An Analytical Study for Some Variables Index of Biomechanical Aiming Skill for Corner Handball Players

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Abstract─The study aims to design a test to measure the preforming accuracy of the aiming skill from the corner of hand ball. 2 - Identify an indicator of the values of some biomechanical variables for the aiming skill of the corner players with a handball. The descriptive method was used by using the survey method to solve the research problem. The research sample included some specialized school players of handball for the sport season 2019-2020 and the number was (6) players. The researchers contacted a design to measure the accuracy of aiming pass for corner player to adopt it as a test to evaluate the performance of the players, in order to get precise results in the biomechanical analysis, because we adopt the successful attempt to come with biomechanical varieties. The main experiment of the research has been conducted in 3/7/2019 on research sample. A video camera was used during the experiment and a special program for sport skills analyzing was used (kinovea) 18th issuance to elicit some of the biomechanical varieties. After treating the data using a computer according to statistical program SPSS 21 Ver. A set of outcomes have been reached:

1. Speed has the essential and major role for the biomechanical variables which were studied in the research, and therefore we note that the results are not at the required level because the player moves somewhat a short distance somewhat without performing another skill such as plumping during running and thus needs a great distance to long his speed.
2. The slow transition during the supporting and pushing process leads in a slower transition during the joints of the body and then the tool and thus the speed of the ball was not good.

Keywords─ biomechanics, kinetic analysis, test, aiming skill, corner player, and handball.

I. INTRODUCTION

1-1. Introduction to the research and its importance:

The field of sport is witnessing a remarkable development in all games, whether individual or team games, and this development did not come by coincidence, but rather by the interest of those in this field and their attempt to find modern theories and employ them with the best correct scientific methods and methods to reach the highest level of performance and achievement.

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The handball game is one of the collective games and widespread in all countries of the world, which its players need to possess a high level of essential skills, particularly the aiming skill. The aiming skill is one of the basic skills of handball, because the game depends on the number of goals in determining winning and losing in addition to it is a fun skill It is fun for the spectator, and enhances self-confidence for players. The aiming skill is considered one of the important skills in handball, because it is used by a lot of players, but it needs to have a high level of accuracy of implementation this because the closeness of the attacking player to the goal and the result of aiming is the ultimate value of these measures and targeted actions (Ali Turki, 2002).

As it tries to minimize the distance between the spot from which the player is aiming and the goal, which is considered one of the important and main factors in handball. Whenever the distance is closer the more likely the success of the aiming.(Dhurgham Abdul Salam, 2018)indicates that the "player should aim quickly and not to prolong the time". In order not to allow the goalkeeper to take the time to know the movement of attacking player and not to detect the area which he will aim at. This requires a fast performance which depends on the preparatory time to perform the skill. The faster it is, the greater the strength of the force.

Harman states that biomechanics studies the interaction of different factors between the musculoskeletal system of a person and facilitate the understanding the resistances and recognize the impact of force by structural factors (morphology) of the body. The system of levers, the cross section, the joints of the body and the angular velocity of the joints (Harman, 1994). Moreover aiming from the corner area depends on the player's skillof performance that the goal angle is almost closed by the goalkeeper. It requires pushing to a corner from the player in order to open the corner of the goal to aim at the far corner. So he needs a large force dominated on the ground that results in the ground reaction to the player, moreover, that is the relationship of the force that the player aims during the rise, because through the pushing force on the ground enables him arriving to the highest point according to Newton's third law (Hussein Mardan and Iyad Abdel Rahman, 2011) .Speed is considered one of the important issues in most sport activities, especially in the activities that the player uses as a tool, as he takes advantage of converting speed as a result of the approximate sprint to the tool, which increases the speed of the tool during its starting and flying stage. handball is one of the games that needs speed in Performance by the horizontal speed obtained by increasing through the approximate run.

It will be transferred to the tool, which is the ball. The more the speed, the greater the strength of the force, therefore the speed of the ball is high. Hence the importance of research in subjecting some of the players of the specialized school to research and experimentation by using the aiming skill from the corner in order be clear image for coaches, which provides information from the mechanical side of the performance. These coaches can explain the performance more accurately and identify the obstacles facing players. During this stage, and therefore to achieve a correct performance that matches the optimal performance of this skill, which raises the level of our players in this position in terms of skill. The researchers adopted an analytical study of an indicator of some biomechanical variables of the aiming skill of corner players with handball.

1-2 Research objective

1. Design a test to measure the accuracy of the aiming skill from the angle of the hand wheel.1

2. Identify an indicator of the values of some biomechanical variables for the aiming skill of the corner players with a handball.

3. Research methodology and field procedures:

II. RESEARCH METHODOLOGY

Since the selection of the appropriate method for researching any problem depends on the nature of the problem itself, so the researchers have taken the descriptive method in the survey method as a way to reach the research objectives and hypothesis.

2.3The research sample

The research sample included some of Basra Municipality Club of handball players for the sports season 2019-2020, and the number was (6) players for each of them because they are of a good level. their percentage Of the original community is(37.5.%),and to ensuring the homogeneity of the sample in Variables that may affect the course of the experiment. The researchers conducted a statistical processe using a torsion and showed all the value of the torsion between ($\pm$ 3) (Wadea'h Yassin Muhammad and Hassan Muhammad Abd, 1999), which indicates the homogeneity of the individuals in the research sample in the anthropometric variables, (arithmetic mean $\pm$ standard deviation) (length $\pm$ 1.78) 0.20 m), (age 16.165 $\pm$ 0.752 years), (mass 70.166 $\pm$ 3.544 kg).

3.3Means, tools and devices used:

● Arab and foreign sources and references
● .(Sony HDR-XR520 video camera with frequency (100 photos / second), count (1)
● .P4 electronic computer
● .Legal handball and soccer field
● .Tripod holder (1)
● .Metal tape measure
● .Medical scale

3-4 Field Procedures of the research:

The researchers deliberately designed and codified tests to achieve the goals of the research, after looking at some available sources and references on the designing and codification of the tests.

1-4-3Steps for Designing Tests (initial test)

The researchers prepared the primary version of the tests and presented them to the experts and specialists * After reviewing the special ethics of tests and measurement in the handball game in physical education, the researcher was able to formulate a new idea to test the performance tolerance index for aiming skill from the corner. Neamah, DA, & Mustafa, U. S (2018) emphasizes that the special practice of skill performance is considered an important thing in handball because it is characterized by a fast nature and requires a performance exercise and that most of its skills are characterized by working according to the air energy system so players must have a bid being able to perform during the match (- Neamah, DA, & Mustafa, U. S) (2018).So he designed a skill a special test that was presented to a group of experts, specialists in the fields of testing, measurement and handball.

2-4-3Final formula of the test

The purpose of the test: to measure the accuracy of the aiming skill from the corner.

Tools: 10 hand balls, a handball field, a handball goal, rubber ropes as shown in the figure below, adhesive tape, a measure tape, registration form, recorder..

Figure (1) illustrates the way the test is performed

Procedures: locating the area from which the player starts the movement and that is in the middle of the field, and the way the player moves and the location where he ends, where the goal was divided into rectangles of different sizes, respectively (50, 55, 55, 65, 70) cm, starting from the right side only, according to the degree of difficulty relative to the horizontal division (goal width).As for the vertical division, the goal height is divided into three rectangles, with different sizes, respectively (60, 75, 65) cm. The spaces between the rectangles are made of ropes which made of solid rubber material with a thickness of 1 cm round shape, as shown in the figure below.

cm 60*70	cm 60*65	cm 60*55	cm 60*55	cm 60*50
cm 75*70	cm 75*65	cm 75*55	cm 75*55	cm 75*50
cm 65*50	cm 65*50	cm 65*50	cm 65*50	cm 65*50

Figure (2) shows the divisions of handball goal

Method of performance

The test player has a handball in his hand in a position which is the corner area within the stadium boundaries. Another player standing on the free throw line handles the ball to the test player receiving it and taking the approximate steps without performing the pluming and then aiming at the goal without touching the goal keeper area line.(I.e. without legal errors) and the presence of a defensive player limits the exceeding of the area assigned to him and his defense is negative (without hindering the attacking player), given to each laboratory (5 attempts).
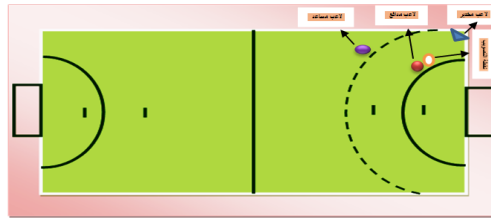
Figure 3 shows the standing areas of the test, defense, and assistant players

Recording

gives grades to the tested from right and consecutive (5, 4, 3, 2, 1) for the higher rectangles.

1. The tested gives grades from the right and respectively (3, 3, 1, 1, 1) for the lower rectangles.

2. The laboratory gives grades from right and consecutive (4, 3, 2, 1, 1) for the middle rectangles.

3. The player is given zero if the ball is struck by a column or crossbar or it is outside the boundaries of the goal.

4. The player is given zero if the ball is struck by a column or crossbar or is outside the boundaries of the goal.

5. If the ball touches any of the rubber cords, it will be given half of the pitch for both regions

6. The value of the test ranges between (0-25) degrees .

The researchers conducted a reconnaissance experiment on some of the players of the specialized school in Basra Governorate, who are (3) players ensure the research problem (research experiment) and its purpose was to identify the appropriateness of measurements and identify some of the requirements for testing before proceeding with rationing.

5-3 scientific treatment of the test.

As the researchers codified the test and applied the scientific principles for experiment in biomechanics, as the following:

1-5-3 Validity of the test

To achieve the purpose of the test,the researchers distributed the test form to a group of experts and specialists in the field of handball tests and measurement to ensure the validity of the test for its suitability with the research sample. It was found that the test measures what was designed for it.The researchers used the (apparent) arbitrators 'honesty' which was 100% after making some adjustments. Also,the researchers performed the test on a sample of (5) players from the Basra Municipality Club for the purpose of finding the stability of the test.

3.5.2 Reliability

In a repeat way, the researchers repeated the test a week after the first test on the same sample that was tested (5) players. Then, the researchers used Pearson (R) for the two tests. It was found that there is a statistically significant relationship between the two tests using the re-test method as shown in table (1).

Table (1) shows the degree of stability for the indicator and the accuracy of the performance of the correction skill from the angle

The Test	The First Test		The Second Test		Calculated value of r	Sig
	$\bar{s}$	R^+	$\bar{S}$	R^+		
Measuring the accuracy of angling skill performance	20.600	2.059	16.600	1.140	**0.891**	.042

3.5.3 Objectivity

The objectivity is conducted by two arbitrators and after recording the results they were statistically processed using the Spearman Law as shown in table (2).

The Test	The First Judgment		The Second Judgment		Calculated value of r	Sig
	$\bar{s}$	R^+	$\bar{S}$	R^+		
Measuring the accuracy of angling skill performance	19.00	2.449	17.00	2.236	0.975	.005

3.6 Biomechanical variables

1. **1.**Reaction Force Index=The maximum height reached by the center of gravity of the body mass divided by the time of propulsion(Banan Raji Karim,2017).
2. Energy kinetic =Half the mass of the body times* the square of its speed. (M.C.Siff)
3. Work = The total of the force multiplied by the displacement caused by the force (Raymond A. Serway, John W. Jewett, Jr,2013)
4. Power = Work performed multiplied by unit of time(Eugene Hecht, 2018).
5. Impulse = The total of multiplying the amount of force in its time (Mohammad Jassim and Haydar Fayyad, 2010).
6. Ball speed **:**It is measured by calculating the distance between the center of the ball in a given point and another point after (5) images divided by the time of the center of the balls moves between two points. It is measured in meter / second (Dergham Abdel Salem Neama, 2015)

3.7 Main experiment:

The main experiment was conducted on 3/7/2019 at the closed hall of the South Oil Club in Basra Governorate, where the correction skill is performed from the angle area.

3.8 Video photography:

The researchers have used a Korean-made video camera with a frequency of (100) images per second, the camera was placed 4.5 meters away from the player at a height of (1.25 m) measured from the ground to the focus of the camera lens, through which the biometric mechanics of the player are fully recognized.

3.9 Computer analysis (kinetic of performance):

After transferring the video clips from the camera to the computer and storing them, the analysis was conducted by (Kinovea) program, the eighteenth edition is installed on the computer. This program is dedicated to the analysis of sport movements. So after photographing the experiment, the researchers transferred it from the camera to the computer. The best attempts were chosen and the researcher extracted biomechanical variables of performance through the analysis program.

3.10 Statistical means:

The data was analyzed statistically by the statistical bag (spss) version (21) to extract,1.arithmetic mean 2. standard deviation 3.percentage (Mohamed Abdel-All Noaimi and Hussein Mardan Omar, 2006) 4.pearson 5.spearman's Law

III. DATA ANALYSIS AND DISCUSSION

This section included a presentation of the study results indicated by the results of the tests that the researcher based on in his study. It was presented in the form of tables, through which we can interpret statistical numerical values to show the extent to which these results are true or not and the extent to which they achieve study hypotheses and objectives," The analysis of information means the elicitation of evidences, quantitative and qualitative scientific indicators, that prove to answer questions and confirm acceptance or non-acceptance of hypotheses"(Saleh Hamad Al-Assaf, 1995).After the data were processed statistically, the results appeared, which are shown in table (3)

Table (3) shows the arithmetic mean and the standard deviations of correction skill from the angle of the study sample .

No.	Biomechanical variables	measuring unit	Arithmetic mean	standard deviation
1	Reaction strength indicator	m/s	1.1751	129600
2	Kinetic energy	gal	257.6315	60.06030
3	Work	gal	1958.3032	252.73293
4	Power	Watt.	1390.2129	67.78819
5	Impulse	Newton*s.	920.5930	166.88302
6	Ball speed	m/s	23.3467	333570

According to the above table, it is shown that the reaction strength indicator of the sample was not at the required level because the skill needs to shed a great force to overcome the moment of inertia. This change does not happen except by shedding strength. This is what Newton's Law of Movement referred to (Newton's second law of motion states that the momentum of a particle can not only be changed unless the force is working on it. Its change is given by ((ma = F)). (Kip S. Thorne and Roger D. Blandford, 2017). [1]The researchers attribute this to the fact that the aiming skill from the angle needs to produce a large force for the lower limbs. As a result, the muscles acquire the appropriate force, increase their speed and reduce their performance time. This means the development of the force marked by speed which works to develop the speed of movement performance because speed plays an important role in skill performance. It is specifically dependent on the muscle strength. That is, "the muscle strength is one of the dynamic factors for kinetic performance as well as the reason for its progression" (Essam Abdel-Khalek, 1999). Moreover, the development of muscle strength leads to the development of a dynamic characteristic at the same time (Fadel Kamel, 1992) [2].

Researchers believe that the kinetic energy possessed by the player is low, because the amount of kinetic energy depends on the mass of the body in addition to its speed. So, we note that playing moves a little distance between 2 - 3 steps, so the amount of speed is small and this is what Wissam Adyab Faesil (2019) indicated. That is, he states "the speed often appears related to the muscle strength or linked to the speed of direction and speed change is a sign of muscle responses resulting from the rapid exchange of states of contraction and relaxation of the muscles."2. Fadel Kamel, "The Impact of Muscle Strength Development on Military Engineering Combatants", MA Thesis, University of Baghdad, College. Physical Education, 1992, p. 40

Researchers believe that the mechanical work has a great role in this skill. It depends on the amount of force produced by the human body, represented by the strength of the muscles of the anchor foot, as well as the displacement of the body, which is an indication of the momentum of the ground during the correction phase, and this is what was indicated by Newton's reaction law (in The state of the interaction of two objects, the force exerted by object 1 on object 2 is equal in size and opposite in the direction of the force) (Raymond A. Serway, John W. Jewett, Jr, 2014). Also, researchers see that the angle of flight is of great importance as an essential and important element which works to determine the level or point T the player reaches it as a projectile. In addition, the angle of flight depends on the angle of rise. That is, as the angle of rise is low, the angle of flight is also low. This is what Muhannad Faisal Salman indicated "a decrease in the angle of flight comes due to the low angle of rise. There is a correlation between the angle of flight and the angle of rise and whenever the rising angle increased, the flight angle increased, and vice versa" (Muhannad Faisal Salman, 2009).

Researchers believe that the ability depends on the amount of mechanical work during a short period of time, the lower the time period, the more the amount of capacity is good. Moreover, the strength and the distance the body moves has a big role, as we note that the distance the player moves is small to perform the approximate steps, as well as that Movement is from stillness so it needs strength to overcome the amount of torque of its inertia so we note that the speed is slow and therefore the amount of force is also small, and this is confirmed by the law of power $p = w / t$ (Raymond A. Serway, John W. Jewett, Jr, 2004).

Researchers see that pushing has a fundamental and significant role in the shooting process, especially for corner players, as the muscle strength product for the two men's muscles depends mainly on weight training of different weights and the use of medical balls and with performance that depends on strength and speed during a few time period and all of this has led to the development of strength distinguished at the speed it needs Kinetic action in aiming and thus positively affected the performance and this is confirmed by (Muhammad Tawfiq Al-Wailili, 2001) that the player who jumps to the top of what is possible for the aim is to be the winner as he can score better, where the relationship of payment is a direct relationship with a For strength and inverse with time, the more time increases, the less the driving force, and this indicates that the speed is low and the less time, the better and the stronger the speed is high, and this is what the Law of Payment = power x time indicated (Hussein Mardan Omar and Iyad Abdel Rahman, 2018) . The researchers see that it is the kinetic chain performed through the momentum of the stage of advancing the foot of the leg, starting with the extension of the entire joints of the body, especially for the leg of the leg, and ending with the instep itself and then the shoulders and arms, as these variables contribute to finding a suitable angle of flight for the instrument.

Researchers believe that the speed of the ball comes as a result of the movement of the movement from the lower extremities to the upper extremities through the trunk, which is the largest part of the body and then the arm and thus the tool, which is the ball. The better the preparation during this period, the faster the speed of the ball, and the researchers point to the importance of tension in skill performance Fast and strong and with a rapid movement of the trunk, opposite the tight bow leads to reducing the angle of the hip by pulling the arm from behind to the forward and quickly and as a result of continuing movement and following the ball at the moment of aiming leads to the tilt of the trunk to the forward with the help of the muscles of the shoulder strap and the tight bow. Dergham Al-Jadaan (2012) indicates that the performance requirements are a correction skill from the corner in the handball game. When the player is aiming at the standing arm, it requires that the correction is made from the maximum special point if the correction is in the maximum angle of the goal and along the column. It requires that the place must be high, which allows enough time to achieve the best amount of accuracy due to the difficulty of aiming. (Dergham Abdel Salem Neama, 2012).

Dergham Abdel Salem and Kamel Shennin(2017) indicate that pulling the ball by hand in the shortest way to the level of the shoulder of the bent arm. Then, the player returns the target arm and the shoulder to The back produces great strength Focusing on the movement of the wrist and fingers joint in directing the ball, researchers also see that there is a direct correlation between the starting point and the starting angle and the higher the starting point of the ball is high the lower the flying angle of the ball and according to the performance requirements and the quality of the movement.

IV. CONCLUSIONS

1. Biomechanical variables have an important impact on the outcome of ball velocity and accuracy for handball corner players because they have an effective role.
2. To obtain an ideal angle for the player to rise as a result of an opponent that resulted in a reduction in the amount of energy lost during the authority to pay.

3. The speed has the fundamental and significant role on the biomechanical variables studied in the research, and therefore we note that the results are not at the required level because the player moves somewhat small distance without performing another skill such as making his movement slow by running and thus needs a great distance to increase his speed.

4. The slow transition during the backup and push operations resulted in a slower transition during the joints of the body and then the tool, and therefore the speed of the ball was not good.

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