

The Special Exercises Effect on Using Aids According to Biomechanical Alignment and Their Impact on the Accuracy of Long-Range Basketball Shooting for Young Individuals

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Abstract:

Long-range shooting by jumping is one of the most important types of basketball shooting that the team and the player depend on throughout the match. Performance In order to indicate whether the research sample individuals have improved after applying the exercises and methods developed by the researcher. The importance of the research is to prepare special exercises using auxiliary tools in order to modify the performance, after identifying the errors of the players during the performance of the skill of distant shooting by jumping (calculated by three points) in basketball according to the bio-mechanical alignment and performance indicators in the skill of shooting and addressing this failure to reduce the loss of match points It also works to improve the motor path and develop the performance index, the skill of long-distance shooting by jumping

Keywords: Special exercises, biomechanical alignment, Sport psychology

1- Introduction:

Sports training is one of the most important scopes in which many developments have taken place in recent years due to scientific experiments and research, which was and still is the only concern to raise the technical level of sport in general and reach the level of athletes to the highest possible, as there is no longer a limit to reach and stop, but everything is possible to benefit from to develop the level of sports.

The goal of the continuous development of training methods and methods in terms of exercises and auxiliary tools used in training, is to raise the level of sports performance to achieve good levels in different sports, especially in basketball game, so the variety of training methods and means and the diversity of their impact, which leads specialists and those involved in the fields of training to choose or select the most useful auxiliary training methods and tools to work to shorten all time and effort and thus improve the level of skill performance of players, as many events and sports require outstanding performance for different times of the game and the same level and accuracy during the implementation of basketball shooting in general and long range shooting in particular .

One of the things that must be provided to maintain the accuracy of the skill of long range shooting by jumping the basketball and for this category that must be taken care of in the right technical form is the use of various methods, tools and scientific means and the correct modern approaches that aim to deliver players to the degree of mastery of this skill from various areas of shooting near and far.

The use of assistive devices and tools in the training process contributes effectively to the development of the accuracy of the skill of long range shooting as the use of these tools and the introduction of exercises data to the player helps to correct the kinetic path and reach the player to the stage of reliability and God in performance during the shooting process. Which called on the researcher to prepare special exercises using aids as an aid in correcting or processing to adjust the bio-mechanical variables in which the player is located during the distant shooting of jumping basketball, as the bio-mechanical variables are one of the most important factors affecting the shooting process of basketball in general and the long range shooting by jumping in particular because of its great impact on the accuracy of the shooting skill in basketball, especially in the skill of distant shooting by jumping (from outside the three-point arc).

2- Research problem

Performance errors that prevent the success of the attempt to long range shooting by jumping (calculated by three points) in players that are difficult for them to determine with the naked eye to the overlap of the kinetic variables of the skill on the one hand and the speed of performance on the other. The use of analytical programs that provide us with information on the minutes of the parts of the stages of the movement and the whereabouts of their errors objectively. Therefore, it is necessary to analyze the performance that works to evaluate the movement objectively because of its reliance on quantitative and apparent variables that can be measured, and that shooting points or not, especially in the accuracy of the performance of the distant shooting skill by jumping basketball for youth may lead to a change in the result of the game. Therefore, each team must be fully prepared to exploit each throw in the distant shooting by jumping available to it during the game, and that achieving an advanced level in the accuracy index of the distant shooting skill by jumping (calculated by three points) depends on the application of the correct biomechanical foundations for shooting that can be detected during the analysis using an analysis program and build a model of it through the failure of the path analysis program for each player to identify the most important variables and mechanical relationships affecting the improvement of the skill level and accuracy of the skill of distant shooting by jumping basketball for youth vigilant club.

Set your Prospecting Goals

1-Identifying the most contributing biomechanical variables by building a biomechanical adaptive model and its impact on the accuracy of the long range shooting of jumping basketball for youth (vigilance club)".

2-Preparing special exercises using assistive methods according to the biomechanical variables and their impact on the accuracy of the distance shooting from jumping basketball for youth (Al Yaqaza club).

Research Hypothesis

1-There is a positive effect of special exercises using aids according to the biomechanical variables in the accuracy of long range shooting from jumping basketball for youth (Al Yaqaza club).

2-There are statistically significant differences between the pre-tests and post-tests of the experimental group in the accuracy of the skill of shooting far from jumping basketball for youth (Al Yaqaza club) in basketball and in favor of post-testing.

There are statistically significant differences between the two groups (experimental and control) in the post-test and in favor of the experimental group.

Areas of Research:

For the human field: -Young Players of Al Yaqaza Basketball Club for the sports season (2022-2023)

Spatial area: - The hall of the Hamza Youth Center (closed) -and the closed hall in the Faculty of Physical Education and Sports Sciences

Time range: -16/2/2022-20/2/2023

2-Research methodology and field procedures:

2-1 Research Methodology: The researchers used the experimental method in the method of the experimental and control groups to suit the nature of the research and to give accurate and real results.

2- Research community and research sample: The two researchers identified the research community as the players of the Middle Euphrates Club for the sports season 2022-2023, while the research sample was chosen in the deliberate way represented by the 12 young basketball athletes who were divided into two groups equally, with 6 players in each group. If the research sample is broken down. So that the groups are perfectly equivalent in all circumstances except for the variables that affect the experimental group.

Table (1) shows the research population and sample and the percentage

Research Sample	No.	Percentage%	Total number of research population
Experimental group	6	50%	12
Control group	6	50%	

2-3 Homogeneity of the members of the research sample and its equivalence:

2.3.1 Homogeneity of the members of the research sample: In order to obtain a homogeneous research sample and to avoid variables that may affect the results of the study in terms of individual differences between the members of the research sample, the second researcher conducted homogeneity in some variables to individualize the control and experimental groups in each of the variables (length, weight, training age, chronological age) and then statistical treatments of these variables were carried out, using the torsion coefficient, and thus the members of the same group were homogeneous and as shown in Table (2) (3) below

Table (2) shows the homogeneity of the control group

N o.	Variables	UOM	Mean	deviation, perversion, variation	Modulus of torsion	Level of Significance
1	Length	cm	178,5	7.45	335	Immoral
2	Weight	kg	67	2.28	0.877	Immoral
3	Training Age	Year	2.83	0.408	My last chance	Immoral
4	Chronological age	Year	17.16	0.983	847	Immoral

Table (3) shows the homogeneity of the experimental group members

N o.	Variables	UOM	Mean	deviation, perversion, variation	Modulus of torsion	Level of Significance
1	Length	cm	179.5	9.89	353	Immoral
2	Weight	kg	62.83	2.73	1.088-	Immoral
3	Training Age	Year	2,5	0.54	-912	Immoral
4	Chronological age	Year	17	1.11	353	Immoral

2.3.2 **Equivalence of the research sample:** Before starting the experimental procedures and field work, the two study groups must be equal, so that the researcher can later return the differences to the experimental factor, "and thus the two groups must be completely equal in all circumstances and variables except the experimental variable that affects the two groups" (341:1)

2-4-1 **Methods of data collection:** Arabic and foreign sources and references, Internet, personal interviews, questionnaire, experimentation.

2-4-2 The tools and devices used: (legal basketball court - basketballs number(10) medical ball – whistle – poles - small contraindications - rubberropes - as a video camera type - (Sony) ordinary camera type- (Nikon) Mobile type (iPhone 13 Pro) 3D3-computer type- (Lenovo). ReadR DVD type (prince). Medical scales, length tape. and other tools.

2.5 Field Research Procedures:

2-5-1 Determining the variables of the analyzed variables:

After reviewing the available scientific sources and studies and personal interviews with the specialists, the most important biomechanical variables for the skill of long range shooting were identified by jumping (calculated with three points). This variables were also identified using two kinetic analysis programs (apas and kinovea), where some variables were excluded through the path analysis program (amos), which showed the lack of statistical results and weak relationships. The analysis stage was divided into three sections (1- maximum bending moment 2 - and the moment of throwing the ball 3- pure variables with the ball). Each section has a set of variables that have an influential relationship in the accuracy of long range shooting with basketball jumping . As shown in Table (4)

Table No. (4) shows some biomechanical variables related to post-shooting by jumping the basketball to the stage (maximum flexion)

No.	Variables	6	Height of body center of gravity
1	Instant maximum flexion	7	Instantaneous force of the thigh
	Angle of knee joint	8	Instantaneous force of the trunk
2	Crank joint angle	9	Arm Instantaneous Strength
3	Angle of the wrist joint of the hand	10	Instantaneous energy of the thigh
4	Shoulder joint angle	11	Instantaneous energy of the trunk
5	Trunk inclination angle	12	Instantaneous energy of the arm

2.5.2 Exercise aids:

The two researchers used many auxiliary means that were employed in the exercises of the study variables. The researcher took into account that when manufacturing the training tools, they should be easy to manufacture and uncomplicated, and any trainer can obtain it with the availability of the safety element and serve it to the requirements of long range shooting skills by jumping the basketball and as shown in Appendix No. (4). The means were also presented to a group of experts and specialists to indicate their suitability or the location of their use and as shown in Appendix No. (2)

2.5.3 Shooting Test Characterization:

Aiming test of jumping basketball(130:2-131)

Objective of the test: Measuring the ability to control the ball through the speed and accuracy of the shot.

Tools needed: Data dump form. A basketball court, balls, a stopwatch, like a video camera.

Test time: Calculates the time from the time the tester receives the ball until the end of the eighth attempt after the ball leaves the tester's hand.

2-6 Reconnaissance experiment: The researchers conducted a reconnaissance experiment on the research sample in the Mindfulness Club on 2/6/2022, the purpose of which is to identify the body measurements and the ages of the players. Another experiment was also conducted in order to identify the most important obstacles that the researcher may face during the test photography process.

2-7 Model construction phase Biomechanical alignment:

Causal parameters consist of a system of equations that includes a set of internal and external variables and causal parameters. When building a model, a scientific theory must be followed that determines the causal

priority of the variables or the use of the chronology of the incidents for the purpose of obtaining causal relationships between the variables or following the rationales in determining these relationships. The steps of building and analyzing the model can be summarized as follows:

- ✚ Determining the relationship between variables based on rationales or scientific theories and taking into account the chronology that must be taken into account when arranging variables and the compatibility of data with the assumed model is one of the principles to be followed when building Causal parameters . (710:3)
- ✚ This step is called specification and is intended to convert theoretical hypotheses into a set of equations for the purpose of forming a causal model.
- ✚ Diagnose each equation in the model (Identification). (557:4)
- ✚ Finding statistical estimates of the parameters in the assumed model.
- ✚ Evaluate model performance by performing appropriate tests.
- ✚ Analyze the model, interpret the results and make appropriate recommendations. (523:5)

2-8 The scientific basis of the tests:

2-8-1 Reliability : "The accuracy, agreement or consistency with which the test measures the phenomenon for which it was developed" (35:6) (Therefore, the researcher used the test and retest method) by applying the test to the same individuals twice under the same conditions on 12/6/2022. The tests were repeated on 18/6/2022

2.8.2 Objectivity: It means that "the two tests are not affected by the change of the two judgments, as the test gives the same results no matter how the arbitrator"(22:7) as the coefficient of rank correlation (Spearman) was calculated between the results of the arbitrators, and the results indicated the objectivity of the tests to a high degree as shown in Table (5).

Table (5) shows the reliability and objectivity of the test

Testing	Reliability coefficient	Objectivity coefficient
Basketball Jump Long range Shooting	0.96	0.98

2-9 Pre-test: The pre-test was conducted on the research sample and to both the control and experimental groups in one day and one place to test the accuracy of the long range shooting of jumping the basketball (from outside the three-point line) on Sunday (10/8/2022) at (10am) and on the closed hall at the Faculty of Physical Education and Sports Sciences, Qadisiyah University.

2-10 For special exercises using aids:

The researcher prepared the exercises using the means of assistance and others without auxiliary means, as shown in Appendix No. (1) after the researcher collected the data on the mechanical variables, which he obtained through the analysis of the kinetic using the analysis program and the kinetic path program (amos), through which the influential variables were identified, as many variables were excluded because they are less influential and others have no effect, as well as through previous studies, where special exercises were prepared according to the biomechanical variables that are under study. The exercises were applied to the research sample and form the following.

- ⋄ The exercises used should be at the level of the abilities of the players of the Al Yaqaza youth Club in basketball.
- ⋄ Use the principle of diversification, some of which are performed with tools and others without tools.
- ⋄ Availability of the devices and tools required to carry out the exercises used in the program and ensure their validity.
- ⋄ The load grades are suitable in terms of intensity, size and density.
- ⋄ Exercises were applied in the special setup period

- ◀ The duration of the training program for exercises (8 weeks). As shown in Appendix No. (3), which shows the training units

2-11 Post-tests: After the researchers finished applying the proposed exercises and with the help of the trainer and the assistant staff, the researchers conducted the post-test of the research sample (experimental and control) taking into account the same conditions as the first experiment.

2- 12 Statistical means: the researchers used the statistical bag spss

3.1 Presentation, analysis and discussion of the results of biomechanical alignment:

3-1-1 Presentation, analysis and discussion of the test of good conformity of the path analysis to the model of long range shooting accuracy by jumping the basketball:

Table (6) shows the good matching of the path analysis to the model of the accuracy of long range shooting by jumping the basketball

Statement	Chi-Square	Degrees of freedom	Probability level	GFI	AGFI	χ^2/ df
Suggested study model	485.1348	139	0.000	0.454	0.450	3.490

The above table shows the safety and validity of the estimates of direct, indirect and total effects in the model, which is a choice for good conformity with the model. A set of tests was used for this according to the indicators extracted for the quality of the model using the following:

- 1- Square as any Chi Square: The statistical value was (485.1348) and the degree of freedom (139) and the significance was (0.000), which means that the result is significant and when dividing the result of X^2 by the degree of freedom

The result is (3.490) and Abdul Hamid points out that "the degree of acceptance in the path analysis is by dividing the result of Chi Square on the degree of freedom and extracting the result if it is less than (5) indicates the acceptance of the model, but if it is less than (2) indicates that the model is completely identical to the data and there are many studies and research that use the significance of X^2 as an indicator of the quality of conformity and this is acceptable in the case of large samples or when we do not want to compare different structural models for the same data where this value is affected by the size of the sample and therefore it must be taken into account some other indicators of the quality of conformity besides the ratio between the value of X^2 and degrees of freedom " (7:8)

- 2- Goodness-of-Fit Index (GFI)

"The value of the good match indicator ranges between zero and one, which determines the amount of variation resulting from the model, which is somewhat similar to the coefficient of R^2 in the regression analysis. The high value between this range indicates a better match for the model with the sample data (140:9). The value of this indicator (0.454), which indicates the acceptance of the validity of the model.

- 3- Adjusted Goodness of Fit Index (AGFI)

"This indicator was developed by Joreskog & Sorbom to correct the good conformity indicator of the complexity of the model and accept and match the model confined between (0, 1) The high result indicates the conformity of the model and can be used to compare different models for the same data or one model for different samples" (50:10) where the value of this indicator (0.450) Which confirms the validity and acceptance of the mentioned model.

Many sources indicate that judging the quality of a particular model or comparing several models can be obtained from the same data should be noted that the best models in terms of conformity to the construction (Implicit) The variables subject to the study is the model that is characterized by the availability of the best values for the largest number of statistical indicators and is not judged in the light of a particular indicator or

more , and in the case of the analysis used if the assumed model of the scale achieves the indicators of quality of acceptable conformity, it can be judged on the validity of its statements or the validity of its dimensions in the light of the standard regression weights, which are known as the coefficients of validity or saturation on the underlying variable. Here, a specific value can be determined. The saturations that are less than them are rejected, as well as the validity of the statements can be judged in the light of the critical ratio and indicate the significance of the difference between the effect of the phrase (slope weight) and the zero effect.

3.2 Presentation, analysis and discussion of test results, long range shooting accuracy and experimental group bio-mechanical variables:

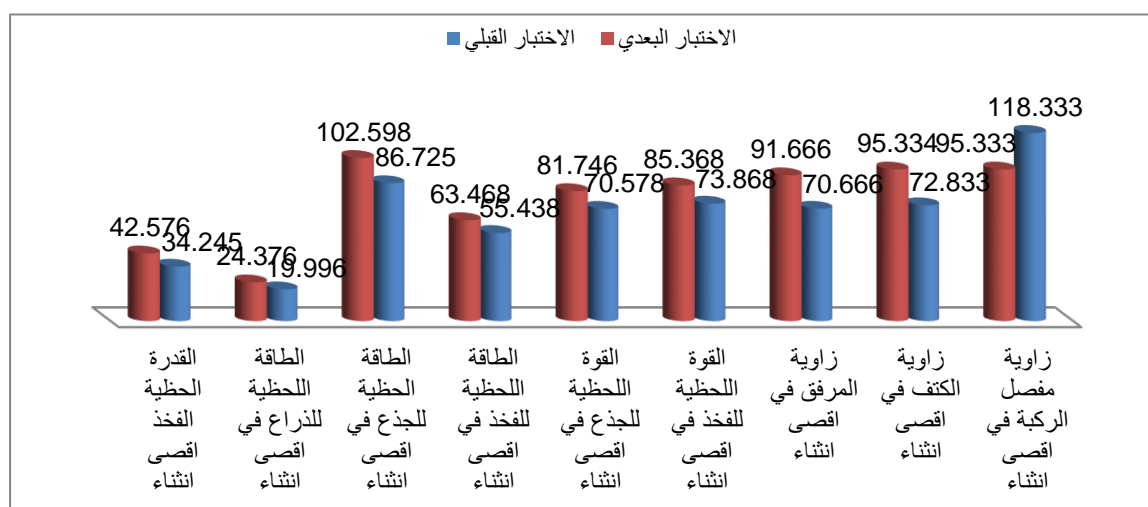
Table (7) shows the arithmetic means, standard deviations, the value of (T) calculated, and its level of significance for the experimental group of the research variable (at the maximum bend) between pre and post tests

Exams	Pre-assessment		Post-assessment		Calculate d value (s) *	Level of Significance	Significance of variances
	Q	E.	Q	E.			
Angle of knee joint at maximum flexion	118.333	8.334	95.333	2.943	8.032	0.000	significant
Shoulder angle at maximum flexion	72.833	3.188	95.334	3.386	12.745	0.000	significant
Crank angle at maximum flexion	70.666	10.053	91.666	5.785	3.481	0.018	significant
Instantaneous force of the thigh at maximum flexion	73.868	11.328	85.368	6.313	2.687	0.043	significant
Instantaneous force of the torso at maximum flexion	70.578	6.610	81.746	7.146	2.620	0.047	significant
Instantaneous energy of the thigh at maximum flexion	55.438	12.459	63.468	2.244	1.543	0.183	random
Instantaneous energy of the torso at maximum flexion	86.725	15.368	102.598	4.915	2.811	0.037	significant
Instantaneous energy of the arm at maximum flexion	19.996	3.789	24.376	2.477	4.551	0.006	significant
Instantaneous power Thigh Maximum flexion	34.245	3.728	42.576	1.003	4.599	0.006	significant

Through the above table, it was found that there is a significant difference between the biomechanical variables at the maximum flexion in the pre and post tests of the experimental group in the distal shooting by jumping (calculated by three points) of the basketball, where the calculated value of T (8.032) at a level of significance (0.000), and a moral significance at the angle of the knee joint at the maximum flexion, where the calculated value of T (12.745) at a level of significance (0.000) and a moral significance at the angle of the shoulder joint, and the calculated value of T (3.481) at a level of significance (0.018), and a moral significance at the angle of the elbow joint, as well as the calculated value of T (2.687) At a level of significance (0.043) in terms of the momentary strength of the torso, and the value of T calculated (2.620) and a level of significance (0.047) in terms of the significance in the momentary strength of the thigh , and the value of T calculated (1.543) and a level of significance (0.183) in terms of random significance in the instantaneous energy of the thigh, where it was in favor of the post-tests, but the statistician did not appear clearly, and to show this, we can refer to Table No. (16) to see the statistical differences in the arithmetic media between the two pre-tests and the two dimensions, through which the extent of development can be calculated, and where the value of T calculated (2,811) and a level of significance (0.037) in terms of significance in The instantaneous energy of the trunk , as well as the value of T calculated (4,551) and the level of significance (0.006) in a significant sense in the

instantaneous energy of the arm , and finally the value of T calculated (4.599) and the level of significance (0.006) in a significant sense in the instantaneous ability of the thigh , This means that the level of adjustment of the biomechanical variables at the maximum flexion in the performance of the long range shooting by jumping to the experimental sample was clearly and significantly advanced. The researcher attributes this progress and the difference to the exercises and aids that were used during the training units, as the preparation of these exercises and means based on the biomechanical foundations that improved the level of performance and detection of this progress through the test used on the one hand. On the other hand, the use of exercises adopted by coaches to improve the players' abilities in the skill of long range shooting with basketball was also used with a focus on the use of biomechanical capabilities dealing with the training units contributed significantly to the improvement of the performance of the experimental sample. Figure (1) shows this.

Figure (1) shows the research variables of the experimental group (at maximum flexion) (before – after)



Conclusion

The study reached the following conclusions:

1-The validity of the model in the statement of the priority of the biomechanical variables in the accuracy of the long range shooting by jumping (calculated by three points) of the basketball.

2-The priority of influencing the bio-mechanical variables on the development of the accuracy of the distal shooting of the basketball was as follows (the angle of the knee joint at the maximum bend - the angle of the elbow joint - the angle of the shoulder - and the angles of departure and entry of the ball - and the center of gravity of the body...)

3-These of exercises has an important and essential role in improving and developing the level of accuracy of the distance shooting by jumping (calculated by three points) basketball.

The researchers recommend some recommendations that contribute to the application of special exercises used in the study, the most important of which are:

1-Relying on the causal model in the training process to perform the skill of long range shooting accuracy by jumping the basketball (calculated by three points) and according to the effective variables in performance.

2-The trainer shall use innovative and modern training methods, taking into account the principle of safety and security and integrating them with the exercises launched by the development of performance variables.

3-Conducting studies similar to other biomechanical variables that the researcher did not address in his thesis, in order to develop these skills faster and accurately.

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