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## Special exercises for critical speed and its impact to development some special endurance abilities and the achievement of the 400m sprint for youth

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### Abstract

That the results of many scientific, educational and psychological studies on the existence of individual differences among the competitors who are in one age stage, for the purpose of reducing energy expenditure with the least possible effort when delaying the appearance of fatigue, as well as ending the race with the least effort and achieving the best achievement for a special performance of the endurance capabilities of the event, Therefore, the importance of the research lies in laying down correct scientific foundations when testing an effective, effective, effective and appropriate training method through the application of the use of effective and high intensity exercises when determining the time period for critical speed performance in developing the special endurance capabilities of running a 400m sprint for young men, Thus, the study makes a serious contribution to developing achievement and maintaining the rhythmic performance of jogging by improving the internal special abilities of different training stimuli. The problem of the research lies in the lack of use of high intensity interval training methods through different high intensity distances, and this is what prompted the researchers and the investigation for an effective training method. And it affects how the performance time is used for special exercises of different distances of high intensity, according to determining the time period for the critical speed. The aim of the research is to prepare a curriculum using high-intensity different distances exercises to develop special endurance according to the development of critical speed and achievement in a 400m sprint. And to identify the effect of these exercises with special exercises at different distances on the development of abilities for special endurance and the achievement of a distance of 400 meters for the sample members. As for the imposition of the research, there are differences and statistical significance between the tribal and remote tests in the research variables and in favor of the post test. As for the third chapter, it included the research methodology and special tests. As for the recommendations, it was to emphasize the use of exercises with special exercises of different distances to develop special endurance capabilities according to critical speed. And the completion of a 400-meter sprint for the sample.

**Keywords:** Special exercises, critical speed, special endurance abilities.

### 1.1 Introduction

The sciences of physical education and sports sciences in particular have had a share of development in terms of quantity and quality for sports sciences, especially the science of training, one of these sciences that took the most of that and which helped him to reach the level of human miracles in sports, including athletics, especially in recent years because it is based on scientific foundations Subject to the foundations, rules, important laws and other sciences, There are also several special training methods for critical speed that aim to prepare a type of athletes, whether they are talented young people or advanced, and the goal is not to train in one method, let alone the randomness of training when using the method or method and employing it in the service of the athlete and reaching stardom, Many educational and psychological studies have agreed on the existence of individual differences between talented people who are of similar ages and the purpose is to reduce energy expenditure by using special endurance exercises using critical speed with the least possible effort and to delay the fatigue of the contestants, as well as to finish the race with the least effort and achieve the best achievement. This may, of course, lead to an increase in the overall training load, fatigue and obvious effort on the athlete's equipment during the training process, and since the process of sports training and physical effort depends on the continuous and repeated transition between

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the states of fatigue and comfort for the athlete during the different training units for what each training unit or special exercises need for the critical speed in proportion to its work, so it became necessary to work on the use of training methods commensurate with its work and performance, Therefore, it has become necessary to use training methods that fit the capabilities of the individual athlete and the sports category through the use of high intensity, which generates and helps the athlete to develop important physical abilities, which are the types of special endurance for speed and strength through critical speed, and legalizing the training load during the training unit or during one of the stages of physical preparation for sports and avoiding Randomization when developing curriculum vocabulary during the training dose. Running 400 meters is one of the competitive sporting events that require physical effort, energy expenditure, and critical speed with exercises specific to the effectiveness. Determining the time period for the critical speed in developing the capabilities for the special endurance of running a distance of (400m), and thus the research makes a serious contribution to the development of achievement and maintaining the rhythmic performance of running by improving the effective performance of the various training stimuli according to the requirements of effectiveness and the capabilities it requires of special endurance and achievement.

### 1.2. Research problem

The access to record records and the increase in the rate of development of these numbers depended, in one aspect, on the large and regulated increase in the training loads and the high intensity of the contestants, and this naturally prompted a large number of researchers to pay attention to studying the types and methods of modern training in the style of searching for the optimal method and method and increasing the effectiveness of the athlete. From performing exercises and creating a state of balance in training, One of the reasons for the low level of achievement for a distance of (400m) among runners is the lack of investigation and search for appropriate training methods and the codification of these methods and methods in terms of the components of the types of training load, as well as the lack of use of high intensity and repetitive interval training methods through different distances for performance. This prompted the researchers to search and investigate a method that helps to develop special speed endurance, so the researchers decided to define a training method on how to use the performance time for exercises of different distances according to determining the time period for the critical speed in developing special endurance and achieving achievement in the 400m youth sprint.

### 1.3. Research objective

- Preparing special exercises for critical speed at different distances to develop special endurance capabilities in a 400-meter sprint for the sample members.
- Identify the effect of these exercises in developing your endurance capabilities and achieving a 400-meter sprint.

### 1.4. Research hypotheses

- There are differences and statistical significance between the tribal and remote tests in the special endurance abilities of the sample members.
- There are statistically significant differences for the tribal and remote tests of the special endurance abilities and the achievement of the 400m sprint for the sample members.

### 1.5. Research fields

**Human field:** Baghdad club runners of young people.

**Time field:** the period from 10/ 6/2022 to 2 /9/2022 .

**Spatial field:** The stadiums of the Specialized School of Athletics - Ministry of Youth and Sports.

### 1.6. Define the terms

**Speed Endurance:** It is the ability to face fatigue in working conditions and sports performance (1: 12).

**Strength endurance:** It is the muscular ability to continue to perform during a specified period of time. This type of strength is linked to returning the outputs of the training load for strength and endurance (2:395).

## 2. Research methodology and field procedures

### 2.1. Research Methodology

The researchers adopted the experimental approach for the experimental and control groups with the pre and post-tests because it suits the nature of the research procedures because the experimental research is characterized by precision and control over the studied variables so that some of them cause an intentional change and control other variables. To be precise. (3:10).

**2.2. The research community and its sample:** The research community was selected from among the youth contestants of Baghdad clubs in the enemy (400m), and their number is (14) contestants. (12) contestants were selected from them by odd and even numbers, and they were divided into two groups (6) contestants for the control group and (6) contestants for the experimental group, where homogeneity and equivalence were conducted on the members of the research sample for the two groups (control and experimental), where homogeneity was in (height, weight, training age, equivalence and the variables of physical abilities for special endurance.

**Table 1:** Tests of homogeneity and equivalence of the control and experimental groups for the variables (height, weight, training age, physical abilities, speed endurance and strength endurance)

Variables	Unit	Control		Experimental		Calculated t value	Sig type
		Mean	Std. Deviation	Mean	Std. Deviation		
Length	Cm	1.73	3.8	1.71	1.78	0.62	Non sig
Mass	Kg	62.0	1.58	63.4	1.51	5.71	Non sig
Training age	Year	17.9	1.11	17.2	1.20	0.41	Non sig
speed endurance	Second	37.97	0.81	36.96	0.80	0.03	Non sig
Strength endurance	Second	24.02	0.62	22.11	0.53	0.02	Non sig
Achievement	Second	50.06	1.22	49.32	1.57	0.04	Non sig

## 2.3. Means of collecting information

### 2.3.1. Tools used in the research

The researchers used the following tools in collecting research information, which are “data, samples, or devices” (4:85), and through them, the results can be reached and invested in research work “with sufficient accuracy, with minimal effort and in the shortest time” (5:213).

### 2.3.2. Devices and tools used in the research

- Arab and foreign sources and references.
- Observation and experimentation.
- Tests and measurements.
- Stopwatch.
- Athletics stadium.
- Handy calculator.

## 2-4 Tests used in the research

### 2-4-1 150m Jump Run Test

- **The objective of the test:** to know the level of endurance of the force of the laboratory, which is specific for short and medium activities.
- Necessary tools:
  - Stadium (track) for athletics.
  - Two (2) electronic stopwatches.
  - Registration Form.
  - Absolute.
  - registered.
  - Two (2) times.
- **Description of performance:** The tester stands behind the specified starting line and from a standing position. When the start signal is heard, the tester starts by jumping (man right and left alternately) to cover a distance of 150 m.
- **Recording:** 150m running distance, jumping distance, d/s.

### 2-4-2 Running test (300m) from the high start (6:195)

- **The objective of the test:** is to know the speed endurance level of the laboratory, which is specific to the effectiveness of short and medium runs.
- Necessary tools:
  - Stadium (track) for athletics.
  - Two (2) electronic stopwatches.
  - Data logger.
  - Two (2) times.
- **Test description:** The tester stands behind a running start line (300m) from the high starting position.
- When the start signal is heard, the tester runs quickly until it crosses the finish line (the test was conducted for every 2 testers for the purpose of competition).
- The laboratory records the time in which it travels a distance of (300m) from the start signal until passing the finish line.
- **Records** the time taken by the laboratory to the nearest 1/100th of a second, and accordingly calculates the time to the nearest fraction of a second.

## 2-5 Exploratory experience

It is an (initial experimental study carried out by the researcher on a small sample before carrying out his research with the aim of choosing research methods and tools) (7: 6), and for his sake, he conducted the research and with the help of the assistant work team his exploratory experiment on (2) outside the research sample on 12/6/2022 At (4) in the afternoon, a test was conducted for the tests under study for

the special endurance of speed and strength. On May 13, 2022, the test was conducted to complete the 400m sprint. Including that this is a tight organizational field experiment of the assumptions and conditions in which we can observe a certain phenomenon to determine the factors affecting this emerging and causative phenomenon. (8: 85) and upon reviewing the data extracted from the exploratory experiment.

## 2-6 pre-tests

Tribal tests were conducted on the two groups (control and experimental) for the test under study for speed endurance and force endurance at (5) pm on 15/6/2022.

- 300m sprint test on the track and the distance was calculated to withstand the force for a 150m jump run. On 16/6/2022, the 400m sprint was tested, completing the time (5) in the afternoon.

## 2-7 Critical speed training program

After reviewing the sources and previous studies, the researchers prepared a curriculum for the effectiveness of running a distance of (400m) for distances of speed-endurance and force-endurance capabilities of the contestants and after determining the time period for the critical speed commensurate with the chosen age group. The curriculum for the special exercises for critical speed took (8) weeks with two training units Weekly (Saturday and Tuesday), the number of training units reached (16) training units and were applied during the time period. As for the repetitions, they were according to intensity levels, but were placed in the form of training groups. The rest period between repetitions was also used, which is relative comfort, as well as the use of gradient and undulation in the intensity of the training load to be the stage of overcompensation for the experimental group, and then the performance of the training work must be done so that it leads to fatigue For the purpose of developing special endurance for strength and speed to develop achievement as well as the specified time period, He used the distances when training this activity was (100-200-300) and he ran by jumping (150m), distributed over (16) training units. Where the exercises were used for critical speed at the intensity 85% to intensity 100% until the intensity of pregnancy for the best achievement for the sample members and at two weeks for intensity 85% and two weeks for intensity 90% and intensity 95% two weeks and then one week for intensity 85% and then intensity 100% one week and then the post test of abilities Critical speed of endurance of speed and endurance of force and test run 400m achievement.

## 2-8 post-tests

After applying the training curriculum in a way of training with different distances to develop the specific endurance of speed and strength according to determining the time period for the critical speed. The researchers conducted the post tests on 12/8/2022 for the abilities to endurance speed and endurance of force, in the same manner, the conditions and procedures in which the tribal tests were carried out, and on 13/8/2022 the 400m achievement test.

## 2-9 Statistical Means

The researchers used the statistical methods that helped to process the results of their research and through the statistical package (spss).

## 3- Presentation, analysis and discussion of the results

This chapter contains the presentation, analysis and discussion

of the results reached by the researchers through the tests they conducted on the research sample and included the following:

**Table 2:** It shows the means, standard deviations, the calculated (T) value, and the level of significance for the control group I n the pre and post tests.

Variables	Pre-test		Post-test		Calculated t value	Error level	Sig type
	Mean	Std. Deviation	Mean	Std. Deviation			
speed endurance	37.97	0.81	36.96	0.90	0.98	0.04	Sig
strength endurance	24.02	0.62	23.35	0.78	7.47	0.02	Sig
Achievement	50.06	1.22	49.86	1.23	2.001	0.08	Sig

Table (2) shows the results of the pre and post tests for the effectiveness of speed endurance, as the results of the group in the pre-test were the arithmetic mean (37.97) and the standard deviation (0.81), while in the post-test the arithmetic mean (36.96) and the standard deviation (0.90), as for the calculated (t) value (0.98), the error level (0.04) and below the significance level (0.05), which indicates the existence of a significant difference between the pre and post tests of the group in the pre and post tests in favor of the post test. .

As for the results of the pre and post tests for the effectiveness of force endurance for running 150 m by jumping, the results of the pre-test were the arithmetic mean (24.02) and the standard deviation (0.62). 78), as for the calculated T value

(7.47) and the error level (0.02) and below the significance level (0.05), which indicates the existence of a significant difference between the pre and post tests of the control group in the pre and post tests in favor of the post test.

As for the results of the pre and post tests of achievement, the results of the pretest were the arithmetic mean (50.06) and the standard deviation (1.22), while in the post test, the mean (49.86) and the standard deviation were (1.23), and the value of (C) calculated (2.001), error level (0.08) and below significance level (0.05), which indicates a significant difference between the pre and post tests of the control group and in favor of the post test.

**Table 3:** It shows the means, standard deviations, the calculated (T) value and the level of significance of the experimental group in the post and pretest.

Variables	Pre-test		Post-test		Calculated t value	Error level	Sig type
	Mean	Std. Deviation	Mean	Std. Deviation			
speed endurance	37.96	0.84	36.36	0.83	3.01	0.03	Sig
strength endurance	23.33	0.55	22.11	0.53	4.43	0.02	Sig
Achievement	49.86	1.69	49.11	1.57	2.91	0.04	Sig

Table (3) shows the results of the pre and post tests of speed endurance. The results of the experimental group in the pre-test were the mean (37.96) and the standard deviation (0.84). As for the post-test, the arithmetic mean (36.36) and the standard deviation were (0., 83), as for the calculated T value (3.01), the error level (0.03) and the significance level (0.05), which indicates the existence of a significant difference between the pre and post tests of the experimental group and in favor of the post test.

As for the results of the pre and post-tests for the effectiveness of endurance of force for running 150 m by jumping, as the results of the pre-test were the mean (23.33) and the standard deviation (0.55), while the post-test was the arithmetic mean (22.11) and the standard deviation (0.53), as

for the calculated (T) value (4.43) and the error level (0.02) and below the significance level (0.05), which indicates the existence of a significant difference between the pre- and post-tests of the experimental group and in favor of the post-test.

As for the results of the pre and post tests of achievement, the results of the pretest were the mean (49.86) and the standard deviation (1.69), while the post test was the arithmetic mean (49.11) and the standard deviation (1.57), and the value of (t) calculated (2.91) and error level (0.04) and below significance level (0.05), which indicates a significant difference between the pre and post tests for the experimental group and in favor of the post test.

**Table 4:** It shows the means, standard deviations, the calculated (T) value and the level of significance for the control and experimental groups in the post and pre-tests.

Variables	Experimental		Control		Calculated t value	Error level	Sig type
	Mean	Std. Deviation	Mean	Std. Deviation			
speed endurance	37.97	0.89	37.86	0.90	2.90	0.01	Sig
strength endurance	22.11	0.53	23.35	0.78	7.47	0.02	Sig
Achievement	49.11	1.57	50.06	1.23	2.001	0.08	Sig

Table (4) shows the results of the tests for the control and experimental groups in endurance of speed, as the results of the pre-test were the arithmetic mean (37.97) and the standard deviation (0.81), while in the post-test it was the arithmetic mean (37.86) and the standard deviation (0.90), as for the calculated T value (2.90), the error level (0.01) and the significance level (0.05), which indicates the existence of a significant difference between the pre and post tests in the pre and post tests in favor of the post test.

As for the results of the tribal and remote tests, the force of running 150 m by jumping, as the results of the pre-test were the arithmetic mean (22.11) and the standard deviation (0.53), while in the post test, the arithmetic mean was (23.35) and the standard deviation was (0.78). ), as for the calculated T value (7.47) and the error level (0.02) and below the significance level (0.05), which indicates the existence of a significant difference between the pre and post tests for the two groups in the pre and post test in favor of the post test.



As for the results of the pre and post tests of achievement, the results of the pretest were the arithmetic mean (49.86) and the standard deviation (1.57), while in the post test, the arithmetic mean (50.06) and the standard deviation were (1.23), and the value of (C) calculated (2.001), error level (0.08) and below significance level (0.05), which indicates that there is a significant difference between the pre and post tests for the two groups in the pre and post test in favor of the post test

#### **4. Discussing the results Tables (2-3-4) for the two research groups (control and experimental) and the results of the post-tests for the two groups**

Through the tables (2-3-4) when analyzing the results of the previously mentioned tests, we note that there is a clear improvement when applying the program, although this test follows the training curriculum and for the purpose of developing the vocabulary of the curriculum on which the athlete depends by cutting a longer distance, which goes back to individual capabilities of each sample, But in general, it was found that there is a significant improvement for the experimental sample members over the control one, and this is due to the legalization of the vocabulary of the curriculum, which was directed according to the requirements of effectiveness (400m) and the rest period between repetitions according to the pulse rate, as well as the training period taken by the number of sample members. And then it helped to improve the special endurance abilities according to the critical speed exercises of the experimental sample members. Through Table (3), we note that there is a clear development among the experimental sample members. And this development to the vocabulary of the curriculum prepared by the researchers, which contains a short distance and high training loads as well as the intensity used as the maximum intensity within the vocabulary of the training curriculum, as the training load was appropriate and regular in proportion to the capabilities of the experimental sample members, This was indicated by Muhammad Hassan Allawi (that the use of a training load leads to the process of fatigue that is also commensurate with the level of that load (9: 151), and the critical maximum speed is a decisive factor and an aid to improving the level of endurance of speed with a short period of time, as the equipment reached Energy for the muscles, which plays a major role in providing the necessary energy for the research sample members. . (Fox et al.) indicate that athletes can fill the deficiency in the beneficial level of ATP by their anoxic capabilities or the maximum rate at which they can consume oxygen (10: 313), and that "increasing the intensity of training may show a high degree of physical adaptation." (11:84) As for the test of running a distance (400m) of achievement, the researchers believe that the distance test for special endurance and critical speed is related to effectiveness, and helps to develop achievement for effectiveness. Therefore, the characteristic of special endurance, both for strength and speed, is one of the traits that he focuses on in training for the effectiveness of a distance sprint (400m), and keeping the speed rate at a high intensity and sufficient for the length of the race performance and resistance to fatigue, and this has been confirmed throughout the duration of the training curriculum in an orderly and appropriate manner. As well as the use of appropriate rest according to the pulse rate between repetitions and training groups, as the development had an effect on achievement, and that this ability is the key to safety for an enemy of a distance of (400m). The rest period between repetitions must be determined by returning the pulse to certain limits (12:363).

As for the control group, and for the pre and post tests, the researchers believe that there is a development by the group. This development is due to the special exercises and in favor of the post tests. As for the post tests, we find The development was clearly and tangible for the benefit of the experimental group, and this development is due to the use of the training method with different high distances according to the determination of the time period for the effectiveness of a sprint (400m), which has a highly trained mixed system through special physical exercises of high critical speed. The researchers indicate that increasing the total training load that focuses on maximum and above-maximal intensity training to improve speed endurance speed according to critical speed training. For the athlete, it is very necessary when running a distance of (400m), as this distance is considered at the present time as one of the short and medium distances. If we look at the percentage of achievement between the two groups, we may notice that there is an improvement in achievement in favor of the experimental group, while the control group used the curriculum prepared by the trainer, where the rate of development in the post test was better than it is for the pre test.

## **5. Conclusions and recommendations**

### **5.1. Conclusions**

- The training curriculum for the critical speed exercises that was applied had a positive and effective effect in developing endurance of speed and strength according to this method, which reflected its effect on achievement.
- The method of working with special exercises for critical speed according to determining the period of time for the critical speed led to the development of special endurance and the achievement of a distance sprint (400m).

### **5.2. Recommendations**

- Confirm the use of special exercises of different distances and of a higher intensity according to determining the period of time for the critical speed to develop the endurance of speed and strength.
- Conducting research and studies to develop the endurance of its divisions and other activities, and determining critical speed times when using exercises with less distances and higher intensity for other activities.

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