

THE EFFECT OF PLYOMETRIC EXERCISES ACCORDING TO SOME BIOMECHANICAL VARIABLES IN DEVELOPING THE PERFORMANCE AND ACCURACY OF PASSES IN SOCCER FOR YOUTH

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Abstract

The research aims to

1. Identify the most important biomechanical variables affecting the performance of long passes.
2. Preparing special exercises according to biomechanical variables to develop the performance and accuracy of long passes.

The research sample is from the youth of the Specialized School for the Care of the Gifted in Babylon. The researchers selected the sample using a simple random method. A sample of 20 players from the Specialized School is selected, and they are divided into two equal and homogeneous groups, one of which is control and the other is experimental, out of 20 players. Thus, the sample represents a proportion $20/20 \times 100 = 100\%$, which is a percentage that best represents the population. The arithmetic mean and standard deviation for the ages, weights, and lengths of the sample were as follows. The research population was determined from the youth of the Specialized School for the Care of the Gifted in Babylon, and the researcher selected the sample by a simple random method and chose a sample of the players from the Specialized School consisting of 20 players who were divided into two equal and homogeneous groups, one of which was control and the other was experimental, out of 23 players. Thus, the sample represents a proportion $20/20 \times 100 = 100\%$, which is a percentage that best represents the population.

Table (1) Shows the homogeneity of the sample

skewness	Mediator	standard deviation	Arithmetic mean	Variables
-1.02	164,5	3.21	163.5	height
0,73	53,5	2,28	54,06	the weight
-0.62	16.5	0.48	16.4	the age

The researchers use the experimental method in order to suit the research requirements, as they divide the sample into two equal and homogeneous groups, one of which is control and the other is experimental. The exercises had a significant impact on the development of the biomechanical variables and thus the development of the performance of long passes. The player constantly needs biomechanical feedback through... Note Table No. (12), which shows the results of the statistical analysis for the experimental and control groups for the post-tests, which shows that (the speed of the ball launch and the knee angle of the pivoting leg at the moment of pivoting) are the two biomechanical variables that were of significant significance, and the researcher attributes this to the plyometric exercises used, where It had a positive impact on the development of this variable. There is an impact of the proposed exercises used by the research sample (the experimental group) in developing the performance and accuracy of corner kick execution. Videography and biomechanical analysis have a great impact in identifying weak points and working to avoid them.

Keywords: Biomechanical Variables, Long Pass, Plyometric Exercises, Ball Launch Speed

Introduction

The progress in the level of performance in sports was the result of the use of modern scientific methods and means in order to develop the condition of the individual athlete and bring him to the highest and best levels in the type of activity practiced. The game of football is one of the most important group games that has received a great deal of importance, research and privacy. Therefore, those who follow it notice the great development that has occurred in the level of physical, technical and tactical performance and high skill. As a result, it has become difficult to score goals in an easy way. It requires many factors, including physical, tactical, and biomechanical, and long passes are considered important key passes that help players reach the goal and try to score goals more easily. Hence the importance of this research in relying on sports training according to the biomechanical variables of long passes in the game of football, which is one of the important and basic skills that influence the team's victory or loss. Therefore, it was difficult to diagnose strengths and errors using the usual methods that rely on self-evaluation. Therefore, the two researchers decided to analyze it using modern scientific methods that would help discover the sources of errors to avoid them and the strengths to generalize them. Therefore, the researcher designed exercises to develop the performance of long passes according to biomechanical variables in order to achieve the best exploitation of the game's parts and score goals from them or contribute to that.

Method and tools

The research methodology and design used

The first step that the researcher takes when carrying out the research is to choose the appropriate method with the nature of the problem of the research, as the researcher used the experimental method to suit the nature of the research, "and the method is the method that the researcher follows in his study of the problem for the purpose of discovering the truth "The researcher used the design of two equal experimental groups, as shown in Table (2)

Table (2) Shows the experimental design

Posttest	Experimental factor	Pretest	Groups
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Measuring the studied research variables	Exercises by the trainer	Measure variables Thoughtful research	Control group
	Exercises by the researcher		Experimental group

Research sample

The research population was determined from the youth of the Specialized School for the Care of the Gifted in Babylon, and the researcher selected the sample by a simple random method and chose a sample of the players from the Specialized School consisting of 20 players who were divided into two equal and homogeneous groups, one of which was control and the other was experimental, out of 23 players. Thus, the sample represents a proportion $20/23 \times 100 = 86.9\%$, which is a percentage that best represents the population.

Equivalence of the research sample

For the purpose of avoiding factors that affect the results of the experiment and returning the differences to the three independent factors, the researcher homogenized the sample in the variables (age, height, weight), as shown in the following table.

Table (3) Shows the homogeneity of the sample

skewness	Mediator	standard deviation	Arithmetic mean	Variables
1.02-	164,5	3.21	163.5	height
0,73	53,5	2,28	54,06	the weight
0.62-	16.5	0.48	16.4	the age

It appears from Table (2) that the research sample is homogeneous in terms of growth indicators (height, weight, age), as the values of the skewness coefficient were respectively (-1.02, 0.73, -0.62), which are all values ranged between (3), which indicates the homogeneity of the sample. It represents the research community faithfully and the sample is normally distributed. In order to control the research variables that affect the experiment and to start from a single starting point, the researcher worked to find equivalence for the two research groups, as shown in Table No. (4)

Table No. (4) represents the equality of the sample

Type of significance	Calculated T value	Female officer		Experimental		the test
		A	s	A	s	
random	0.540	0.53	2.24	0.53	2.04	Long pass

Experiment design

The researchers applied an experiment with two tests, pre- and post-tests, for the control and experimental groups. The research population was determined from the youth of the Specialized

School for Gifted Care in Babylon. The researcher selected the sample by a simple random method and chose a sample of 20 players from the Specialized School.

Used devices and tools

Means of collecting information

1. Observation.
2. Arab and foreign sources and references and the Internet.
3. Personal interviews.
4. Registration form.
5. Tests and measurement.

Auxiliary means, tools and devices:

1. Rubber ropes.
2. Jumping box.
3. Wooden wall.
4. Iron bar (Shift)
5. Football balls (10)
6. Measuring tape.
7. sirens.
8. Colored adhesive tapes.
9. Dell personal computer.
10. Sony video camera.
11. Legal football field.

Field research procedures

The exploratory experience of the study

Exploratory experiment: (a preliminary experimental study carried out by the researcher on a small sample before conducting his research with the aim of testing research methods and tools)

It means (the possibility of testing the test several times before preparing it in its final form)

Accordingly, after determining the research sample, the researcher conducted the exploratory experiment on a sample of (10) players on the day (1/20/2018 AH) with the assistance of the assistant work team.

The aim of the exploratory experiment was to identify

1. Verify the general conditions of the test.
2. Identifying the problems and difficulties that obstruct the researcher's work while applying the tests and working to avoid them.
3. Verifying the tools and devices used and their suitability, suitability, and research requirements.
4. Informing the assistant work team about the tests.
5. Identify the extent to which the sample understands and responds to the tests.
6. Finding the best way to conduct tests.
7. Taking into account the safety of the testers as well as the safety of the equipment and tools.
8. Identify the time required to implement the tests.

9. Knowing where to place the camera when photographing

The exploratory experiment resulted in the following:

1. Safety and validity of devices and tools.
2. Adequacy of the supporting work team.

Pre-test for the research sample

The researcher conducted pre-tests on the field of the Specialized School for Gifted Care on February 10, 2023 AD, and through videotaping, biomechanical analysis, and the use of mechanical equations and mathematical calculations, the most important biomechanical variables that directly affect the accuracy of executing long passes were identified. Determine the following variables-:

1. The speed of the ball's launch: - It is measured by calculating the distance between the ball from a certain point and another point after (5) pictures and dividing it by the time of that distance
2. The angle of inclination of the body at the moment of fulcrum: It is the angle between the center of gravity of the body to the fulcrum of the fulcrum leg with the horizontal plane, as in Figure No. (1)



Figure No. (1) shows the angle of inclination of the body at the moment of fulcrum

The angle of inclination of the body at the moment of hitting the ball: It is the angle between the horizontal plane and the plane of the body at the moment of hitting the ball, as in Figure No. (2)



Figure No. (2) shows the angle of inclination of the body at the moment of fulcrum

The angle of inclination of the body at the moment of hitting the ball: It is the angle between the horizontal plane and the plane of the body at the moment of hitting the ball, as in Figure No. (3)



Figure No. (3) shows the knee angle of the fulcrum leg at the moment of fulcrum

Main experiment

The researcher conducted the main experiment for the period from 3/23/2023 AD until 5/25/2023 AD on the field of the Specialized School for Gifted Care in Babylon at six-thirty in the afternoon, which included (32) training units, four training units per week. The researcher prepared exercises for the players that included the physical and skill aspects of developing passing performance, and these exercises were applied directly by the researcher in the main part of the unit.

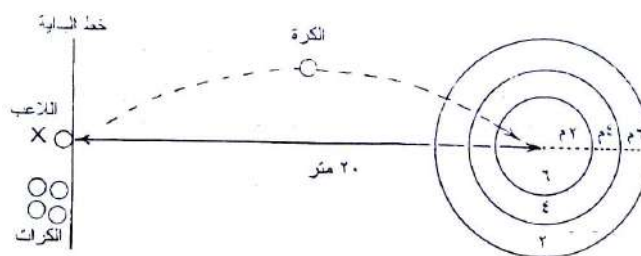
The test used in the research

The test used in the research

Handling test(1)

- Test name: Average handling accuracy test about three circles drawn on the ground at a distance of (20) metres.

- Purpose of the test: to measure average handling accuracy.
- Necessary tools: A specific area to conduct the test, (5) balls, a measuring tape, and a Bork.
- Procedures: Three overlapping circles are drawn, their diameters are respectively (2m, 4m, 6m) and degrees are given to them respectively (6, 4, 2) degrees, where the center of the circles is the distance point between the starting line and the three circles, which are at a distance of (20) m. Figure (3) explains this.
- Registration: - The player is given (5) consecutive attempts.
- The number of scores the player obtained from the five attempts is calculated.
- The highest score a player gets is 30.
- General instructions: - If the ball falls on the circle line, the next score will be given, and according to the sequence of the circles (5, 3, 1).



The statistical method used

The researchers used SPSS for statistical analysis and used video imaging and the Tracker program to determine the biomechanical variables affecting the performance and accuracy of long passes in football.

Posttest:

After completing the implementation of the main research experiment, the post-test was conducted on Monday, 5/29/2023 AH, under the same conditions and tests used in the pre-test.

Results

Presentation and analysis of long-pass test results and biomechanical variables:

The researcher presented the results of the pre- and post-tests of the research sample, by displaying the arithmetic means and standard deviations in illustrative tables after performing the necessary statistical operations for them, in order to facilitate observing the results, in addition to making a comparison between the experimental and control groups in the pre- and post-tests between the groups through analysis and interpretation. The results of all measurements to determine the reality of the differences and their statistical significance, according to a precise scientific perspective, in order to achieve the research objectives and hypotheses.

Presentation, analysis and discussion of the results of the pre-tests for the experimental and control groups (pre-pre-test)

Table No. (5) It shows the arithmetic means, standard deviations, and (t) value calculated for the pre-tests (pre-pre) for the control and experimental groups in the long pass test.

Type of significance	Calculated tvalue	Experimental group		Control group		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
Insignificant	1.2	0.5	2.3	0.6	2.81	Long pass	1

Presentation, analysis and discussion of the results of the tests for the experimental group and for the two tests (pre-post) regarding the accuracy of executing the long pass:

Table (6)It shows the arithmetic means, standard deviations, and t value calculated for the long-pass experimental group

Type of icancesignif	Calculatedt value	Posttest		Pretest		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
Insignificant	0.34	0.68	4.84	0.7	3.2	Long pass	1

The tabular score is (2.26) with an error rate of (0.05%)

Presentation, analysis and discussion of the results of the tests for the control group and for the two tests (pre-post) regarding the accuracy of executing the corner kick skills under investigation:

Table (7) It shows the arithmetic means, standard deviations, and (t) value calculated for the long-pass control group

Type of significance	Calculatedt value	Posttest		Pretest		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
Insignificant	1.85	0.52	2.44	0.6	2.18	Long pass	1

Presentation, analysis and discussion of the results of the post-tests of the experimental and control groups (post-post) in the accuracy of executing the long pass under investigation:

Table (8)It shows the arithmetic means, standard deviations, and the calculated (t) value for the post-tests (post-post) for the control and experimental groups in the long pass test.

Type of significance	Calculatedt value	Experimental group		Control group		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
moral	2.44	0.68	4.84	0.52	2.44	Long pass	1

Presentation of the results of biomechanical variables

Presentation of the results of the biomechanical variables of the corner kick for the control and experimental groups for the pre-test (pre-pre-test)

Table (9) It shows the arithmetic means, standard deviations, and (t) value calculated for the pre-tests (pre-pre) for the control and experimental groups for the long-pass biomechanical variables.

Type of significance	Calculated t value	Experimental group		Control group		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
Insignificant	0.55	2.66	20.81	1.55	19.85	Ball launch speed	1
Insignificant	0.90	5.55	64.60	8.91	64.00	inclination The angle of of the body at the moment of fulcrum	2
Insignificant	0.15	5.93	62.80	8.73	70.75	The angle of inclination of the body at the moment of hitting the ball	3
Insignificant	0.08	9.30	159.00	7.23	170.50	The knee angle of the fulcrum leg and the fulcrum moment	4

The table score is (2.26) with an error rate of (0.05)

Presentation of the results of the biomechanical variables of the corner kick for the control group for the pre- and post-tests (pre-post)

Table (10) shows the arithmetic means, standard deviations, and t-value calculated for the control group (pre-post) for the long-pass biomechanical variables.

Type of significance	Calculated t value	Posttest		Pretest		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
Insignificant	1.65	1.52	21.64	1.55	19.85	Ball launch speed	1
Insignificant	0.92	7.65	69.45	8.91	64.00	The angle of inclination of the body at the moment of fulcrum	2
Insignificant	0.28	4.63	72.15	8.73	70.75	The angle of inclination of the body at the moment of hitting the	3

DESIGNING AN AUXILIARY DEVICE AND ITS IMPACT ON LEARNING THE SKILLS OF ANGULAR SUPPORT AND OPEN SUPPORT FOR HANDSTAND PUSH-UPS ON THE PARALLEL APPARATUS IN ARTISTIC GYMNASTICS FOR BUDS

						ball	
Insignificant	0.47	5.36	172.65	7.23	170.50	The knee angle of the fulcrum leg and the fulcrum moment	4

The table score is (2.26) with an error rate of (0.05)

Presentation of the results of the biomechanical variables of the corner kick for the experimental group for the pre- and post-tests (pre-post)

Table (11) It shows the arithmetic means, standard deviations, and the (t) value calculated for the experimental group (pre-post) for the long-pass biomechanical variables.

Type of significance	Calculated t value	Posttest		Pretest		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
moral	2.94	1.54	25.32	2.66	20.81	Ball launch speed	1
Insignificant	1.91	2.32	70.35	5.55	64.60	The angle of inclination of the body at the moment of fulcrum	2
Insignificant	1.12	3.13	66.54	5.93	62.80	The angle of inclination of the body at the moment of hitting the ball	3
Insignificant	0.61	6.32	162.45	9.30	159.00	The knee angle of the fulcrum leg and the fulcrum moment	4

The table score is (2.26) with an error rate of (0.05)

Presentation of the results of the biomechanical variables of the corner kick for the control and experimental groups for the post-tests (post-post)

Table (12) It shows the arithmetic means, standard deviations, and the calculated (t) value for the experimental and control groups (post-post) for the long-pass biomechanical variables.

Type of significance	Calculated t value	Experimental group		Control group		Statistical methods Variables	T
		p±	˘ S	p±	˘ S		
moral	3.40	1.54	25.32	1.52	21.64	Ball launch speed	1
Insignificant	0.23	2.32	70.35	7.65	69.45	The angle of inclination of the body at the moment of fulcrum	2

Insignificant	2.09	3.13	66.54	4.36	72.15	The angle of inclination of the body at the moment of hitting the ball	3
moral	2.46	6.32	162.45	5.36	172.65	The knee angle of the fulcrum leg and the fulcrum moment	4

The table score is (2.26) with an error rate of (0.05)

Discussion of the results of biomechanical variables

By observing the previous tables, which show the results of the statistical analysis of the biomechanical research variables for the corner kick, it becomes clear that most of the biomechanical variables had non-significant differences between the two research groups (control and experimental), which enhances the equality and homogeneity of the research sample for the control and experimental groups, and the beginning is From one starting line before proceeding to apply the suggested exercises. This is what most scientific research sources emphasize because of the necessity of equality between the two groups in most of the variables studied to know the effect of the independent variable on the dependent variable. It is clear from the aforementioned tables that most of the biomechanical variables were of non-significant significance if compared with the tabular value of (2.26) under an error rate of (0.05), as in Table No. (9), where all the biomechanical variables were Not significant, and this confirms that the two groups started from the same starting line. By observing Table No. (10), which shows the results of the statistical analysis of the biomechanical variables for the control group and for the pre- and post-tests, all variables were non-significant, and the researcher attributes this to the approach used in the club that may lack biomechanical foundations. By observing Table No. (11), which shows the results of the statistical analysis of the experimental group for the pre- and post-tests, which shows that the speed of the ball's launch is the only biomechanical variable that was of significant significance. The researcher attributes this to the plyometric exercises used, as they had a positive effect on The development of this variable and that the device also had a positive impact on the development of this variable, as it was used during the training units so that the players could see the optimal performance, and the rest of the variables were insignificant, and the researcher attributes this to the fact that the exercises were not useful for developing these variables. By observing Table No. (12), which shows the results of the statistical analysis for the experimental and control groups for the post-tests, which shows that (the speed of the ball's launch and the knee angle of the pivoting leg at the moment of pivoting) are the two biomechanical variables that were of significant significance, and the researcher attributes this to the exercises. The plyometrics used had a positive impact on the development of this variable, and the device also had a positive impact on the development of this variable, as it was used during the training units so that the players could see the optimal performance. The rest of the variables were non-significant, and the researcher

attributes this to the fact that the exercises were non-significant. Useful for developing these variables.

Conclusions

In light of the results reached by the researcher through the use of field experience to develop the performance and accuracy of executing free kicks and using tests and their statistical methods, the following was concluded:

1. There is an impact of the proposed exercises used by the research sample (the experimental group) in developing the performance and accuracy of corner kick execution.
2. Videography and biomechanical analysis have a great impact in identifying weak points and working to avoid them.
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Appendices

Suggested exercises

1. Squat jump: Starting position: The erect position is taken with the feet shoulder-width apart, with the fingers of the palms interlaced and placed behind the head. This ensures the appropriate and suitable position for take-off and landing.
2. Sequence of performance: Start and bend towards the bottom in a semi-squat position, and immediately stop this movement downward and extend (explosively) the knees as high as possible, extend or extend the hips and knees, and raise the feet to their maximum length as quickly as possible. Go down and stop for a while, then repeat again.
3. Striking the heel with the feet: Starting position: Take a standing position with the body erect and slightly bent in the knee joint, with the chest forward and the shoulders back.
4. Performance sequence: He uses a quick counter-jumping movement, extending the hips with the aim of a vertical rise, and at full extension the toes of the feet are bent up and slightly towards the back toward the seat, and the knees will meet a slight rise up and forward, but not in a bent way.
5. Knee bend jump: Starting position: Take a standing position with your palms down at chest level to ensure a good starting and landing position. Performance sequence: The exercise is carried out by lowering the body down quickly until the squat position, and immediately after that, the body is pushed upward explosively. The knees should be raised up to chest level and try to touch them with the palms of the palms. Upon landing, the sequence is repeated.
6. Scissors jump: Starting position: The torso is erect and the legs are extended forward with the knee bent over the middle of the foot and the other leg backwards, with the knee bent under the vertical line connecting the shoulders and hip.
7. Performance sequence: The jump leads to the top from the starting position, and there is a reversal or exchange between the two legs, meaning that the front leg goes back and the back

leg goes forward, and this exchange occurs between the position of the two legs in the air, and this change is carried out quickly before landing, as In Figure No. (18)



Figure No. (17) shows how to perform the exercise

Box jump (repeated response)

Introduction: For the purpose of carrying out this exercise, it is necessary to have a box, a bench, or a fixed high platform with a height of (30-60 cm)

Starting position: The player stands relaxed in front of a box or platform and is approximately two arms length away from it. The arms should be down and to the sides and there should be a slight bend in the knees.

Performance sequence: The exercise should begin by using the arms to help the body up and forward, then landing with the feet together on the top of the box or platform, and then quickly falling or jumping back and down to the initial position. This action is repeated as in Figure No. 19)



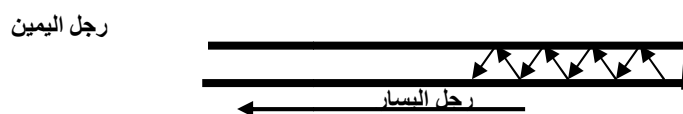
Figure No. (18) shows how to perform the box jump exercise

Tying the striking player's foot with a rubber rope:

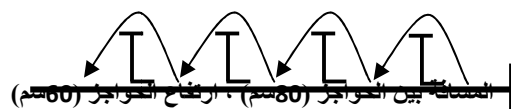
One end of the rubber rope is fixed with a weight and the other end is tied to the player's striking foot, and fixed strikes are performed.



Side jump by exchanging legs (right and left) in succession (direction of movement forward)



Side pair jump over hurdles, distance between hurdles (80cm)



Jumping with one leg sideways over one person.



Double jumping from the rope (right and left)

