



A COMPARATIVE ANALYTICAL STUDY OF SOME BIOMECHANICAL VARIABLES FOR THE SKILL OF REMOTE SHOT VIA JUMPING OF BASKETBALL AND HANDBALL YOUTH PLAYERS

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Abstract

The study aims:

- 1 Identifying the indicator of the values of some of the variables of the bio-mechanical skills of a remote shot by jumping to basketball and handball youth players.*
- 2 Getting known the differences in the indicators of the values of some bio-mechanical variables of the skill of remote shot by jumping for basketball and handball youth players.*
- 3 There is a significant difference between the values of the reaction strength variable for basketball and handball players and handball and for handball players.*
- 4 There is no difference in the kinetic energy of the players of basketball and handball, but there are apparent differences in the values of these variables for the handball players.*

The main recommendations are:

In light of the conclusions, the researcher recommends what follows:

- 1. The knee joint should be flexed to the base foot in order to take advantage of an increase in the output of the push-up in order to obtain a high elevation point (vertical distance).*
- 2. Confirmation of periodic tests to identify the outputs of the force produced for the muscles of the body, especially leg muscles in order to develop training programs that develop the output of a push power.*

Keywords: *biomechanical, basketball, handball*

JEL classification: *I1, I12, I21*

Introduction

1. Research Design

1.1 Introduction and Importance of Research

Recently, the world is witnessing a great and remarkable development in all areas of life and sciences, especially in the field of physical education, which is one of those sciences which started to progress during these years. This is the result of the observation of experts and specialists in the field of sports education and all games. Today, bio-mechanics is one of the basic sciences in the physical education.

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It is one of the basic sciences in physical education that analyzes human movements from the point of view of the laws of mechanics, taking into consideration the biological conditions (whether mechanical, anatomical, physiological or psychological) to reach the best technique. Basketball and handball games are widespread across the world where players need to have a high level of basic skills, especially the skill of remote shot and skill of shot of basic skills, whether in basketball or handball. Because the game depends on the number of shots successful in determining the win and loss, as well as it is a skill of fun for the fans and enhances self-confidence for players, and the skill of remote shot of the jump of the important and difficult skills, especially if they are from long distances in addition to the presence of a defender who limits or hinders the shot process, which is one of the main duties of the defender.

Therefore, the player must get rid of the opponent by jumping to reach the highest point trying to overcome the opponent through the rise of the push power of the foot to the top so it needs a large force in a short time in order to get enough amount of push to achieve the desired goal in addition to the opponent being far away at the moment of shot is one of the important things that grants the player full freedom of shot.

In addition, there's the existence of mechanical variables that directly affect the amount of shot because it needs a quick transfer to achieve the skills use the hands in the shot accuracy. It is a must to note that distance does not require a great force to deliver the ball to the goal, whether in handball or basketball.

And this requires the performance of important movements in the body parts working to change the body's status, and so the force works on it, and hence the importance of research in subjecting the remote shot through jumping in order to be a clearer picture to the trainers, providing information to enable these trainers to explain the performance in a more accurate and thus to achieve the performance of the correct and agree to the optimal performance of this skill, which raises the level of players of basketball and handball in terms of skills.

1.2 Research Problem

Basketball and handball are ones of the fastest games that need a high level of skills including the skill of a remote shot through jumping needed by the player and ending of the offensive, especially if the shot is from the opposite side of the goal because the corner is greater than the chance of successful shot. The fact that the player starts to do some movements during the shot works to deceive the opponent and because it is difficult to rely on determination of the biomechanical variables of performance, so it is necessary to use sophisticated devices and the fact that the science of biomechanics is not in isolation from training operations.

It is one of the means of evaluation of performance, which provides accurate information on the level of skill performance of this type of shot that the lack of information about some gives a clear indication of the biomechanical variables during the stage of focus and push, which gives a clear indication of the



resulting strength and vertical work done... etc. During this stage, both skills are somewhat similar in terms of distance and performance as they both use the base foot and push up to get the highest point reached by the player and then the shot.

Therefore, the researcher has intended to study this case for basketball and handball players by comparing some of the biomechanical variables of the skill of remote shot by jumping. In addition, the difficulty of performance is sometimes in the lack of accurate understanding of how to perfect the performance of this skill because of the lack of mechanical information and reliance only on the player's sense of need for performance, especially for long distances, which has prompted the researcher to study this problem.

1.3 Research Objectives

- 1 Knowing value indicators of some of the biomechanical variables of the skill of remote shot by jumping for basketball and handball players;
- 2 Identifying the differences in the value indicators of some biomechanical variables for the skill of remote shot by jumping for basketball and handball players.

1.4 Research Hypothesis

There are differences in the value indicators of some biomechanical variables for the skill of remote shot by jumping between basketball and handball players.

1.5 Fields of research

- 1.5.1 The Human Field
- 1.5.2 Some players of the South Oil Basketball Club and some players of Basra Municipality handball players for the sports season 2017-2016, for the youth.
- 1.5.3 Time Field
From 30/07/2017 to 07/08/2017
- 1.5.4 Spatial Field
Hall of South Oil Sports Club in Basra Governorate.

2. Methodology and Field Procedure

2.1 Research Methodology

Since the selection of the appropriate approach to the study of any problem relies on the nature of the problem itself, so the researcher has adopted the descriptive method of surveying method to obtain objectives of the study and its hypothesis.



(1) Schedule

Shows some anthropometric measurements, values of computational arguments, standard deviations and value. The difference coefficient in the research sample

No	Variables	measuring unit	Basketball			Handball		
			Mean	St.d	C.V	Mean	St.d	C.V
1	Total length	Cm	177.800	1.923	1.081	176	1.081	0.617
2	Mass	Kg	70	1.224	1.748	67.44	2.073	3.073
3	Age	Year	17	1.870	11	17.400	2.063	11.856
4	The training age	Year	5	0.707	14.14	6.800	1.482	21.794

2.2 Research Sample

The sample of the research has included the players of the South Oil Basketball Club and the Municipality Club players 2016-2017, for the youth category of (5) players each, because they are of high level and constitute 66.41% for basketball and 31.25% for handball). And the research sample uses the right arm in the shot. In order to ascertain the homogeneity of the sample in the variables that may affect the course of the experiment, the researcher performed the statistical analysis using the coefficient of variation. It was found that all the values of the difference coefficient were less than 30% (11: 161). This reflects homogeneity of the members of the research sample in the variables below, and as shown in Table (1). This table shows some anthropometric measurements, values of arithmetic means, standard deviations and the value of coefficient of variation in the research sample.

2.3 Means, tools and devices used

Arab and foreign sources and references

2.4 Tests Used

2.4.1 Select the Correct Parameter to Measure Accuracy of the Shot (7: 61);

2.4.2 The three-point remote shot test (233: 9);

2.5 Biomechanical variables

1 Function Indicator = maximum height reaches the center of the body top divided by the time of push (6: 131);

2 Kinetic energy = half the mass of the body multiplied by its velocity square (4: 304);

3 Vertical work = the work required to raise the body a specific height against the forces of gravity (4: 304);



- 4 The cornea = the work done in the unit of time (3: 177);
- 5 The amount of movement = is total of multiplying the mass of the body in its speed (3: 132);
- 6 Pushing force = is the product of multiplying the amount of force in its time (3:16).

2.6 Pilot Experiment

The researcher conducted a survey experiment on 30/07/2017 at the Hall of the South Oil Club, on two players of the Municipality of Basra, Handball team, other than the main sample of the research. This is done in order to determine the dimensions of the camera and the angle of photography, which ensure access to research variables and sufficient time, and identify the obstacles that may face the workflow.

2.7 Main Experiment

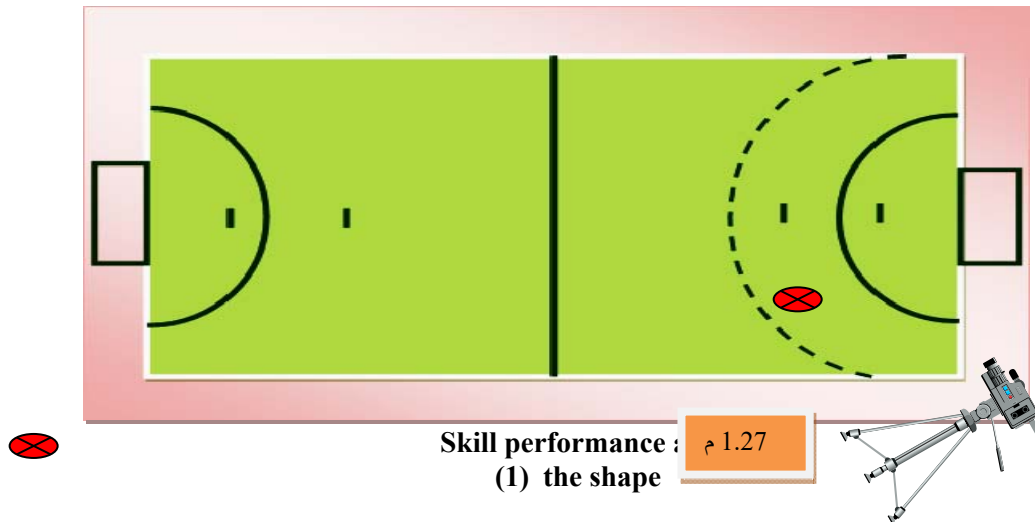
The main experiment of the research was conducted on 30/07/2017 at the closed hall of the South Oil Sports Club for Handball Sample in Basra Governorate by giving (3) attempts to each player for remote shot. The second experiment was conducted on 07/08/2017 at the closed Hall of South Oil Club, Basketball Sample.

2.8 Video Imaging

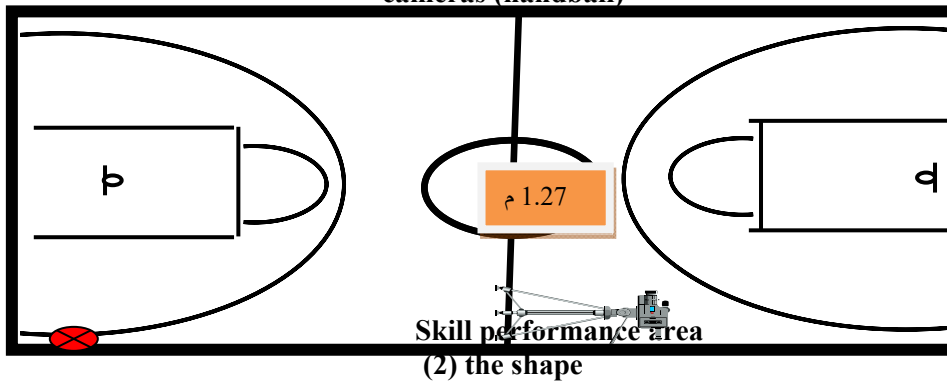
The researcher used a Sony-type video camera with a frequency of 100 images per a second. The camera was placed at a distance of 2 meters in the basketball court and 4 meters in the handball field from the side line inside the stadium, with a Height (1.27 m) measured from the ground up to the focus of the lens of the camera where the player's biomechanical variables are fully recognized.

2.9 Computer Analysis (Kinetic Performance)

After the transfer of video clips from the camera to the computer and saved, the analysis was carried out by the program (Kinovea), the 18th version installed. This program is dedicated to the analysis of sports movements, so after the researcher videoed the experiment got it transferred from the camera to the computer. Extension of imaging was transferred to (MPEG VCD). The best attempts were selected, and the researcher extracted biomechanical variables for performance through the analysis program.



The performance site shows the player the skill of jumping and location of the cameras (handball)



The performance site shows the player for the skipping skill and location of the cameras (basketball)

2.10 Statistical Means

The data was analyzed statistically by the statistical bag (SPSS), version (19) to know:

- 1- The arithmetic mean
- 2- Standard deviation
- 3- Percentage (101:10)
- 4- T-test, for correlated equal samples.



Presentation and discussion of Results

After the data was processed statistically, the results were indicated in table (2).

(2)Schedule

Shows the computational circles, standard deviations and the value of (T) in the research sample

No	Variables	measuring unit	Basketball		Handball		Calculated T value
			Mean	St.d	'Mean	St.d	
1	The strength of the reaction	Cm / S	286.143	45.467	359.765	42.632	2.641
2	Kinetic energy	Jules	11.454	3.147	15.315	3.733	2.120
3	Vertical work	Jules	392.627	37.074	456.248	35.414	2.775
4	Ability	Watt	568.341	143.093	862.383	240.946	2.346
5	Push the force	Newton. M 2	39.782	5.370	45.244	5.848	1.538

The (t) table value at the degree of freedom (8) and the level of significance $0.05 = 2.306$.

Table (2) shows that the arithmetic mean value of the variable of the reaction indicator for basketball players is (286.143), and the standard deviation is (45.467). While the arithmetic mean of the handball players in the same variable is (389,765), and the standard deviation is (42,632). A calculated test (t) value is (2.641) for the independent samples which is greater than the value of the table (t).

The researcher believes that the basketball players did not achieve a result or superiority. This is due to the contact time, which is one of the equation two sides that the skill is performed by taking one step so the big amount of time as well as the height obtained by the player during an push up are little. This could affect negatively on the reaction indicator, while we note the handball players in this variable, although the contact time is somewhat large, but it is better than the players of the basketball, which increases the factor of the reaction of the earth. Sareeh Abdul Kareem referred to the fact that whenever contact time decreases, the earth's reaction becomes stronger (131 : 6).

The table above shows that the arithmetic mean value of the kinetic energy variable of the basketball players is (11.454), and the standard deviation is (3.147), while the mathematical mean of the handball players in the same variable is (15.315). And the standard deviation is (3.733). For the purpose of testing the



hypothesis regarding the difference. For the independent samples, the calculated (t) value reaches at (2.120) which is less than the table (t) value.

The researcher has an opinion that the sample of the study has taken the test by taking only one step so the preliminary movement of performance has a large role in the output power, the faster the movement, the better the output of power is better than if it was stable. This has been observed with the research sample. This is confirmed by Iman Shaker stating that the horizontal speed is the main source for obtaining the vertical height after the push with the least decrease of speed at the start (194: 1), in addition to the strength of the foot's muscles which have a role in achieving the output of the force significantly.

The researcher believes that the effect of the angle of the knee joint through bending and stretching has a significant role in achieving the best output of the strength where the bending of the knees is considered the important variables that affect the time of standing up and then on the output of power through an increase in the push in less time. However, it has an impact on the muscles that it produces a huge strength helping stretch of joints to achieve a good output at the push moment. It's connected with time, as there is a linear correlation between time and the push. Risan Khraibut and Najah Mahdi Shalash indicate that muscle contraction generates strength which should be in a very short time. Because the force, to be more effective in terms of pushing the body up, must be conducted at a very high speed (267: 2).

The table above shows that the value of the mathematical mean of the vertical position variable for basketball players is (392.627), and the standard deviation is (37.074). While the mathematical mean of the handball players in the same variable is (456.248), and the standard deviation is (35.414). For the purpose of testing the hypothesis of significance of difference, the calculated (t) value is (2.775), which is greater than the table (t) value.

The researcher comes up with a notion that the variable capacity depends on the other variables, especially the achieved position, which is one of the equation sides. However, the research sample has made a difference between the players of basketball and handball, for the advantage of handball players. This has affected the ability output that the time is inversely proportional to the ability in addition to that the movement has a large role in achieving high capacity. And this is confirmed by Sameer Mislut that the effect of force is greater when the movement is done quickly (short period), that is to say there is a direct correlation between capacity and movement speed (178: 3).

The above table shows that the value of the arithmetic mean of the power push variable for the basketball players is (200.530), and the standard deviation is (34.696). While the arithmetical mean of the handball players in the same variable is (242.696), and the standard deviation is (31,505). In order to test the hypothesis of difference of significance for independent samples, the calculated (t) value is (2.427), which is greater than the value of table (t).

In the opinion of the researcher, the push indicator of handball players is



much better than of basketball players, as they depend heavily on linear momentum, the larger the mass, the greater the output of power. It is noticeable that both samples receive the test by taking only one step, hence the amount of linear momentum is very little. This discloses that the amount of final movement of the body depends on the amount of force exerted and time of impact whenever the ability is large and in a short time, then the body height is higher.

The law of basic dynamics has referred to the fact that as ($F=ma$). The researcher Adel Mohammed Rushdi stresses that a push power means exerting power in the least possible time to change the momentum of the body from one direction to another, as happens in pushing the ground by foot (86: 8). In this, the push relationship is a direct relationship with power and reverse with time. The more time is, the lower the driving force is. This indicates that the speed is low. and the lower the time. The more the push is, the speed is better and greater, the higher. The role of the working muscles, legs muscles, is remarkable in obtaining a great power output.

3. Findings and Recommendations

3.1 The following findings obtained:

1 - There is a significant difference between the values of the reaction power variable for basketball and handball players for the good of handball players.

2 - There is no significant difference between the values of the variable kinetic energy of basketball and handball players, but there are apparent differences in the values of these variables for the good of handball players.

3 - There is a significant difference between the value of the variable vertical position for basketball and handball players, for the good of handball players.

4 - There are significant differences between the values of the ability of basketball and handball players for the focus foot and shooting arm for the good of handball players.

5 - There are no significant differences between the value of the variable of force push for basketball and handball players, but there are apparent differences in the values of these variables, for the good of handball players.

3.2 Recommendations

The researcher has recommended the following:

1 There is a need to emphasize the speed of approach when performing the skill of shot according to the movement duty.

2 Ensure that the use of force exercises during the training units in the research sample.

3 The need to bend the knee joint of focus foot in order to take advantage of the increase in the output of the push to obtain a high point (a



vertical distance).

4 Conduct periodic tests to identify the output of the force produced for the muscles of the body, especially the muscles of the legs in order to start training programs that develop the output of a push force.

5 There is a need to increase exercises during the training units, for a training to perform the skill of one-step shot in the study sample.

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