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The Effect of Resistance Training In Two Opposite Directions in Developing Some Physical and Mechanical Abilities for the 100-Meter Running Race for Young

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Abstract

Some auxiliary training methods are methods that help the runner exert previously unaccustomed forces to achieve new requirements for the step components (length and frequency of the step) as much as possible and outside the pattern to which the athlete is accustomed, and to ensure that these changes to such properties remain in the motor memory for a longer period of time. In order to have an effective effect and improve achievement, the researcher noticed that there is repetition of speed training that includes running short distances in order to reach the maximum speed early for the players. The researcher wanted to study this problem by using training with non-typical aids to overcome this barrier, facilitate the application of performance, and enhance reactions. Neuromuscular of the performing muscle groups, which is one of the most important problems facing the 100 m competition, using a new special device (Polar A360). The investigation was applied to a portion of 12 100-meter runners from the National Center for Athletics in Baghdad. The pre-test was conducted and then carried out. Special training, and the researcher reached several conclusions, the most important of which is the development of intelligence in performance for the 100 m event, as well as an improvement in the steps and achievement variables.

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Keyword: Variable steps, neuromuscular reactions, physical abilities and motor memory

1. Introduction

The training direction for training speed events, including the 100-meter run in athletics, is focused on creating an effective effect on the nervous and muscular reactions by using training methods that help stimulate the nervous and muscular systems and create rapid timing of the nervous signals that are associated with the reactions and their direct impact on the physical and biomechanical variables to achieve the correct integration of artistic performance. For skill and the development of the efficiency of the nervous system, all of which aim to develop the level of achievement in the 100-meter competition. Training to run for different lengths of rubber ropes based on the direction of travel and its distance opposite, while adhering to the scientific limits of the components of the training load, is a training direction that aims to bring about development in speed levels, especially for the stages of performance, and to facilitate the process of linking Starting and running in accordance with the specific mechanical requirements and the resulting improvement of explosive and rapid strength and its components, which gives limits to the level of speed for the

stages of the 100-meter running race and the amounts of exerting the required instantaneous forces associated with achieving the best achievement. These methods help the runner exert previously unaccustomed forces to achieve new requirements for the step components (length and frequency of the step) as much as possible and outside the pattern to which the athlete is accustomed, and to ensure that these changes to such properties remain in the motor memory for a longer period in order to achieve an effective effect and improved achievement. That traditional speed training is what causes the speed level to stop, and it often appears in novice runners who are exposed to speed training very early during training. [1] The achievement depends to a large extent on the level of development of physical abilities, especially speed, rapid strength, and explosive power, so that these conditions constantly change for the better with continuous work to raise the level of development of physical abilities.[2] The elastic resistance exercises aim to create an eccentric and central contraction force with very high consistency in order to serve the fulcrum and propulsion moment in each step and achieve a high running speed or Great ability to accelerate "the level of nerve cell functioning definitely increases after each training run for running with pull-ups. [3] In addition, the auxiliary methods for running make the muscles of the legs more effective and responsive to ground reactions. Theories are that the increased amount of body movement resulting from assisted running changes the stability ability of the knee and ankle joints and thus allows for a greater amount of force transmission. In both training methods the assistance method or the resistance method, it is important to stay within the 10% limit during training. This means that the athlete's speed should not be more than or less than 10% of their current running speed, because as the intensity of the resistance increases or decreases, the body breaks the current movement pattern specific to running, which increases the chance of injuries occurring. To reduce the length of the steps, the pulling force should not exceed 8.3% of the athlete's body weight. Among the most effective training methods for developing speed is These are those performed by athletes under situations of reduced external resistance (facilitating resistance), as in fast running on a slope or fast running with the direction of the rubber after it has been stretched, which gives the athletes a great feeling that they are running faster than running in normal situations under such new training situations. The runner will be able to re-adapt the central nervous system and the neuromuscular compatibility to the new training requirements to perform. Repeating new training stimuli creates rapid new adaptations, leading to a reduction in speed time, which may be impossible to develop in normal cases. [4] The importance of the research lies in emphasizing the development of speed for young 100-meter runners by using different resistances in the direction or opposite of the direction of movement, which forces the athlete to break the pattern he is accustomed to when applying maximum speed, explosive force, and speed to improve some unique physical attributes and biological variables and achieve 100-meter running for youth. [5] The researcher noticed that there is a repetition of speed training exercises that include running short distances in order to reach the maximum speed early for the players in this competition, and that these intense and focused exercises generated a movement pattern in the 100-meter runners, which caused the progress in the capabilities of the performance stages to be limited and almost intangible. [6] Therefore, the researcher wanted to study this problem by using training with non-typical aids to overcome this barrier, facilitate the application of the performance, and enhance the neuromuscular reactions of the performing muscle groups, which is one of the most important problems facing the 100 m competition, using a new special device (Polar A360) in order to achieve accuracy in measuring these variables and build special training to develop them and achieve success, as no technology has ever been used to measure skill performance and know the physical capabilities of young 100m runners.

2. Research Objectives

1. Prepare special running exercises using rubber ropes and slopes (up and down) in the direction of movement or in the opposite direction.
2. Identify the effect of these exercises according to the stages of performing a 100-meter run on some physical abilities related to the stages of performance.
3. Identify the effect of training with these resistances on the average length, frequency, and number of steps for every 50 meters of the race distance and the total distance through the POLAR step control device.

Research hypothesis

1. There were statistically significant differences between the pre- and post-tests in the physical abilities of the performance stages.

2. There were also statistically significant differences between the pre- and post-tests in the number, length and frequency of steps and achievement for the research sample.

Field research procedures

The researcher employed the experimental method, and the research sample was chosen with the intention of including (12) 100m runners from the National Center for Athletics affiliated with the Ministry of Youth for the year 2022-2023. Under 20 years of age, they were segregated into two groups, one of which was a control group, the other was experimental, and uniformity was attained for them (Table 1).

Table 1: Shows the homogeneity of the sample members

Variables	mean	STD	Median	Skewness
Total length	1.7	0.04	1.7	**2**
Weight	**65**	**3.5**	**66**	0.9
Training age	**7**	**06.1**	**7**	**0.89**

Sources, references, the electronic information network, observation, experimentation, personal interviews, tests, and measurements were employed as means to gather information. The researcher employed a device that measured height and weight, a stopwatch, the Kenova program for movement analysis, rubber ropes of different lengths, and a POLAR A360 device number 3 (which provides us with high accuracy with

heart rates, number of steps, and rate of movement). Speed, maximum speed, and acceleration. It also includes a chest strap made of soft fabric that adapts to the shape of the body to measure heart rate. The device is also waterproof with a replaceable battery. It also enables us to connect the device to exercise equipment in the gym using GYMLINK. (Note the appendices). The researcher determined the 100-meter dash stages in agreement with specialized sources and experts in athletics, this is followed by:

1. The first and last stages, 10 meters (responses and starts)
2. The first deceleration stage, which was located at 30 meters.
3. The second stage of acceleration that includes the 60-meter mark.
4. Time 100 meter.

In light of these stages, special tests were determined to measure each stage:

1. The first test: starting and running 10 m: It was filmed with a video camera from the starting position of sitting on the field of running 100 m to the end of the first 10 m. It is measured in a few seconds and its components via a stopwatch.
2. The second test: 30-meter run: The athlete takes a sitting position and, at the signal, he or she covers a distance of 30 meters. The duration of covering the distance is expressed in seconds, and its constituent parts.
3. The third test: 60-meter run: The athlete takes a stationary position and, at the signal, covers a distance of 60 meters. The location for covering the distance is calculated in seconds and its parts.
4. The fourth test: 100 m run: according to international law. The test included placing a POLAR device on the player's body in order to calculate the distance traveled, rate of speed, and step repetition.

Pilot study

The pilot study was conducted on 12/2/2023 on a sample consisting of 2 athletes who train at the National Athletics Center. The pre-tests were carried out on 12/3/2023. The application of these tests was taken into account in accordance with the rules of the game regarding the 100-meter run, and the application of the tests was supervised by a specialized work team. The researcher prepared exercises with assistive means that included running with the help of rubber ropes or running up and down a slope, and it also included the training was carried out using the same methods in a resistance manner, determining the intensity and volume according to the results of the tests conducted at a distance of 100 m. The number of training units was (14) training units, over a period of two months and 6 weeks, with two units per week. The training began to be implemented on 12/9/2024 until 1/21/2024. The exercises for rubber ropes and the upward slope were applied, and the intensity was determined according to the maximum running time completed and the maximum strength of the rope used. The exercises were in the main section of the training unit as complementary exercises, and the training load was graduated by 1:3 in order for the training to be effective and effective, based on scientific foundations. The intensity for each method was determined according to the following:

- With regard to rubber ropes: The intensity of the intensity of the rubber ropes was measured as a maximum force from which the training intensity to be trained can be extracted.
- With regard to the slope up or down, to determine the maximum speed reached by the athlete and then determine the specific training intensity, as well as conducting speed jumping exercises on it.

Posttests

The post-tests were conducted on 1/25/2024 in the same manner as the pre-tests.

3. Results and Discussions

Table 2: Shows the statistical features the performance and capabilities of the experimental group were greater than those of the control group

Variables	mean		STD		mean diff.	STD diff.	(T) Value*	Significance level	Meaning of differences
	Pretest	Posttest	Pretest	Posttest					
Run 10 meters (s)	**2.483**	**2.32**	**0.152**	**0.136**	**0.163**	**0.045**	**3.624**	**0.015**	Sig.
30 m(s)	**4.957**	**4.535**	**0.203**	**0.178**	**0.423**	**0.093**	**4.453**	**0.006**	Sig.
60 m(s)	**7.515**	**7.345**	**0.406**	**0.349**	**0.17**	**0.035**	**4.854**	**0.005**	Sig.
Achievement 100 m (s)	**11.75**	11.157	0.139	0.204	0.593	0.053	11.215	0.000	Sig.

* Significance level < 0.05 with 5 degrees of freedom

Table 3: Show statistical features of the step variables for the experimental group

Variables	mean		STD		mean diff.	STD diff.	(T) Value*	Significance level	Meaning of differences
	Pretest	Posttest	Pretest	Posttest					
Step length (m)	**1.98**	**2.05**	**0.39**	**0.025**	**0.071**	**0.006**	**10.95**	**0.000**	Sig.
Step frequency	**3.49**	**3.8**	**0.07**	**0.07**	**0.05**	**0.02**	**2.63**	**0.05**	Sig.
Number of steps(repetition)	**50.4**	**48.6**	**0.98**	**0.6**	**1.8**	**0.2**	**10.2**	**0.000**	Sig.
Speed rate(m/s)	6.8	96**8.**	0.09	0.14	45**0 .**	04**0 .**	**10 .73**	**0 .000**	Sig.

* Significance level < 0.05 with 5 degrees of freedom.

Table 4: Show statistical features of physical abilities and achievement of the control group

Variables	mean		STD		mean diff.	STD diff.	(T) Value*	Significance level	Meaning of differences
	Pretest	Posttest	Pretest	Posttest					
Max speed (Sec.)	**2.635**	**2.607**	**0.152**	**0.151**	**0.283**	**0.013**	**2.177**	**0.081**	**Non Sig.**
Increasing speed (Sec.)	**4.974**	**4.898**	**0.257**	**0.195**	**0.103**	**0.036**	**2.891**	**0.034**	**Sig.**
Bearing speed (Sec.)	**8.048**	**7.972**	**0.488**	**0.469**	**0.076**	**0.022**	**3.454**	**0.017**	**Sig.**
achievement(Sec.)	**11 .699**	**11 .594**	**0 .241**	**0 .186**	**0 .105**	**0 .044**	**2 .371**	**0 .064**	**Non Sig.**

* Significance level < 0.05 with 5 degrees of freedom

Table 5: Show Statistical features of step variables for the control group

Variables	mean		STD		mean diff.	STD diff.	(T) Value*	Significance level	Meaning of differences
	Pretest	Posttest	Pretest	Posttest					
Step length (m)	**1.982**	**2.02**	**0.045**	**0.021**	**0.038**	**0.016**	**2.335**	**0.076**	Non Sig.
Step frequency	**3.978**	**3.932**	**0.157**	**0.078**	**0.046**	**0.036**	**1.265**	**0.262**	Non Sig.
Number of steps(repetition)	**50.485**	**49.509**	**1.198**	**0.508**	**0.976**	**0.433**	**2.257**	**0.074**	Non Sig.
Speed rate(m/s)	547 .8	625 .8	**0 .149**	**0 .117**	078**0 .**	032**0 .**	**2 .41**	**0 .061**	Non Sig.

* Significance level < 0.05 with 5 degrees of freedom.

Table 6: Show statistical features of post-tests of physical abilities and achievement for the two research groups

Variables	Experimental group		Control group		mean diff.	STD diff.	(T) Value*	Significance level	Meaning of differences
	mean	STD	mean	STD					
Run 10 meters (s)	**2.32**	**0.136**	**2.607**	**0.151**	**0.287**	**0.083**	**3.452**	**0.006**	Sig.
30 m(s)	**4.535**	**0.178**	**4.898**	**0.195**	**0.363**	**0.139**	**2.619**	**0.027**	Sig.
60 m(s)	**7.345**	**0.349**	**7.972**	**0.469**	**0.627**	**0.239**	**2.626**	**0.026**	Sig.
Achievement 100 m (s)	11.157	0.204	**11 .594**	**0 .186**	**0 .436**	**0 .113**	**3 .878**	**0 .003**	Sig.

* Significance level < 0.05 with 10 degrees of freedom.

Table 7: Show statistical features of post-tests for step variables for the two research groups

Variables	Experimental group		Control group		mean diff.	STD diff.	(T) Value*	Significance level	Meaning of differences
	mean	STD	mean	STD					
Step length (m)	**2.05**	**0.025**	**2.02**	**0.021**	**0.038**	**0.014**	**2.835**	**0.018**	Sig.
Step frequency	**3.8**	**0.07**	**3.932**	**0.078**	**0.066**	**0.042**	**1.573**	**0.147**	Sig.
Number of steps(repetition)	**48.6**	**0.6**	**49.509**	**0.508**	**0.92**	**0.321**	**2.869**	**0.017**	Sig.
Speed rate(m/s)	96**8.**	0.14	625 .8	**0 .117**	337**0 .**	086**0 .**	**3 .895**	**0 .003**	Sig.

* Significance level < 0.05 with 10 degrees of freedom

The researcher attributes the reason for these significant differences between the pre- and post-test results of the experimental group to the nature of the exercises based on scientific foundations and similar to the exercises for the 100-meter event, as the exercises included different training intensities that had a positive impact on improving the special physical abilities of this group. The development achieved in The results of these physical tests have a direct relationship to developing speed, and the propulsion phase represents one of the most important phases,[7] as all exercises were influential in the 100-meter performance by controlling the movement of the legs and trunk during flight, the increase in angular velocity affects the increase in the linear velocity of the body's center of gravity.[8] Considering that angular velocity is related to linear (circumferential) velocity, if this velocity is connected to the rotating body.[9] Therefore, all exercises used will have an impact on the development of explosive and quick strength and thus have an overall impact on the development of performance. In addition, the 30 meter sit test and the rest of the tests related to the performance of the 00 meter run, the 00 meter run is where the athlete tries to overcome the force by practicing proper movement to get this mass to have a certain speed whether it is solid, pressing quickly and in pressing. The moment the body acquires the necessary momentum helps it overcome this resistance and impart speed to this mass. Velocity equals the object's mass and gives it linear kinetic energy. [10] In order to conserve this energy, athletes must take appropriate positions during the athletic performance during the competition phase by controlling the angles of body parts, which means controlling the movement of body parts during competition, which is related to the resistance of the body. The body resists rotational motion during performance because when the radius decreases the resistance decreases and when the radius increases the resistance increases. [11] Speed training requires the athlete to control the location of the body's center of gravity during performance, as training requires efforts on these surfaces; this forces the athlete to lean forward to overcome the backward torque. [12] This means that the muscle contraction of the leg muscles will increase to resist this torque and the control will be better. in areas of space (distances of partridges over these areas). This result in a positive response in terms of increasing the muscle strength required to reach a certain distance when performing the running motion.[13]

4. Conclusions

1. The physical fitness and performance levels of group members using inclines and auxiliary facilities for the 100m sprint have been significantly improved.
2. The experimental group exceeded all physical fitness tests and 100m sprint performance levels.
3. By using training sessions with different resistances, the step length variable of the experimental group was significantly developed.
4. Incline training and bungee training programs are characterized by the development of specific physical variables.
5. Changes in training load and the nature of muscle contraction have a significant impact on the development of special physical abilities and 100m running level.

5. Recommendations

1. Implement a special training plan to develop physical fitness and improve 100m sprint performance.
2. The diversified application of modern training methods and diversified and appropriate training methods can help overcome stagnation and improve the performance level of the 100m run.
3. Utilizing the skills of research samples and using modern scientific methods to train the resistance equipment used in the research can effectively improve the technical performance level of various sports events.
4. It is necessary to benefit from modern training methods, break the traditional training mode and usual action mode of sample players, and bring about the development of physical skills in other games.

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