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The Effect of Exercises (Educational - Corrective) According to Some Biokinematic Indicators and the Accuracy of Motor Performance of the Shooting Skill of High Jumping Handball for Juniors

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BSTRACT

Kinetic analysis is one of the methods of biomechanics that we must invest in learning motor skills in the game of handball, after which it is one of the main pillars on which sports biomechanics is based in the field of scientific research to facilitate the development of learning and corrective programs and solve problems that hinder reaching technical performance**, and the research problem was manifested** through the researcher's follow-up in the game of handball and motor learning, observe indirectly through kinetic analysis, where the researcher noticed that most of the players resort toto use the parts close to the axes of motion of the body with priority over their use of the distant limbs, without achieving the optimal investment to achieve the appropriate kinetic ranges, which in turn are reflected mechanically on the height of the jump at the moment of pushing, and the torso and arm ranges at the moment of throwing and aiming, and to achieve the highest degrees of strength and speed, and this is one of the mistakes made by the beginner or novice in the technical performance of the skill, as well as The research aims to identify the effect of exercises (learning – corrective) in some biokinematic indicators of the skill of shooting from jumping high with a ball for the research group, and the researcher assumes that there are statistically significant differences between the pre- and post-measurements in some biokinematic indicators of the skill of shooting from jumping high with a handball for the research group, the researcher used the methodology experimental, by designing one experimental group, as for the research sample, where (6) emerging players from the Nasiriyah Sports Club in handball were selected in a deliberate manner in order to implement the study and achieve its goals, and the researcher concluded that the learning-corrective exercises applied by the research group as a result of theTo develop the internal strength of the muscles, bones, ligaments and joints in a way that contributed to and stabilized the angles of motor performance in the direction of the motor path of the handball shooting skill, the researcher recommended the use of motor analysis as a basis in diagnosing skill errors according to the motor and temporal path and according to what was applied in the research because of its importance in learning biokinematic indicators.

1- Introducing the research:

1-1 Introduction and importance of the research:

Kinetic analysis is one of the methods of biomechanics that we must invest in learning motor skills in the game of handball, after which it is one of the main pillars on which sports biomechanics is based in the field of scientific research to facilitate the development of learning and corrective programs and solving problems that hinder reaching technical performance.

Therefore, a thorough knowledge of the technique of shooting from high jumping with a handball helps us to quickly diagnose mistakes during performance, and contribute to fixing them by improving body posture regardless of the type of exercise, as well as using the appropriate words of direction during the performance of the skill.

As some of the positions taken by the body parts in performing the skill of shooting with the handball from jumping high are a source of error, as any movement emanating from the player's body, whether it is close or far from the axes of movement, affects the ideal technique of the movement, unless it represents the priority in terms of participating in achieving the goal of the movement, and these movements may be in the direction of the ideal path of the movement, specifically the original axis, whether it is tilting backwards, forwards, or sideways. It is important to adjust the perfect technique of the body so that skill mistakes do not become a habit, whether these mistakes are in the preparatory section, the main or the final section to avoid injury.

Therefore, the combination of motor learning with sports biomechanics and based on one of the tools of scientific research, which is kinesthetic analysis, is an effective tool between the researcher and the trainer to investigate the facts, as it helps to visualize the skill and know its technique and brings the image of the ideal motor skill closer to being able to choose the learning exercises and deliver them to the learner in order to correct motor errors, in turn it is a motor achievement with the least possible effort when performing the skill of shooting from jumping high with a handball, so the researcher hopes to add new information In the applied field of handball and keeping pace with the great progress made in the results of handball in general and the skill of shooting in particular.

2-1 Research Problem:

Through the researcher's follow-up in the game of handball and motor learning, they observed indirectly through kinetic analysis, where the researcher observed that most players resort to using the parts close to the axes of motion of the body with a priority over their use of the distant limbs, without achieving the optimal investment to achieve the appropriate kinetic ranges, which in turn is reflected mechanically on the height of the jump at the moment of pushing, and the ranges of the torso and arm at the moment of throwing and aiming, and to achieve the highest degrees of strength and speed This is one of the mistakes that a beginner or

beginner makes in the technical performance of the skill, as well as the timing mistakes by reducing the player to a part of the movement so that it seems unsmooth.

Therefore, the researcher considered the application of the exercises (corrective – educational) according to the Kinova kinesthetic analysis program and the researcher hopes to obtain results that contribute to solving the problem of the modest achievement of this skill and provide some scientific solutions

1-3 Research Objectives :

1- Preparation of exercises (learning – corrective) according to some biokinematic indicators of shooting skill from high jump in handball for juniors.

2- To identify the effect of exercises (learning – corrective) on some biokinematic indicators of shooting skill from high jumping with a reel for the research group.

3- Identify differences in some biokinematic indicators of shooting skill from jumping high with a reel for a research group**.**

1-4 Research Hypotheses:

1- There is a positive effect of exercise (learning – corrective) on some biokinematic indicators of shooting skill from high jump handball for juniors.

2- There were statistically significant differences between the pre- and post-measurements in some biokinematic indicators of the shooting skill of high jumping with a handball for the research group.

1-5 Research Areas :

1- Human Field: Young players of Al-Nasiriyah Sports Club in handball for the 2024-2025 season.

2- Time Domain: The period from 30/10/2024 to 5/4/2025.

3- Spatial Area: Sports Hall (Martyr Haider Kamel Burhan Hall), Dhi Qar Governorate, Nasiriyah.

2. Research Methodology and Field Procedures :

2-1 Research Methodology :

The researcher used the experimental method, designing one experimental group.

2-2 Research Sample :

(6) junior players from Al-Nasiriyah Sports Club in handball were selected in a deliberate manner in order to implement the study and achieve its goals, and Table (1) shows the characteristics of the research sample.

Table (1)

Sample homogeneity in the variables of height, training age, and apparent weight

Divergence coefficient	Standard deviation	Arithmetic mean	characteristics	t
1.90	2.72	143	Length (cm)	1
13.52	0.23	1.7	Training Age (Year)	2
2.52	1.16	46	Bulk Weight (kg)	3

researcher used the following tools and means of collecting information:

- Arab and foreign sources.
- Observation and experimentation.
- Tests and measurement.
- International Information Network.
- One Japanese-made Casio camera (1).
- One (2) Japanese-made Sony camera.
- Kinova kinetic analysis software.
- Different means of measurement (distances, weights, lengths).

2-4 Exploratory Experiment:

The researcher conducted the reconnaissance experiment on Wednesday 30/10/2024 on (3) players who were not the research sample and were photographed to identify the location of the cameras, their dimensions, height , clarity of the image, the time required for each shooting, and the appropriate time to conduct the filming, as well as to identify the following:

- Height of the cameras.
- Identify the difficulties and obstacles that will arise during the implementation and progress of the tests.
- Identify when to take the tests and how long it takes.
- The possibility of imaging and analyzing the results of mechanical variables.
- The ability of the sample members to perform the tests and the extent to which they are suitable forthem.
- Identify the devices and tools needed to carry out experiments and tests.

- The total time required by the experience.
- Familiarize the team with the nature of the experience and its requirements.

2-5 Testing and Measurement:

The tests and pre-measurement of the research group were conducted on Friday morning (22/11/2024) in the closed hall of sports in the Model Forum of Al-Nasr District, and measurements of lengths, mass, and training age were taken, and the shooting test was conducted with a handball, where the experiment was filmed, and the cameras were placed in their assigned place. The researcher has proven the conditions related to the test in terms of time, place, tools used, method of implementation, and the assistant work team in order to work on providing them in the post-test.

2-6 Exercises (learning – corrective) applied by the research group:

The researcher has prepared Exercises (Educational – Corrective) by using rubber ropes to develop the muscular strength of the muscles working on the joints of the body to develop the internal strength of bones, muscles, ligaments and joints in a way that helps to stabilize the angles of motor performance in proportion to the motor path with the motor performance path to aim from jumping high with the handball, which helps to adjust the angles of motor performance Due to the rubber rope exercises that Performed by the arms And the legs and the torso Then with the aim arm and with a movement path similar to the motor path of the skill, especially when used according to certain angles) by gradient in Performing these movements from stability and then moving and jumping and linking more than one movement in one sequential performance to develop strength Jumping and throwing(Alsaeed et al., 2024)).

Where focusing on the correct motor path and the optimal angles for pushing and throwing, as well as correcting the mistakes that accompany the stages of the technical performance of the skill from the first stages of training and working on repeating the correct performance to reach the stage of performance stability, with a focus on the development of the muscles working on the motor track of the shooting skill in a concentrated manner, and thus the player receives exercises that target the absolute and relative parts of the body to modify the position of the body in general during the anchoring and pushing Below is a summary of how to use intensity for different exercises:

- For rope training Inflatables, Total rope elongation is measured as a maximum limit and then training the training intensity of the ropes accordingly(Kazem & Jabbar, 2019)).

The researcher used the above methods to ensure that the variables under study are descriptive variables that show us the external form of performance, so it is necessary to focus on the force that causes the performance, i.e., in the sense of teaching the muscle on the performance of the pivot and thrust and its ability to "guide the body in general to carry the weight of the body, so that the force in turn helps to bring out the ideal technique for shooting the handball from jumping.

2.7 Testing and Dimensionation:

The test and telemetry of the research sample was conducted on Tuesday morning (25/1/2025) in the closed hall of sports in the Model Forum for Al-Nasr Youth, and the researcher was keen to ensure that the conditions were similar to the pre-test and its procedures after the completion of the period of the application of the educational exercises.

2.8 Statistical Methods:

The researcher used statistical software (SPSS) to process the results.

3. Present, discuss, and analyze the results

3-1 Presentation and discussion of the results of the differences in the biokinematic variables of the pre- and post-test of the research group:

Table (2)

Shows the values of the arithmetic media, standard deviations, and the value of (z) of the and Cookson selectors for the pre- and post-biokinematic variables of the research group.

Conclusion	Significance Level Sig	Z value	Post-testing		Pre-test		Unit of Measurement	Processors and Measurements	t
			±	Going to	±	Going to			
Moral	0.027	2.207	0.012	0.975	0.083	0.871	meter	Maximum height mk.k.g. moment of flexion	1
Moral	0.091	1.686	0.013	1.156	0.083	1.07	meter	Maximum height mk.k.g. at the moment of payment	2
Moral	0.026	2.213	0.816	10.333	0.632	14	degree	Angle of Tilt Trunk Moment of Push	3
Moral	0.025	2.232	0.752	10.833	0.836	14.500	degree	Angle of inclination of the body at the moment of thrust	4
Moral	0.043	2.022	1.602	82.833	2.160	79.666	degree	Push angle	5

Moral	0.026	2.213	1.032	8.666	1.966	17.666	**degree**	**Perfect Performance Angles (Absolute) Moment of Push**	**6**
Moral	0.026	2.225	2.338	39.666	1.169	35.166	**degree**	**Angle of departure**	**7**

*At a significance level of ≤ 0.05

It is noted that the value of (z) function calculated below the true error level of the ability (05.0) means significant differences and in favor of the post-test, we can see from the above that the significant differences that appeared in the indicators Biokinematic It was in favor of the post-tests, attributed to **Researcher** A reason These differences in Indicators of distance and angles of kinetic performance To nature **Exercises (Educational – corrective) applied by the research group, which contributed to modifying the motor performance of the handball shooting skill from jumping high and contributed to achieving these significant differences compared to the pre-tests, and this was evident through the statistical parameters in Table (2), and the researcher believes that** When Diagnosis of performance errors Going to Facilitate Them Afterwards, they were treated early due to early knowledge of the causes of error and early onset Procedure Patch Whether the correction is related to the physical or technical aspect, the result is that we must subject the learners to educational units that will address skill errors. and get to know The possibility of players serving as a starting point for a change from the old kinetic performance, the more mistakes are corrected. Performing early The probability of success is high, and mistakes must be noticed early And for all of the above, it was adopted. The researcher based on the above applied foundations in the application of the exercises under research, thus enabling them to develop muscular strength and muscles working on the joints of the body, in the indicators of maximum height of the mk.k.g. at the moment of flexion and pushing, the exercises (learning and corrective) in turn increased their efficiency Muscle groups working on the legs, thighs, and lower trunk muscles in flexion resistance at the moment of fixation (with the anchor foot), which led to an improvement in the performance of the research sample in lifting the hip point in accordance with the requirements of this preliminary stage To push the decrease in the center of body mass and the great flexion of the knee joint during the preparation phase and jumping This stage has affected the flow of this stage up to the throwing stage، This was reflected in the value of the angles of inclination of the torso and the body in a way that helped the player to maintain that the force exerted in the direction of the main section was without loss For kinetic energy and less time، This led to an increase in the player's ability to resist The force of attraction of the object relative to the earth(Kazem & Jabbar, 2019)).

The researcher believes that the weakness of the internal strength of the muscles, ligaments, torques and joints affects the angles of motor performance and the way

in which they are not proportional to the ideal performance By tilting the upper part of the body, which is often done more than is required In preparation Avoid transferring the weight of the body to the front leg in the last step, which affects the result of the throw.‹ Therefore, the angles of the ideal performance at the moment of pushing had values appropriate to the nature of the technical performance of the shooting skill, and this is due to the nature of the exercises applied by the research sample, which in turn contributed to correcting the previously diagnosed errors and thus helped the members of the research sample to take Proper angles in the joints of the working body give the lowest values for the body's intrinsic torque in the joints Hip, thigh and leg and put Body as a whole "As a result of the approaching The center of mass of the body from the ground line of gravityYou have relied on and payment‹ The consequent exemplary thrust is in harmony with the mechanical conditions of the body at this moment, and with the momentum of force and resistance achieved during this phase‹**(Kazim, 2017) Thus, this is reflected in the values of the starting angle which are related to the height of the body mass at the moment of thrust as well as the ideal performance angles** If Increase This angle means increasing the speed of the vehicle Verticality, Thus, the velocity was achieved in proportion to the decrease in the value of the ball starting angle, which indicates that the members of the research sample have Developed for them This mechanical advantage through the development of technical performance according to the correct mechanical conditions that achieved the best kinetic conditions to be exploited In the best possible way,(Kadhim et al., 2020)) The factors associated with the ideal angle of departure According to the type of motor performance and its goal, as well as the speed of the start, it is very important in training, as it is largely related to the length of the players, their muscular abilities, and high flexibility in execution, as well as Its correlation with the variable that occurs in the condition of the players between one attempt and another because of the difference in the overlapping circumstances in the success of Performance for the skill of shooting the handball of jumping high.

3-2 Presentation and discussion of the results of the differences in the accuracy of handball shooting between the pre- and post-aiming of the research group:

Table (2)

Shows the values of the arithmetic media, standard deviations, and the value **of (z)** of the Wilcoxon option for the pre- and post-handball accuracy variable of the research group.

Conclusion	Significance Level Sig	Z value	Post-testing		Pre-test		Unit of Measurement	Processors and Measurements	t
			±	Going to	±	Going to			

Moral	0.029	2.46	0.41	6.99	0.52	4.62	**number**	**Handball Shooting Accuracy**	**1**

***At a significance level of ≤ 0.05**

It is noted that the value of (z) function calculated below the true error level of the ability (05.0) This means the differences are moral and in favor of the post-test, the researcher attributes the reason for these differences to the nature of the exercises (Corrective – learning) that I applied The research sample that played a role in Modifying the technical performance of the shooting skill Handball of Jumping Highly use rubber bands to develop muscular strength that Targeting Modify errors in skill parts through Analyzing the parts of the skill and thus working on the evaluation and thus Players were able to direct the biokinematic indicators towards the motor path, and the researcher sees that exercises applied by the research group worked on Increase aiming accuracy It has contributed effectively to increasing motor coordination through the interconnection between the work of the nervous and muscular systems as an integrated system."Accuracy is nothing but the ability of the player on Controlling his motor system towards a specific target is an important element for the success of the throw"(Kharkan et al., 2019)).

4. Conclusions and Recommendations:

4.1 Conclusions:

1. The learning-corrective exercises applied by the research group are the result of the development of internal strength of muscles, bones, ligaments and joints in a way that contributed to and stabilized the angles of motor performance in the direction of the motor path of the handball shooting skill.
2. The correction of the height of the body mass center at the moment of preparation and pushing was the result of a reduction in gravity in a way that helped the players to exert force in the vertical direction that resulted from the use of the learning exercises under study.
3. The learning-corrective exercises adjusted the angles of the ideal performance at the moment of preparation and pushing, and the consequent optimal force push in line with the mechanical postures of the body during this moment of jumping high to aim.
4. The learning-corrective exercises contributed to making the members of the research sample achieve a good starting angle, which enabled them to obtain a field of motion that allows the player to apply the skill with a high level of speed and accuracy at ideal angles in the post-test.

4.2 Recommendations:

1. Emphasizing the use of kinetic analysis as a basis in diagnosing skill errors according to the motor and temporal trajectory and according to what has been

applied in the research because of its importance in learning biokinematic indicators.

2. Performing corrective educational exercises to adjust the values of kinematic indicators can contribute to the integration of the technical performance of the shooting skill of high jumping with a handball.
3. Conducting complementary studies aimed at studying biomechanical variables and learning methods by analysis or observation, as well as introducing other variables (such as angular kinetic energy, angular power, etc.). and others).

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