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## The effect of compound training on some morphological measurements and explosive power of working muscles, and the level of achievement by javelin throwing

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### Abstract

The importance of the research lies in showing the impact of the application of complex training to develop morphological measurements and the explosive power of working muscles and thus raise the level of achievement and contribute to the promotion of scientific applications more effectively and bypassing traditional methods and adding progress in the right direction for the development of javelin throwing for young people and attention to this segment as they constitute an essential future sports base. The problem arose with the question: Does compound training affect the explosive power and level of achievement by javelin throwing? The search aims to recognize the effect of compound training exercises in developing some morphological measurements, explosive power, and achievement level for javelin throwers. The researcher adopted the experimental method as it is compatible with the solution of the problem to be investigated. The intentional process chose the research sample. They are a group of talented school players, the junior class, by javelin throwing, and their number 6 players yet applied the training program to them. The conclusions were that the training program using compound training led to an improvement in the morphological measurements (arm and legs) for the research sample.

**Keywords:** Compound training, explosive power, javelin throwing

### 1. Introduction

The process of reaching high levels in sports activities is no longer easy to achieve because the level of achievement in sports activities has reached high peaks that can be overcome by making more efforts in the preparation process in sports training. Training is considered one of the critical topics in the sports field, as it is closely linked to achievement through its laws and theories studied on a comprehensive and continuous basis by experts and specialists. And it became imperative for the individuals of physical education and sports to keep pace with this tremendous and constant development to find modern methods for building the athlete in all aspects of physical, skill, psychological, planning, physiological, and morphological aspects appropriate to the type of effectiveness to achieve achievement. The science of sports training closely relates to the other sciences on which it is based for the integrated construction of athletes. Every kind of sporting event has physical requirements on its own, and muscular strength is the basis for other movements and exceptional muscular strength aims to develop the amount of muscular strength of the muscles that work mainly in the individual's custom sports and uses its exercises during the duration of the unique numbers of the training curriculum. It also works on developing types of muscular strength according to the percentages of its contribution to specialized performance. The muscles are mainly qualified in the kinetic version of the sports practiced for competition exercises. The particular types of strength are explosive power and the power characterized by speed, speed, throwing ability, and performance (Abdel-Maqsoud, 1996) <sup>[1]</sup>. The trainer must have full knowledge of them when defining training methods, and complex training is one of the integrated methods. It includes weight training and plyometric exercises in succession in the training unit. To develop strength that can use in a wide range to create muscular reactions and produce various sports movement's specific to sports, including the effectiveness of javelin throwing.

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Donald Shaw (2014) [6] defines compound training as one of the training styles in which weight training and plyometric exercises are used together in the same training unit. (Donald Cho, 2014) [6] Hence the importance of the research in showing the impact of the application of complex training to develop morphological measurements and explosive power of working muscles, thus raising the level of achievement and contributing to the promotion of more effective scientific applications. Overcoming the traditional methods and adding progress in the right direction to develop javelin throwing for young people and taking care of this segment being an essential sports base for the future. The urgent desire to take care of young people in the sports field as they constitute the broad base of sports contributes positively to expanding the base of young people who are prepared physically, kinetically, mentally, and emotionally in a scientific manner (Hammad, 2010) [3].

**Research problem**

Muscular strength is the most important physical ability that plays a significant role in achieving sports achievement for various athletics, including the effectiveness of javelin throwing, which depends directly on the explosive force, which expresses the Use of strength and speed at the same time. As the researcher was one of the former players in the field of teaching physical education, he noticed stagnation in the level of achievement for a long time without achieving new figures. So he wanted Use Exercising in a compound training method, where it combines weight training and plyometric exercises in succession to one practice, adding to the movement a kind of excitement and suspense and achieving the desired results of training and achieving this in shortening the time instead of using weight training exercises in a training unit and plyometrics in a later training unit. On the other hand, explosive strength training based on similar performance gives the possibility of achieving the integrated conditions that the researcher believes will enhance the

excellent achievement, which did not take the actual field in the training process, which has come into practice in modern research and studies in most sports, including athletics (javelin throwing). And Brad Mack (2006) [5] sees the continuous and increasing emphasis on reaching achievement led scientists to search for training methods that positively affect performance, and weight training and plyometrics are one of these methods that have drawn attention recently (Brad Mc, 2006) [5]. The problem emerged with the following question: Does training exercises in The compound affect morphological measurements, explosive power, and level of achievement by javelin throwing?

**Search objective**

Recognizing the effect of compound training exercises in developing some morphological measurements, explosive power, and achievement level for javelin throwers

**Force search**

There are significant differences between the results of the tribal and remote tests in the morphological measurements and the explosive power and the results of the achievement level of the javelin throwers.

**2. Research methodology and field procedures**

The researcher adopted the experimental method as it is compatible with the solution of the problem to be investigated. The research sample was chosen by intentional practice, and they are a group of talented school players; the junior class, by javelin throwing, and their number 6 players, applied the training program to them. The researcher also conducted the homogeneity and equivalence of the group members in the variables of height, age, weight, and achievement by throwing the spear, and the calculated T values were randomly assigned, which indicated that the group members were equal, as shown in Table (1):

**Table 1:** It shows the equivalence of the research sample

The m changes	Measuring unit	The research sample		Values t	Indication
		Q -	p		
Height	cm	1.47	0.05	0.526	not significant
The age	year	16.67	1.18	0.552	not significant
Weight	kg	68.01	3.90	0.178	not significant
Achievement	meter	43.35	0.55	1.04	not significant

Note that the tabular value (2.15) is under the degree of freedom = 5, and the level of significance is 0.05

▪ **Tools and devices used in the research:**

The researcher used some devices and tools that he used to obtain the search results, as well as using the means of collecting information for the research. Spears weigh (700 g), the legal weight for the junior category and according to the rules of international law for athletics (Abdul Karim *et al.*, 2004).

▪ **Search procedures**

The researcher reviewed a group of Arab and foreign sources, research, and studies that focused on the issue of explosive power and complex training (weights and plyometrics). The research tests were selected.

**First/morphological measurements of the aiming arm and legs**

**Secondly, physical examinations**

1. The extended jump test of stability

2. Vertical jump test of stability
3. The triple jump test of stability
4. Throwing a medical ball weighing 2.5 kg over the head from stability

Third/legal javelin test. (Digital level gauge).

**Survey experience**

The researcher conducted an exploratory experiment on 3/2/2022 on a sample of (3) junior players from the talented school players to throw a spear on the scout camp stadium with the aim of:

1. Ensure the validity of the tools used in the field experiment.
2. Ensuring ease of preparing and implementing the tests.
3. Knowing the Time taken to perform the tests.
4. Observe the extent of the testers' response to the performance of the test.

5. Note the suitability of the assistant work staff.
6. To identify the suitability of the tests as a measure of explosive power.

In light of this experience, the researcher developed the training program to avoid errors and obstacles he may face when implementing the program. He also ensured the tests' validity and suitability for the research sample in terms of performance and availability of their own tools.

▪ **Pretest**

The researcher conducted tribal tests on the research group on 2/6/202 at the Scout camp stadium. All members of the research sample, numbering (6) players, attended, and the tests were conducted as in the exploratory experiment. A rest period of (5 d) was given between one test and another, as the researcher proved all the other conditions of the test in terms of place, time, method, and climate to create the same or similar conditions when conducting post-tests.

▪ **Main experience**

The researcher prepared a training program for each training unit, taking into account the capabilities and general levels of the research sample on the one hand and, on the other hand, the availability of devices and tools based on the results of the exploratory experiment. With body weight, using barriers and platforms of different heights, using throwing exercises

similar to the importance of the spear and different weights, and pushing exercises with the arms from the front position, taking into account the intensity of the appropriate effort for the activities that are commensurate with the age level of the research sample members, and the number of training units was (3) training units per week On Sundays, Tuesdays, and Thursdays, it is implemented after performing the technical exercises. The time for implementing the training unit was (40-45 minutes), where the essential effectiveness of javelin throwing is given, and then the exercises for the research are performed. The implementation of the training program scheduled in the research plan took a period of (8 weeks) implemented (24). Training unit) and the performance of these units was within the special preparation period Post-tests for the research sample.

The research sample was 1/4/20 22, and he followed the same method that he followed in the tribal tests after completing the scheduled period of the experiment, which lasted eight weeks. The researcher was keen to find all conditions for the pretests and their requirements when conducting the post-tests in terms of time, place, and means of testing.

**3. Statistical means**

The researcher used the statistical package (SPSS).

**4. Discussing the Results**

**Table 2:** It shows the calculated (t) value and the results of the differences between the pre and post-measurements and tests for the research sample

T	Variables	Measuring unit	Pretest		Post-test		Calculated T	Evolution %	Statistical significance
			s	+p	s	+p			
1	humeral circumference aiming	cm	27.31	1.26	30.2	1.22	2.37	11.35%	moral
2	Right thigh circumference	cm	45.29	2.88	49.10	2.85	5.23	8.19%	moral
3	Left thigh circumference	cm	45.20	2.78	49.6	2.38	4.72	8.70%	moral
4	long jump	meter	2.30	0.28	2.67	0.23	14.19	12.65%	moral
5	vertical jump	meter	0.35	0.16	0.53	0.38	6.30	9.81%	moral
6	triple jump	meter	6.22	0.25	7.40	0.29	11.82	14.14%	moral
7	medical ball throw	meter	7.95	0.22	8.81	0.20	6.15	8.13%	moral
8	javelin	meter	41.20	3.21	46.32	4.12	16.65	17.90	moral

t value (2.015) under the significance level of 0.05 and the degree of freedom of 5

Is noted in Table No. (2) that the value of t appeared. Calculated in all research variables and is greater than the tabular value (2.015) under the degree of freedom (5) and the level of significance of 0.05, which indicates the existence of significant differences in favor of the measurements and the post-tests of the research sample. The researcher attributes to the Use of complex training, which combines training with weights and plyometrics at the same time, in a consecutive and varied manner, and the regularity of the players in training has a positive impact on improving the variables under discussion and the events of development. Complex training improves morphological measurements and muscle strength (arms and thighs) by stimulating motor units and recruiting a large number of muscle fibers during the performance, which is reflected in the level of achievement. Where exercise with weights helps to develop strength, speed, and plyometric in developing muscle contraction by squatting and muscle contraction by lengthening to bring out the maximum muscular ability, similar to a performance that depends on moving muscle work, and this is what the spear needs to achieve the farthest possible distance during the throw. This is consistent with what was stated by William (2002) that the combination of weight training and

plyometrics leads to positive results in increasing the athletic ability of the athlete, which has become widely practiced in the sports field and recommended for athletic ability and achievement of sports achievement. Sequential, where the first a performed using weights slowly, followed by the second movement, performed in a fast, explosive manner, without weights (William p, 2002) (42:7). Mohamed Hassan (2016) mentions that compound training led to the development of morphological variables, maximum muscular strength, and endurance of large and small muscles in the players' bodies (Khattab, 2016) [4].

**5. Conclusions and recommendations**

**Conclusions**

1. The training program using compound training led to an improvement in the morphological measurements (arm and legs) of the research sample.
2. The program using compound training led to the development of the explosive power of the working muscles of the research sample.
3. The compound training program led to the development of the level of achievement in javelin throwing.

**Recommendations**

1. The necessity of using complex training for javelin throwers because of its impact on the development of morphological measurements (Arm and legs), the explosive power of working muscles, and the level of achievement by javelin throwing.
2. Conducting studies and research for complex training in training programs with other activities and events.
3. 3-Providing equipment and tools used in compound training in stadiums and sports clubs.

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