CHARACTERISTICS OF KINETICS AND THEIR IMPACT ON THE MOTOR FUNCTION OF THE SERVING SKILL OF UNIVERSITY VOLLEYBALL TEAM PLAYERS

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Abstract:
The research indicates the importance of the serving skill, as it is a basic skill through which one can start playing and score a lot of points in matches. The more effective the serve is, the more points it will achieve, and this is clearly demonstrated by the participation of the research sample in the Iraqi Universities Championship for the season (2022-2023). The study also showed the importance of using modern laboratory equipment (Biosyn system) in detecting the values of angular kinetic variables and their effective impact in training and benefiting from them in skill development. It also aimed to identify the characteristics of angular kinetics and the extent of their impact on implementing the skill effectively, which makes the process of motor development or learning more effective and positive. Using these digital values in the training process has many benefits and functions, the most important of which is determining the correct motor paths and other important benefits that work to achieve the greatest possible training and educational efficiency. In addition to saving the effort and time spent on the training unit, the researcher used the descriptive approach and identified the research population, which is the Al-Qadisiya University volleyball team participating in the Iraqi Universities Championship for the season (2022-2023), and chose a sample of 4 players who perform the aces only. As for the most important conclusions, the results showed the importance of providing information about the chain of moments during the performance in the main stage (the moment the ball is hit) and then benefiting from it in interpreting the movement. The results of the characteristics of the angular kinetic curve for the variables of the moment series showed a consistent shape in the main stage (hitting the ball) with the skill of serving the volleyball to the parts of the body, each according to the amount of its mass and its contribution to the hitting stage.

Keywords: Kinetics, Biosyn System, Circular Kinetics, Statistical Bag (SPSS), Serving Volleyball.

Introduction

Introduction to The Research:

1-1 Introduction and Importance of The Research:

Volleyball is considered one of the important sports at present, as it is a very popular Olympic game and there is great competition between teams in winning medals and rankings, and it plays a major role in achieving the best high sporting achievements. Scientific research and studies have proven the benefit of this sport in improving balance and the nervous sense of the body's position, as well as the development of the neuromuscular strength component and its development,

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especially in the muscles of the trunk, shoulders, and limbs, in addition to the fact that the skill studied is a basic skill, and this is what led the researcher to pay attention to this sport and skill in particular. Accordingly, this research was an attempt to develop this effectiveness through the use of biomechanical analysis and extracting mechanical values for this sample, especially since the researcher is one of the coaches of the university team participating in the Iraqi Universities Championship for the season (2022-2023) and who holds the third level. It was important to extract the variables and values using the latest laboratory equipment (Biosyn system), which is concerned with taking the most important biomechanical variables for the selected sample by dealing with the variables of the volleyball serving skill, and by informing the researcher of several research and studies. He noticed the lack of mechanical values for this skill. Its basis is building and formulating scientific curricula and preparing exercises and training for volleyball players, based on their importance. Therefore, the study is directed towards knowing and discovering the values of angular kinetics (torque) and skill variables, that is, the motor duty, and thus knowing the importance of providing digital values using advanced devices for volleyball players and the extent of their impact on the performance of the serving skill? The researcher seeks to provide these values through the use of the latest laboratory equipment (biosyn systems)

1-2   Purpose of The Study
The researcher intends to identify the kinematic characteristics (torque) of the volleyball serving skill and its relationship to the performance of the skill through motor duty variables.

3- Research Methodology and Field Procedures:
3- 1 Research Methodology:
The researcher used the descriptive approach in the technique of correlational and reciprocal relationships to solve the research problem. The term method refers to "The methods, procedures, or approach that are used in research to collect data and arrive at results, interpretations, explanations, or predictions related to the research topic.(169:3) ''

3-2 Population and Research Sample:
The research population was identified as the players of the Al-Qadisiya University team for the academic year (2022-2023), and the players who perform the ace serve, numbering (4) players, were selected, and the researcher gave 10 attempts to each player.

3 -3 Means Of Collecting Information:-
3 -3-1 Scientific Research Tools:-
Scientific sources and references (Arabic and foreign).
Personal interviews with specialists.
Measurements and tests used in research.
International Information Network (Internet).
Observation and experimentation.
Software and applications used in computers.
Assistant work team.

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3-3-2 Devices and methods used in the research - :
•The college gymnasium.
•Legal volleyball court.
•Biosyn system.
•A laptop computer.
•Fast CASIO (EXILIM) cameras with a frequency of 300 images/second.
•Papers to record players' names and measurements.
•A device to measure weight and height.
•Japanese-made CASIO manual calculator.
•Casio electronic stopwatch.

3 - 4 Specifications Of Measurements and Tests Used:
3-4-1 Measurement Specifications
Body mass measurement:
  The player sits on the scale, and his body mass is measured to the nearest half kilogram, which can be measured by dividing the weight in kilograms by the square of the height in meters (112:6).

The Age:
The ages of the students were recorded to give a complete idea of the sample characteristics.

Length measurement:
 From a standing position, the length is measured from the bottom of the foot to the highest point of the skull (51:1), and the unit of measurement is the centimeter**.**

Table (1) shows the arithmetic means of the sample specifications

No.	Player Name	Length	Mass	Age
1	**Sample**	**183 cm**	**72 KG**	20 Year

**3 - 4 -2 Testing Technical Performance and Measuring The Accuracy of The Ace Serve Skill :
. (87:7)**
- **Test name:** Transmission accuracy for specific areas.
- **The aim of the test:** to measure the accuracy of transmission for specific areas
- **Tools used:** a legal volleyball court, 10 volleyballs.
- **Method of performance:** The player stands behind the end line of the court while holding the ball, and performs the serve skill so that the ball crosses the net to the middle of the planned court.
- **Conditions:** Each player has (10) attempts.
- **Scoring**: The player takes a score for each area in which the ball falls, along with the accuracy of the correct performance, noting that the total score for the test is (25) points, noting that if the ball falls on a line separating two areas, the laboratory will calculate the score for the higher area, as shown in Figure 1.

Figure (1) Shows A Test to Measure the Accuracy of The Ace Service Skill for Specific Areas of Volleyball

Figure (2) Shows the Performance of the Serving Skill

- The number of attempts (10) and then dividing it by the time to perform these ten attempts, where we extract the value of the accuracy index, which is one of the most important variables of the motor task, as entering the time value makes the accuracy variable have a physical value.

3-5 Exploratory experience:

The researcher conducted the exploratory experiment on Wednesday, 15/3 /2023, at exactly (10 am) in the gymnasium at the College of Physical Education and Sports Sciences / Al-Qadisiya University on a sample of one player from the research community

The aim of the experiment is as follows:

- Locating video cameras.
- Photographing the research sample to determine the variables required by performance.

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- Ensure the working capacity of the system, the cameras, and their supports.
- Ensure that the time for conducting the entire experiment is appropriate.
- Preparing a sufficient number of assistant work staff and guiding them in the tasks assigned to them.
- Knowing the time required to conduct the experiment and the suitability of the devices used.
- Knowing the obstacles that the researcher may face in the main experiment. Determine the final locations of the cameras used to know the accuracy results.

Figure No. (3)
Explains the Conduct of the Reconnaissance Experiment

3-6 Biomechanical Variables:

To determine the most important biomechanical variables that affect the skill of serving, one must consult previous sources and studies and through personal interviews for the opinions of experts and specialists in the field of biomechanics and volleyball. The researcher is also one of those with a precise specialization, in addition to being one of the members of the training staff for the sample, as he arrived at the most important variables for the parts of the body that affect the performance of the serving skill, which are extracted through the Biosyn system. It is worth noting that there is a great ability of the device to simulate movement and performance after placing the system's sensors on the parts of the body that experts indicated are important for performance.

3-6-1 Biomechanical Variables Extracted By (Biosyn System)
Variants of The Circular Kinetic Series:
Torque of force:

It is studied when its effect is circular according to its mechanical law

(torque = force x distance from the axis of rotation)

It was extracted via the Biosyn system directly and its unit of measurement is (NM) for all ten parts of the body after converting their values from the device to Excel and extracting the values of the ten parts. As for the studied parts, they are:

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❖ Trunk Torque (Nm).
❖ Left Shoulder Torque (Nm).
❖ Right Shoulder Torque (Nm).
❖ Left Elbow Torque (Nm).
❖ Right Elbow Torque (Nm).
❖ Left wrist Torque (Nm).
❖ Right wrist Torque (Nm).

**Figure No. 4 Explains How to Connect the System's Sensors
For the Purpose of Extracting Variables**

3-6-2 Variables for Completing the Motor Task Extracted by Videotaping:
This means extracting biomechanical variables for skill performance, which are as follows

- **Accuracy index** (15:2): It is the result of dividing the degree of accuracy in an attempt according to the specified areas by the time of that attempt. It expresses the final result and its unit of measurement (degree/second).
  Kurt Meinel confirms this by saying, "The ball requires hitting it accurately, and therefore the accuracy of the hit means calculating the time of movement from the moment the ball is hit with the serve until it hits the ground". (105:5) through video recording and analysis.
- **Movement time**: This is the time taken by the movement in its three parts (preparatory, main, and final), including the moment the ball is hit until the point of its contact with the ground until the end of performing the skill and its unit of measurement (the second).
- **Ball launch speed**: It is the distance that the ball travels from the moment it is hit with the hand to a certain point based on the time taken for that, and its unit of measurement is (m/s).

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- **Ball launch angle:** It is the angle between the imaginary horizontal plane parallel to the surface of the earth and the path of the ball after it leaves the hand, and it is calculated directly in degrees.
- **Starting point height:** It is measured from the point of contact of the ball at the moment the ball hits the ground, and its unit of measurement is (centimeters).

Figure No. (5) Explains the Variables of Serving Skill Extracted by Video Analysis Using the Kinovea Program

3 -7 Videography:

The best means of motion analysis (obtaining information) is an analysis using videography, through which movement, its paths, and biomechanical variables are studied, and then mathematical and physical sciences are applied to provide us with the final results. It also provides us with curves of the characteristics to be studied to compare them with the ideal curves for those characteristics. In this study, to determine the studied biomechanical variables that affect the skill of serving in volleyball, the researcher resorted to videography, as it was used to extract the skill variables and show the results. Videography is "an important means of discovering errors and controlling the extent to which players' technical performance levels are close or distant" (23:4).

From it, researchers can describe the movement and analyze it to determine the closeness of the levels of a particular group, as analysis in its general sense is "the key to dividing the complete movement into parts."

And studying the relationship between them, arriving at a comprehensive understanding of all these parts and identifying their shortcomings while increasing knowledge of their detailed details and monitoring defects in their performance" (285:8).

On this basis, the research sample was filmed with (2) video cameras with a frequency speed of (300 images/second) to determine the path of movement.

Video cameras have been set up on a tripod, and a camera has been placed on the side of the court on which the serve skill is performed so that the camera covers the entire performance from the approach run to the end of the performance.

The filming process took place in the closed hall of the College of Physical Education and Sports

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Sciences at Al-Qadisiya University**.**

3 - 8 Computer analysis:

Studying sports movement scientifically requires knowledge of the laws, meanings, and mechanical factors affecting the motor performance of sports events analytically to raise and develop sports achievement for the better.

Kinetic analysis using a computer represents a qualitative leap in the field of sports biomechanics. The more modern programs and devices are used, the more accurate the analysis results are and the easier the analysis process is. Therefore, the researcher used a laptop calculator with high specifications. The imaging was analyzed using the Kinovea program and the software included in the Biosyn System, which is a program dedicated to analyzing sports movements to extract values and data (linear and circular biomechanical functions), where the values are taken from the program as they are. After completing the main testing process and saving the files that were recorded in the device's software, the results were analyzed after ensuring that the variables under study were extracted according to the performance that the researcher was interested in. After that, he exported the data to the Excel program to be processed statistically**.**

3- 9 Main Experience:

Given the importance of connecting sensors to the biosyn system to calibrate the device ,The researcher was keen to pay attention to the periods for connecting sensors between one player and another, so the researcher completed ten attempts for each player separately and then moved to the other player, taking into account the scientific instructions for the test and the device:

The researcher conducted the main experiment on Sunday (2/4/2023) at exactly 10 a.m. in the closed gymnasium hall at the College of Physical Education and Sports Sciences/University of Al-Qadisiya, by fixing the locations of the cameras and marking them with significant points. The experiment was conducted on a sample of the university team's players, which numbered (4), and they are the players who perform the team's aces. Each player was given 10 attempts, and the players were photographed with the player's side camera to extract skill variables and a front camera. For each attempt separately, and using the biosyn system for each player as a means of extracting the biomechanical variables that will be studied .

Figure No. (6) Explains the Main Experiment Procedure

3-10 Statistical Methods

The data obtained was processed using the statistical package (SPSS) and the program (Excel), including:

1. Arithmetic mean.
2. Standard deviation.
3. Sprain.
4. Coefficient of variation.
5. The mediator.
6. Analysis of variance.
7. Correlation coefficient.
8. Regression coefficient.
9. Correct connection (canonical analysis).

4- Presentation, Analysis, and Discussion of the Results:

The results of the research are presented, analyzed, and discussed, after the researcher has completed collecting the data resulting from the tests used, which were placed in tables, because of the ease they represent in extracting scientific evidence.

Because it is an appropriate explanatory tool for research, it enables the research hypotheses and objectives to be achieved through field procedures carried out by the researcher. Note that these results for the studied variables are taken at the moment of hitting the ball in the volleyball serving skill

4-1 Presentation of the Results of the Kinetic (Angular) Characteristics of the Transmission Skill Extracted from the Biosyn System:

4-1-1   Presentation of the Torque Results for the Volleyball Serving Skill Extracted from the Biosyn System:

Table (2) Shows the Results of The Properties Extracted from The Biosyn System

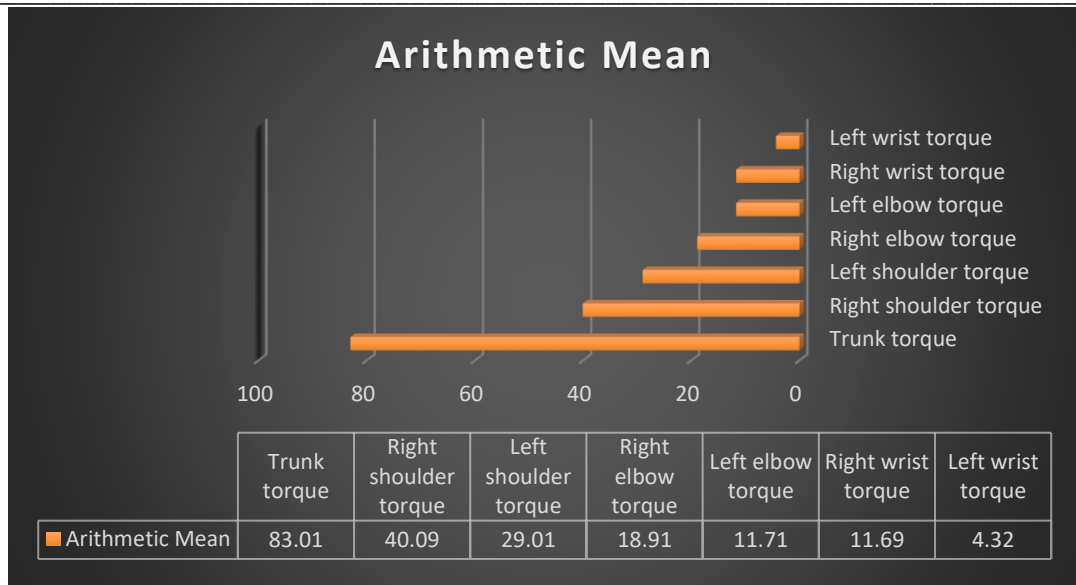| No.	Variables	Unit	Arithmetic Mean	Standard Deviation	Mediator	Skewness	The Difference	Highest Value	Less Value
1.	Trunk torque	NM	83.01	3.61	67.64	-0.60	9.25	97.05	62.71
2.	Right shoulder torque	NM	40.09	0.52	35.54	-0.56	16.70	51.04	38.7
3.	Left shoulder torque	NM	29.01	0.96	24.72	-0.63	13.96	34.23	21.6
4.	Right elbow torque	NM	18.91	1.08	15.8	0.42	9.86	23.6	12.5
5.	Left elbow torque	NM	11.71	0.55	8.55	-0.28	10.69	14.7	8.87
6.	Right wrist torque	NM	11.69	0.78	10.26	0.33	12.80	13.21	10.77
7.	Left wrist torque	NM	4.32	0.53	18.82	0.82	5.24	7.23	6.1.48

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Figure No. (7) Shows the Arithmetic Means of The Torque Variable

4-2 Presentation Of The Results Of The Motor Task Variables For The Volleyball Serving Skill

Table (3) Shows the results of the motor assignment for the volleyball serving skill

No.	Variables	Unit	Arithmetic Mean	Standard Deviation	Mediator	Skewness	The Difference	Highest Value	Less Value
.1	Accuracy Index	Degree/Second	16.44	6.10	15.15	0.10	22.71	18.23	14.16
.2	Movement Time	Second	2.34	0.57	2.01	0.16	11.76	3.21	1.96
.3	Cruising Speed	M/S	25.46	1.62	24.11	-0.80	10.48	28.70	22.50
.4	Departure Angle	Degree	9.05	2.14	8.98	0.18	26.57	9.22	8.34
.5	Starting Point Height	Centimeter	279.29	9.78	282.20	-0.99	6.03	290.00	272.66

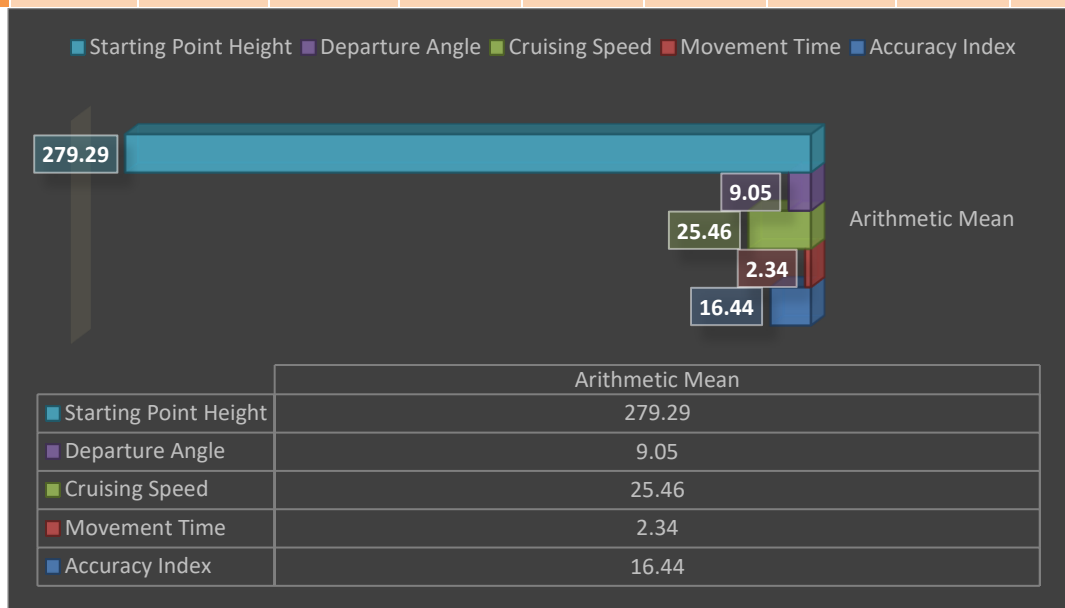|	Arithmetic Mean
■ Starting Point Height	279.29
■ Departure Angle	9.05
■ Cruising Speed	25.46
■ Movement Time	2.34
■ Accuracy Index	16.44

Figure (8) The distribution of the arithmetic mean values of the variables shows the motor function of the serving skill

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4-3 Presentation, analysis and interpretation of the results of the intercorrelations matrix

Table (4)

It Shows the Correlation Matrix for The Variables of Torque and Motor Duty for The Volleyball Serving Skill

| Variables	Precision	Movement Time	Cruising Speed	Departure Angle	Starting Point Height
Trunk Torque	0.980	0.970	0.911	0.919	0.996
Indication	0.000	0.000	0.000	0.000	0.000
Right Shoulder Torque	0.993	0.956	0.909	0.901	0.932
Indication	0.000	0.000	0.000	0.000	0.000
Left Shoulder Torque	0.852	0.933	0.928	0.921	0.929
Indication	0.000	0.000	0.000	0.000	0.000
Right Elbow Torque	0.977	0.953	0.902	0.958	0.964
Indication	0.000	0.000	0.000	0.000	0.000
Left Elbow Torque	0.911	0.933	0.882	0.913	0.954
Indication	0.000	0.000	0.000	0.000	0.000
Right Wrist Torque	0.977	0.969	0.971	0.985	0.978
Indication	0.000	0.000	0.000	0.000	0.000
Left Wrist Torque	0.458	0.544	0.524	0.512	0.649
Indication	0.000	0.000	0.000	0.000	0.000
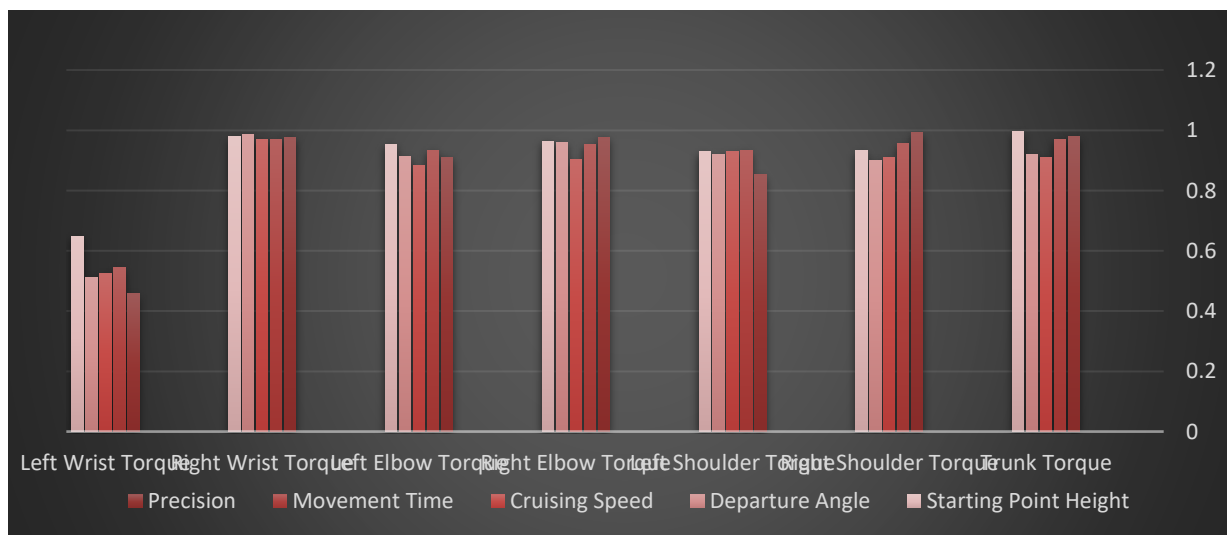
Figure (9) Shows the correlation matrix for the variables of torque and motor duty

The process of obtaining Canonical correlation values which represents the value expressing the extent of the relationship between two groups of variables, each group containing two or more variables begins by finding the correlation matrices for each of the variables of the first group, torque (torso torque, right shoulder torque, left shoulder torque, torque Right elbow, left elbow torque, right wrist torque, left wrist torque) with each other and the correlation matrix for each of

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the motor task variables (accuracy index, movement time, starting speed, starting angle, starting point height) with each other and then finding the correlation matrix Between each of the variables of the first group and the variables of the second group, Table (4) shows these matrices together. These matrices must be extracted through which the values of the latent root can be arrived at, by squaring which (the latent root) we obtain the canonical correlation. In general, there are two methods. To obtain these latent roots, they are the covariance matrix and the correlation matrix. It is not hidden that these two statistical terms share one result, as the correlation necessarily gives the percentage of explained variance between any two variables, as the value (0.980) can be interpreted, which is the correlation value between the variable (torso torque) and the variable (Accuracy index), since (0.980) of the variance of a variable (torso moment) is explained by the variance of a variable (accuracy index) or vice versa. Hence, all the correlations in Table (4) reflect cases of explained variance. The idea of deriving the latent roots from the intercorrelations can be simplified by Understanding the correlation matrix stage in factor analysis, as the correlation matrix is first found, through which the acceptable factors are determined through the latent root test, which represents the sum of the squares of the saturations of the tests on the factor. The researcher cannot find simplification easier than this, since the canonical correlation is one of the most complex statistical operations.

5 - Conclusions and recommendations-:
5-1Conclusions-:

1- The results showed the importance of providing information about the series of moments during a performance on the main stage and then benefiting from it in interpreting the movement.

2- The results of the kinetic characteristics of the moment chain variables showed a consistent shape in the main stage (hitting the ball) of the serving skill for the body parts, each according to the amount of its mass and its contribution to the hitting stage.

3- The results of the kinetic properties of the torque series showed that the starting point height variable was superior to the other motor duty variables according to the concept of using the optimal correlation, as any increase or decrease in this torque value necessarily means an increase or decrease in the level of skill performance in terms of the aesthetics of the performance and the coordination of the movement, as One of the conditions for the ideal performance of the serve is to hit the ball from the highest point.

4- The kinetic properties were affected by the results of the performance accuracy index in the hitting phase and showed significant results, especially for the torque variables of the right parts of the players, since they serve with the right side.

5- 2 Recommendations-:

1. The necessity of conducting similar studies on teams in more advanced competitions to identify the values and benefit from them in an attempt to raise the skill level of the players.

2. It is necessary to conduct other studies on the rest of the volleyball skills, through which performance can be reached to the highest level.

3. The necessity of using the latest laboratory equipment in performance experiments to determine the results is of greater scientific benefit.

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4. Through what was presented in the study, the results showed the importance of benefiting from the extracted values of moments in building training curricula and exercises for skill performance.

5. The necessity of studying the parts of the body's mass according to the proportion of its movement when performing the skill and in a manner compatible with the rest of the movement parts.

6. In light of the kinetic results of the series of moments, it is necessary to pay attention to the parts of the body studied according to their importance in achieving the path of movement according to the realization of the moments and their values based on the details of those parts.

7. It is necessary to pay attention to the parts of the body that are mainly involved in movement to achieve high accuracy index values.

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