ABSTRACT

The aim of present study is to know the relationship between rotation momentum and some of launch variables to attack serve in volleyball. Eleven (11) players from University of Babylon team were selected and have been subjected to height, weight, and age measurements, as well as attack serve test in volleyball. A descriptive research design was used because it is suitable to the nature of the study. We filmed the performance with a camera its speed of 60 images/S, then the imaging video of the performance was analyzed by (Kinovea) program to extract mechanical variables under study (the horizontal distance of the body gravity center for the focal point of the player), after that we extracted rotation momentum of the body, moreover, we got variables (launch speed and angular of the ball launching). The study was conducted in 2014 and data was analyzed by using SPSS. Our conclusion showed that there is a significant relationship between rotation momentum and angular of launching the ball and launch speed.

Keywords: Rotation momentum, launch variables, attack serve, volleyball.

1. Introduction

The mechanical field is one of prominent scientific fields in the study of individual differences among learners, this field represents the way most favorable to the individual learner in the handling of information, processing, and retrieval in educational situations which characterize an individual with a lot of ambition, interaction, and activity to achieve a high yield goals. However, mechanical studies in sport games are a great importance because it uses the objectivity in performance evaluation and measurements of (ie: angulars, distances, times, and powers) influential movement in quantitative and accurate rising of objectivity and sincerity in the performance of good movement calendar (Talha, 1993).
Volleyball is one of games which its performance depend on the player improvement for all physical, kinetic, psychological, and physiological requirements as well as the mechanical aspect in the development of physical abilities and investigation to solve the problems related to the technical performance so as to diagnosis and treatment. Mastering the basic skills of the game is the most important factors which achieve success of any team, the essential skills are “movements which have to performance by the player in situations which require the game to reach the best results”.

It must analyze the technical skills to facilitate learning stages accurately and correctly according to the law of the game. Although the serve skill in volleyball looks easy but it requires a great effort to mastery because the law of the game poses a short duration of touching the ball and determine touching the ball with the fingertips and the small size of the court and speed of flight of the ball and legal and technical aspects. The aim of the serve skill is to achieve the required precision through performance and on this basis, we find that some of the mechanical variables occupies common denominator when studying this skill from the mechanical point of view, serve in volleyball is effected by mechanical basis such as a rotation momentum of the body for a moment pivot, starting angular, starting speed, and the high starting point.

However, in the light of that the coach and the player should understand these variables (Yareb, 2002). The importance of the study is to find a relationship between the rotation momentum and angular and the speed of the ball the moment of the strike which helps to understand the concepts of the performance of this skill to be able workers in this field of applied to achieve better learning.

2. Methodology

Eleven (11) players from University of Babylon team were selected and have been subjected to height, weight, and age measurements, as well as attack serve test in volleyball. A descriptive research design was used because it is suitable to the nature of the study, table (1) shows homogeneity of the subject.

<table>
<thead>
<tr>
<th>N</th>
<th>Variables</th>
<th>Means</th>
<th>SD</th>
<th>Middle</th>
<th>Skewness sufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age (Year)</td>
<td>23.81</td>
<td>3.78</td>
<td>23.80</td>
<td>264</td>
</tr>
<tr>
<td>2</td>
<td>Height (Cm)</td>
<td>178.02</td>
<td>2.23</td>
<td>177.00</td>
<td>2.489</td>
</tr>
<tr>
<td>3</td>
<td>Weight (Kg)</td>
<td>82.90</td>
<td>4.01</td>
<td>81.70</td>
<td>2.212</td>
</tr>
<tr>
<td>4</td>
<td>Length of strike arm</td>
<td>69.45</td>
<td>6.59</td>
<td>70.40</td>
<td>%89</td>
</tr>
</tbody>
</table>
2.1 Measurements

- Weighting by medical Balance.
- Measure the height by tape.

2.1 The Main Experiment and Photography

Subject of the study was filmed on Monday, 10/03/2014 at exactly ten o'clock in the morning in a closed hall at the University of Babylon, Faculty of Physical Education by using video camera was placed after the (7.54 m) of the mid-serve area with high (1.36 m) from the center of the lens size. Each player is given three attempts for each player and choose the best one and the filmed was completed by depending on an assistant team, Figure (1) shows main experiment.

![Diagram showing the main experiment setup](https://example.com/diagram.png)

**Figure (1) shows main experiment**

2.3 Mechanical analysis

After converted movie to a CD-ROM, we used a special program on the computer (Kinovea) to measure the variables such (ball movement time, the ball movement, distance, starting angular of the ball and horizontal distance to the center of the weight of the body from the leaning of the vertical line connecting the weight of the body center until invoked feet of the front leg for the player).
2.4 Statistical analysis

The data of present study was analyzed by using SPSS and we used following laws.

- Mean.
- Standard deviation.
- Correlation coefficient (person) (Ayed, 2009).

3. Results and Discussion

To know the correlation between rotation momentum and angular and the speed of the ball researchers used correlation coefficient for person as shown in table (2).

<table>
<thead>
<tr>
<th>Variables</th>
<th>M Unite</th>
<th>Mean</th>
<th>SD</th>
<th>Correlation coefficient</th>
<th>Level of trust</th>
<th>Error level</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation momentum</td>
<td>Net</td>
<td>2843</td>
<td>28.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting angular</td>
<td>Degree</td>
<td>32.75</td>
<td>2.654</td>
<td>0.612</td>
<td>99.9</td>
<td>0.001</td>
<td>S</td>
</tr>
<tr>
<td>Starting speed</td>
<td>M/S</td>
<td>28.60</td>
<td>1.65</td>
<td>0.685</td>
<td>99.9</td>
<td>0.001</td>
<td>S</td>
</tr>
</tbody>
</table>

Table (2) showed mean of the rotation momentum value (2843) Net and standard deviation (28.7), while the starting angular mean showed (32.75) degree and a standard deviation (2.654) whereas correlation rate (0.612) at the confidence level (99.9) and error (0.001) which means there is a high significant correlation between rotation momentum and starting angular of the ball to note when rotation momentum is increased resulting in an increase in starting angular of the ball.

The mean of the speed of starting the ball was (28.60) m/s and a standard deviation of (1.65) and the correlation between the rotation momentum and starting speed of the ball reached (0.685) at the confidence level (99.9) and standard error (0.001) which means there is a high significant correlation between rotation momentum and starting speed of the ball. The study showed a high correlation between rotation momentum and angular of starting the ball, this relationship is a good and referred to that increasing the value of rotation momentum leads to get enough time to perform the serve and gives physical area for the player in order to achieve a good starting angular, this performance results in increase the starting angular.
However, number of studies agree with scientific books about the existence of an ideal starting angular for starting the ball in attack serve because this skill is subjected to the system of projectiles, so has to provide an ideal performance angular, "The best performance angular for starting is always less than 45 degrees, but if the difference is increased between the level of starting and landing results in decrease the angular value" (Adil, 1998).

The researchers believe that rotation momentum is the sum of body mass × horizontal distance which location between the connecting line from the body's mass center and based foot of the front leg increases with increasing distance, the increasing in the distance means introducing left foot to the front which means introduce the weight of the body center forward which generates a large momentum increases muscular balance to this skill and thus increases the stability and lead to an increase in the ability of the player to push the ground up and therefore his ability to guide the starting angular correctly.

However, if a rotation momentum relatively increased resulting in the increasing the horizontal distance between the based foot and coming down line from the weight of the body center and thus provides for the player a large basing act as a momentum strength against the trunk momentum and impulse arm and thus provides a dynamic field through increasing the trunk movement and arm and get the impulse arm high peripheral speed "peripheral speed increases with increasing the length of the radius at constant speed" (Adil, 1998).

The researchers see that the reason for the increased speed at the start of move the ball due to the increased rotation momentum which is increasing push strength at the moment of starting. This was confirmed by (Saeb et al., 1991), the mechanic change of the server body position in which the last step will be the biggest as possible during prepare the largest stable base so as to move the trunk with greatest possible extent from back to front because maintaining the balance during fast motion which requires a large stable basing to equal momentums of the forces affecting on the body. Moreover, to maintain the balance should be equivalent the momentum of the push strength with the momentum of body weight, otherwise, if the last player step is short to complete the move trunk with large extent which reduces the amount of rush the upper part of the body which affects the power transmitted to the impulse arm (Saeb et al., 1991), thus a reduction in the speed of starting the ball to fit speed proportional with strength push.

4. Conclusion

Our conclusion showed that there is a significant relationship between rotation momentum and angular of launching the ball and launch speed.
References


