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The effectiveness of special exercises weightlifting and plyometrics to developing the explosive ability of the legs and some complex offensive skills of basketball for youth aged under 19 years

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Abstract

The research aimed to identify the effect of exercises using weights and plyometrics in developing the explosive ability and some offensive skills of young basketball players. An experimental approach with two equal groups was used. The research sample was represented by young basketball players in Al-Hilla Club, who numbered (14) players and were randomly divided into two groups. An experimental group with 7 players for each group. The first experimental group used plyometric exercises, and the second experimental group used weight exercises. The time plan for the training curricula included (24) training units for each group, distributed over (8) weeks, three training units per week on days (Saturday, Monday, Wednesday). The high-intensity interval training method and the repetitive training method were used, with a training intensity that ranged between (85-95% of the maximum intensity of the player's performance). One of the most important conclusions reached by the researchers is that the plyometric exercises used in the research have a positive effect in developing the explosive ability of the muscles and legs, which was reflected in the skill performance of the players.

Keywords: Special exercises, weightlifting, plyometrics, explosive ability, complex offensive skills

Introduction

One of the scientific fields that has contributed to the development of sports achievements for various sports is the interconnection between the various sports sciences (Such as learning, sports training, physiology, etc.). This helps researchers and highlights the significance of these sciences in order to develop levels of motor performance and achievements for various sports events. All these disciplines deal with the properties of movement from its own point of view and how these properties relate to the total motor performance of any given talent. Every kind of athletic event has unique physical needs (Abilities). When deciding on the sports training methods, the coach needs to be fully informed about each of these abilities because they each have a unique training regimen that focuses on their development and helps the athlete master the art of motor performance (Skills) as well as the implementation of the art of motor performance. Evidence of a sound physical structure is shown proficiently (Iyad Muhammad Abdullah and two others, 1995) [1]. Furthermore, plyometric exercises are one of the strength training methods that can be used in a wide range to develop muscle reactions, which inevitably lead to the production of various sports movements that can be used in the field, especially in the field of sports training, which is related to developing special strength for various sports, including the effectiveness of javelin throwing. It is also thought to be one of the important factors upon which the success of performance is based in When performing jumping movements, which involve numerous secondary rotational movements in various body parts (Arms, legs and torso), the body's weight acts as a resistance that the internal muscles must overcome. Whether the jumps are made on the ground with the body weight or over obstacles of varying heights, on boxes or on platforms?.

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Muhammad Hassan Allawi & Muhammad Nasr Al-Din Radwan, 1991, p.34 [3]. Therefore, the study is important because it shows how plyometric activities and weight training may help basketball players build their explosive leg muscles and other complicated offensive talents.

Research Problem

Through monitoring the researchers as coaches of the game, they found that many coaches do not prefer diversity in exercises to develop physical abilities and rely more on weights and without other training methods. On the other hand, offensive skills, including peaceful shooting and shooting from jumping, depend greatly on the amount of explosive ability of the legs in order to Rising and reaching the highest point in order to gain a point. Hence, the researchers set out to prepare exercises using weights and plyometrics to develop the explosive ability of the legs and some complex offensive skills for young basketball players.

Research objective

1. Preparing weight and plyometric exercises for young basketball players under the age of 19 years.
2. Identify the effect of exercises using weights and plyometrics in developing the explosive ability of the legs and some complex offensive skills for young basketball players under the age of 19 years.

Research hypotheses

The pre- and post-test results for the control and experimental groups vary statistically significantly, with the post-test and the experimental group benefiting more.

Research fields

Human field: Al-Hilla Sports Club players for the 2022-2023 training season

Time field: From 25/4/2022 to 3/7/2022.

1Spatial field: Talent Sports Hall in Babil Governorate - Iraq.

Research Methodology and Field Procedures

Research Methodology

The researchers used the experimental method in the manner of two equal experimental groups (first experimental group - second experimental group) with pre- and post-test in order to suit the nature of this study.

The research community and its sample

The study population consisted of the fourteen basketball players from Al-Hilla Sports Club and the young individuals (17-18 years old) who competed in the Iraqi Premier League in the 2022-2023 season. Using a thorough enumeration procedure, 100% of the research community was included in the selection of the study sample. Two experimental groups were randomly selected, with seven participants in each agency group.

1. **The first experimental group:** Consists of 7 players applying the plyometric program.
2. **The second experimental group:** Consists of 7 players applying the weights program.

Devices and tools

This research required several methods for collecting data, which are

- Questionnaire.
- Observation.
- Testing and measurement.

The researcher used many devices and tools that helped him in his research, including

- Measuring tape.
- Medical scale to measure weight.
- Weighting different weights.
- Barriers of different heights.

Exploratory experience

The researchers conducted the exploratory experiment on a sample of 5 players from the research community, and through it, several purposes were achieved, including ensuring the validity of the methods used when applying the test. The clarity of the test instructions and understanding of the contexts of their application by the players. The appropriateness of the time period for the test.

Pre-tests

On April 25, 2022, at three o'clock in the afternoon, the pre-tests were administered by the researchers at the Al-Mawhibah gymnasium. Following a short discussion to the researchers about the procedures and goals of the tests, the study sample underwent skill and physical testing, and measurements of height, weight, and training age were collected.

The main experiment

The exercises were applied to the study sample for the period from 1/5/2022 to 1/7/2022. The first experimental group used plyometric exercises, and the second experimental group used weight exercises.

Suggested exercises

The time plan for the training curricula included 24 training units for each group. It was distributed over 8 weeks, with three training units per week on days (Saturday, Monday and Wednesday). The time of the training unit is 90 minutes, with a total of 2610 training minutes. The following matters were taken into account when implementing the training curriculum.

- **Training time:** It was the same for both groups: (Days - Time - Stadium).
- **Warm-up:** It was uniform for both groups.
- **The main part:** Each group applies one of the types of exercises.
- **The closing part:** It was unified for both groups.
- Time for the main section of the training unit: (30-45) minutes.
- **The training method used:** High-intensity interval training and repetitive training.
- **Training intensity used:** (85-95%). The maximum intensity of the player's performance.

Post-tests

After completing the implementation of the exercises set within the specified period, then conducting the tests for the research on 3/7/2022 at three in the afternoon in the talent gym. The researchers took into account providing conditions similar to the pre-tests in terms of (time, place, tools used, and method of conducting Execution of tests).

Statistical methods used in the research

The researchers used the statistical package (SPSS) to find the appropriate statistical treatments.

Presentation, analysis and discussion of the results of the two experimental groups regarding the variables investigated

Presenting the results of the differences between the pre- and post-tests of the first experimental group in the variables investigated and analyzing them

Table 1: The difference of the means, its standard deviation, the value of (t), and the significance of the differences between the results of the pre- and post-tests for the first experimental group in the variables under study.

Tests	Measuring Unit	Pre-test		Post-test		T-Value Calculated	Sig Level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Receiving + three points shooting	Degree	1.128	0.776	3.761	1.897	5.776	0.022	Sig
Receiving + Dribbling + Chest passing	Degree	16.642	3.415	24.621	4.651	5.213	0.005	Sig
Receiving + Dribbling + Lay-up shooting	Degree	5.321	1.986	7.359	2.111	7.136	0.000	Sig
Explosive ability	Cm	22.125	4.61	35.125	2.531	13.00	0.000	Sig

Presenting the results of the differences between the pre- and post-tests of the second experimental group in the variables investigated and analyzing them

Table 2: The difference of the means, its standard deviation, the value of (t), and the significance of the differences between the results of the pre- and post-tests for the second experimental group in the variables under study.

Tests	Measuring Unit	Pre-test		Post-test		T-Value Calculated	Sig Level	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation			
Receiving + three points shooting	Degree	1.999	0.541	2.651	1.542	3.897	0.030	Sig
Receiving + Dribbling + Chest passing	Degree	15.872	3.147	17.552	3.981	3.328	0.02	Sig
Receiving + Dribbling + Lay-up shooting	Degree	4.221	0.869	6.761	1.982	3.731	0.032	Sig
Explosive ability	Cm	21.62	5.68	29.00	3.07	7.25	0.012	Sig

Presentation of the results of the differences between the two groups' post-tests and the first and second experimental groups in the variables investigated

Table 3: The value of (t), the level of error, and the significance of the differences between the results of the post-test for the two groups and the first and second experimental groups in the variables under study.

Tests	Measuring Unit	First experimental groups		Second experimental groups		T-Value Calculated	Sig Level	Sig Type
		Mean	Std. Deviation	Mean	Std. Deviation			
Receiving + three points shooting	Degree	3.761	1.897	2.651	1.542	4.762	0.000	Sig
Receiving + Dribbling + Chest passing	Degree	24.621	4.651	17.552	3.981	3.832	0.003	Sig
Receiving + Dribbling + Lay-up shooting	Degree	7.359	2.111	6.761	1.982	5.921	0.014	Sig
Explosive ability	Cm	35.125	2.531	29.00	3.07	7.25	0.012	Sig

Discussion of the results

By examining the results of Table 3, we find that there are significant differences between the results of the first and second experimental groups in applying both the plyometric training method and the weight training method in the two research variables (Explosive ability) and (Basketball-combined offensive skills). This difference was in favor of the first experimental group that used the plyometric training method. The researchers attribute the reason for this to the positive effect of this method over the two weighting methods, which was applied to the first experimental group. The method used by the first experimental group would increase the motivation of the players and keep them away from boredom, and would encourage the players to implement the training units with enthusiasm and high spirit due to the diversity of its contents and the multiplicity of its objectives, in addition to ensuring the principle of safety and security and removing the fear of negative consequences or overload to suit the training with the capabilities. The physical players and their skill abilities, in terms of taking into account the effort exerted by the players in one training unit. This is consistent with what was stated by (Hamid, Saleh Radhi, 1999, p. 76) [4], who concluded that plyometric exercises are of great importance in developing the explosive ability of the muscles of the lower limbs of young athletes. In

general, references to sports training, when choosing the content of the training curriculum, emphasize the necessity of planning it to work towards achieving goals that translate into performance that can be observed and measured, and this is what the researchers strived to achieve. Therefore, the player needs great (Explosive ability of the legs) to achieve this requirement. On the other hand, when the knee joint is extended - with maximum force and speed - the power is transferred from the muscles of the legs to the muscles of the torso, and then to the muscles of the arms to achieve the force required to push the ball. Accordingly, the exercises under discussion were directed towards strengthening the muscles of the legs to improve (Explosive ability), so the direction of training (Quantitative and qualitative) was determined on this basis. Talha Hussam El-Din and others (2001) [6] agree with us: Strength training using resistance (Plyometrics) is important for training the nervous system in addition to the skeletal muscles in the case of developing strength and ability to a certain percentage, and this requires the presence of a factor encouraging the continuation of training, and such training may It leads to boredom, so the coach is required to clarify the importance of each training, whether the importance of its role in developing muscle work or preventing injuries and other factors that help the player bear the burden of training. (El-Din, Talha Hossam

and others, 2001, p. 52) [6].

This is confirmed by Moatasem Gotouk (1995) [7]: Training tends to build the special physical capabilities associated with the player's future specialization, and exercises of a special preparation nature are used according to the characteristics and requirements of each game. Trainers must pay attention to the correct technical performance while implementing strength exercises and using appropriate weights and rational doses can have positive effects in the process of developing muscular strength. (Ghoutouq, Moatasem, 1995, p. 12) [7]

The researchers believe that the development of explosive ability affected skill performance by maintaining the level of performance throughout the duration of the test, as the development that occurred in the receiving and jumping shooting tests (3) points with the difference in the distance to perform each test, in addition to that the jumping shooting test requires (3) points. To neuromuscular compatibility, the player performs (5) attempts at stability and (3) attempts at movement and rotation from behind the goal to receive the ball and jump to shoot. Here, the benefit of using exercises appeared, as some studies have proven (Mona Muhammad Jawad, 1990) [9] (Ishraq Ali Mahmoud, 2002) [10]. There is a significant correlation between the skill level of shooting in basketball and the ability of the arms and legs". (Mona Muhammad Jawad, 1990, p. 12) [9], (Mahmoud, Ishraq Ali, 2002, p. 33) [10]

The development in the ability of the arms and legs contributed to the performance of the receiving test and the high thrust ending with chest handling, since this test is composed of three complex skills. As for the receiving and high thrust test ending with the peaceful correction, it is also a composite of (3) basic skills, but the time to perform it is longer than the tests. Then, performing special exercises to develop endurance ability, which in turn affected maintaining the level of performance throughout the time period of taking the test.

In the broad jump test, the researcher found significant differences between the pre- and post-tests and in favor of the post-test. This means that a development in the explosive ability of the muscles of the legs occurred for this group. The researchers attribute these differences to the result of using plyometric exercises to develop the explosive ability of the muscles working on Jumping and jumping, such as deep jumping exercises, box exercises, and rebound exercises, and such exercises depend on lengthening the muscle and then shortening it, which generates a high explosive force. In this regard, Crossly explains, If there is no delay between the process of eccentric contraction (lengthening) and central contraction (Shortening), the amount of work performed under this condition is translated into elastic energy released into the muscle during stretching (Crossly G, 1984, p. 26) [11].

Conclusions and Recommendations

Conclusions

1. The good organization of the plyometric exercises used in the research and the progression of difficulty contributed to the implementation of the curriculum items by the players, and the plyometric exercises used in the research had a positive effect in developing the explosive ability of the muscles and legs, which was reflected in the skill performance of the players.
2. The two methods of plyometric training are preferable to weight training and have positive results for young basketball players.
3. The development of the explosive ability of the leg

muscles has a positive impact on offensive skills in general and jump shooting in particular. This indicates the direct relationship between explosive ability and basketball shooting skill.

Recommendations

1. Relying heavily on plyometric exercises in training curricula for young people in order to ensure the development of explosive ability at higher levels.
2. Interest in developing explosive ability as it is an important type of muscular strength and has a direct impact on some basic skills in general and shooting skills in particular.
3. Providing the necessary supplies to perform plyometric exercises and using those using scientific methods.
4. Encouraging coaches to pay attention to plyometric exercises and training, as it contributes to developing physical qualities and motor skills that play a major role in performing the shooting skill that is relied upon to win matches.

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