

THE EFFECT OF MUSCLE BALANCE EXERCISES ACCORDING TO SOME BIOMECHANICAL VARIABLES, THE ELECTRICAL ACTIVITY OF THE THIGH MUSCLES, AND THE ACHIEVEMENT OF THE LONG JUMP YOUTH

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ABSTRACT

The developments that took place in the field of sports training science are many and significant at the theoretical and practical levels as a result of scientific and practical experiments and research that are still continuing in the use of various training methods and methods that contribute to the development of the level of players, and that this development comes from the work of the corresponding working muscles through the contraction of a muscle or A group of muscles on the same joint while the opposite is relaxed so as not to hinder movement. Therefore, training to develop strength and mechanical variables for long jump players requires work to balance force on one joint, which called the researcher to study this problem. The study aimed to prepare exercises for muscle balance and to know the effect of this Exercises in some biomechanical variables, electrical activity of the thigh muscles, and the achievement of the long jump for young people, and there were differences with a statistically significant difference between the pre and post tests of the research variables. For muscles, the researcher concluded the contribution of exercises in making a difference to Some biomechanical variables and the electrical activity of the muscles. He studied other variables of the electrical activity of the muscles, such as the arena and other games.

Keywords: muscular balance, biomechanical variables, electrical activity, thigh muscles, long jump.

1-1 RESEARCH INTRODUCTION

The developments that took place in the field of sports training science are many and significant at the theoretical and practical levels as a result of scientific and practical experiments and research that are still continuing in the use of various training means and methods that contribute to the development of the level of players, according to the theories and concepts of sports training and its practical applications, and in order to understand what is. Movement minutes It was necessary to harness the various sports sciences, including biomechanics, which has a great impact in improving and developing the level of technical performance and the digital level in all sporting events, and due to the important place of athletics competitions in championships, countries have relied on scientific foundations, research and analysis that is based on modern science in Preparing the champions, and it had a prominent role in science, its effective impact in directing and choosing the methods and techniques of training players to get them to high levels, and what you see from thousands of breaking numbers is considered the best evidence of that.

Scientists have discovered that many sports activities cause an increase in the muscle strength of one muscle group without being associated with this increase in the corresponding muscles.

These scientists have theoretically concluded that the corresponding muscle groups should be trained more in order to help improve performance and prevent injury. Any sporting activity does not develop all muscle groups in the same way and in a coordinated manner, and training for the type of sporting activity leads to the occurrence of distinctive adaptation phenomena that mainly lead to the development of the muscle groups that are needed to perform for competition successfully.

As for the other groups whose role it seems to the trainer or the athlete to determine the level is not much, they are often neglected, and this leads to the emergence of what is called muscular imbalance. From here came the idea of research in preparing special exercises for muscular balance, through which the focus is on the muscle groups that require them. Performance formula in the practiced activity.

These exercises are according to the electrical activity of the thigh muscles for young long jumpers

1-2 Research Problem

The muscles usually work in pairs: when a muscle or muscle group contracts in the opposite muscle or muscle group at the same joint, it relaxes so as not to impede movement, or when the moving limb reaches the final limit of the range of motion of the joint, the muscle or muscle group contracts momentarily in proportion to the The force of contraction of the main motor muscles and the speed of the moving limb to stop the movement of the moving limb in order to protect the joint from injury

Therefore, training to develop strength and some bio-mechanical variables for long jump players must have a balance of strength on one joint, and the compatibility between the contracting muscle groups and the relaxed muscle groups will help increase the speed of movement and keep the muscles in real balance with increasing strength, the first requirement for the development The muscles produce the maximum force in the maximum range of movement with the highest possible rate of speed. From this point of view, the research problem was identified in an attempt to identify the effect of muscular balance exercises prepared by the researcher according to some biomechanical variables and electrical activity in the thigh muscles and the achievement of the long jump for young people.

1-3 research objectives

- 1- Preparing exercises for muscular balance according to some biomechanical variables and electrical activity in the thigh muscles and achieving the long jump for young men.
- 2- Knowing the effect of muscular balance exercises according to some biomechanical variables and electrical activity in the thigh muscles and the achievement of the long jump youth.

1-4 research hypotheses

- There are statistically significant differences between the pre and post tests in the biomechanical variables, electrical activity, and the achievement of the long jump for young men.

1- 5 areas of research

- 1- the human field: a sample of (8) young players for the effectiveness of the long jump
- 2- Time range: for the period from 10/10/2022 to 15/12/2022
- 3- Spatial workers: the arena and field stadium in Al-Shaab International Stadium

2-1 Research methodology

The researcher used the experimental method for one group in the pre and post tests, due to its suitability to the research problem.

The term methodology refers to the methods, procedures, or approach that is used in such a manner as to collect all data

Through it, access to results, interpretations, or explanations related to the subject of the research" (74:1).

2-2 Research sample

A sample was selected to search for young players in the long jump event for the season (2021-2022), which consisted of (8) players who were chosen by the deliberate method and who continue their training regularly. And as shown in Table (1)

Table (1) The homogeneity of the research sample in variables (age, training age, mass, height)

variants	measruing unit	Arithmetic mean	Standard equilibrium	Mediam	torsion modulus
the age	year	17.44	5.81	17	0.41
training age	year	5.18	0.99	5	0.81
body mass	kg	60.29	14.33	60	0.39
height	C.M	168.8	29.08	169	0.43

It appeared from Table (1) that the research sample is homogeneous in all variables, as the value of the torsion coefficient for all variables is confined between (-1, + 1), and this indicates that the moderate distribution of the members of the research sample and thus indicates the homogeneity in the variables

2-3 The means, devices and tools used in the research.

- Observation and experimentation
- Personal interview
- Testing and measurement
- Stationery
- Electronic balance
- a laptop.
- Measuring tape for length.
- Device (EMG) to measure indicators of electrical activity of the muscles of the thigh and razor blades, medical alcohol, adhesive tape, surface pickups)

- Japanese-made (Sony) video camera, frequency of 30 fps, with a tripod
- Kenova program for kinetic analysis
- Healthy pickups
- Razor blades, medical alcohol, medical post-tape,
- A box with a height of 40 cm
- Moradha rope

2-4 research tests

2-4-1 Biomechanical variables for long jumpers

- 1- The angle of inclination of the torso
- 2- The height of the body's center of gravity at the moment of flight
- 3- Momentum of movement of the body
- 4- The angle of movement of the front leg at the moment of the goal.

2-4-2 after Looking at previous studies and related research and taking the opinions of specialists. The working muscles of four groups were identified during the jump performance.

- 1- Rectus femoris muscle
- 2- The biceps femoris muscle femoris Hamsting
- 3- The calf muscle

2-4-3 Achievement of the long jump

Give two attempts and choose the best

2-5 Exploratory experience:

The researcher conducted the exploratory experiment on 10/5/2022 on a sample (2) of the long jumpers who were not excluded from the exploratory experiment, because the research is experimental and does not contain questionnaire questions, so the sample of the exploratory experiment can be kept in the main experiment

2-6 Pre-tests

The researcher conducted the pre-tests on 10/7/2022 after determining the most important tests by experts and specialists in the Al-Shaab International Stadium / Arena and Field Stadium at ten o'clock in the morning for the research sample.

The goal was the following

- 1- Ensure that the camera is valid
- 2- Knowing the vocabulary of the test
- 3- Knowledge of the supporting work team
- 4- Determine the location and dimensions of the camera

2-7 The main experiment

The main experiment was carried out in the arena and field stadium / Al-Shaab International Stadium on the research sample, and the researcher applied muscle balance exercises to target the muscles to be developed. The exercises were applied as follows

- The exercises were applied for a period of (6 weeks) at a rate of three training units per week, thus the number of units is 18 training units.
- The exercises were implemented in the preparation period using the high-intensity interval and repetitive training method
- The intensity of each exercise ranges from 85 to 95% of the maximum intensity for each player
- Taking into account rest periods between repetitions and between sitat
- The exercises included targeting the muscles corresponding to the balance, working with the working muscles
- Apply the number of exercises within each training unit, equivalent to 10 exercises per training unit

2-8 post exams

The researcher conducted the post tests on 22/11/2022 at ten o'clock in the morning at the arena and field stadium / Al-Shaab International Stadium and under the same conditions that the pre-tests were conducted on the research sample

2-9 Statistical means

The researcher used Spss for the statistical treatment of the research

3 Presentation, analysis and discussion of the research results

3-1 Presentation, analysis adiscussion of the results of the biomechanical tests between the pre and post tests of the research sample

Table (1) Between the arithmetic mean, standard deviations, the calculated value of t and its significance for the biomechanical tests of the research sample

variants	measru ing unit	pretest		post test		Calcula ted T	signifi cance level	Moral Connot ation
		M	S	M	S			
Torso tilt angle	degree	0.88	0.083	0.93	0.08	1.000	0.39	non- moral
The height of the body's center of gravity at the moment of flight	m/ its parts	0.37	0.04	0.58	0.05	8.8	0.003	Moral
momentum of the body	kg m/sec	0.57	0.101	0.77	0.12	9.71	0.002	Moral
The knee angle of the front leg at the moment of getting up	degree	0.83	0.18	0.95	0.06	1.35	0.26	non- moral

3-2 Presentation, analysis and discussion of the results of EMG tests for muscles between the pre and post tests of the research sample for the highest value of muscle activity

Table (2)

It shows the arithmetic mean, standard deviations, the calculated value of t, and its significance for the EMG tests of the muscles in a variable with the highest value of muscle activity and the achievement of the long jump.

variants	pretest		post test		Calculated T	significance level	Moral Connotation
	M	S	M	S			
The rectus femoris muscle	196.0	67.89	1254.0	150.7	2.146	0.001	Moral
Biceps femoris	125.0	63.5	330.0	71.4	4.590	0.000	Moral
conjunctive muscle	112.0	59.4	310.0	69.3	3.123	0.003	Moral
Long jump achievement	5.08	0.94	5.33	0.87	4.04	0.002	Moral

Table (1) and (2) show the arithmetic mean, standard deviations, the calculated t value and the level of significance of the biomechanical tests and the EMG peak activity variables of the research sample, where the significant value appeared in the test of the height of the body's center of gravity at the moment of flight and the movement momentum of the body, and the significant value appeared in the EMG variables in the rectus muscle and the rectus muscle The biceps femoris, the sympathetic muscle, and the long jump achievement. The researcher attributes these significant differences to the exercises prepared by the researcher, which are summarized in muscle balance exercises, targeting the muscles corresponding to the working muscles, and increasing their work by giving appropriate repetitions, stresses, and rest times that helped in the improvement in the mechanical variables represented by the height of the body's center of gravity at the moment of flight, which contributes to improving achievement. When we observe the results before and after the mechanical variables, we find that the height of the center of gravity of the body at the moment of flight was better, as the height of the jumper depends on getting up, as the jumper tries to raise his torso up immediately after his rise by doing kinetic methods to raise his arms forward or high. It turns out that the flight time is what determines the height The center of gravity of the body and the higher the body in the air, the longer the flight time. (Talha Hussam El-Din, 1993) mentions: "The increase in the height of the body's center of gravity increases the time the body stays in the air" (2:211). And the exercises used during the training units have effectively affected the development of the movement momentum of the body in order to achieve a vertical jump height, as the movement momentum is the amount of movement that the athlete can generate during the jump up. And since muscular strength is important for generating greater force by the reaction of the earth, so we must, through the exercises used in the main experiment of the research, increase this momentum by increasing the strength and increasing the path of accelerating the movement of the knee joints, as the angles of the knees work at maximum speed and strength at ideal angles so that the athlete can generate the largest force It spends the least possible kinetic energy and confirms (Ahmed Fouad, 2005) "The special exercises that resemble the performance movements of the skill and using the same muscle groups and in the same general direction to perform the same game in order to reach the high level" (78:3)

Thus, these mechanical variables that have been developed, therefore, will lead to the development of achievement by improving the work of the muscles in question to the rate of peak activity, which leads to an increase in the mechanical effect of the muscles if the main working muscles differ from the auxiliary, corresponding and antagonistic ones in the production of values, and this is what was indicated by (Amer Musa , 2006) "All muscles aim to serve the movement and skill studied and according to the requirements of mechanical skill" (60:4).

The electrical activity signal (EMG) provides information related to whether the muscle is in a state of activity or not for the longest period of this activity and the rest period for these muscles. The reason for the emergence of the time period of muscle activity is the chemical changes that occur before the muscle can contract, in addition to the need for the muscle to remove relaxation before the movement of the joint or part of the body appears" (119:5).

In the light of the previously determined mechanical characteristics of the performance stages of the long jump event, we can rely on the methods of developing values for the mechanical variables in training the effectiveness to reach the high level of achievement in the least effort based on the adaptations in the quality of the muscle fibers of the muscles under study, and this is confirmed by (Abu Ela, 2003) that physiological adaptation takes place based on the improvement of the processes of recruiting the types of muscle fibers involved in muscle contraction, as well as the development of the characteristics and synchronization of the activity of the internal motor units, as well as the synchronization of the work of the external muscles during the use of the muscles involved in the work" (104:6).

4- Conclusions and Recommendations

4-1 Conclusions

- 1- The exercises applied in the main experiment contributed to the development of some biomechanical variables represented in the height of the body's center of gravity at the moment of flight and the momentum of movement.
- 2- Muscular balance exercises have a positive effect on developing the electrical activity of the working muscles under study.
- 3- Muscular balance exercises had an effective contribution to the development of the long jump achievement for young men, which is a result of the development of some biomechanical variables and muscle activity.

2-4 Recommendations

- 1- Emphasizing the need to study the values of the mechanical variables and the electrical activity of other muscles that have a contribution to improving the achievement of the long jump.
- 2- Studying the electrical activity of muscles in terms of area and other muscles for various games.
- 3- Emphasizing the joint work between trainers and physiological specialists who emphasize the importance of electrical activity of muscles in developing achievement.

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Sample training unit

Week: The first objective of the training unit
 Unit: The first is the development of the corresponding muscles

S	the exercise	Time of performance	stress	repetition	rest between repetitions	groups	rest between groups
1	Jump rope two hops for each foot and then adjust	50 s	80%	5	40 s	2	60 s
2	Lying flat on the ground, 40 cm high, so that the angle to the knee joint is 90o, the hands are placed in front of the chest, and the upper body is lifted up and back	20 s	80%	20	-	2	120 s
3	Jogging three steps and performing the landing process	2 s	90%	15	15 s	2	60 s
4	Quick jumps to the sides for 30 seconds	30 s	75%	5	30 s	2	120 s