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The Effect of Special Training Using Certain Assistive Devices in Developing Specific Physical Abilities in Javelin Throwing for Talented Individuals Aged (17-18) Years

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ABSTRACT
This research has addressed the use of specialized trainings with assistive devices to develop the specific physical abilities of talented (17-18) year olds, in the javelin throw at Baghdad athletics clubs. The study examined the use of assistive devices such as softball, shot put, and the use of leg-jumping platforms to develop specific physical abilities for the javelin throw. Such as explosive power, transitional speed and to improve their performance in the activity. The program included training with assistive devices using varying weights and jumps of different heights to develop leg and arm explosive power and transitional speed. The research concluded that these training methods had a significant impact on improving performance in the activity, as well as on post-test results. The study recommends adopting the use of assistive devices to develop physical abilities for the activity to improve performance. Also to utilize these devices to develop physical abilities in other activities.

Keywords: Explosive power; Transitional speed; Assistive devices; Javelin throw.

ABSTRAK
Penelitian ini membahas penggunaan pelatihan khusus dengan alat bantu untuk mengembangkan kemampuan fisik spesifik anak berbakat (17-18) tahun, dalam lempar lembing di klub atletik Baghdad. Studi ini meneliti penggunaan alat bantu seperti softball, tolak peluru, dan penggunaan platform lompatan kaki untuk mengembangkan kemampuan fisik spesifik untuk lempar lembing. Seperti kekuatan eksplosif, kecepatan transisi, dan meningkatkan performa mereka dalam aktivitas tersebut. Program ini mencakup pelatihan dengan alat bantu menggunakan berat dan lompatan dengan berbagai tinggi untuk mengembangkan kekuatan eksplosif kaki dan lengan serta kecepatan transisi. Penelitian menyimpulkan bahwa metode pelatihan ini memiliki dampak signifikan dalam meningkatkan performa dalam aktivitas, serta hasil pasca-tes. Studi ini merekomendasikan penggunaan alat bantu untuk mengembangkan

kemampuan fisik dalam aktivitas tersebut guna meningkatkan performa. Juga menggunakan perangkat ini untuk mengembangkan kemampuan fisik dalam aktivitas lain.

Kata Kunci: Kekuatan eksplosif; Kecepatan transisi; Perangkat bantu; Lempar lembing.

INTRODUCTION

What science has achieved in all aspects of life including the significant role of sports in international arenas, and the remarkable development we witness in our present era, are a direct result of the tremendous scientific and technological progress achieved in various fields.

This progress has led to the emergence of modern scientific inventions that have brought profound changes in all facets of our modern lives, including various developmental sciences. One of the most important sciences is sports training. This development has opened new horizons for research, discovery, and the development of knowledge, permeating all areas of our lives, including the field of sports. Sports are considered as a measure of evolution and progress of nations and societies worldwide, as clearly demonstrated by the achievements of highly developed countries.

Athletics, which occupies a prominent place in the Olympic and international Games, offers excitement and thrills with its distinctive events. These events have captivated football fans throughout the Olympic and World Championships, chosen for their competitive nature and the high level of performance required from the athletes. Among these activities is the javelin throw, the first of the athletics events, which requires

Meticulous attention and analysis in all its phases due to its greater difficulty and reliance on. Many physical variables in general, such as strength in particular, and the goal of achieving optimal performance and achievement, so that the coach can build accurate observations on the athlete's performance, whether physical or skill-based (1:121). Since the establishment of World Olympics, the competitive character and splendor of performance of champions from several countries had come up in this field, and the numbers reached by this event is true evidence of its high standards among athletics activities. Among the special physical abilities in it there are such as the explosive power of the arms and legs and the transitional speed. As a result of training research by specialists in the field of athletics, the explosive power of the arms and legs and the transitional speed are the abilities that play an important role in performing the basic role in achieving the pleasure of cohesion of the stages of performance and achieving achievement in the activity. Hence, the researcher emerged to find a way to develop performance using medicine balls of different weights and pull ropes as aids in javelin throwing. This involved using a new method with different weights of medicine balls and iron balls to develop the explosive power of the arms and legs and the transitional speed of the javelin throw. The method improved performance using balls of different weights and sizes and elastic pull ropes. This method was used with these balls and pull ropes in the stages of the throwing action. These different weights of medicine balls and pull ropes where it is used as aids according to the weights of pulling ropes as a new method to develop the physical abilities along with javelin throwing. Hence came the

importance of the research to use this method in training and achieving performance in this activity.

Research Problem

The diverse training methods, including the use of assistive devices and their impact, make it necessary for throwers, especially in the javelin throw, one of the athletics activities that needs an appropriate physical preparation according to their capabilities and abilities that this activity requires.

The explosive power of the arms and legs and the transitional speed are among the physical abilities that play an important and effective role in the performance and achievement of the javelin throw.

With the great development in achievements of athletics through the recent years, especially in throwing events, there is a large gap between them and international levels, with the difference estimated at 2-3 meters.

therefore, the researcher decided to identify assistive devices as a new method in performing the stages of throwing and improving the achievement of this acitivity by using iron balls of different weights with elastic pull ropes to develop the explosive power of the arms and legs of throwers in the javelin throw games for talented throwers in this activity or throwers at the National Center for the Care of Sports Talent and throwers of Baghdad clubs.

Research Objectives

1. To develop exercises using medicine balls of varying weights and also to improve explosive power, arm and leg strength, and javelin throwing performance among the gifted participants in the sample.
2. To determine the effect of these exercises using medicine balls and resistance bands on improving performance among the participants.

Research Hypotheses

1. There is a statistically significant correlation between the pre-test and post-test results of using assistive devices such as medicine balls of varying weights to develop explosive power, transitional speed, resistance bands, and javelin throwing performance among the gifted participants in the research sample.
2. There is a statistically significant correlation between the pre-test and post-test results and the javelin throwing performance of the gifted participants in the research sample.

Research Areas

1. Human Resources Area: Talented Javelin Throwers from the National Center for Sports Talent Development and Baghdad Clubs.
2. Timeframe: From 10/6/2026 to 15/8/2026
3. Location: Ministry of Youth and Sports stadiums – Athletics Talent Center and University of Baghdad stadiums

Definition of Terms

1. Transitional Speed: The attempt to move from one place to another at the maximum possible speed, meaning covering a certain distance in the shortest possible time (2:128)
2. Explosive Power: The highest force an athlete can exert in the shortest possible time and for a single duration (3:85)

3. Physical Abilities: The state of an individual's physical and organic constitution that enables them to use their body skillfully in various activities (4:78)
4. Javelin Throw: An athletics game in which the javelin is thrown from a specific range using a specific technique, allowing the thrower to achieve the greatest possible distance (5: IAAFI)

METHODS

Research Methodology

Choosing the appropriate methodology is essential for scientific research, as the methodology is (the path leading to the goal or the invisible thread that guides the researcher from beginning to the end with the intention of reaching specific results) (6: 42). Every research project has its own specific method for finding solutions. Therefore, the researcher used the experimental method, employing intensity, volume, and repetition techniques for testing the physical abilities of weightlifters. The experimental method is considered (the true test of cause-and-effect relationships and represents the most reliable approach to practically solving many scientific problems) (7: 217).

The researchers used the experimental method with a single experimental group, employing pre- and post-tests.

The Research Population and Sample

The sample (It is the model upon which the entire study is based on and it is the focus of the research; in physical education, the sample is (Human Being) (8:12). The researcher selected the research sample from javelin throwers, deliberately choosing (6) throwers from a total of (8) throwers, representing (75%) of the original sample. While (2) throwers were excluded for the pilot study.

It is possible for the researcher to intentionally select a sample and generalize the results to the entire population, especially when the sample is homogeneous, as a small sample is sufficient to represent the original population (9:165).

Table 1. Represents the Homogeneity of the research sample in terms of (height, weight, and age)

Variables	Measuring Tool	Mean	St.d	Coefficient of skewness
age	year	8,64	0,25	2,01
height	cm	1,77	0,02	1,63
weight	kg	63,44	0,04	1,52

Table (1) shows that all values are confined (between +1) in all variables, indicating homogeneity.

Table 2. Represents the sample percentage

Original total	Research sample	Research sample percentage
8throwers	6	%75

Tools and Equipment Used in the Research

To achieve the research objectives and solve its problem, the researcher must provide the appropriate tools and resources in a way that ensures success.

The availability of research tools refers to the means or methods by which the researcher can collect data with solving the problem to achieve research objectives, regardless of the nature of these tools, such as races, samples, equipment's, and educational tools (10: 165).

Information Collection Methods - Equipment Used

1. Arabic and foreign sources and references.
2. The internet.
3. A support team.
4. A registration form.
5. A questionnaire to determine the physical abilities of the sample in javelin throwing.

Tools and Equipment Used in the Research

1. Legal javelins (600g)
2. Medicine balls of different weights (1kg,2kg,3kg).
3. Iron balls of varying weights
4. Measuring tape
5. Two elastic bands
6. Stopwatch
7. Jump hurdles of varying heights
8. Elastic tow ropes.

Implementing the research steps

Identifying the most important physical abilities of javelin throwers

After reviewing several reliable scientific sources and the opinions of experts and specialists (*) in the field of athletics, the researcher compiled these abilities into a questionnaire. The abilities were listed and assigned a five-point scale. After using the relative importance of the abilities, the physical abilities that scored 80% or higher were adopted. These include explosive power of the arms and legs and transitional speed, as shown in Table.

Table 3. The opinion of experts and specialists in selecting specific capabilities for the activity is shown

No	Importance of Muscular	Abilities
1	Arm Explosive Power	%90
2	Leg Explosive Powe	%85
3	Speed Strength	%75
4	Maximum Strength	%65
5	Strength Endurance	%67
6	20m Sprint Speed	%82

After identifying the most important abilities for the javelin throw, the researcher compiled them into a table and developed the most relevant tests. These were then presented to a group of experts and specialists in the field of athletics. After the tests were reviewed, the researcher calculated the percentage of agreement among the experts using the percentages for the abilities related to the shot put, explosive power of the arms and legs, and transitional speed.

Pilot Test

Conducting a pilot test involves the researcher assessing the suitability and effectiveness of the equipment, support staff, and selections used in the experiment. This is an important process recommended by specialists in scientific research. The researcher conducted the pilot study on June 11-12, 2026, at 3:00 PM at the National Center for Sports Talent Development, Ministry of Youth and Sports.

This pilot study was conducted on two shooters from outside the research sample. The study consisted of specific tests related to the research requirements (explosive leg and arm power and transitional speed). The most important results of the pilot study included: - Demonstrating control and skill in performing the tests, including the method of execution.

1. Assessing the effectiveness and suitability of the equipment and tools used in the research.
2. Determining the time required for each test.
3. Familiarizing the support team with the types of tests, the experiment, and the use of the tools.

Field Research Procedures

Tests Used in the Research

First - Standing Long Jump Test (11:67).

Purpose of the test: To measure the explosive power of the legs.

Equipment: A level surface that prevents the subject from slipping; a measuring tape.

Test Description: The subject stands behind the starting line with feet slightly apart and arms raised. The arms are swung forward and backward while the knees are bent at a slight angle and the torso leans forward until it resembles a swimming starting position. The arms are then swung forward forcefully while the legs are extended along the torso, and the feet are pushed off the ground forcefully, attempting to jump forward as far as possible.

Scoring: The measurement is taken from the starting line to the nearest mark left by the body on the starting line. The subject's best attempt is recorded.

Second - Medicine Ball Throw Test (3 kg) (12:34)

With both hands, while seated on a chair.

Objective of the test: To measure the explosive power of the arm muscles. Equipment and tools: 3 kg medicine ball – measuring tape – chair with a strap to securely hold the torso.

Procedure:

The subject sits on a chair, holding the medicine ball overhead with their torso against the chair's edge. A strap is placed around the subject's torso and secured to the back edge of the chair. This prevents the subject from moving forward while throwing the ball with both hands, allowing for a controlled throw without using their torso.

Scoring: Each subject is given three attempts, and their best attempt is recorded.

Third: Transitional Speed

20m Sprint from a Standing Start (13:128)

Equipment: A level surface 40m long for safety and 1.22m wide.

Test Description: The subject stands and, upon hearing the command, sprints to the nearest second to cover the 20m distance.

Scoring: The time is recorded to the nearest second. Fourth: Javelin Throw Achievement Test (Numbered Level and Performance Level)(14: IAAFI)

Purpose of the test: To measure javelin throw performance.

Equipment: Legal throwing circle, measuring tape, cones for marking the throwing sector, support staff, tools and cones for marking the javelin throwing field, javelin weight (800g).

Performance: The subject stands within the throwing field and performs the approach run, throwing the javelin as far as possible.

Scoring: The thrower is allowed three attempts, and the best attempt is recorded, with the distance measured to the nearest meter/centimeter.

Pre-tests:

The pre-tests were conducted on the research sample on June 13, 2026, at 3:00 PM at the Ministry of Youth and Sports' National Center for Sports Talent Development.

Training Program:

The training program included exercises for throwing medicine balls of different weights and sizes using resistance bands of varying lengths. The researcher used exercises based on the required intensity, repetitions, and rest time between reps and sets. The researcher developed these physical abilities for javelin throwers using this new throwing method with different tools, such as medicine balls of various weights and sizes, and a rubber band from Prock on the knees, both while sitting on a bench and standing. This was a new approach to develop the arms, trunk, and legs to increase the explosive strength of the arms and legs and to run faster, improving the athletes' transitional speed. The researcher used these exercises for eight weeks, with two sessions per week on Sundays and Tuesdays. The program involved medicine balls of different weights and sizes, various types of resistance bands, and jump hurdles depending on the type of ball, exercise intensity, and number of repetitions. Intensity gradually ranged from 85% to 100% depending on the exercise position and repetitions. Each main part of the training unit allocated 30 minutes for training javelin throwers from the talents of the National Center and associated clubs.

RESEARCH RESULTS

Table 1. Shows us the statistical operations that were reached as a result of the pre- and post-tests of (3 kg medicine ball thrown from a seated chair, standing long jump, 20 m sprint, transitional speed) for the sample of talented javelin throwers

Significance of differences	t-critical	t	f-critical	f	post-tests		per-tests		Measurement Unit	Statistical treatments for tests
					St.d	Mean	St.d	Mean		
Moral	2.52	2.428	0.075	0.224	0.487	7.926	0.503	7.703	cm	3 kg medicine ball was thrown from a seated chair

Moral	2,52	8.098	0.104	0.344	0,019	2.436	0.148	912.1	cm	Standing long jump
Moral	2,54	4.28	0.112	0.251	0,124	3,115	0.196	3,315	sec	30m sprint transition
Moral	2,53	0,24	0,112	0,153	0,283	56,811	0,223	52,36	cm	shot put performance test

At a significance level of 0.05 and degrees of freedom of 5

The results of the experimental group's 3 kg medicine ball throw test from a seated chair showed a pre-test mean of 7.03 and a standard deviation of 0.503. In the post-test, the pre-test mean was 7.926 and the standard deviation was 0.487. The F-value was 0.224 and the F_e value was 0.075. To determine the significance of the differences between the pre-test and post-test, a t-test was conducted. The results showed a significant difference between the pre-test and post-test scores, favoring the post-test. The calculated t-value (2.428) was greater than the critical value (2.53) at a significance level of 0.05 with 5 degrees of freedom.

DISCUSSION

The results of this t-test showed a significant difference between the pre-test and post-test scores, favoring the post-test. In the same group's results for the standing long jump test, the pre-test mean was 2.191 with a standard deviation of 0.148, while the post-test mean was 2.426 with a standard deviation of 0.119. The F-value was 0.324, and the F-value was 0.104. To determine the significance of the differences between the pre-test and post-test, a t-test was conducted. The results of this test showed a significant difference between the pre-test and post-test in favor of the post-test, as the calculated t-value (8.098) was greater than the critical value of 2.52 at a significance level of 0.05 with 5 degrees of freedom. The results of the same group in the 20m sprint test were as follows: the pre-test mean was 3.315 with a standard deviation of 0.196, while the post-test mean was 3.110 with a standard deviation of 0.124. The F-value was 0.251, and the F-value was 0.112. To determine the significance of the differences between the pre-test and post-test, favoring the post-test, a t-test was conducted. The results showed a statistically significant difference between the pre-test and post-test, favoring the post-test, as the calculated t-value (0.28) was greater than the critical value (2.54) at a significance level of 0.05 with 5 degrees of freedom.

The results of the t-test showed a statistically significant difference between the pre-test and post-test, favoring the post-test. The results of the same training group in the javelin throw performance test were as follows: the pre-test mean was 52.136 with a standard deviation of 0.223, while the post-test mean was 56.511 with a standard deviation of 0.383. The F-value was 0.153, and the F-value was 0.112. To determine the significance of the differences between the pre-test and post-test, a t-test was conducted. The results of this t-test showed a significant difference between the pre-test and post-test, favoring the post-test. The calculated t-value (0.24) was greater than the critical value (0.53) at a significance level of 0.05 with 5 degrees of freedom.

The results of this t-test showed a significant difference between the pre-test and post-test, favoring the post-test. Based on the presentation and analysis of the results shown in Table (4), significant differences were found in the pre- and post-tests of the experimental group in the research variables: (3 kg medicine ball was thrown

from a seated chair, standing long jump, 20-meter sprint, and javelin throw). The researcher attributes the improvement achieved by the experimental group to the exercises designed using medicine balls to develop strength, and resistance bands to develop arm and leg speed and physical mobility, highlighting their importance as explained by some experts in their publications.

Some scientists believe that "performance-specific physical strength" is the foundation upon which an individual reaches the highest levels of athletic achievement. It also significantly influences the development of certain physical abilities, such as speed and strength, and their various forms in both the arms and legs, especially in sports activities where the use of muscular strength is combined with other physical attributes. Experts in physical education and sports science testing and measurement indicate that individuals with high muscular strength and speed can achieve a high score on general physical fitness (16: 264).

The researcher also attributes this progress to the nature of the training exercises administered to the experimental group, which placed a high level of stress on the body, particularly on the muscles, tendons, and joints. Therefore, the body must gradually adapt to this type of exercise, starting with less intense exercises and progressing to more intense ones (17: 29). This was achieved using tools such as medicine balls, resistance bands, and varying-height jump boxes. Seguin (2022) states that resistance band training improves acceleration mechanisms by increasing propulsive force during the launch phase (7:19).

Sarici and Gencer (2024) indicate that resistance band training has a positive effect on 30-meter sprint performance (31:20). Stanković (2025) also points out that the significant improvement achieved using resistance bands targets key neuromechanical components of directional change, including reactive force. This provides increased tension during the concentric contraction and acceleration phases and enhances muscle load during the eccentric contraction phase. Resistance bands also provide a suitable method of resistance for the joints (18:11). Therefore, the use of exercises with medicine balls of varying weights and sizes and resistance bands positively impacted the development of explosive arm power, with medicine ball training being particularly effective, while resistance band training had a positive effect. It is effective in increasing the throwing speed of the throwers. Hence, the use of this method of training, with medicine balls of different weights and sizes and the use of elastic bands, positively affected the development of physical abilities of strength and arms, and box exercises on leg strength and transitional speed, and the achievement of the research sample of javelin throwers and those talented with this training method. The researcher (Billah:2026) mentions in the role of training based on medicine ball in improving throwing performance that it was found that resistance training using medicine balls greatly improves throwing speed compared to traditional programs (129:21).

CONCLUSIONS AND RECOMMENDATIONS

Through the presentation and analysis of the results, the researcher reached the following conclusions:

1. The research demonstrated the effectiveness of using assistive devices, such as medicine balls of varying weights and sizes and resistance bands, within training programs to develop certain physical abilities in javelin throwing.
2. The results showed the effectiveness of the training program in improving performance and achievement in javelin throwing as a result of using assistive devices, such as medicine balls of varying weights and sizes and resistance bands, among the research sample.
3. The development of certain types of strength and speed through the use of assistive devices, such as medicine balls of varying weights and sizes and resistance bands, positively impacted the development of these strengths and the performance of the research sample of talented javelin throwers.

In light of the research conclusions, the researcher recommended the following:

1. The results of the variables should be considered and utilized in conjunction with the results of athletes in track and field.
2. The use of diverse modern training methods should be encouraged, employing appropriate assistive devices and resistance bands to develop and improve performance.
3. The importance of studying performance improvement using other assistive devices should be emphasized.
4. A similar study on developing other physical abilities for other events.

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