from the approach steps, which contributes to increasing the speed of rise and this is what is required In the process of advancement, and this is what the player must achieve in order to succeed in obtaining a suitable height that enables the player to perform the skill in the required manner (Mustafa Thabet Odeh: 2020: 11-21) As for the horizontal dimension of the pivot base, it increases the time of rise, and this leads to the dispersal of the force as a result of the increase in inertia, but in

all cases there must be a loss of a certain part of the amount of movement during the process of getting up, but the player must take into account the reduction in that loss of The amount of movement (Yarob Abdul-Baqi 2010: 9-22) indicates that in all cases the process of stopping to change the direction of movement upwards reduces the player's speed and thus reduces the amount of movement due to that, It was also found that there is a relationship between the dimensions of the fulcrum base and the time of rise, that the time of rise depends on the amount of force and the time of its impact, and since an increase in the amount of force and a high amount of Impulse occurs with the player trying to maintain the maximum amount of movement, this necessitates a relationship between the two dimensions of the rule Focus and rise time , That is, the time of getting up is affected by the mechanical position of the body during the stage of getting up, and that prolonging the time of getting up will reduce the smoothness of movement and the player will lose a large part of his horizontal speed, which increases the momentum of the advancing body forward (Yarob Abdul Baqi: 2005: 175). And that the speed of advancement means the smooth performance of the skill, and the more the technical performance is good, "the more the economy in effort is clear" (Bastawisi Ahmed: 1996: 165) and it is necessary not to lose the driving force that is inversely proportional to the time of its impact and thus achieve a better speed according to the law of speed It is equal to the distance traveled per unit time." (Samir Muslat Al-Hashemi: 1999: 85).



Position2 Position4

shape (2)

It shows the relationship between the horizontal distance of the pivot base when getting up, the time of getting up and the sample distribution for the two playing positions

There was also a correlation between the vertical dimension of the base base and the rise angle, which is an important mechanical factor, which indicates the

investment of horizontal speed to the vertical speed outcome, and that the angle of advancement is affected by the vertical dimension of the base of the anchor and is not affected by the horizontal dimension where the closer the Impulse to the center of gravity, the less weight torque (the distance between the anchor foot and the imaginary line coming down from the center of the body's gravity) which leads to an increase in the angle of advancement of the player and the speed collected depends on the ability of the weight On the production and application of force at full speed and comes by moving the body of the weight quickly in the right direction at the moment of breaking the body's connection to the ground (Hajim Shani: 1995: 82) and that the stage of advancement and increase the vertical distance between the feet is clear in the angle of advancement as the movement of the center of gravity from the back to the front depends on the large base of anchorage and the last thing that leaves the ground before advancement is the front foot and certainly if it is advanced excessively, the angle of rise It will be low, as the thrust is usually done when the center of gravity moves forward or departs somewhat from the center of the pivot base, since the crushing skill requires moving the body forward by a certain amount while maintaining a greater vertical distance in order to achieve the required height, and the greater the angle of rise means flight The object is at an angle that does not provide a great height and increases the horizontal distance that the object will travel.

It also turns out that your concern is a relationship between the vertical dimension of the base of the anchor and the maximum bend of the knee joint at the moment of Impulse and this relationship makes sense because the position of the body before advancement affects the angle of the knee joint and the less distance between the feet the amount of bending in the angle of the knee joint and this leads to increased speed and decrease of time at the moment of advancement and thus increase the amount of propulsion because it reduces the amount of inertia, Making the angle as good as the type of performance increases the amount of strength in the first Impulse stage (Amer Jabbar Kazim: 1998:77), and Hajim Shani states that "the higher the values of the corners of the knee joint before the moment of departure, the more a short stretch of the man's rising muscles during the rise" (Hajim Shani:1995:113)

Conclusions

1) The vertical dimension of the pivot base affects the biomechanical performance variables.
2) It was found that there is a correlation between the vertical dimension of the pivot base and (pushing after maximum flexion, maximum force, time of rise, angle of rise, maximum flexion of the knee joint at the moment of Impulse).
3) The horizontal dimension of the pivot base affects the biomechanical performance variables.
4) It turns out that there is a correlation between the horizontal dimension of the base of the base and (Impulse after maximum maximum strength, the time of advancement)
5) It was found that the horizontal dimension of the pivot base does not affect (the angle of rise, the maximum flexion of the knee joint at the moment of Impulse)

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