

THE EFFECT OF PLYOMETRIC EXERCISES BY ADDING WEIGHTS TO BODY WEIGHT TO DEVELOP PERFORMANCE AND SOME PHYSIOLOGICAL INDICATORS FOR WEIGHTLIFTERS UNDER 20 YEARS OF AGE

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ABSTRACT

The weight-pushing competition is based on maximum strength, as well as explosive ability, correct technical performance, and digital achievement. Explosive ability depends primarily on maximum muscular strength, which is one of the important basic components for players in the weight-pushing competition. There have been recent changes in the training process for the weight-pushing competition, especially with regard to developing the explosive ability of players. One of the most recent of these exercises is plyometric exercises. The researcher chose an important training method for plyometric exercises, which is adding additional weight to the body weight of the weight-pushing player. Hence the importance of the current research because these exercises are different and varied within the exercises used by the coaches for this competition, and the training unit is for weightlifters under 20 years of age to develop their muscular strength and speed of performance, which is of very great importance in their digital achievement, and through the physiological indicator from the device Muscle and nerve EMG mapping in order to improve their physical and functional capabilities and develop the completion of this competition in a scientifically correct and standardized manner. The study aimed to identify plyometric exercises by adding weight to the athlete's body weight, as well as to know the difference between cardiac and post-tests for the functional and physical research variables, and also to know the impact that these exercises had on developing digital achievement and the physiological index. The researchers used the experimental method to suit the nature of the problem posed by the researchers. The research population was 15 players from the Central Euphrates national team for the weight-pushing competition, and the research sample was only 8 players.

Keywords: *Plyometric, exercises and physiological indicators.*

INTRODUCTION

The weight-pushing competition is based on maximum strength, as well as explosive ability, correct technical performance, and digital achievement. Explosive ability depends primarily on maximum muscular strength, which is one of the important basic components for players in the weight-pushing competition.

There have been recent changes in the training process for the weight-pushing competition, especially with regard to developing the explosive ability of players. One of the most recent of these exercises is plyometric exercises. The researcher chose an important training method for plyometric exercises, which is adding additional weight to the body weight of the weight-pushing player.¹

Hence the importance of the current research because these exercises are different and varied within the exercises used by the coaches for this competition, and the training unit is for weightlifters under 20 years of age to develop their muscular strength and speed of performance, which is of very great importance in their digital achievement, and through the physiological indicator from the device Muscle and nerve EMG mapping in order to improve their physical and functional capabilities and develop the completion of this competition in a scientifically correct and standardized manner.

Research problem

As weight push players rely on muscular strength in general in performing the competition, relying on that neuromuscular coordination in the speed of performing the push, and the competitors of this event use their physical capabilities, as the muscles of the legs, back and arms have an effective and important role in producing muscular strength. Training for achievement The strong and the big call for specialization in training. Researchers have not noticed a lack or near absence of plyometric exercises. Therefore, the researchers prepared plyometric exercises by adding weights to the body weight of the player in this competition to determine the extent of their impact on the athletic achievement of this category, which is the under-20 category.

Research objectives

1. Learn about plyometric exercises by adding weight to your body weight
2. Knowing the difference between cardiac and posttests for functional and physical research variables
3. Knowing the impact that these exercises have had on developing digital achievement and physiological indicators

Research hypotheses

1. There are statistically significant differences between the pre- and post-tests of the experimental research group on the effect of plyometric exercises by adding body weights on functional and physical work and achievement among the players of the Middle Euphrates national teams in the weight-pushing competition.
2. There are statistically significant differences in the rates of development and the size of the effect for the experimental research group on the effect of plyometric exercises on functional and physical variables and achievement among the players of the Middle Euphrates national teams for the weight-pushing competition.

Research field

- Human field: Middle Euphrates national team players for the weight pushing competition.
- Time frame: From 1/12/2024 to 3/12/2024.
- Spatial field: Najaf Al-Ashraf Stadium - National Center for Talent Nurturing Stadium.

Research Methodology

The researchers defined their research methodology as an experimental method with one experimental group and one with a pre- and post-test. The experimental method is “an approved change in the specific conditions of an event, and observing the changes that can occur through the event itself and its interpretation.”²

The research sample

The researchers selected their research sample from the players of the Middle Euphrates teams for the weight-pushing competition, which numbered 15 players. The research sample was only 8 players, which constituted 66.66% of the original community.

Tools and devices used in research

- Arab and foreign sources.
- Testing and measurement.
- The interview.
- Iron bar of various weights, 15 kg - 20 kg.
- Iron terraces.
- 12 barriers of different heights.
- 6 kg weight, 5 pieces.
- Dynamometer.
- EMG measuring device.
- Hp laptop.
- Wooden boxes of different heights.

Tests that researchers will use in research

After the researchers reviewed many Arab and foreign sources specialized in sports and physiological training, in addition to consulting a group of experts and specialists in this field, as well as the modest experience of the researchers, the tests were determined as follows:

1. Testing the explosive ability of the legs (long jump from standstill)

- Test name: Standstill long jump.
- The purpose of the test: to measure the explosive power of the leg muscles.
- Tools used in this test: measuring tape - pit and long jump.
- Performance specifications: The testers take a ready position on the edge of the long jump pit. The tester bends the legs downward and opens the arms to the side from this position. When the signal is given, the tester begins to jump with the maximum possible force forward to obtain the highest possible horizontal distance.
- Measurement: The distance is measured from the last trace left by the tester in the jumping pit to the nearest fraction of a cm. Each tester is given 2 attempts and chooses the higher one between them.

2. Maximum strength test of the arms (Bench Press)³

- Test name: Maximum arm strength test Bench Press
- The purpose of this test: Measure the maximum strength of the arm muscles
- Tools that the researchers used in this test: A 20 kg iron bar - various iron discs - iron suspenders - a flat iron bench.
- Performance description: The tester holds the barbell with the arms as wide as the chest, and the distance between the arms is shoulder-width apart. After taking the barbell from the suspenders, the tester bends the arms completely with a ping press, then lifts the bar completely with the barbell and records the best attempt and the highest weight.

3. **EMG test** : In order to record the electrical activity of the leg muscle, the tester is on the dynamometer device with its base fixed in the ground so that the device does not move, then the rod connected to a wire with the chains of the dynamometer rings is placed on two legs. The EMG device is also connected to the muscle through surface electrical electrodes over one of the leg muscles of the legs. Upon the signal, the laboratory moves the legs through the semicircle, where the maximum isometric muscle contraction is performed to measure the maximum force for a period of 6 seconds. At the same time, the electrical activity of the muscle is recorded at a recording speed of 6 mm/sec.

4. **Completion test**: The testers perform the feat of pushing the weight through the legal circle, which is 2,135 meters long and bordered by a front edge 10 cm high and 122 cm long. The tester performs the slide movement from behind the circle, and the weight of the weight is 6 kg. Each tester is given 3 attempts and chooses the highest distance between them. This distance is measured from the place where the weight falls in Designated throwing space.

Exploratory experience

The researchers conducted a reconnaissance experiment with 4 players from the national teams of the Middle Euphrates for the under-20 weight-pushing competition on the day corresponding to 1/14/2024 for the purpose of knowing the pros

and cons that the researchers may face, in addition to knowing the time it takes for each test and the safety of the equipment and tools as well.

Pretests

The researchers conducted the pre-test on their research group to know the results and pre-measurements of the experimental research group. The pre-test was conducted on two consecutive days, where the explosive power of the legs and the maximum strength of the arms were tested on the day corresponding to 1/16/2024.

The physiological test was conducted on January 17, 2024 in the Physiology Laboratory at the University of Karbala - Department of Physical Education and Sports Sciences.

Plyometric exercises

The researchers prepared plyometric exercises by adding weights to the player's body weight.

1. Plyometric exercises were performed in the special preparation stage.
2. Starting the implementation of plyometric exercises on January 17, 2024.
3. The exercises continued for (6 weeks).
4. Number of training units (2 training units) per week.
5. The total number of training units for the exercises (12 training units).
6. The intensity used in performing the exercises ranged between (85% - 100%) of the athlete's maximum ability in light of the pre-tests that were applied to the research sample.
7. As for training methods, the researcher used two methods: high-intensity interval training (85%-90%), and repetitive training (90%-100%).
8. The rest period between repetitions was (2 minutes - 5 minutes) and between exercises (7 minutes).
9. The exercises ended on 3/10/2024.

Posttests for the research sample

After the researchers finished performing the exercises on their experimental research sample, they conducted the post-tests on 3/11/2024 and tried to have the same conditions as the cardiac tests as much as possible.

Results

- **Presenting and analyzing the results of the differences between the pre- and post-tests of the experimental research group on physical and functional variables**

Table 1. Show the table below shows the results of the functional and physical research variables

Variables	Units	Groups	Pretest		Posttest		Diff.	(t) value	Indication
			mean	STD	mean	STD			
Bench Press	Kg	Experimental	170	22.39	197	33.62	19	5.17	Sig.
Jumping from a standstill	Cm	Experimental	46	10.91	53.7	10.69	8.7	15.10	Sig.
Achievement	Cm	Experimental	110	16.24	121.5	16.91	9.5	41.29	Sig.
Vector space	Sec.	Experimental	3190	139.8	5480	571.6	2290	3.3	Sig.

Table (1) shows that the calculated T-value for the Bench Press test between the two tests for the pre- and post-test group was (5.17), while the T-value for the long jump from stability between the pre- and post-tests was (15.1), and the T-value for the achievement variable was (15.1). It reached (41.29) and as for the physiological variable, the value of (t) reached (3.3). This means that there are statistically significant differences in favor of the post-measurements in the physiological and physical research variables.

The reason for this is that the nature of the performance of weightlifters must emphasize the development of the important muscle groups of the legs, as plyometric exercises for performance use the muscles of the legs, whether during performance or during training, to strengthen the muscles that are related to getting up, which are the muscles of the legs. Therefore, it is logical that Strength in the leg muscles develops for all groups according to the principles of

performance to be applied, but this development was uneven according to the values that appeared in the mathematical settings.⁴

Discussion

Trainers resort to developing the strength of these muscle groups, especially by practicing maximum strength and explosive power exercises primarily in their training units.

The speed of muscle action must be dominant, and muscle action explosions must be performed at maximum speed in order to have a very high explosive capacity.⁵

The progress in achievement that occurred was quickly affected and was associated with the development of the leg muscles as a result of this group being exposed to various jumping exercises by adding weight, which caused an improvement in performance in the direction of the movement applied to determine the effect of the exercise used, where the muscles are strongly stretched before shortening (the elongation-shortening cycle). As a reverse muscle action, it also improves the rate of force development.

The exercises to which the experimental group players were exposed helped the transmission of nerve signals and increased the efficiency of contractile activity of the working muscles, as some scientists have confirmed that when strength training occurs, neural changes occur in shortening the time required to recruit motor units and increasing the tolerance of motor neurons to high nerve impulses.⁶

Conclusions

1. There is a positive development in the strength of working muscles.
2. A positive effect appeared for plyometric exercises on explosive ability by adding more effective weights to the body weight.
3. The differences appeared significantly significant in the wave area variable for the (EMG) test for the research group that used plyometric exercises and adding weight to body weight.

Recommendations

1. It is necessary to use plyometric exercises with a weight added to the body weight for weightlifters
2. It is necessary to monitor periodically using an EMG device in order to determine the progress in the degree of neuromuscular coordination after using exercises.
3. Conduct similar research in light of the results of this research on other activities that depend on jumping, as well as studying the accompanying functional variables.

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