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## THE EFFECT OF LANDMINE EXERCISES ON CERTAIN PHYSICAL VARIABLES AND SHOT-PUT RECORD FOR JUNIORS

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### Abstract

*Aim.* Identifying the effects of landmine exercises on certain physical variables and Shot-put record for Egyptian junior.

*Methods.* The sample was chosen intentionally from the players of the National Talent Project (disc throwing competition), (12) juniors under 12 years old. (3) juniors were excluded from conducting the exploration experiment on them, so that the basic sample consisted of (9) juniors. we conducted homogeneity among the sample.

*Results.* Statistical analyses showed that: significantly different ( $p = > .05$ ) in (Leg Muscle Strength (CM), Arm Muscle Strength (M), Core Muscle Strength (S), Leg Press (KG), Bench Press (KG), and Shot- Put record (M) to the and Post – measurements of experimental group.

*Conclusions.* Under the conditions of our study, the proposed landmine exercises could be affected on physical variables (Leg Muscle Strength (CM), Arm Muscle Strength (M), Core Muscle Strength (S), Leg Press (KG), Bench Press (KG). and Shot- Put record (M). These results must be considered by instructors to imply these concepts.

*Keywords:* Landmine Exercises, Beginners, Shot- Put.

### Introduction

Shot-put is one of the track and field events that requires special physical abilities and preparation, as it relies heavily on muscular strength. This requires the athlete to utilize all their strength to maintain the body's center of gravity, prepare the working muscles for contraction, and produce maximum instantaneous explosive force for the throwing arm along the same kinetic path as the thrower, thus achieving the best numerical result.

Mahmoud (2019) believes that muscular strength is one of the physical elements that significantly influences the level of achievement in the Shot-put. Depending on the requirements of each stage of the performance, muscular strength enables the athlete to execute the technical stages of the performance according to mechanical principles and foundations, producing the optimal result of the force.

Farag (2004) points out that the Shot-put competition is a strength competition characterized by speed, as it requires the presence of general physical fitness elements, particularly skeletal strength and speed of movement. The body's movement and ability to perform motor actions are linked to the distance the disc is launched, thus expressing an individual's motor ability. The Shot-put competition is considered a field competition that involves rotation. Thanks to the disc's shape, weight, and relatively long acceleration path, high speeds can be achieved. This requires the effective transfer of rotational speed to the tool, a good level of coordination abilities, and a high level of physical strength. During the throw, the athlete not only requires strength to increase the disc's speed, but also an additional force, represented by centripetal force, which counters the effect of the centrifugal force resulting from rotation.

Mahmoud (2019) points out that the Shot-put competition is one of the events characterized by rapid movement in a very short time. This is evident in the movements performed by the competitor before executing the throw, Kyle et. al. (2021) note that the landmine bar training method was invented before the landmine bar rule. Arnold Schwarzenegger used to train in 1975 by sticking a barbell in the corner of his gym to perform heavy sets of T-bars. Thanks to the creative minds of trainers, landmine bar training has become increasingly popular as a great way to train muscles from multiple angles and positions. Rodrigo & Juan (2021) indicate that landmine training is a functional strength training method, as it works on all axes of movement, unlike traditional weights. It allows movements to be performed in all directions and can be used to train all parts of the body, including the upper and lower extremities. It consists of a barbell attached to a base resembling a landmine. This base allows the barbell to move in all directions. Iron rings at the other end, with various weights, are used to train different body parts. These exercises improve functional vector strength, rotational strength, and pushing and pulling strength. They can be performed standing, lying on the back, or sitting on all fours, and in any body position, depending on the part of the body being developed.

Although the landmine is typically used for basic, simple functional movements, it is an amazingly versatile tool, as it can be used as a basic exercise for many muscle groups. It is a modern method for building overall strength and endurance. The landmine bar is a short tube mounted on a swivel joint, usually hung in a corner of the gym, and is considered one of the most versatile and effective fitness tools for increasing functional strength and enhancing athletic

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performance. From preliminary swings to rotations, with the goal of achieving the greatest possible speed and power, thus propelling the thrower as far as possible. Therefore, modern training equipment and tools must be used to develop physical and skill levels, in line with the requirements of muscular work and skill performance, to achieve outstanding performance in the Shot-put. (Hubbard, Mestre, & Scott, 2001)

Iqbal (2004) points out that the Shot-put competition is one of the competitions that requires the competitor to utilize the strengths of the various parts of the body and coordinate their movements according to the mechanical principles and laws related to the nature of the human body's movement systems.

We believe that the primary task of performance in various throwing competitions is to attempt to throw the object as far as possible while utilizing all the body's potential strength. The Shot-put competition is one of the throwing competitions in athletics, as it requires linking the movement path of the body's joint parts without falling into an unrelated path. The Shot-put competition is also linked to increased rotational movements and the impact of these movements on the locomotor balance system.

Given the multiple physical performance requirements, the difficult skill level required in the Shot-put competition, the high level of record achievement in international competitions, and the variety of sports training methods, this has had a significant impact on the Shot-put competition, prompting those in charge of this competition to use modern training methods. One of these methods includes landmine training. Additionally, Amr et. al. (2015) indicate that most coaches use weight training only to improve their players' muscular strength, and this is a common mistake in training for the Shot-put competition. Coaches should diversify their use of resistance training and ensure that they are in the same movement paths used to perform the Shot-put. It is preferable to use landmine training.

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To the best of our knowledge, Arab studies that have addressed landmine training in track and field competitions have not addressed the Shot-put competition. The foreign studies that have addressed landmine training have not addressed athletics competitions but rather have addressed a variety of sports. For example, a study by (Kyle et. al. 2021; Rodrigo & Juan, 2021).

Based on the above, we will conduct this study with the aim of identifying the effects of landmine exercises on certain physical variables and Shot-put record for Egyptian juniors.

## Methods

The sample was chosen intentionally from the players of the National Talent Project (disc throwing competition), 12 juniors under 12 years old, 3 juniors were excluded from conducting the exploration experiment on them, so that the basic sample consisted of 9 juniors. We conducted homogeneity among the sample.

Table 1. age, height, and weight of the experimental group (Mean  $\pm$  SD)

Group	N	Age [years]	Height (M)	Weight (KG)
Experimental group	9	11.12 $\pm$ 0.80	145.75 $\pm$ 1.89	46.12 $\pm$ 1.54

Table (1) shows the homogeneity of the sample members in the variables of age, height, and weight, with values of the skewness coefficient ranging between  $\pm 3$ .

### Devices and tools

- A stadiometer to measure height (nearest cm).
- Medical scales (standards) to measure weight (nearest kilogram).
- Multi-weight Shot-put.
- Dumbbells of different weights.
- Medicine balls.

- Landmine of different weights.
- Measuring tape.

*Physical tests*

We reviewed a group of specialized references in testing and measurement to find the best physical tests characterized by high validity and reliability. These tests were applied to samples like the sample, and the following conclusions were reached:

*Power tests*

- Broad jump test from standing.
- 3 kg medicine ball push test.

*Strength tests*

- Leg push-up test (to measure leg muscle strength).
- Core muscle strength test.
- Bench press test.

*Training program specifications*

- Program duration (10) weeks.
- Number of weekly training units in the core period (3) units.

The proposed training program was implemented on the experimental sample for a period of (10) weeks, with (3) training units per week.

- The average duration of a training unit was (80) minutes, making the total training time per week (240) minutes, and the total time during the training program (2400) minutes.

- The duration of the training unit was divided as follows:

- Warm-Up (10 minutes)
- Landmine Exercises (60 minutes)
- Cool-Down (10 minutes)
- (10) exercises were implemented throughout the program.
- The load cycle was formed throughout the program stages at a ratio of (1:2)

*Statistical analysis*

Version 26 of (SPSS) software. Analyses included the calculation of means and standard deviations, along with the application of the student's t-test for paired samples to evaluate differences in specific parameters.

## Results

Table 2. Mean  $\pm$  SD, and "T" sign between Pre and Post – measurements in physical variables and shot-put record to the experimental group

Variables	Pre		Post		T sign
	M	SD	M	SD	
Leg Muscle Strength (CM)	165.64	1.14	170.32	1.53	Sign
Arm Muscle Strength (M)	6.85	0.12	7.00	0.13	Sign
Core Muscle Strength (S)	74.52	3.41	85.89	3.66	Sign
Leg Press (KG)	69.01	1.81	73.18	1.45	Sign
Bench Press (KG)	62.30	3.41	65.92	3.54	Sign
Shot- Put record (M)	8.15	0.11	8.98	0.15	Sign

Significant differences,  $p < 0.05$

A paired sample T-test revealed that it was significantly different ( $p = > .05$ ) in (Leg Muscle Strength (CM), Arm Muscle Strength (M), Core Muscle Strength (S), Leg Press (KG), Bench Press (KG), and Shot- Put record (M) to the and Post – measurements of experimental group.

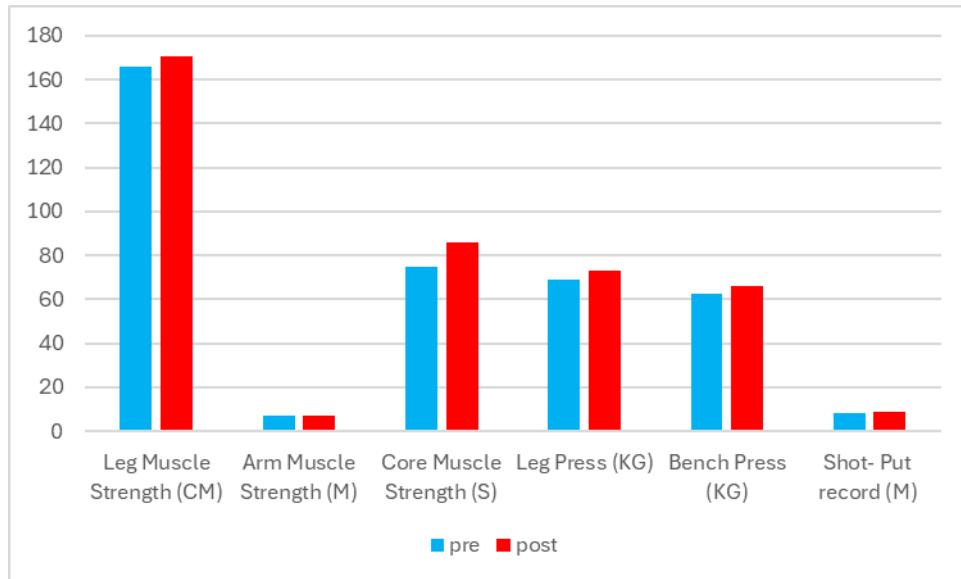


Figure 1. The sign between Pre and Post – measurements in physical variables and shot-put record to the experimental group

### Discussions

We attribute this improvement in physical variables to the careful planning of the landmine exercises, and the scientific rationing of training loads appropriate to the age and training stage of the sample.

In this regard, Dave (2003) emphasizes that one of the most important features of functional strength training using the landmine bar is its focus on emphasizing the core, where the strong core muscles connect the lower extremities to the upper extremities. In addition, it includes multi-directional movements, making it one of the best exercises used to improve muscular endurance.

Regarding the improvement in muscular endurance, Osama et al. (2022) emphasize that the activity of the elastic reflex allows for excellent transfer of muscular endurance to similar biomechanically similar movements that require high endurance from the trunk and legs, and its results are evident when performing the broad jump.

This is confirmed by Amr (2025) who argues that functional strength training using the landmine is a new method for bodybuilding because it can help better isolate muscles and diversify specific exercises. The landmine movement can help the athlete effectively transfer force between the upper and lower body, while also placing greater demands on transverse (multi-plane) stability. This places the athlete in charge of executing the proper technique by maintaining the landmen position relative to their body and the landmen's countermovement. Ultimately, this can help the athlete build strong body control, becoming more resilient and spatially aware.

We attribute this improvement to the diversity in the selection of functional strength training exercises using the end bar (landmen) for the arms and legs, and their distribution throughout the program periods according to the goal of each period.

Iqbal (2004) confirms that track and field competitions are considered sports that rely on record achievement. To achieve this in a positive manner, modern and advanced sports equipment must be used to achieve improved records.

Muhammed (2015) believes that the use of modern equipment and tools is the most important method or alternative for increasing the effectiveness of the training process, which contributes to addressing some shortcomings. During training periods, those responsible may neglect to consider the balanced development of the working and opposing muscles, or through the player's focus on performing a specific technique with one limb and neglecting its performance with the opposite limb, which may result in deficiencies in the proportions of muscle strength between the working and opposing muscles.

In this regard, Coh et. al. (2007) asserts that the technical performance of the Shot-put depends on the integration of the players' physical abilities, and that these abilities include explosive power, speed-specific strength, maximum strength, and speed. The integration of these qualities will inevitably lead to good technical performance, enabling the player to perform the throw at a good pace, while emphasizing the time aspect of the performance. Furthermore, the presence of the factor of kinetic balance during performance is essential, as a weakness in this factor leads to a bad throw. Body balance must be maintained, especially during the execution of the throw, and in a good manner.

Bartonietz (1994) asserts that the primary goal of improving performance during acceleration is to improve the vector of interaction forces on the ground by facilitating the direction of horizontal propulsion.

We paid attention to muscle stretching and joint flexibility exercises so that the muscles and joints are fully prepared to perform functional strength training using the (landmine) efficiently without causing injury.



We believe that the relationship between performance and skill level of the Shot-put competition, and its various physical requirements (general and specific) are closely related and must be considered when preparing juniors. There should be no separation between skill and physical preparation. On the contrary, physical abilities should be developed in accordance with the competition requirements. This will enhance juniors' performance. When a player possesses a high degree of physical abilities, they can achieve good technical performance in the Shot-put competition.

Therefore, physical components are considered among the most important performance requirements in track and field competitions in general, and the Shot-put competition in particular.

This is consistent with the findings of Sayed et. al. (2022), who stated that skill training alone is not sufficient to improve this skill and achieve fruitful results. In addition to skill development, the motor abilities specific to the skill itself must also be developed.

The results of this study are consistent with the findings of Sayed et. al. (2022) and Bartonietz (1994) found that the (landmine) contributed to improving the muscular strength and muscular power of the experimental group

### Conclusions

Under the conditions of our study, the proposed landmine exercises could be affected on physical variables (Leg Muscle Strength (CM), Arm Muscle Strength (M), Core Muscle Strength (S), Leg Press (KG), Bench Press (KG). and Shot- Put record (M). These results must be considered by instructors to imply these concepts.

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