



Comparative Study According to Absolute Power and Muscular Activity (EMG) between Leg and Arm Muscles for Weightlifting Trainees

Ghassan Adeeb Abdlhassan¹, Hussein Hassoun Abbas², Hussein Makki Mahmoud², Sahira Aliawi Hussein²

¹. University of Baghdad/The faculty of physical education and sports sciences/Iraq.

². University of Kerbala/The faculty of physical education and sports sciences/Iraq.

Abstract

It is known that inside the exercises of maximum power there are trends and factors influential and for the purpose of verifying the extent of the effects of these factors in the maximum force had to go into these factors and to determine the reality, which comes in the forefront of the area of the cross section of the muscle, so researchers compared between the muscles of the arms and legs in terms of strength the absolute value of these two muscles in order to verify the returns of the maximum power and determine accurately. The main objectives of the research to identify the following:

- Identify the differences between the muscles of the limbs (legs - arms) according to the absolute power of weightlifters.

The researchers selected a random sample of 6 students from the College of Physical Education and Sports Science / University of Baghdad. The researchers conducted tests of the maximum strength of the two men and arms on the research sample. The results were obtained and dealt with statistically using (SPSS).

The most important conclusions were as follows:

- That the muscles of the arms of absolute strength higher than the muscles of the legs.

Keywords: *Absolute power, Muscular activity, Muscles and weightlifting.*

Introduction

The maximum strength of the most important qualities and physical abilities because of the impact on the development of the physical side on the one hand and in the rest of the physical capabilities on the other hand and since the maximum strength to such a position, the factors affecting many and need to be accurate when interpreting those factors, and perhaps the most prominent of these factors is the area of the cross section of the muscle as the separation in determining the output of force in the final form, but the most important if the relative weight of the muscles of the two men or arms to know the absolute strength of the muscles of the men or arms after determining the amount of lift These muscles[1].

It is common knowledge that the muscles of the two of the strongest muscles of the body that the area of the cross section is larger than the rest of the body so that the output of

the maximum power The final muscles of the two men overcome the rest of the body parts, but if the measure of the maximum strength of the muscles of the two men according to their relative weight of the body we find that the muscles of the arms according to their relative weight superior to the force, despite the size difference, which needs to review the most important factors affecting the force (Cross-sectional area) [2].

This leads us to the first question about the possibility of retaining the muscles of the two men center between the muscles of the other body in terms of muscle strength in isolation from the rest of the body as the theory confirms that the arms if compared with the muscles of the two men according to the absolute strength and not according to the output of the overall force gives clear superiority and question Second, is the determination of the absolute strength of the

parts of the body subject to the size of the working muscle or the amount of the neuromuscular muscle and to measure the amount of the nerve pathway is better than to identify the electrical signal of the working muscle only using the planning device.

The importance of research lies in the possibility of determining the exact strength of the muscles of the limbs in their absolute form according to the amount of each kilogram of the muscles of the two men or arms as well as the knowledge of the underlying phenomena [3].

Research Objectives

- Identify the differences between the muscles of the limbs (legs - arms) according to absolute power.

- Identify the differences between the muscles of the limbs (legs - arms) in the electrical activity of the muscles.

Research Hypotheses

- There are significant differences between the muscles of the limbs (legs - arms) according to the absolute strength in favor of the muscles of the arms.
- There are significant differences between the muscles of the limbs (legs - arms) according to the electrical activity of the muscles, for the muscles of the legs.

Research Methodology

The researchers adopted the descriptive approach in the method of comparisons, in order to suit the research procedures.

Table 1: Shows the design of the research group

Muscle groups	Test the muscles of the legs	The design	Test the muscles of the arms
Search group	Maximum force of the legs (rear squat) Top of the electrical activity of the muscle of the legs (straight thigh)	Description of comparisons	Maximum strength of the arms (Bing Price) peak electrical activity of the arms (triceps)

Community and Sample Research

The researchers selected a random sample consisting of (6) students in the Faculty of Physical Education and Sports Sciences in the third stage of their weights (70-80 kg).

The homogeneity in the scale (age, body weight, and training age) was calculated as shown in table (2) and the value of the sprain coefficient between (± 1).

Variables	Unit measurement	Mean	Median	STD.EV.	Skewness
Age	Years	20.666	20.500	1.632	0.305
Weight	Kg.	76.166	77.500	6.96	0.575
Training age	Month	42.500	42	12.92	0.166

Means, Tools and Devices used in Research

- Note.
- Measurement and testing.
- Loaders of iron and weighing tablets of 1-25 kg
- Medical Balance.
- Camera.
- Electrical Signal Planning Device (EMG).

Field Research Procedures

Identify the Tests used in the Research

The researchers determined the physical test commonly used in weightlifting to measure the maximum strength of the legs muscles (squatting) and also (Bing press) for the measurement of the muscles of the arms as well as the measurement of the activity of the joint muscle groups in the performance of the same tests accredited researcher in the determination of these tests on scientific sources, [4] are as follows:

First, Physical Tests

Squat back-bear

(Bend the knees and extend them to stand with the iron load).

Machines and Tools used in the Test

Iron Ore (bar) various iron disks weights, leather belt.

Purpose of Measurement

Measure the maximum strength of the quadriceps muscles.

Mode of Performance

The players stand and carry the iron behind the neck on the shoulders from the back and hold the iron from the sides with both hands and when given the starting signal the player to bend the knees fully and return to stand again.

Method of Registration

The player is given three attempts to calculate the best attempts measured by the weight raised.

Bing Press

(Bending the arms and extending them from lying flat):

Purpose of the test: Measure the maximum strength of the arms of the arms

Tools

- A steel razor weighing (20) kg.
- Different iron tablets weights from (0.5 kg to 25 kg).
- A bench for the exercise of the pressure of the iron bar with the hands (Bing press).

Mode of Performance

The player lying on the flat level, and carry the iron of the load above the chest and hold the iron from the sides with both hands in equal dimensions and when given the starting signal, the player full bending of the arms to the level of the chest and the full extension of the arms.

Method of Registration

The player is given three attempts calculated the best attempts measured by the weight raised.

Second, Physiological Tests

Measuring the Electrical Activity of the Muscles (EMG)

The electrical activity of the front straight muscles of the thighs was recorded by attaching a device to measure the electrical activity of the femoral muscle muscles during the performance of the posterior (quadrilateral) tests. The electrical activity of the triceps muscle was also recorded by attaching a device to measure the electrical activity of the muscles during the performance of the test the results were analyzed and the highest electrical signal of the muscle (peak) was measured in a micro-volt unit.

How to Compare the Muscles of the Legs and Arms According to Absolute Power

The researcher used the absolute force of the muscles of the legs and arms following the following steps: [5]

The weight of the target body (arms and legs) was adopted according to the following table.

Table 3: Shows the weights of body parts according to percentages

Body parts	Ideal weight ratio	Approximate value for weight
Head	7.06%	7%
the trunk	42.7%	43%
Thigh	11.58%	12%
the leg	5.27%	5%
Foot	1.79%	2%
The humerus	3.36%	3%
Forearm	2.28%	2%
the shoulder	0.84%	1%

The Amount of Weight of the Body has been Extracted, for Example

- Weight of the player's body (80 kg) * Total weight of both legs relative to total body weight (0.38) = 30.4 kg Weight of the legs only.

- The same player's body weight (80 kg) * Total weight of both arms, the proportion of the total body weight (0.12) = 9.6 kg weight arms only.
- The maximum strength of the leg muscles and arms was tested using the highest weight of the body.

- And from the above points was calculated the absolute strength of the muscles of the legs as well as the arms of the following equation:

The Absolute Power of the Legs

The maximum weight raised by the player by the test of the bear (160) kg/Weight of leg muscles (30.4) Kg= 5.26The amount of each legs weight is raised.

The Absolute Power of the Arms

The maximum weight raised by the player by testing the Bing Press (130 Kg)/the weight of the arms of the arms (9.6) Kg=13.54 kg the amount of each kilogram raised by the arm.

- The results were adopted in the two equations above to compare the absolute strength of the muscles of the legs and arms and the introduction of statistical work to extract the results based on the results of the main experiment.

Pilot Study

Is a mini-experiment of the used tests available to benefit from the results as well as the identification of the total time of tests

and the definition of the auxiliary team .What is required of them, and was the pilot study in physical tests on Wednesday, 28/1/2018 on a sample of 2 Players outside the sample search.

Main Tests

The main tests were conducted on the members of the research sample on Monday 26/3/2018 in the laboratory of the College of Engineering Al-Khwarizmi / Department of Life Medicine at 9:00 am

- Include: test the maximum strength of the two men (the bony) and electrical activity of the muscles (rectum femoral).
- The test of the maximum force of arms (Bing Bryce) and electrical activity of muscles (triceps brachial).

Results

View the Results of the Comparison of the Absolute Strength Test of the Legs and Arms Muscles of the Research Group

Table 4: Shows the mean and standard deviations, the value of (t) and the error level to test the absolute strength of the legs and arms muscles of the research group

Tests	Unit measurements	Mean	STD.EV.	calculated* (t)	Error level	Significant
Absolute strength of the legs muscles	Kg	4.4433	0.44261	20.709	0.010	Sig.
Absolute strength of the arms of the arms		12.2683	0.81288			

*At the level of moral significance $\leq (0.05)$ degree of freedom (10).

View and Discuss the Results of the Comparison of the Electrical Activity of the Legs and Arms Muscles of the Research Group

Table 5: Shows the mean and standard deviations, the value of (t) and the error level of the electrical activity of the legs and arms muscles of the research group

Tests	Unit measurements	Mean	STD.EV.	calculated* (t)	Error level	Significant
Electro - muscular activity of the legs	Microvolt	1631.33	453.503	2.53	0.03	Sig.
Electro muscular activity of the arms		1147.5	116.833			

*At the level of moral significance $\leq (0.05)$ degree of freedom (10).

Discussion of the Results of Comparison of Absolute Force and Electrical Activity of the Muscles of the Legs and Arms of the Research Group

The results of the comparison of absolute force between the arms and legs in Table (4) show a clear superiority in favor of the arms of the arms. The field condition shows that despite the small size of the arm muscles compared to the leg muscles, the maximum force output of the arms was the largest distribution of weight raised by each kg of the arm A higher value than the maximum strength output of the leg muscles when the weight of the legs is distributed by the kg as well.

This is done when measuring the maximum force of the body parts independently of each of the two men or arms which is called (absolute power) Independence this is explicitly confirmed by Al-Fadhli that the absolute force can be measured and determined by using the ratio between the level of the completion of any tests of the maximum strength, whether in the arms in the test of flexing the elbows and extending them from lying or legs at Test the bending of the knees and extend them to stand relative to the weight of the body part of the arms or legs [6].

In the opinion of the researchers that the reason for superiority of the arms in absolute power is because it can be upgraded because of the weight of the arms, which does not have a lot of fat compared to the legs, which can bear some of some increase at the expense of fat and this is confirmed by the virtuous that the upgrading of absolute power is due to two factors The first is to reduce body weight at the expense of fat, not muscle mass, and secondly increase the maximum force (absolute force) of the body part [7].

The researchers consider that the results of the research in the absolute power variable came to give clear and justified implications on the field side that the area of the cross-section of the muscle is not the same as the dominant effect in the output of the maximum force, but there are other explanations shown in Table (5) The muscles of the legs came superior to the muscles of the arms and this enables us to link and give an explanation of this phenomenon, which need to clarify the reasons, where researchers believe that the reason for the output of the maximum strength of the legs muscles greater than the muscles of the arms subject to the influence of another factor of the maximum force Which is the processing

of the nerves of muscles, the larger the muscles of the muscle was the neurotransmitter that reaches the muscles of a higher capacity and this is evidenced by measuring the peak of the contraction of the electrical activity of the muscles of the legs and this is confirmed by some sources in the nervous system is the process of regulating the origin and the strength of contraction in the muscles to get the maximum Constriction in two ways:

- Activation of different setting of kinetic units.
- Change the speed and frequency of the neural signal.

The first method is compatible with the requirements of bodybuilding sport, as the process of stimulating the fibers in it works on the possibility of mobilizing the largest number, regardless of the amount of acceleration of the nerve. The second method followed by the nervous system to influence the quality and level of muscle contraction is the change in the speed and frequency of nerve signals, so the use of this method of the nervous system comes as an alternative to the first method, as it resorted to the goal of raising the process of adaptation to develop the speed of frequency of nerve [8].

Which is a major requirement in weight training as the high frequency of nerve fibers makes the muscle work very high contraction, leaving adaptations reflected in the form of contractile constrictions resulting from the printing on the work of the immediate maximum and the amount of height of the curve, which represents the peak of contractile muscle when measuring the signal.

The physiological bases of the maximal force develop moderately, with a time of constriction of fast motor units (60 ms /Sec.). This development is due to the neuron that controls the muscle lobe. The fast motor units in weightlifting are fed by neurons with larger bodies and larger thicker than the units The slow motion of the bodybuilders, which reduces the resistance to the speed of the flow of the neural signal, and this difference from the slow units has the effect of phlegm, as the rapid units are characterized by the intensity of the alarm or arousal and the speed of the signal frequency nerve. The character of the weight exercises from the use of high levels of muscle strength

imposed on the player's body adaptations in increasing the flow of nerve signal, which is a clear indication of the type of motor units possessed by weight lords, which affects the contraction of muscles strongly and at very high speeds.

From the above, it appears that the maximum strength depends on the activity of the central nervous system and on the physiological state of the muscle and the biochemical processes that occur in the muscle, depending on the type of nerve preparations, the methods of transmission of these preparations, and the mechanism for the degradation of ATP and creatine phosphate.

Conclusions

The researcher's findings of, the following conclusions were drawn:

- The absolute power of the body part can be used as a way to develop maximum force.

References

1. Reaz M Hussein, M Mohd F (2006) Techniques Of EMG Signal Analysis, Defection: Processing classification and application. Biological procedures on line. 8: 1.
2. Buchtelzetel (1955) Propagation velocity in Electrically Activated fibers in man: Activity of Physiology, 34.
3. Deluca CJ (1997) the Use of Surface Electromyography In Biomechanics: Journal of Applied Biomechanics, 13(2).
4. Ali Salman Abd (2013) Applied Tests in Physical Education: Edition1, Baghdad, National Library of Publication, 52.
5. Mansour Jameel et al (2015) The Philosophy of Sports Training: I 1 (Baghdad, House of Innovation,) 109.
6. Sareeh Al-Fadhli (2010) Biomechanics Applications in Mathematical Training and Performance: Edition 2, Baghdad, Dar al-Kutab and Al-Wawdah, 247.
7. Allan DG, Westerblad H (1995) Muscle cell function During Prolonged Activity Cellular Mechanisms Of Fatigue: Ex. physiology,.
8. Mohamed Samir Saad El Din (2004) Physiology and Physical Effort, Alexandria, Al Ma'aref Establishment,.
9. Suleiman Ali Hassan (2007) Development of muscular strength, Cairo, Dar al-Fikr al-Arabi, 120.
10. Brannon (1975) Experiments and Instrumentation in Exercise physiology: Kendall Hunt publishing low. U.S.A.
11. MoayadJassim (1998) The Effect of Using Different Training Methods in the RM System on Developing Maximum Power, Master Thesis, College of Physical Education, Baghdad University,.
12. AlsaidAbdelmaksoud (1997) Theories of Mathematical Training, Training and Physiology of Power, Edition1, Cairo, the Book Center for Publishing,.

- Absolute strength has a fundamental effect in determining the maximum strength of the body.
- The cross-sectional area is not the effect of maximum force.
- Nervous processing of muscles and the amount of frequency of nerve cells is influential in the maximum force.
- Electroplating techniques provided objective information on the level of muscular nervous voltage performed in the working muscles.
- Adopting the peak wave index is a clear indication of the maximum strength of a part of the body.
- Adopting absolute power in the regulation of training loads for the body part.
- The muscles of the arms with absolute strength higher than the muscles of the legs.