

A Comparative Study Of Some Of The Kinematic Variables Between The Right And Left Player And Their Relationship To The Accuracy And Speed Of The Performance Of The Crushing Skill Of The 2nd Center Volleyball

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Article Info	Abstract
<p>Article History</p> <p>Received: December 20, 2020</p> <p>Accepted: February 18, 2021</p> <hr/> <p>Keywords : Performance, Volleyball, Sport, Training</p> <p>DOI: 10.5281/zenodo.4549109</p>	<p><i>The workers in the field of sports were interested in studying moving skills and analyzing and developing them as well as enhancing the details of strength in performance, the goal is not only to know the areas of weakness but also to reinforce the areas of strength in order to develop the components and variables of performance, for this was interested in studying some of the kinematic variables between the player who uses the left hand and the player who uses the right hand which affect the performance of the crushing hit skill from center 2 and its relationship to accuracy and speed of performance through which we seek to achieve results to find the characteristics of our ability to Relying on them in training then improving the level of technical performance of players, the study aimed at identifying the differences in the values of some kinematic variables between the player who uses the left hand and the player who uses the right hand and to recognize the relationship between en the values of some kinematic variables, accuracy and speed during the performance of the skill of crushing beating of center 2. The researcher used the descriptive approach, while the sample of the research were the players who perform the skill of crushing beating of center 2 they were (4) players of the Iraqi national volleyball team of the season for the period from 2014 to 2019, and was The sample was filmed with two Chinese-made Video imaging machines (Casio) (240 ph / sec) and an American (sports radar) to measure speed, and was analyzed by the (kinovea) application, and the data were processed statistically using the program (SPSS ver. 23). After discussing the results, the most important conclusions were the preference in the values of the kinematic variables under consideration for the overwhelming beating of the left player and the right player, and there is a correlation in the level of accuracy and speed with the kinematics variables of the overwhelming diagonal and straight beating of the left player for the right player.</i></p>

Introduction

The optimal performance of the players at the higher levels represents an area of surprise and wonder at perfection, which exceeds the level of perception and knowledge of the nature of human performance, which was the result of the efforts of workers in the sports field of scientists, researchers, trainers and athletes, and the mathematical sciences had a great impact in reaching all these achievements and among those sciences There was the mechanics, as all scientists and specialists in the field of physical education agree that mechanics plays an important role in giving positive results to results by improving and developing technical performance as well as through knowing the influencing forces and harnessing them in the service of motor performance, which in turn leads to an understanding of the reasons for success Some athletes reach the higher levels, so it has become very difficult to know the exact characteristics of technical performance through analysis using observation, which necessitated the emergence of a number of modern techniques that help in studying sports movement in a more objective study, and photography is one of the most important of these widespread techniques in recording And analysis of mathematical movements. The human body has both mechanical and biological properties, so they must be taken into consideration when studying any movement skill and that these characteristics have a great degree of freedom of movement with respect to its extremities that can influence the forces between parts of the kinematic chain and kinetic manifestations on the one hand and the effect of the body's forces on the surface of the earth from On the other hand, the effect of mechanical aspects in the field of movement and its path is clearly evident in the skills that are characterized by strength, quantity, direction or speed and their effect on the paths of the body as well as the necessary angles and kinematic manifestations that

the player uses to harmonize with the skill and linear aspects, and the practice of any mathematical skill takes forms Varied according to the purpose or aim of the skill, including the skill of crushing volleyball, and that the result of the movement can be analyzed into mechanical variables and kinematic manifestations in proportion to their shape and speed, and the performance performed according to these components. Hence, workers in the sports field have been interested in studying the movement skills. Analyzing, evaluating and developing them through diagnosing areas of strength and weakness in performance, and then this weakness is corrected by trainers and specialists as well as strengthening Parts or details of strength in performance, so the goal is not to know the areas of weakness only, but to strengthen areas of strength as well in order to develop components and variables of skill performance, so the researchers interested in studying some kinematic variables between the player who uses the left hand and the player who uses the right hand that affect the performance of the hitting skill The overwhelming of the Center (2) and its relationship with accuracy and speed of performance, through which we seek to achieve results through which we can find kinematic specifications that enable us to rely on them in training and thus improve the technical performance of the players.

Research Problems

There are many important factors in developing the performance of the skill of hitting spiking with volleyball, including, for example, the strength of rise, jumping, the mechanics of the rise, or the interest in steps of improvement, accurate and speed ... etc. All of these factors depend on a categorical judgment to influence the correct performance and accurate diagnosis, The researchers noticed some coaches during the training units do not pay any attention and the similarity of the exercises between the player who uses the left hand and the player who uses the right hand, which affects the performance of the skill of spiking from the center (2), which we seek through this study to achieve results through which we can find Kinematic specifications that enable us to rely on them in training and thus raise the level of technical performance of the players, so the researchers decided to study this topic to contribute to developing scientific solutions through a comparative study of some biochemical variables between the left and right players to show their optimal performance in terms of movement mechanism, accuracy and speed.

Research Targets

- Identify the differences in the values of some kinematic variables between the player who uses the left hand and the player who uses the right hand while performing the spiking skill from center (2).
- Identify the relationship between the values of some kinematic variables and the accuracy and speed of performing the skill of spiking from center (2).

Research areas

1. The human field: players of the Iraqi national volleyball team.
2. Temporal domain: the period from 1/12/2018 to 1/3/2019 AD.
3. Spatial domain: Representation hall of the Iraqi National Olympic Committee in Basra Governorate.

Research methodology and field procedures

1. Research methodology

The fact that the research problem is of an analytical nature, it is self-evident that the researcher proceeds with the descriptive approach (by the method of studying interrelationships) in order to suit it with the nature of the problem, as the statement of the interrelationships between facts and facts and their correlation states gives accurate and scientific descriptions of all phenomena (Wajih: 1993)

2. Research Community And Sample

Researchers collect their data and information either from the entire original community or a sample that represents this community (Ahmed Badr: 1987), as the selection of the research sample comes within the main and important points in the research procedures that the researchers adopted to reach highly credible results, so the researcher chose an intentional sample. It consists of (4) players (two players using the left hand and two players using the right hand) representing the crushing players from the center (2) of the Iraqi national team for the applicants of volleyball for the years 2014 AD - 2019 AD and registered in the lists of the Iraqi Central Volleyball Federation as the highest rating for the players of the Iraqi League for soccer The homogeneity of the sample was performed in length, age, mass and training age in order for the sample to be homogeneous, as the value of this parameter was less than (30%), which indicates the homogeneity of the sample (Wadih: 1999), (age 26 ± 1.633 years) (training age one year 10.5 ± 2.082) (length 190.25 ± 2.5 cm) (mass 86.75 ± 1.708 kg).

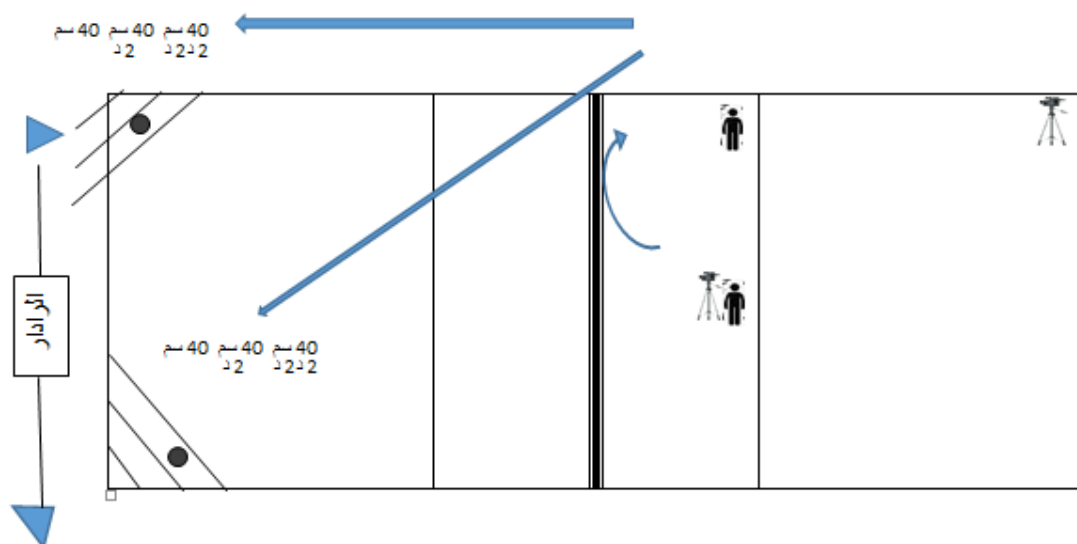
3. Means, Tools And Devices Used

The researchers used a set of methods, tools and devices for research (Arab and foreign sources, a legal volleyball court, five legal volleyballs, a tape measure, a (2) Chinese-made video camera (Casio) with a speed of (240 images / second), Pentium-4 electronic computer.

4. Field research procedures

The Test Used In Research

The researchers used the technical performance test for the accuracy and speed of the crushing skill (Ahmed Sabaa, 2012), which is the technical performance test for the speed and accuracy of the crushing skill from the Qatari and straight center 2 by performing it according to the legal conditions of the game, and the sample members perform the skill according to its four stages (approach, Raising, hitting, landing), and the aim of the test was to find out the accuracy and speed (degree / second) of crushing beating from the 2 position of the Iraqi national team players with volleyball, as for the tools used were a legal volleyball court, legal volleyballs, tapes to determine accuracy areas Triangular in shape, the dimensions of which are (40) cm for each division, i.e. the length of the side is (120) cm, and the following is a description of the performance as the tested player performs the skill of hitting the high frontal hitting from the specified area and to the opposite court, provided that the ball crosses the net at high speed and into areas The specified accuracy, and the attempt in which the ball does not fall within the accuracy areas or if it touches the net or any other legal error within the skill requirements, and the method of scoring is to record (3) successful attempts within the conditions of the specified accuracy areas and the speed is calculated By recording the radar device to measure the speed of the ball, then the attempt is recorded, and on how to calculate the degree of accuracy and speed, the researcher worked to extract this degree by the following: The opposite half of the playing field has dimensions (9 x 9) m, and by the Pythagorean theorem the length of the chord is calculated in relation to the crushing strike The diagonal is ($x^2 = 29 \times 29$), after which the extracted number is rooted and its final value is (12.72) m. And (40) cm is reduced, which is the distance of each section of its value, so it becomes (12.32) m, this is the distance from the net, and the distance from the ball from the net is added to it, the moment it was hit, it was (60) cm, so the final result is the distance (12.92) m, and after that a result is taken The radar is converted to m/ s, shown in Figure (1).



Figure(1) Shows measurements of the crushing test instruments from the diagonal and straight center 2

4.3.2 Measuring the biochemical variables of the Skill Spiking from center 2

The researchers used the following kinematic variables:

- 1- Approaching steps distance: It is the distance between the player's hip joint in the readiness stage before the movement and the same joint after moving before leaving the ground during the moment of advancement.
- 2- The speed of the approach steps: it is the product of the horizontal distance interrupted between the distance of the approach steps and their time.
- 3- The angle of advancement: It is the angle between the horizontal plane and the line connecting the point of the thrust foot's fulcrum on the ground and the hip joint in the last image before the foot leaves the ground and is measured from the front.
- 4- The flight velocity: It is the flight distance (the distance of the center of the hip joint travel) to time Hip joint transfer for ten consecutive images.
- 5- The knee-to-leg angle: It is the angle between the thigh bone line (from the hip joint point to the knee joint point) and the shin bone line (from the knee joint point to the ankle joint point, and is measured from the back.

- 6- Hip angle: It is the angle between the trunk line from the shoulder joint point to the hip joint point) and the thigh line (from the hip joint point to the knee joint point) at maximum flexion and is measured from the front.
- 7- The height of the hip joint: It is the vertical distance between the surface of the ground and the point of the hip joint at the moment of hitting the ball.
- 8- The shoulder joint angle: It is the angle between the trunk line and the humerus line, and is measured from the front.
- 9- The angular velocity of the striking arm: is the sum of the angle between the initial position (of the striking hand with its first contact with the ball) and the final position (after ten consecutive images) by the time taken, 10- The ball velocity: is the distance the ball travels after hitting to a time Moving for ten consecutive photos.

3-5 Exploratory Experience

The researchers conducted the reconnaissance experiment on Friday (7/9/2018) at 5:30 pm in the representative hall of the National Olympic Committee in Basra on one player from the Iraqi national team with volleyball, during which the crushing test was applied from the center of 2, which aims to suffice The assisting work team, and knowing the distances and altitudes according to which the cameras and the radar position must be placed, and determining the appropriate lighting.

3-6 Main Experience

The researchers conducted the main experiment for several days, starting on Saturday (22/12/2018) until Friday (28/1/2018) and at the representative hall of the Olympic Committee in Basra, and after all the requirements for the experiment were prepared, the research sample was photographed With two Chinese-made Casio video cameras, with a speed of (240 images / sec) placed on a tripod and a lens height of (1.25 m) from the ground during all the first stages of performance behind the players and at a distance of (9 m) from the place where the player performs the crushing skill from Center 2 and the second on the left side of the player and at a distance (6 m) from the place of the player's performance, which ensures that all stages of the technical performance of the skill are photographed so that the image is clear from the beginning of the movement to the end, in addition to placing the American-made Sports Radar device to calculate the speed of the ball in kilo Meters, and before starting the filming process, a sufficient warm-up period was given to the members of the research sample, after which the search experiment was started and the three attempts were filmed for each player. One of the analysis programs was used with a sophisticated calculator to make the results of the analysis more accurate, as the use of the program (Kinovea) and the position on the computer, which is a specialized program for the analysis of mathematical movements, to extract the values of angles, dimensions and times after transferring files (video clips of movement) and opening them through the program, and this program represents a file An integrated system that allows users of this system to display a group of videos in the form of animated thumbnails that can be saved and referenced, allowing coding of specific movements within the video and detecting movement in frame by frame or slow motion, and it enables them to add any content to their videos by using tools Drawing and adding various shapes such as lines and arrows with addition of description for location keys.

3-7 Statistical Means

The data were treated statistically using the statistical bag program (23 SPSS ver.) Through the following laws (1 - the arithmetic mean, 2 - standard deviation, 3 - coefficient of variation, 4 - test (T) for the significance of the differences between the mean of two independent populations, 5 - correlation coefficient. Simplex (Pearson).

4- Presentation, analysis and discussion of the results

Table (1) shows the values of the arithmetic mean and the standard deviations of the kinematic variables of the diagonal and straight crushing multiplication from the center of 2 and the value of the differences between the left and right player

sig	T	right hand		left hand		Hand Striker	Alone Measurement	variable
		±p	s	±p	s			
0.742	2.326	4	265	5.115	258.833	Country	meter	Step distance Approaching
0.447	1.616	8.035	270.167	4.775	264	Rectal		
0.646	1.838	0.753	5.833	0.817	6.667	Country	Meters / second	Speed steps Approaching
0.243	1.168	0.837	6.5	0.632	7	Rectal		
0.076	1.582	1.862	71.667	4.535	74.833	Country	Degree	Advancing angle
* 0.031	0.640	3.146	73.5	0.516	74,333	Rectal		
0.308	1.832	0.983	4.167	1.211	5.333	Country	Meters / second	Flight speed
* 0.026	2.410	0.817	5.333	1.862	3.333	Rectal		
* 0.045	1.167	2.280	124	6.242	120.833	Country	Degree	Knee angle

0.061	0.099	3.742	124	1.722	123.833	Rectal		
* 0.047	0.340	0.018	1.77	0.045	1.777	Country	meter	Detailed height Hip
* 0.033	0.924	0.033	1.735	0.058	1.76	Rectal		
0.171	0.292	6.387	167	2.858	167.833	Country	Degree	Knuckle angle the shoulder
0.163	0.069	3.502	164.667	4.792	164.833	Rectal		
0.161	6.793	17.190	595.5	6.535	646.5	Country	second degree	Angular velocity For strike arm
0.056	5.323	14.325	608	8.472	644.167	Rectal		
0.444	3.523	1.169	23.833	0.753	25.833	Country	Meters / second	Ball speed
* 0.049	2.599	1.265	23	2.875	26,333	Rectal		
0.661	0.725	0.837	2.5	0.753	2.833	Country	Degree	Performance accuracy
* 0.040	1.103	0.516	2.667	0.983	3.167	Rectal		
* 0.042	2.902	0.408	5.167	1.049	6.5	Country	second degree	Accuracy and speed
* 0.021	0.756	0.894	5	1.966	5.667	Rectal		

Through the above table, we find that the national team sample was better for the player hitting center 2 with the left hand in some of the kinematic variables under study for the straight and diagonal hitting areas, and this is an important note for coaches, so it was preferable for the training units to be directed to strengthening this type of attack and the numbers and attack are for the players During matches for these areas, this guarantees the team more points, or that the training units are directed to develop the Qatari or straight type to the required level .The researcher Wen noticed a difference in the value of the angle of advancement variable between the left player and the right player for the straight crushing strike because the weight arm decreases as this angle increases, and it is one of the influencing angles even in the starting angle for a better altitude level, and this is what the second variable of flight speed between the left player and the player showed The right for straight crushing hit is the distance of the area from the areas of accuracy and the need for this area to jump well is the best way for players to get rid of the pivots and open the space above the net, as for the third variable, which shows the increase in the kinetic energy of it during the hitting and its importance comes through the transmission of movement and the increase of the speed of the arm and as We showed in a position that is like a whip when the angular range of the trunk stops, and as a training example of the connection of this variable with other variables, if we want to develop it, we must develop the bending stage, which helps with a good level of rise for the sake of the height superior to the walls of blocking and as a result the player can increase the energy of the trunk movement, which means Increasing its angular velocity and consequently increasing the angular velocity of the arm .The higher its value, the lower the torque arm, and as a result the torque value decreases, and the starting angle is affected by that, so its result is greater whenever the torque of the weight is less and this amount of angle leads to the vertical direction is greater than the horizontal when jumping, which gives greater height to the player and more accuracy .The higher the values of the angle of advancement, the higher the values of the center of gravity of the body (Hajem, 2000).

Researcher Wen sees through the above results that the increase in the values of the hip height is the point of the player leaving to hit the crushing cat t J and the straightener comes through the flying player, which generates tidal speed of the knee joint with a strong push and that this increase the player can perform the skill of performance well, with Take advantage of the increase in time resulting from the elevation of the body's center of gravity as the elevation of the body's center of gravity increased significantly higher than the time the athlete was in the air (Northrup, 1979). Thus, the ball can be steered correctly and at high speed, since the ball velocity is related to the high vertical jump and time of flight in the air (Marek, 2008). In addition, the increase in the height of the hip joint is due to the resulting velocity with which the body is launched, which has achieved an increase in the height of the body's center of gravity from the maximum flight path of the body, which means that it is being used correctly from the resulting velocity with a dangerous vertical velocity caused by a force Ground thrust and shift direction of movement.

Researcher Wen noticed that the higher the jump height, the greater the accuracy, especially for a direct hit by the left player, because the height the hitter gains control over the precision areas and the player gains an acute angle in hitting the ball to the area. The playing field of the opposing team (Ahmed Amin, 2000), and in the ball speed variable, note the increased accuracy, especially with regard to the diagonal hitting of the left player, since the angular velocity variable of the hitting arm may develop as a result of a good jump, which affects the achievement of a good starting speed and starting angle values for the ball (Habib, 2011).

Table (2) shows the values of the correlation coefficient between the accuracy and velocity of diagonal and straight crushing for center 2 and the kinematic variables of the left player and the right player

right hand		left hand		The striking hand	variable
sig	The link	Sig	The link		
0.474	0.367	0.751	0.168	Country	Steps distance approaching
0.343	0.473	0.481	0.362	Rectal	

0.838	0.108	0.656	0.234	Country	Speed approach steps
0.609	0.267	0.332	0.482	Rectal	
* 0.022	0.877	0.069	0.778	Country	Advancing angle
0.399	0.426	0.105	0.722	Rectal	
* 0.011	0.914	0.344	0.472	Country	Flight speed
0.261	0.548	0.364	0.455	Rectal	
* 0.028	0.859	* 0.050	0.810	Country	Knee angle
0.648	0.239	0.237	0.571	Rectal	
* 0.045	0.822	* 0.015	0.898	Country	Hip joint height
* 0.003	0.957	* 0.014	0.900	Rectal	
0.075	0.767	* 0.039	0.834	Country	The angle of the shoulder joint
0.300	0.511	0.758	0.163	Rectal	
* 0.050	0.812	* 0.010	0.919	Country	The strike arm angular velocity
* 0.023	0.874	* 0.034	0.844	Rectal	

The direction of striking in relation to the body from this area differs in its performance in wrapping the parts of the body, as well as it is more difficult for players to perform from a straight center 2 to the left player, so when the ball reaches high in position 2 it will be easier for the player who uses the left arm to reach the same ball as he will need To twist the trunk is larger and thus will affect the angular velocity values of the rest of the body and arm (Iman, 2008). The angular or circumferential arm velocity is included in building the principles of movement in crushing beating (Ahmed Abdel Amir, 2008). The relationship of the kinematic variables that appeared on accuracy and speed is due to their moral relations, but this does not mean that the non-intangible variables are neglected in training, as they will be used to explain their type if it is direct or inverse, and scientific research has given us the importance of these variables according to their sequence. The coaches have to set their programs and develop their players according to a sequence relationship to these variables.

The flight speed that the player gets has a great effect in obtaining the highest altitude through the momentum of the two legs when leaving the ground, as well as the angle of advancement and the angle of the knee, as it is mentioned that there is a positive correlation between the speed of departure and the extension of the body, which requires synchronization in performance and harmony. Kinematics between body parts and thrust simultaneously (Qasim, 1998). This good synchronization and speed of launch gives the result a superiority in hip height, which is one of the most important factors in the player's success due to the preference for spiking and its requirements. The researchers believe that the small angle of the knee joint has the effect of reducing the height of the hip joint from the ground, and that the movements of the arms and legs coincide in the stage of rise and flight, an important process in obtaining a higher height of the hip joint and achieving the goal of movement, and all the effects and actions must be compatible. The two men limit them simultaneously, and the influence of force ends at the same time (Abd Ali, 1992). And that the transmission of the effect of other muscle groups to both the body and the arms gives an increase in the height of the jump, and the correct weight of the arms helps in the height of the center of gravity of the body during the jump by a rate ranging between (20% - 25%) relative to the maximum height that the center of gravity reaches to the body (Adel, 1984)), And that the value of the knee angle of the driving leg for spillovers is at an appropriate angle in order to obtain a correct body position the moment of touching the ground through the height of the hip joint point and thus an appropriate approach to this point from the gravitational line, which leads to good performance the moment of advancement with a high thrust and kinetic momentum Good (Frank, 2010). And that the kinetic force and momentum enables the player to rise appropriately to hit the ball from the highest point according to the required movement duty. The higher the jump, the greater the accuracy, because the height gains control over the influencing areas in the opposing team, and the player gains a sharp angle in hitting the ball to the opposing team's court (Ahmed Amin, 2000). The accuracy and speed of the ball is based on several mechanical factors, and it is related to the angles values achieved in the torso and the striking arm, the height of the center of gravity of the body, the angle of the thrust, and the momentum quantities achieved in the body of the hitting player, whether when preparing to jump or in the movements of his body at his highest point of flight (Sarih, 2007). In addition, in the Qatari crushing hitting, the length of the playing field in front of the player is longer than the straight direction, which allows him self-confidence during the hitting by not leaving the ball outside the field and the speed of the ball is the result of the complete performance from the process of approaching the process of hitting the ball as well as the hitting process that It depends on the correct and proper transmission of the amount of movement of the arm, which in turn appears to transfer this movement to the ball. From the above results, we find that the angular velocity variable of the striking arm has the greatest influence on the accuracy and speed of the ball launch after hitting and that the movement is performed correctly to obtain the hitting force as a result of the kinetic transmission from the trunk which is a large mass of the body and when it moves to the arm, the result of the force is better. And that the kinetic transfer of the kinetic energy comes from the parts of

the upper limb to the ball, which affects the speed of the ball and when performing the crushing hitting of the ball, there must be agreement between the members of the body in order for an effect to occur on the material muscle forces of the lower end with those that work on hitting the ball i.e. the muscles of the upper limb in One time, smoothly, in direction of hitting the ball (Cooper, 1982). The arm has a major and essential role in directing the ball accurately towards the goal, and if the striking arm is towards it and its correct skill path, this will achieve harmony in the kinetic transmission during hitting and thus the final result of this movement will be an increase in accuracy (Raisan, 1992).

Conclusions and recommendations

1. The priority in the values of the kinematic variables under study was for the diagonal and straight crushing hit of the left player over the right player.
2. There are significant differences in the variables (knee angle and hip height) between the left player and the right player for a diagonal crushing strike from the center of 2.
3. There are significant differences in the variables (angle of advancement, flight speed, hip height, ball speed, performance accuracy, accuracy and speed) between the left player and the right player for a straight spike from the center of 2.
4. There is a correlation in the level of accuracy and speed with the kinematic variables of the diagonal and straight crushing hit of the left player over the right player.
5. The variables (angular velocity of the arm, hip height, knee angle and shoulder angle) achieved a strong correlation with the variable of accuracy and velocity of the diagonal crushing hit of the left player from position 2.
6. The variables (hip height and arm angular velocity) achieved a strong correlation with the accuracy and velocity variable for straight crushes of the left player from position 2.
7. The variables (flight speed, angle of advancement, knee angle, hip height, and arm angular velocity) achieved a strong correlation with the variable of accuracy and velocity of the diagonal crushing strike of the right player from the 2nd position.
8. The variables (hip height and arm angular velocity) achieved a strong correlation with the accuracy and velocity variable for straight crushes of the right-hand player from the 2nd position.

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