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## **The effect of training with rubber ropes isometric training on some bio-financial variables and achievement for the 100-meter sprint for men**

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**Abstract**--The science of sports training has taken a great deal of development as a result of the great interest by specialists in this field, so its methods and tools have developed and modern techniques have been used in it, The progress of sports levels depends on the selection of appropriate training methods for each type of sport, Therefore, the researcher found that it is of great importance to use modern training methods and methods that work to develop the speed of the running stages and the step stages in particular, since the race consists of the length and frequency of the steps , From the foregoing, the importance of research is evident in explaining the importance of isometric training exercises using rubber ropes to increase the efficiency of our runners and work on developing important muscles, including the muscles of the hips, a major role in improving running performance, And work to improve the technique of the correct sprint and reduce the time of the step, which would contribute to the development of the performance of our heroes and take their hands to reach the global podiums in the men's 100-meter sprint event. As for the research problem, it was represented in the slight progress in the digital level of the 100-meter runners, which over time created a big difference between our champions and the world champions as a result of not using modern methods to develop physical strength, especially the flexors and extensors of the hip for the 100-meter runners. This is what prompted the researchers to study this problem, and since the nature of the problem is what determines the method used in the research, so the research problem imposed the adoption of the experimental method, on a sample of the Basra team runners for the effectiveness of a 100-meter sprint.

**Keywords**---isometric training, biomechanical variables, sports training.

## **Introduction**

Reaching high levels of sports requires unremitting efforts and continuous research in order to achieve optimal integration of the physical, technical and tactical aspects. Developed countries, thanks to research and development and investing their modern technologies at the level of various sciences and harnessing them in the field of sport achievement, have been able to achieve great achievements that were in the near future a kind of impossible. Undoubtedly, there are great differences between the level of our heroes and the global level, and we, as researchers, must put our hands on the reasons for these differences that make our heroes unable to achieve what their peers have reached of global heroes and this difference as seen by the researchers, It lies in the lack of diversity in exercises and innovative training methods and the development of the correct running technique, where there is a clear and visible difference, which is the superiority of global runners over our heroes in the technique of the correct sprint, in addition to the great strength that It lies in the lack of diversity in exercises and innovative training methods and the development of the correct running technique, where there is a clear and visible difference, which is the superiority of global runners over our heroes in the technique of the correct sprint, in addition to the great strength that, As a result of not using modern means and methods in training physical strength, especially the hip flexors and extensors, and the focus of our trainers on developing the pushing muscles only through weight lifting, lifting and pulling exercises without paying attention to developing the important stage and the longest time between the stages of the step, which is the swing stage (flying), which plays the hip muscles The main role in it, which has an impact on achieving the best achievements.

## **The objective of the study**

- Designing exercises in an isometric training style using elastic cords for the hip extensor and flexor muscles.
- Identifying the effect of proposed exercises in an isometric training method on some biomechanical variables (Impulse time, swing time, pull time) and the achievement of a 100-meter sprint.

## **Methods and structure of the study**

### **Research Methodology**

The research method constitutes the path that the researcher takes to study the problem in order to reach the truth and reveal it, and it is also one of the means that help researchers to test their hypotheses (Ibrahim Ahmed Salama: 1980: 5). Since the nature of the problem is what determines the method used in the research, so the research problem imposed the adoption of the experimental method in the style of equal groups as the most appropriate means used, to

obtain the most accurate data (Jaber Abdel Hamid and Ahmed Khairy: 1987: 200).

### **Participants**

In light of the objectives set by the researchers and the nature of the problem, the research sample was determined by the intentional method. The sample of the research included the players of the Basra Governorate team for men in an enemy (100 meters), whose ages ranged from (27-32), where their number reached (10) runners, and two of the runners were excluded. To ensure the homogeneity of the sample, thus, the sample rate from the community reached (80%), and they were divided randomly by lottery into two groups, one experimental and the other controlling, with (4) runners per group.

### **The homogeneity of the sample and the equivalence of the two research groups**

To ensure the most accurate results, the researchers conducted a process of homogeneity of the sample in each of (height, weight, chronological age, training age, and completion of 100 meters). The sample is homogeneous in those variables, and Table No. (1) shows this, as Marwan Abdul Majeed indicates that the sample is homogeneous if the value of the coefficient of variation is (30 or less) (Marwan Abdul Majeed: 2000: 241), and as shown in Table (1)..(

Table (1) shows the arithmetic means, standard deviations, and coefficient of variation for the variable length, mass, age, training age, and completion of 100 meters for the research sample.

Variables	Measuring unit	Arithmetic mean	standard deviation	coefficient of relative variance
Length	centimeter	170.3	2.35	1.37
Mass	kilogram	64	2.36	5.25
the age	year	28.66	2.06	7.19
training age	year	6.83	1.16	16.98
100 m achievement	second	11.31	0.31	1.67

After that, the researchers performed the process of equivalence between the experimental and control groups in the previous variables, as the data were processed statistically by using the (T) test for independent samples. on the experimental variable and Table No. (2) shows this.

Table No (2), shows the equivalence of the two research groups

Variables	Measuring unit	control group		experimental group		T calculated	Indication level
		S . d	Arithmetic mean	S . d	Arithmetic mean		
Length	centimeter	1.73	170.00	2.64	171.00	0.548	insignificant
Mass	kilogram	3.05	64.33	2.08	63.666	0.312	insignificant
the age	year	1.73	28.00	2.52	29.33	0.756	insignificant
training age	year	1.53	6.66	1	7	0.316	insignificant
100 m achievement	second	0.23	11.26	0.18	11.35	0.542	insignificant

Tabular value (T) at an error rate of  $\leq (0.05)$  and a degree of freedom of  $6 = 2.44$  Table (2) shows that the calculated T value for all variables between the experimental and control groups was less than its tabular value of (2.44) under the degree of freedom (6) and the level of significance (0.05), and this indicates that there are no significant differences for the variables under research. Thus, the researchers reached the parity of the two research groups.

### Procedure

The researchers used the following means and tools: (Arabic and foreign sources and references, two Japanese-made video cameras, Casio Exillim Ex-FH20 9.1 mp digital 20 x 1000 fps, a Dell inspiron cori 5 laptop, a tape measure with a length of (50) meters, a game track Strengths (4) Casio type stopwatch (2) starter cubes Whistle Wei Heng electronic helical weighbridge, Chinese-made.

### Measures

After confirming the validity of the devices and tools, the exploratory experiment was conducted on 25/1/2022 in the municipality sports club stadium on 3 of the runners within the research sample at ten o'clock in the morning.

- Recognize and correct errors that may occur.
- Adjust the correct location for the locations of the cameras.
- Determining pitch measurements and marking.
- Ensure that the work team knows their duties and their correct sequence.

The research sample was filmed within the pre and post tests using a Sony video camera at a speed of (208 images / sec), The cameras were installed on one level so that the distance between one machine and another was (10 meters), while the distance between the camera and the midpoint of each (12 meters) (which is the distance that was filmed with one camera) was (10 meters), and the height of the center of the lens from the ground was (115 cm). When installing the cameras, the researchers took into account that there is an interference in the field of photography for each machine with the other so that through this interference the player's movement can be followed during the maximum speed stage until the end of a distance of (62 meters). The variables to be studied were analyzed through the program (Dartfish Team Pro 5.5). In order to determine the level of the experimental group members before starting to develop the training curriculum, the researchers conducted on 30/1/2022 some tests aimed at: Knowing the

maximum intensity level of the experimental group members by performing the proposed exercises for once with the maximum force possible using a rubber rope armed with fibers of great resistance and linking it to the means The manufactured training session and the other party using the electronic spiral weight, attaching the weight to the player's foot, performing the suggested exercises for one time to exhaust the effort and recording the reading of the weight. This test was conducted for the members of the experimental group.

The exercises were started for the experimental group on (1/2/2020) and the isometric exercise was completed on the manufactured equipment for the experimental group on (25/4/2022) (12 weeks) at a rate of three days per week, so the total number of training units For the period of using the proposed exercises on the manufactured medium for the experimental group (36 units).

The exercises prepared by the researchers were planned according to the physical and functional capabilities of the sample members, and the researcher chose the gradual wavy method, which would achieve the development of the experimental research group. The intensity in all training units ranged between (75-100%). The researchers designed physical exercises using isometric training with rubber ropes, targeting the development of the hip extensor and flexor muscles. The exercises were as follows;

- 1- The first exercise/ attaching the rubber rope to the device from below and then standing so that the runner's back faces the device with a distance and the back of the other rubber rope is tied to the leg of one of the legs and then move forward until a slight stretching of the rubber rope occurs and then pull the foot forward so that the tension on the rubber rope is most And steadfastness in this position for ten seconds, and the exercise is repeated for two groups, each group five times for each leg. The goal is to strengthen the muscles of the swinging.
- 2- The second exercise / it is the opposite of the first exercise so that the standing is facing the device and the foot is pulled back so that the tension with the rubber rope is in the strongest and continue in this position for ten seconds and the exercise is in two sets. Objective: To train the muscles of the pull-up phase.
- 3- The third exercise: Lie on the stomach and the runner's head is in the direction away from the device. The rubber rope is tied to the device and the other end to the legs. The rubber rope is pulled towards the hip and steady when the tension reaches the highest degree for ten seconds. Objective: To strengthen the hip muscles responsible for the swing phase and the pull phase.

Table No. (3) shows the training vocabulary and its volume in the training program

training period	Training Vocabulary	intensity	The number of weekly units	Rest between workouts	total comfort	overall size
general setting	Exercise 1: 2 x 4 repetitions for each foot Exercise 2: 2 x 4 repetitions for each foot Exercise 3: 2 x 4 repetitions	75-85 %	3 units	20 second	38 minute	5280 K.g
private setting	Exercise 1: 2 x 3 repetitions for each foot Exercise 2: 2 x 3 repetitions for each foot Exercise 3: 2 x 3 repetitions	85-90%	3 units	20 second	28 Minute	4168.8 K.g
competitions	Exercise 1: 2 x 2 repetitions for each foot Exercise 2: 2 x 2 repetitions for each foot Exercise 3: 2 x 2 reps	90-100%	3 units	30 second	20 Minute	960 K.g
overall size		75-100%	36 units		86 Minute	10408.8 K.g

After implementing the experimental group of the exercises prepared by the researchers in an isometric training method for a period of twelve weeks, the researchers conducted the post-tests for the experimental and control groups on 4/4/2022 in the municipality club stadium at exactly four o'clock in the afternoon, where a 100-meter test and photography was conducted on 28/4/2022, where a 100-meter achievement test was conducted by the assistant staff after conducting the general and private warm-up, and each two runners were tested together to ensure the competition factor. Then, after the end of the test (15 minutes), filming was conducted for the maximum speed stage.

### **Analyses**

The data was processed by a computer according to the statistical bag (spss ver 21).

### **Result**

Presentation, analysis and discussion of the results of the pre and post tests for the biomechanical research variables for the experimental and control groups

Table No. (4), It shows the arithmetic means, standard deviations, the calculated (t) value and the level of development for the post-tests of the experimental and control groups in the biomechanical variables.

Variables	measuring unit	control		Experimental		T calculate d	indication
		S.d	mean	S.d	mean		
Impulse time	meter/sec	0.0062	0.068	0.0012	0.055	4.87	moral
draw time	meter/sec	0.0009	0.067	0.0019	0.057	14.14	moral
Swing time	meter/sec	0.005	0.107	0.0057	0.095	5	moral
Completion of 100 meters	meter/sec	0.12	11.06	0.07	10.85	8.45	moral

The tabular value of T) at the degree of freedom (6) and the level of significance (0.05) is (2.44). From Table No. (4) it was clear that there were significant differences between the pre- and post-tests in the value of the variable (Impulse time) for the two research groups and in favor of the post-test for the experimental group, which performed the exercises proposed by the researchers in an isometric training method using rubber ropes, hip flexors and extensors. The researchers attribute the reason for the superiority of the experimental group in the variable pushing time to the strength of the hip muscles, and because the hip muscle is responsible for the movement of the lower extremities, especially the thigh muscles, which are the largest muscle of the man. Speed of movement for runners (RUSSELL.S.DEANE, etal:2005:615-621).

It is also clear from Table No. (4) that there are differences in the values of (withdrawal time) for the experimental and control groups between the pre- and post-test in favor of the post-test for the experimental group. The change in the time of withdrawal is the result of the change in the time of the push, which increases the speed of getting up due to the production of a large force according to Newton's second law, and that the increase in speed means the smooth performance of the skill, and the better the performance, the better is the economy of effort (Bastawisi Ahmed: 1996: 26), In addition, as a result of the strength of the hip and pelvic muscles, from which the motor transfer phase of the running step begins, followed by the thigh and leg muscles, which developed as a result of the use of isometric exercises on the manufactured method. As an inevitable consequence of the development of these stages.

The change in the thrust time led to a development in the hauling time as a result of an increase in the amount of force that is inversely proportional to the time of its impact, and thus an increase in speed. The improvement that occurred in the time of the push worked to reduce the amount of lost movement, which was represented in preserving the muscle strength from dispersal, as the force is inversely proportional to the time of the movement, which achieves a better speed according to the speed law. "Speed is equal to the distance traveled per unit time"(Samir Muslat al-Hashimi: 1999: 85). It is also clear from Table No. (4) that there are differences in the values of sprint achievement (100 meters) for the two

experimental and control groups in the post-test and in favor of the experimental group, whose members performed the exercises prepared by the researchers in an isometric training method using rubber ropes, as shown in Figure No. (1)

This development in achievement came as a result of the researchers' use of the principle of ripple in pregnancy and its gradation by increasing the resistance and according to the stages of preparation, which was effectively reflected in the development of the level through the development of the level of the variables under study, which in turn was reflected in the achievement, and this is consistent with what Shaghathi mentioned that every increase in carrying the training program in terms of intensity, size and comfort, it is offset by another increase in the functional capacity of the internal organs and organs, in a way that ensures the growth and development of the sports result and its development (Amer Fakher Shaghathi: 2011: 32).

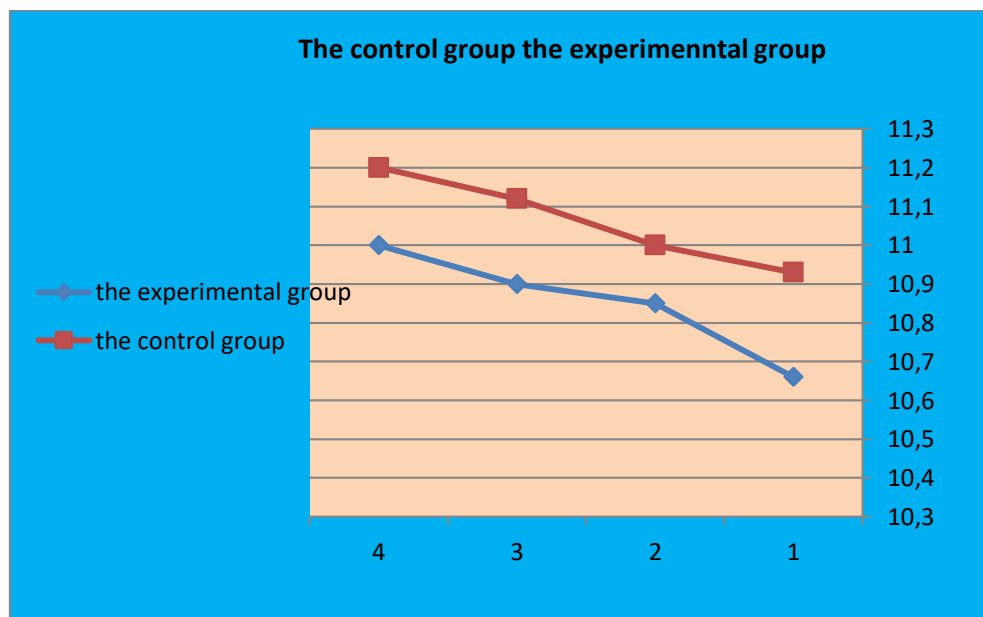


Figure (1) shows the difference in arithmetic means in the post-test for completing 100 meters for the two research groups

This remarkable improvement in the level of the experimental group came through the use of exercises prepared by the researcher, which targeted important muscle groups that our trainers did not put in the first place before, and after using these exercises, which effectively contributed to the development of the experimental research group, where the effectiveness of an important group of muscles, which increased. It is one of the basic and fast muscles, which plays a crucial role in improving the physical abilities of the runners in question as well as the achievement. Where the coach is able to succeed in setting the training program that takes into account the ratio of intensity and size used and its suitability to the capabilities and capabilities of the runner, as well as the goal for which the program leads to raising the level of sports (Muhammad Othman: 1990: 36), The researchers' use of the principle of ripple in pregnancy and its gradation

according to the stages of preparation was effectively reflected in the development of the level through the development of the level of the variables under study, which in turn was reflected in the achievement.

From Table (4), the researchers found that the experimental group, whose members performed isometric training of three training groups per week, had better results in terms of achievement and in terms of physical and biomechanical research variables. In fact, what the researchers noticed during the last periods of the end of the program was that There is an improvement over the runners that appeared in the running technique through the values of biomechanical variables. The researcher attributes the reason for this to the development of the hip muscle, as it generally affects most parts of the lower extremities, and the strength of the hip helps to develop achievement by its effect on the movements of the two legs. Therefore, some sources mention, that Increasing hip muscle strength is likely to be greatly beneficial to athletes for whom running and jumping performance is an integral part of their sport (CHU, D.A. Explosive Power: 2001:83-97).

### **Conclusions**

The exercises prepared by the researchers affected the development of the efficiency of the hip flexor and extensor muscles in terms of the development of research and achievement variables. The researchers concluded that the exercises prepared in an isometric training style affected the improvement of the sprinting technique of the research group in terms of the biomechanical research variables. The use of isometric training with rubber ropes had a significant impact on improving the achievement of the research group.

### **References**

- Jaber Abdel Hamid Wahid Khairy: Research Methods in Education and Psychology, pg. 2, Dar Al-Nahda Al-Arabiya, Dar Al-Autuf Press, Source 1987, pg. 200.
- Marwan Abdel-Majid: Descriptive and Inferential Statistics, Dar Al-Fikr for Printing, Publishing and Distribution, 200, pg. 241.
- Abdel-Rahman Abdel-Hamid Zaher: Physiology of Jumping and Jumping Competitions, Cairo, 1st Edition, Al-Kitab Center for Publishing, 2000, p. 223.
- Essam Abdel-Khalek: Sports Training, Theories, Applications, 1st Edition, Alexandria University, 1999, p. 116.
- Amer Fakher Shaghati: The Science of Sports Training and Youth Training Systems for Higher Levels, Baghdad, National Library, 2011, pp. 32-256.
- Hajim Shani and others: Modern educational and arbitration foundations in athletics, 1917, p. 19.
- Muhammad Othman: Encyclopedia of Athletics, (Training Technique Education Arbitration), 1990 AD, pp. 46-96.
- Qassem Hassan Hussein and others: Analysis of biomechanics in the activities of arena and field games, University of Baghdad, Dar Al-Hikma Press, 1991, p. 61.
- Ibrahim Ahmed Salama: Research Methodology in Physical Education, Dar Al Maaref, 1980, p. 5.

- Bastawisi Ahmed: Foundations and Theories of Motion, 1st Edition, Cairo, Dar Al-Fikr Al-Arabi, 1996, p. 28.
- Samir Muslat al-Hashimi: Mathematical Bio-mechanics, 2nd Edition, Mosul, Dar al-Kutub for Printing and Publishing, 1999, p. 85.  
(ISBN 3-442-10592-7). Goldman, Munich, Ilse Buk, Gesund und schlank durch Isometrik, oflage, 1976, -
- RUSSELL. S. DEANE, et al (2005); EFFECTS OF HIP FLEXOR TRAINING ONSPRINT, SHUTTLE RUN, AND VERTICAL JUMPPER FORMANCE, Journal of Strength and Conditioning Research, 2005, 19(3), 615–621
- CHU, D.A. Explosive Power. In: High Performance Sports Conditioning. B. Foran, ed. Champaign, IL: Human Kinetics, 2001. pp. 83–97.
- Gambetta, V.Essential,Consideration for the Development of ateaching Model for 100m sprint.New Studies in Athletics,1991,p 27