International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 03, 2020
ISSN: 1475-7192

The effect of some mechanical properties by using optical means to develop the kinematic index and some biomechanical variables for the accuracy of high-flying aiming with a hand ball

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Abstract

The importance of biomechanics as the science concerned with the study of movement for the athlete by analyzing, clarifying, improving and developing a lot of mathematical skills based on the latest tools and devices represented by imaging devices that achieved accurate objective results in motor performance, as well as the importance of using visual aids in units were discussed. Educational, which works to improve the level of performance, especially the accuracy of remote aiming by jumping high with the hand ball.

The importance of the research was evident in the fact that learning is not complete without the use of important educational aids that demonstrate the importance and effectiveness of mechanical properties and the extent to which they are effectively applied during the skill of remote correction by jumping high with a hand ball.

This section also included the research problem, which was embodied in the study of the effectiveness of mechanical properties based on the optical means system in order to develop the kinematic transmission index and some biomechanical variables for the accuracy of shooting by jumping high with the hand reel.

As for the research goals, they are as follows

1- Identifying the effect of mechanical properties by using the optical means system applied within an educational curriculum in developing the kinematic transmission index for the accuracy of shooting by jumping with a hand ball.

2- Identifying the differences in the values of some biomechanical variables for the accuracy of shooting by jumping aloft with the hand ball between the pre and post tests of the experimental and control groups.

3- Identifying the differences in the values of some biomechanical variables for the accuracy of shooting by jumping high with the hand ball between the experimental and control groups in the post tests.

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As for the research hypotheses, they are as follows

1- The mechanical properties of using the optical aids system applied within the educational curriculum have a positive effect on the development of the kinematic transmission index for the accuracy of shooting by jumping high with the hand ball.

2- The existence of differences in the values of some biomechanical variables for the accuracy of shooting by jumping aloft with the handball between the pre and post tests of the control and experimental groups.

3- There are differences in the values of some biomechanical variables for the accuracy of shooting by jumping high with the hand ball between the experimental and control groups in the post tests.

Keywords: *biomechanical, high-flying aiming, hand ball*

I. Introduction

Reaching high levels of sport requires an integrated preparation in terms of physical, technical and mechanical aspects. Many developed countries have achieved sports achievements and won championships depending on scientific development in the sports field.

As the development in this field came as a result of research and studies based on the accurate scientific foundations carried out by researchers and experts in the field of physical education as well as the link of physical education with other sciences such as physiology, physics, chemistry and others. Biomechanics, which is interested in studying the movement of the athlete by analyzing, clarifying, improving and developing a lot of mathematical skills based on the latest tools and devices represented by imaging devices that have achieved accurate objective results in kinematic performance and knowledge of his faults. Important educational methods that improve the level of performance, especially the skill of correction with hand ball

Hence the importance of research in the fact that learning is not complete without the use of important teaching aids that demonstrate the importance and effectiveness of mechanical properties and the extent to which they are effectively applied during the skill of remote correction by jumping high with the hand ball

This importance comes as a result of the development of defense in its various forms in addition to the difficulty of penetration, which hinders the movement of the attacking player in penetrating the defense formation, and accordingly this topic has been studied in order to obtain positive results that give its effective effect in a way that contributes to the implementation of the offensive requirements to perform the motor duty through the use of accuracy The skill of remote correction from jumping high with the hand ball in order to reach the performance of the mechanical requirements imposed by the conditions and the required biomechanical duties and in order to obtain a positive result that gives the effective effect and contributes to the implementation of the skills of the handball game.

Research problem

The remote shooting skill by jumping high with handball is one of the basic and necessary skills for all handball players, and it is a way to overcome defensive plans with handball and it is one of the basic offensive skills in influencing the outcome of the match as any failure in the level of technical performance of this skill causes a great failure in resolving The result of the match in some cases and since this skill requires reaching the highest altitude and aiming strongly at the goal, the research problem has been embodied in studying the effectiveness of mechanical properties based on the optical means system in order to develop the kinematic transmission index and some biomechanical variables for the accuracy of remote aiming by jumping high with the hand ball.

As a result of previous studies and research at the local and Arab levels, we find that there are differences in the biomechanical properties of each player compared to others, and this means that there are differences in the biomechanical kinematic path of each player separately, and accordingly the researcher decided to solve this kinematic problem following an ideal kinematic model through the use of Computer as a visual display segmented segmented through the slow display of movement in a manner that ensures a clear view of the kinematic performance coherently and according to the technical performance stages of the correction skill in order to find mechanical solutions to the kinetic duty on the basis of the specific mechanical properties of the accelerated path of the center of gravity of the body in the horizontal direction by taking the three steps to create a fulcrum Good to serve the player's recovery distance and achieve the largest possible momentum and in the shortest time in order to invest the largest amount of potential energy to convert it into kinetic energy to reach the highest height in the flight stage, in addition to the above, we find that the application of mechanical properties of the art of performance is the method of the biomechanical solution to the motor duty The required that is reached through the application of an educational program, depending on the visual aids system, etc. The biomechanical properties of the skill to be studied, taking into account the conditions and mechanical foundations affecting the basis of the biological characteristics of the player and under unified educational situations, we put the conditions and laws of the competition into consideration on the basis of the single mechanical properties of similar movement states and this is possible of course because the art of sports performance represents a method of solving the kinetic problems that produce There is a general basis for a player's biomechanical properties.

research aims

1- Identifying the effect of mechanical properties using the optical aids system applied within an educational curriculum in developing the kinematic transmission index for the accuracy of shooting by jumping with a hand ball.

2- Identifying the differences in the values of some biomechanical variables for the accuracy of remote aiming by jumping aloft with the hand reel between the pre and post tests of the experimental and control groups.

3- Identifying the differences in the values of some biomechanical variables for the accuracy of shooting by jumping high with the hand ball between the experimental and control groups in the post tests.

Research hypotheses

1- The mechanical properties of using the visual aids system applied within the educational curriculum have a positive impact on the development of the kinematic transmission index for the accuracy of shooting by jumping with a handball.

2- The presence of differences in the values of some biomechanical variables for the accuracy of shooting by jumping aloft with the handball between the pre and post tests of the control and experimental groups.

3- There are differences in the values of some biomechanical variables for the accuracy of shooting by jumping high with the hand ball between the experimental and control groups in the post tests.

II. Research Methodology:

The research method is the method that the researcher uses to study the problem in order to reach the truth and reveal it, and it is also one of the means that helps researchers to test their hypotheses, and the type of problem to be studied is what determines the research method used to solve the problem, and based on the requirements of the study the researcher used the design He called the two-group method which "is one of the best experimental designs".

Research community and sample

The process of selecting the sample is one of the main steps for collecting information and data, and the researcher often resorts to determining a sample community based on the phenomenon or problem he chooses, meaning that the researcher chooses a sample that he deems faithfully representative of the original community he studies (), and accordingly the researcher chooses the research sample in the intended intentional way. The sample of the research was Naft Sports Club players

In Basra for the 2019 season, ages (16-17 years), the number of the research sample was (10) players, divided into two groups, the control group (5) players, who applied the usual curriculum by the club's coach and the experimental group (5) players, who applied the educational curriculum. The proposal is to use the visual aids system in addition to (5) players from the training center players in Al-Asma'i, and they were the pilot experiments sample and thus the percentage of the sample to the research community of (19) players

(71.42)% where goalkeepers were excluded from the research sample because of their defensive duties that they carry out by guarding the goalkeeper and (2) from the players due to injury. Height, weight) and the level of accuracy of high-flying shot with handball for both the pilot and control groups.

As it became clear from the results shown in Table (1) that the value of the coefficient of variation for the control group ranges between (1.21-25)%, while the value of the coefficient of variation for the experimental group ranged between (1.28-28.48%), and this means the good selection of the sample and its homogeneity because The

values of the coefficient of variation are close to (1%), the homogeneity is high, and if it increased to (30%), the phytophthora is heterogeneous.

Procedures for preparing visual aids

In order to prepare the visual aids, the following steps were followed:

1- The researcher analyzed nine attempts to perform the remote shooting skill by jumping aloft with the handball for the best three players from the Iraqi youth team, where the researcher approved the player who performed the best attempt based on the kinematic analysis of the attempts where the attempt obtained the best mechanical variables as well as the accuracy of performance What characterized this attempt, which was considered the model that the researcher used as a visual means for the proposed educational curriculum.

2- The researcher cut the pictorial skill into sequential images, where the skill was cut by the (Hero soft 2000) program, and the cut images were stored in the calculator on the hard disk and each image was given a specific number of its own.

3- By using the (acd see) program, the researcher summoned each image separately and carried out the process of clarifying the image, enlarging it and preparing it for printing.

4- The researcher printed the images using an HP printer.

5- As a result of the researcher's knowledge of the research and scientific studies that dealt with studying the skill of remote aiming by jumping high with the hand ball, as well as studying the shapes in the printed images of the skill, the researcher was able to identify the images and places for the visas in line with the important movement parts in each stage of the performance of the correction skill The distant jumps with the hand ball and the researcher also wrote the explanation and applied it using a verbal communication method that accompanies the appearance of the visas at every stage of the movement parts at the same time.

6- Determine the shape of the visas to be added to the photos.

7- Using the (adobe photo shop) seventh edition program, the photos that were selected were called to place the appropriate visas on them, and each picture was given a specific number and stored in the form of a folder inside the computer.

8- Using the (video editor) seventh edition program, the sequential images movie in paragraph (2) was called and placed in the field (va), which is the area designated for video clips and images in the program, and the images that were called in paragraph (7) were deleted and each one placed in its place.

* (va), which is the field dedicated to videos and images in the (video editor) program

The same image on which the visas were placed using the (adobe photo shop) program, with control over the period of time in which the image must remain fixed, with what suits it from a verbal comment that the researcher prepared for each image.

9- Using the (mp3) device as shown in Figure (1), the researcher used the verbal communication method for each image, and then inserted it into the film using the (video editor) seventh edition and placed it in the field of (Aa), which is the area devoted to sound clips in the program.

10- After that, the sequential image film and the verbal communication of each image were combined using a program

(video editor) By instructing (create video file) the final film was created.

11- The researcher converted the film from the hard disk to a CD, where the learner could watch the film via video (cd) or by the computer.

Field experiment process steps

The steps for conducting the field experiment included conducting the pre-video filming on the research sample, then applying the educational curriculum using the visual aids system on the experimental group for a period of (8) weeks, at two units per week, and after completing the implementation of the educational curriculum, the researcher conducted video post-imaging on the research sample.

Tribal video of the research sample

The pre-video filming of the research sample was conducted on 1/12/2019 at 4:00 pm on the stadium of the Technical Institute in Basra, where the pre-video filming was conducted to test the accuracy of the remote aim by jumping high with the handball on the experimental group and the control group of the research sample where each player performs (6) Attempts, three attempts to shoot on the upper right side of the goal, and three attempts to shoot on the upper left side of the goal, and the attempt that got the most accuracy in the goal was analyzed.

The educational curriculum used

The researcher prepared an educational curriculum using the visual aids system according to some mechanical properties. The curriculum consisted of (16) educational units that lasted for (8) weeks and at two units per week at a rate of (50) minutes per educational unit as shown in Appendix No. (2). The implementation of the educational units took place on Tuesday, 2/12/2019, as the educational curriculum included exercises to develop the kinematic transmission index and develop some biomechanical variables and exercises that work to develop the accuracy of remote correction by jumping high with handball, as it included jumping exercises in addition to terrain exercises, kinesthetic exercises and correction exercises With the ball, the researcher was keen to use the general and private methods used in teaching and developing motor skills in addition to stimulating the desire and motivation of the players as well as taking into account the researcher the principle of graduation in the educational process from easy to difficult and the variables related to the study have been controlled by making use of some assistive devices and exercises That would enable the learner to acquire propulsion and motor transport correctly. The educational unit has been divided into three sections depending on Some sources (1) (2).

The time allotted to see mechanical properties (mechanical performance) has reached

Through slow presentation and repeated repetition during the implementation of the educational curriculum (160) minutes, i.e., 20% of the total time allocated to learning.

Post videotaping of the research sample

The remote video imaging of the research sample was carried out on 1/25/2019 at 4:00 pm on the stadium of the Technical Institute in Basra, where the remote video imaging was performed to test the accuracy of the remote aim by jumping high with the handball on the experimental group and the control group of the research sample where each player performs (6) Attempts, (3) attempts to shoot on the upper right side of the goal, and three attempts to shoot on the upper left side of the goal, and the attempt that got the most accuracy in the goal was analyzed.

videography

The researcher used a (2) Japanese-made 8 mm sony camera with a frequency of 25 images / second, and the researcher also used sony video films with a tripod during the exploratory research experiment and the main experiment, the cameras were installed in two locations, one side and the other diagonal And they were installed on the basis of the main axes of the body are (the deep cross axis, where the camera represents No. (1), the transverse axis extending from the side of the aiming arm and was placed on a tripod, and the distance between the aiming lens and the middle of the aiming circle was (20.7) m and on The height is (1.40) m from the ground level, and the camera No. (2) represents the diagonal axis extending from the back of the test player, and the distance between the focus of the camera lens and the center of the aiming circle was (7.50) m and at a height of (1.40) M from the ground level, where this camera was used to obtain the approximate jog speed, and the scale was photographed with a length of (1) m to be a reference for measurement when performing the analysis.

Computer analysis

The researcher analyzed the video film using the electronic calculator of the (Pentium 4) laptop type, and the researcher analyzed the attempt that obtained the most accurate performance in performing the remote aim by jumping high with the handball out of three attempts for each side of the upper target (left and right) and the analysis procedures included steps The following:

First . The video material was converted from the video tape to (files) format using the (snazzy) conversion card and then to the CD-ROM, in order to facilitate the steps of computer analysis.

Second: The animation was cut by the (hero 2000) program into clips to extract the specified variables and those clips were stored in the form of files stored in the calculator files.

Third. Then these files (motion clips) were transferred to the (dart fish) program installed on a laptop calculator (with high specifications), which is a program dedicated to analyzing mathematical movements.

Biomechanical variables for research and method of extracting them

The biomechanical variables for the research were chosen in a manner commensurate with the goal set for it and according to the opinions of experts and specialists if the number of variables that were selected reached

(33) variables for each player, as the researcher adopted the selection of the variable that obtained a percentage from (80%) to (100%), which included The variables that have been selected are as follows.

A- Variables of the approximate run stage

1- First step distance

2- The second step distance

3- The third step distance

4- The speed of the body during the approximate run

B- Variables of the moment of the first touch in the landing phase

1- The angle of approach (landing) to the first touch in the landing stage

2- The knee angle of the focal point, the moment of the first touch in the landing stage

3- The hip angle at the moment of the first touch in the landing stage

4- The angle of bending the trunk at the moment of the first touch in the landing stage

C-Variables of the pivot moment in the end stage of the vertical stop section (start of push)

1- The knee angle of the pivot, the end of the vertical stop section (the start of the push) during the pivot moment.

2- Hip angle, pivot moment (start of thrust) at the end of the vertical stop section

3- The angle of bending the trunk, the moment of fulcrum (the start of thrust) at the end of the vertical stop section

4- The height of the hip point, the moment of fulcrum (the start of the push) at the end of the vertical stop section.

5 - The horizontal distance of the hip from the pivot foot (the start of the push) at the end of the vertical stop section

6- Landing time

D- The variables of the moment of impulse (last MS) at the end of the section of the peak tide of thrust

1- The knee angle of the pivot at the moment of thrust (last touch) at the end of the maximum extension section of the thrust

2- The hip angle at the moment of thrust (last muss) at the end of the extreme tide section of the thrust

3- The angle of bending the trunk at the moment of thrust (end touch) the end of the extreme tidal section of the thrust

4- Payment time

5- Time of contact with the ground (landing time + push time)

6- Rising angle

7- The starting angle of the body

8- The speed of the body's launch

T- variable of the kinetic transmission index for the fulcrum stage

And - variables during the flight phase

1- The angular velocity of the aiming arm during the flight phase, the pre-throwing moment

2- The angular velocity of the trunk during the flight phase, the moment before throwing

P- Variables of the throwing stage

1- The height of the hip point at the moment of throwing

2- The elbow angle of the aiming arm at the moment of throwing

3- The shoulder angle of the aiming arm at the moment of throwing

4- The angle of bending the torso at the moment of throwing

5- The height of the starting point of the ball

6- Ball starting angle

7- Ball launch speed

Methods of extracting biomechanical variables for research

First. Angle variables (degrees)

A- The angles of the joints of the body

1- The knee joint angle: It is the angle between the line connecting the ankle joint and the knee joint and the line connecting the hip joint and the knee joint, which is measured from the back.

2- The angle of the hip joint with the pivot leg: It is the angle between the line of the trunk and the thigh and is measured from the front.

3- The shoulder joint angle: It is the angle between the hip joint to the shoulder joint and the line connecting the elbow joint to the shoulder joint, measured from the front

4- Elbow joint angle: It is the angle between the humeral line and the forearm, measured from the front

5- The angle of bending the trunk: It is the angle between the line connecting the hip joint to the shoulder joint with the horizontal line passing from the hip joint horizontally and parallel to the ground and measured from the front.

B- Angles of approach, rise and departure

1- The angle of approach (landing): It is the angle between the horizontal line passing through the point of contact of the foot with the ground at the moment of the anchor with the line connecting from the same point to the point of the hip joint, which is measured from the back.

2- The angle of advancement: It is the angle between the horizontal line passing through the point of contact of the foot with the ground at the moment of thrust with the line connecting from the same point to the point of the hip joint and is measured from the front.

Table (1) shows the arithmetic mean, standard deviations, mean difference, level of development, and (T) value.

Calculated for the values of some biochemical variables of the approximate run (first step distance, second step distance, .third step distance, approximate run speed) for pre and post -tests of the experimental group

Biochemical variants	Pre-test		Post-test		Differences A	Level of development	The value of T calculated	Significance
	A	STD	A	STD				
First step distance (cm)	95.22	6.20	86.32	4.40	8.9	10.31	9.88	Sign
Second step distance (cm)	87.33	7.10	96.20	5.80	8.87	9.22	13.64	Sign
Third step distance (cm)	115.22	8.60	100.27	6.30	14.95	14.90	13	Sign
Running speed is approximate	2.84	0.39	3.84	0.20	1	26.04	10.52	Sign

- The researcher attributes that the development in the distances of the three steps is due to the researcher's use of visual aids in the learning process, as the use of visual aids as an educational method is of great benefit in the process of learning motor skills, where the use of visual aids using a computer is a departure from the traditional pattern followed in the process of learning motor skills It achieves better skills learning by dividing the presentation of skills into their minute details as well as into the accuracy of the presentation of skills through its ability to slow the presentation of the skill, which provides a good opportunity to know the minutes of movement and the speed of its absorption, and that the use of different educational methods in the learning process makes the learning process in it positive and thus affects On the educated individual so that he is able to correct his conditions and movements and

thus the educational process will be more positive and effective and help to shorten the time allocated to learning and work to attract students' attention and arouse their interest and excitement (1).

The researcher also instructs that the application of the educational curriculum that adopted appropriate learning methods for young people and the use of selected exercises according to some mechanical characteristics as well as the use of feedback in order to correct errors and adjust performance all of this helped the development of performance for this group and this is confirmed by YaroubKhayun is that to learn skills by using Feedback accelerates learning rate (2)

In addition to the above, the researcher attributes that the development in the distances of the three steps is due to the effectiveness of the mechanical properties used in the exercises applied within the educational curriculum, where the experimental group was able to adjust the distance in the correct time as the use of visual aids in the educational curriculum provides a good opportunity to understand the skill and assimilate it faster as the presentation The ideal model in front of the learners leads to improving the motor performance and helps to comprehend and perception of the learner, as well as that the use of the illustrated model and its presentation to the learners leads to knowing what is required of the learner clearly and more understanding, so that viewing the presentation of the model gives the learners integrated pictures of the motor performance of the skill and this is confirmed by sources Is that "using visual control to adjust the final steps before getting up leads to elimination."

From any accumulated error and applying that without any loss of time, and thus does not lead to a loss in horizontal velocity. "(3)

The first step distance variable achieved an evolution rate, as it achieved the third rank among the proximity jog variables, while the second step distance achieved the fourth rank, while the third step distance achieved the second rank in relation to the level of development.

- The researcher attributes that the development in the approximate jog speed variable is the result of the development in the three step distance variables in the approximate jog as the development in these variables led to the development of the approximate jog speed, especially since the second step has become relatively long, which reduces the rate of speed as a result of increasing the amount of disability In the end, the researcher also believes that the development of the proximity jogging variable at that time helps to convert the speed to the vertical direction more by storing the kinetic energy in the form of potential energy that affects the working muscles, and that the development in the experimental group came as a result of the effectiveness of the educational curriculum exercises according to mechanical properties Which had an impact on the development of this variable as an inevitable result, as sources affirm that "correcting errors and feedback results in an increase in the individual's performance capacity as a result of performing physical exercises for several days, weeks or months, by adapting the body's systems to the optimal performance of exercises." The proximity jogging speed is a high development rate, as it has achieved the first place among the proximity jog variables.

III. Conclusions

1- The experimental group achieved a significant improvement in the variable of the first and second three distances

And the third where it surpassed its control counterpart in the values of these mechanical variables

The third distance achieved the highest development rate for these distances.

2- The experimental group achieved a significant development in the approach jog speed variable, the approach angle variable (landing) the moment of the first touch in the landing stage, the knee angle variable for the focal leg, the moment of the first touch in the landing stage, and the hip angle variable for the focal leg, the moment of the first touch in the landing stage, as it surpassed its control counterpart In the values of these variables.

3- The control and experimental groups did not achieve a significant improvement in the variable tilt angle for the moment

The first MS is in the decline stage, where the two groups are homogeneous in the values of this variable.

4- The experimental group achieved a significant improvement in the knee angle variable for the support leg for a moment

The start of the thrust at the end of the vertical stopping section, the variable of the hip angle, the moment of the pivot, the start of the thrust at the end of the vertical stopping section, the variable of the height of the hip point, the moment of the pivot, the start of the thrust at the end of the vertical stopping section, and the time of landing variable, as it surpassed its counterpart Controls in the values of these variables.

5- The control and experimental groups did not achieve a significant improvement in the two variables, angle of inclination

The trunk and the horizontal distance of the hip from the pivot foot The moment of fulcrum (start of thrust) at the end

Section the vertical stop where it homogeneous in the values of these two variables.

6- The experimental group achieved a significant development in the variable knee angle of the support leg for a moment

Pushing (last touch) at the end of the maximum extension section of the thrust and variable hip angle moment of thrust (last

MS) at the end of the maximum tide section of the thrust as it surpassed its control counterpart in the values of this mechanical variable.

7- The experimental group achieved a significant improvement in the variable hip angle at the moment of thrust (Akermus)

At the end of the high tide of thrust section it outperformed its control counterpart in this value

Mechanical variable

8- The experimental group achieved a significant development in the payment time variable at the end of the moment of payment The peak tide of the thrust section outperformed its control counterpart in the values of this variable The Mechanic.

IV. Recommendations

In light of the researcher's findings, he recommends the following:

1- Emphasis on the application of biomechanical properties by young players due to their impact

Positive in developing the technical performance of the skill of shooting precision by jumping high with the hand ball.

2- Emphasizing the importance of investigating ideal angles at the moment of landing and rising in order to obtain

On a path to fly the center of gravity of the player's body during the moment of aiming.

3- The necessity of using the visual aids system included in the educational curriculum and which contributed to

Developing the precision of remote aiming by jumping high with the handball and some biomechanical variables, which achieved a positive learning and development case for the skill of remote aiming by jumping high with the handball due to its importance and its ability to give learners the best kinetic perception of the skillful performance depending on the requirements and mechanical foundations compared to the traditional method.

3- The need to emphasize the importance of using modern hardware and software in using the analysis system

Pictures to measure biomechanical variables to reach correct and objective results of performance

Locomotor.

4- The necessity of adopting the important mechanical foundations and factors for the projected objects, which were represented in

Variables of body speed and angle of flight and height of the hip joint point to achieve a flight path

Ideally suited to technical performance requirements in line with the required motor duty.

5- Conducting research and studies that include studying the locomotor transport index in sporting events The difference is that the kinetic transmission index is of great importance in achieving the largest amount of energy

Total mechanical, thus achieving high performance

6- It must be emphasized that the contact time with the ground at the vertical stop is slightly in order

The largest amount of mechanical energy investment.

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