SOME KINEMATIC VARIABLES AND THEIR RELATIONSHIP TO THE DYNAMIC BALANCE IN THE SKILL OF SCORING FROM OUTSIDE THE THREE-POINT ARC OF A BASKETBALL

Dr. Mohammed Mutlaq Bader  
College of Physical Education and Sports Sciences / Al-Mustansiriya University, Iraq.  
dr.bader@uomustansiriyah.edu.iq  
https://orcid.org/0000-0002-8445-4231  
https://scholar.google.com/citations?user=NmNdlAYAAAAJ&hl=en

ABSTRACT
The purpose of this paper is to identifying the strength of the correlation between some of the kinematic variables with the dynamic balance in the skill of scoring from outside the three-point arc of basketball, as well as identifying the values of some of the kinematic variables affecting the skill of Shot scoring from outside the three-point arc of the basketball and the dynamic balance of the skill of shot scoring from outside the three-point arc Basketball. The researcher used the descriptive approach to solve the research problem, and for the research community, the research community included all the advanced players in the Al-Tadhamun Basketball Sports Club, which numbered (14) players in Najaf Governorate, and thus they are the sample of the research, and the researcher excluded five players from them because they were excused due to circumstances Thus, the research sample became (9) players, and accordingly, the percentage reached (64%) of the original community. Among the conclusions reached by the researcher were angles in the joints of the body affect the dynamic balance but in relatively small amounts, a (non-significant) relationship appeared between the angles (elbow, body inclination, knee, shoulder, wrist, ball launch, starting point height, starting speed) and dynamic balance as well as scoring accuracy. One of the most important recommendations recommended by the researcher is to pay attention to dynamic balance and increase the level of achievement for players through exercises for dynamic balance, conducting another study dealing with other variables that were not addressed in this research.

I. INTRODUCTION:
The rapid development that occurred in the game of basketball, which witnessed an improvement in the level of performance at all levels as a result of training software based on many sciences, including biomechanics, which is one of the modern sciences that affected the scientific progress of motor performance in humans, as the main objective of this science is in The field of physical education is the study of the causes of movement, that is, taking into account the internal and external forces surrounding the movement. Movement, whether in normal life or in the sports field, is nothing but a reciprocal and interactive effect between the various internal and external forces that affect positively or negatively on the level of performance and directly, so We find the importance of investing the positive ones and limiting as much as possible the negative effects of them that prevent the athlete from investing his abilities to harness them in order to achieve the best performance, by revealing them by electronic scientific devices so that we can obtain accurate information about the components of the movement sections and their errors, which are difficult to detect or evaluate with the naked eye Or with field experience for its overlap and speed of performance.

Balance is one of the basics on which the sport of basketball is based, as it represents the individual's ability to maintain a balanced position of movement, and this is normal in the case of body movement. With a new movement, this was called Dynamic Balance, which is one of the basic components of kinetic skill, especially in complex and difficult movements in basketball. From the above, the importance of research is evident in identifying the relationship between biomechanical variables when performing any skilled movement and the
relationship of these variables to dynamic balance, whether at the beginning, during or at the end of the scoring move outside the three-point arc of the basketball.

II. RESEARCH PROBLEM:

Through the researcher's field experience, he noticed difficulties, lack of effectiveness, and weak interest in kinetic (dynamic) balance exercises, and the lack of training aids allocated by coaches in proportion to its importance in developing the accuracy of performance for many offensive skills, and given that the dynamic balance and the kinematic variables in the basketball game are extremely important precisely. Performance, especially in the skill of shooting from outside the three-point arc, the subject of the research, in a lot of matches, the researcher decided to study this problem.

Also, we can add another problem that led us to this study, which is that most of the training process in Iraq is not subject to the rule of biomechanical analysis, which is the most important and basic in the process of progress, in addition to the fact that many basketball players do not rely on clear scientific foundations deduced from the analysis that illuminate their work To make better use of their capabilities.

Research objective:
- to Identifying the strength of the correlation between some of the kinematic variables with the dynamic balance in the skill of scoring from outside the three-point arc of basketball, as well as identifying the values of some of the kinematic variables affecting the skill of Shot scoring from outside the three-point arc of the basketball and the dynamic balance of the skill of shot scoring from outside the three-point arc Basketball.

Research hypotheses:
- There is a statistically significant relationship between the dynamic balance and some kinematic variables in the skill of shot scoring from outside the arc of the three points with a basketball.

Research fields:
- Human field: players in the Al-Tadhamun Basketball Sports Club
- Time field: (7/12/2020) to (22/5/2021)
- Spatial domain: closed sports hall of Al-Tadhamun Club

III. RESEARCH METHODOLOGY AND FIELD PROCEDURES:

Research Methodology:
The researcher used the descriptive approach because it fits with the nature of the research problem.

Community and sample research:
The research community included all the advanced players in the Al-Tadhamun Basketball Sports Club, which numbered (14) players in the province of Najaf and thus understood the research sample. The community (64%) of the original community.

Devices, tools and means used in the research:

Means, devices and tools used:

Data collection methods:
- Arab and foreign sources and references.
- Personal interviews.
- Tests and measurements.
- Special forms for recording test results for players
Tools and equipment used in the research:

- Casio Fx 82 LD Manual Calculator.
- A Japanese-made Sony video camera.
- Camera stand.
- Videotape.
- Disc CD.
- Sony computer with accessories.
- (1)meter long scale.
- Auxiliary staff.

Field research procedures:
Define tests variables and metrics

The researcher prepared a study of the following kinematic variables:

1. The angle of Starting: (it is the angle of the Starting of the projectile (the ball) that is confined between the horizontal line passing through the center of gravity of the projectile and parallel to the ground during the start of the flight and the path drawn by the center of gravity of the body during flight) (1)

2. Starting speed: (It is one of the most important basic variables in determining the horizontal or vertical distance of achievement. Since the speed is a vector quantity, the initial speed of the moment of the ball’s launch is determined by the amount and direction, and therefore this speed can be analyzed into two vertical and horizontal components, which determine the motor path and the height that the ball reaches depending on the starting angle, the starting speed is maximum at the moment the ball is released from the player's hand (2).

3. The height of the starting point: The height of the starting point is one of the complementary and affecting factors in the path of the ball's flight and in determining the starting angle. A direct relationship between the velocity of the ball and the length of the body (2).

4. Angle of the knee joint: It is the angle between the shin line and the thigh line, from the point of the ankle joint through the point of the knee joint to the hip joint area at the moment of shooting, i.e. in the last image of the shooting hand touching the ball.

5. The angle of inclination of the trunk: it is the angle between the longitudinal axis of the body and the vertical line during its pivot moment (3).

6. Angle of the elbow joint of the shooting arm at the moment of shooting: It is the angle between the humerus line with the forearm line from the point of the wrist joint of the shooting arm through the elbow joint to the point of the shoulder joint at the moment of shooting.

Determine the moving (dynamic) balance test (moving around the marks):

- The purpose of the test: to measure the ability to jump and land accurately while maintaining balance during and after movement.

- Tools used: stopwatch, tape measure, (11) markers.

- Performance specifications: The tester stands on the first mark with the right foot and then jumps to stand on the mark No. (1) with the left instep (so that it covers the mark completely with the foot) and tries in
this position for the longest possible period of time with a maximum of five seconds and then jumps to mark No. (2) And so on.

- Recording: the laboratory records ten degrees for each jump attempt, five of them when the jump is done properly, as this requires landing on the instep so that it covers the mark on the ground completely, and the other five degrees are recorded for the laboratory for each jump in which he can prove after, in this way, the total score for the test will be 100.

IV. MAIN EXPERIENCE:

After completing the selection of the kinematic variables, as well as the pre-determination of the dynamic equilibrium, and in view of the completion of the procedures that qualify to perform the main experiment, the researcher supervised the application of those procedures to the research sample of (9) and to the closed hall in the Kufa Sports Club in Najaf on 3/3/ 2021 At exactly two o’clock in the afternoon, and in the presence of the assistant work team, where the researcher resorted to a special office in the technical production, where he transferred the video film in raw format to the compact disk (CD) in order to perform the computer analysis steps on it, after which the film was stored through the (Short Cut) program. So that each member of the sample had his own file called (FILE) .This file represents his movement to be analyzed, after that, through the same program, the movement of each player (his movie) was cut into picture clips that include the movements to be analyzed, and then each clip was stored From the same private file for each individual, the Darfash program was used for the purpose of extracting the search variables regarding distances, displacements, velocities and angles.

Statistical methods: The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Presentation, analysis and discussion of the results:

Presenting the results of the kinetic analysis of all the kinematic variables and their relationship to the dynamic balance:

Table (1) shows the arithmetic means and standard deviations of some kinematic variables and the dynamic balance of the scoring skill from outside the arc of the three points in basketball and the calculated and tabulated (t) value.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Arithmetic mean</th>
<th>Standard deviation</th>
<th>T value</th>
<th>Type</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>dynamic balance</td>
<td>57.77</td>
<td>11.486</td>
<td></td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>elbow angle</td>
<td>103.71</td>
<td>8.016</td>
<td>0.43</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>body inclination angle</td>
<td>13.78</td>
<td>2.540</td>
<td>-0.34</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>knee angle</td>
<td>171.35</td>
<td>5.752</td>
<td>0.32</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>shoulder angle</td>
<td>105.17</td>
<td>5.273</td>
<td>0.31</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>wrist angle</td>
<td>115.03</td>
<td>4.213</td>
<td>0.07</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>Ball starting angle</td>
<td>53.61</td>
<td>2.485</td>
<td>0.12</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>Ball starting point height</td>
<td>2.51</td>
<td>0.247</td>
<td>0.02</td>
<td>Non</td>
<td>Sig</td>
</tr>
<tr>
<td>Ball starting velocity</td>
<td>15.65</td>
<td>1.653</td>
<td>0.56</td>
<td>Sig</td>
<td></td>
</tr>
</tbody>
</table>
Presentation of the results of the kinetic analysis of the kinematic variables and their relationship to the accuracy of the research sample:

Table (2) shows the arithmetic means and standard deviations of some kinematic variables and the accuracy of scoring from outside the arc of the three points in basketball and the calculated and tabulated (t) value.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Arithmetic mean</th>
<th>Standard deviation</th>
<th>T value</th>
<th>Type</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoring accuracy</td>
<td>1</td>
<td>0.866</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elbow angle</td>
<td>103.71</td>
<td>8.016</td>
<td>0.30</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>body inclination angle</td>
<td>13.78</td>
<td>2.540</td>
<td>- 0.30</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>knee angle</td>
<td>171.35</td>
<td>5.752</td>
<td>0.00</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>shoulder angle</td>
<td>105.17</td>
<td>5.273</td>
<td>0.27</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>wrist angle</td>
<td>115.03</td>
<td>4.213</td>
<td>0.30</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>Ball starting angle</td>
<td>53.61</td>
<td>2.485</td>
<td>- 0.06</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>Ball starting point height</td>
<td>2.51</td>
<td>0.247</td>
<td>- 0.02</td>
<td>Non Sig</td>
<td></td>
</tr>
<tr>
<td>Ball starting velocity</td>
<td>15.65</td>
<td>1.653</td>
<td>0.56</td>
<td>Non Sig</td>
<td></td>
</tr>
</tbody>
</table>

V. DISCUSS THE RESULTS:

The researcher believes that the angles of the body, especially the variables of the current research, are related to the development of the stages of technical performance of the skill of scoring from outside the three-point arc in basketball and the player’s physical, skill and psychological ability, provided that they appear with a high flow in order to obtain an ideal and distinctive performance, so through the results that appeared in the table (1) The researcher attributes that the aforementioned reasons may lead to poor performance, which caused the random differences between balance and the variables under discussion, as the researcher instructed that the balance is between the eye and the aiming arm, as the balance depends on “the extent of complete harmony between the work of the muscular and nervous systems.” In terms of the implementation of the muscle reaction to the nerve signal emitted to it” (4), so from the foregoing, we find that the players differ in their stances during their performance of throwing, which causes the angles to not appear in a typical way and this showed the randomness of the assumptions.

Through the foregoing in Table (2), the random differences between the accuracy and the angles in question appeared, and the researcher attributes this to the fact that the accuracy has a significant impact on the success of any skill to achieve the goal to be reached, there is no doubt that directing the ball at the moment of shooting at the target depends on the accuracy of the target What is meant is that accuracy requires complete control over the voluntary muscles and also requires that the nerve signals received from the muscles be appropriate in order for the movement to perform in the desired direction and with the necessary accuracy. It is known that accuracy is one of the duties on which victory depends because it is the final outcome of performance in order to obtain activity, so Accuracy must be from the beginning of the player in order to know the target, and for this, we find that there is a weakness inaccuracy through the researcher’s observation of the players who performed the skills during the test and did not find performance and correction in the direction of the target through the players, and this, in turn, led to weakness in body positions.
VI. CONCLUSIONS AND RECOMMENDATIONS:

Conclusions:
Based on the research results that were reached within the limits of the research community, the following conclusions could be reached:

- Angles in the joints of the body affect the dynamic balance but in relatively small amounts.
- There was a (non-significant) relationship between the angles (elbow, body inclination, knee, shoulder, wrist, ball launch, starting point height, starting speed) and dynamic balance as well as scoring accuracy.

RECOMMENDATIONS:

- Paying attention to dynamic balance and increasing the level of achievement of players through dynamic balance exercises.
- Conducting another study that deals with other variables that were not addressed in this research.
- Using kinetic analysis to follow up the development in the kinematic variables to work on enhancing the correct ones, and correcting the defect in some of them through the development of these mechanical variables and their integration among the members of the research sample.
- Paying attention to the kinematic factors by developing the information about these factors among the coaches and players and introducing them to courses in this regard and training the players in a practical way in them as well as using teaching methods and kinetic analysis films especially for basketball players to introduce the importance of mechanical aspects

REFERENCES
1 Samir Muslat Al-Hashemi: (1999); Mathematical Biomechanics, 2nd Edition, Mosul, Dar Al-Kutub for Printing and Publishing, p. 27.