

## **The Effect of Endurance Training on Some Functional and Physical Variables and the Digital Level of Middle Distance Running**

**Ibrahim Rahma Muhammad, Saif Ali Muhammad, Wissam Shaker Razig**

Sawa University, Ministry of Higher Education and Scientific Research, Iraq

Ministry of Education, Iraq

Al-Muthanna University, Ministry of Higher Education and Scientific Research, Iraq

**Email:** [ibrahem.rahma.m@sawa-un.edu.iq](mailto:ibrahem.rahma.m@sawa-un.edu.iq)

### **Introduction to research and its importance:**

After running from the simplest exercise, because of its ease of performance and the possibility of practicing it anywhere, at any time and in various climatic conditions, and at the same time it is considered one of the most ideal and vital means of developing physical fitness and maintaining health (4:13). There is no way to protect an individual from developing cardiovascular disease, except through jogging (jogging), as running is the cheapest medicine to protect against infection with these diseases. Essam Abdel Khaleq (11: 9), Muhammad Hosni Allawi (72:13) and Mufti Ibrahim (105: 15) agree that endurance is the ability of an individual to work for long periods without decreasing the level of efficiency or effectiveness and delaying the onset of fatigue. Running can be practiced before. Different ages and accords with different physical levels it is also considered one of the exercises that can be controlled and its effect on the functional and physical variables that accompany its performance or its practice. It is considered one of the studies that should receive wide attention in our present time, as Saad Kamal Taha (174: 6) mentions that the variables The functionality that occurs in the body is the basis on which the training load is based, which is the means for training, and this is consistent with what Lamb (73:20) and Lemur (123: 21) have indicated that regular training leads to changes in vital organs that lead to more The rates of functional activity in a way that enables these devices to adapt to the physical loads and this is consistent with the severity of them. We believe that endurance is an important element among the basic physical elements such as strength, speed, flexibility and agility that running races require, due to its great association with those other physical elements.

Therefore, trainers must emphasize the development of this element and work to delay the phenomenon of fatigue. So the importance of our research is reflected in the study of endurance and the extent of its impact on some functional and physical variables and the digital level of young athletes who practice this game.

### **Research problem:**

Athletics (middle distance running) is one of the competitions that receive wide attention by the Olympic and University sports administrations, due to the excitement and individual competition it contains during the mother's training during official competitions, and it also occupies the top place in the modern Olympic Games and this is evident through the organization of these Olympic Games Which has become a feature of our present age that indicates the progress of human societies in this field.

Endurance is considered one of the most basic components of physical performance, as it is the greatest common denominator in most physical activities that require continuous effort for long periods of time, especially middle distance running. Therefore endurance occupies the fore position among the tasks that the trainer is required to pay attention to, and therefore we have to look at what are the means and methods to overcome early fatigue and uncover its causes and how the training methods can work at the very least on the delay in the emergence of fatigue, and work to develop endurance The antenna, and we must also study endurance from a functional and physical point of view that gives us an indication of the level of endurance, as many scholars such as Butcher (99:18), Clark (113: 19) and Lomore (73:21) agree that the respiratory cyclic endurance can It is measured by the time span of effort exerted during a period. And that the efficiency of the circulatory and respiratory systems is one of the important components of physical fitness and functional efficiency. Astrand (115: 17) believes that the pulse as a physiological stimulus can be used during the physical effort to direct and rationalize training programs. Many studies in recent years have dealt with the effect of using training programs and their effect on some Physiological characteristics of the circulatory and respiratory system and physical efficiency, including the study of Abdulaziz Ahmad (7: 62) and the study of Awais al-Jabali (27: 8).

Through the experience and observation of researchers in the field of training middle-distance running athletes, it has become clear that most young athletes have a lower level of performance and functional competence during official races and appear on them fatigue and fatigue in the last seconds of the course of the race. Hence, the necessary need to conduct such an experimental field study in which we propose an experiment The training program By using the interval training method, the intensity is reduced to show the extent of its impact on some physiological and physical variables, as well as the digital level of the (800 - 1500) race in order to reach results that may serve the training of young players, raise their functional and physical competence, and achieve the desired sporting achievements.

## **Research aims**

### **The research aims to:**

Identify the impact of the proposed training program on the development of some functional and physical variables and the digital level of jogging 800 - 1500 m.

## **Research hypotheses**

The proposed exercises have an impact on some functional and physical variables and the digital level of running (800 - 1500) m.

## **Research Methodology**

Due to the nature of this study and to achieve its objectives, the experimental method was used by using two groups, one experimental and the other control.

### **The research sample**

The research sample is up to (20) athletes who practice middle-distance running in college playgrounds divided into two groups and equally, and the first random method is a control and the second is experimental.

### **Methods of data collection:**

Pulse measurement at rest (1 - 44)

Pulse after voltage measurement (14-263)

- Vital capacity
- Cooper test
- 800m running test
- A test run of 1500 meters

### **The proposed training program:**

To identify the effect of the proposed program for endurance development on some functional and physical variables in middle distance running, the researchers developed the content of this program by following the following steps:

### **Determine the duration of the program implementation:**

Based on the results of some studies conducted previously that aimed to develop training programs, including the study of Nabila Abdullah Awad 1990, which indicated that the

average period required for the emergence of the effect of training on the efficiency of physical work ranges between 8-10 weeks and at 3-5 training units per week (16:58 ).

Fathi Al-Mehshah's (1997) study, citing Canham and Hill, indicated that training for 9 weeks leads to a significant improvement in aerobic capacity (11:48).

Hanafi Mahmoud Mukhtar (1988) also indicated that the process of adaptation to physical exertion takes place after a period of training of not less than 15 weeks and on this basis and based on most scientific references that clarify the period of the training program, we have considered that a period of three months, i.e. up to 12 weeks is sufficient. To implement the proposed training program (25: 3)

### **Time period of the proposed program:**

The time period for implementing the program was 12 weeks, with 48 training units distributed into 4 training units per week, and the duration of the training unit is 90 minutes. The following table shows the time period for the training program during the preparatory phase.

Table No. (1) Illustrates the training program during the preparatory phase

Number of competitions and tournaments	Total training hours	Average training hours per week	The percentage of training	The number of training days during the week	The time of the training unit Per minute	Its duration Per week	The training phase
-	42	6	% 58	4	90	7	Period of the preparation of the main
4	30	6	% 42	4	90	5	Special preparation period

Determine the weekly pregnancy cycle used in implementing the proposed training program.

The performance of any exercise is characterized by different degrees of intensity depending on the degree of performance or the amount of actual completion of this exercise or that. Based on this, we set out to define the weekly pregnancy cycle as follows (1 low: 1 high) (139: 1).

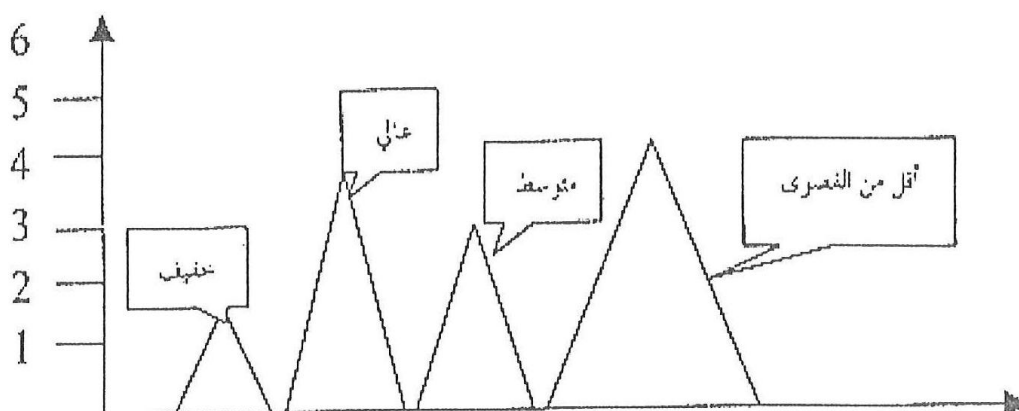


Figure No (1) shows an example of the weekly pregnancy cycle used in the proposed training program

Table No. (2)As for degrees of severity, the two researchers have relied on the table of degrees of severity and position in the following table:

The percentage of an individual's ability to accomplish	Degrees of severity	
90: 100 %	Paramount	6
80: 90 %	Less than maximal	5
70: 80 %	high	4
60: 70 %	Average	3
50: 60 %	light	2
40: 50 %	Few	1

### Exploratory study:

The exploratory study was conducted on six players for the period from 3/11/2019, through which the following was verified:

- The validity of the devices used in the search.

- The extent to which the members of the research sample respond to the research tests.
- The size of the research staff assisting in the implementation of the research has been determined.
- A training unit was implemented from the program devoted to the experiment where the number of repetitions commensurate with the level of the members of the research sample was determined, as well as an attempt to adjust the interval of interval.

### **Tribal measurements:**

By conducting pre-measurements during the period of 10/11/2019 for the measurements tests under discussion, on the playgrounds of the College of Physical Education in Al-Muthanna

### **Equivalence of the two research groups:**

The two researchers carried out the equivalence process between the two research groups from 2-3/11/2019, and Table (3) shows the equivalence process between the two research groups.

Table No. (3) Clarifies the equivalence of the control and experimental groups

level indication	T values Calculated	Experimental group		Control group		Tests and measurements for describing the research sample
		P	s	p	s	
Not a function	0.36	1.6	15.29	1.11	15.09	Age / year
Not a function	0.17	13.1	159.9	8.66	160.43	The length is cm
Not a function	0.22	10.7	52.27	8.30	53.14	Weight / kg
Not a function	0.21	2.91	67.1	3.30	67.3	Pulse at rest / n / d
Not a function	0.22	11.51	163.5	11.01	164.3	Pulse after voltage / n / d
Not a function	0.35	164.01	4090	192.09	4100	Vital Capacity / ml
Not a function	- 0.87	0.20	2.620	0.29	2.580	Cooper test 12 min / km
Not a function	1.56	14.8	161.75	10.5	162.76	Test run 800 m / s
Not a function	1.54-	13.4	345.763	13.6	334.225	Running test of 1500 m / s

### **Dimensional measurements**

The dimensional measurements were made on the individuals of the research sample and in the same manner that was carried out and with the same measurements and tests that were made in the pre-measurements, during the period from 10/11/2019 to 2/15/2020.

## Presentation and discussion of results:

Dimensional measurements were made for the period from 2/15/2020 with the same method and specifications in which the pre-measurements were made. See Table No. (4), which represents the pre- and dimensional measurements of the control group.

As for Table No (5) it represents the pre and post measurements of the experimental group.

As for Table No (6), it represents the dimensional measurements of the control and experimental group.

Table No. (4) Shows the arithmetic mean, the standard deviation, the difference between the two averages, and the t value of the differences between the pre and post measurements of the control group

Indication level value	Semantic Statistic	T value Calculated	S2	the difference between The medians	Tribal and dimensional measurements of the control group.				measuring unit	Statistical data Functional and physical variables
					after me		Tribal			
					the second group		The first group			
					P <sub>2</sub>	Q±	P <sub>1</sub>	Q±		
0.00	D.	2.17		-1.8	2.57	65.3	2.91	67.1	N / d	The pulse at rest
1.00	D.	3.64		-8.6	8.17	155.7	11.01	164.3	N / d	Pulse after effort
0.00	D.	7.12		310	144.57	4410	192.09	4100	Milliliter	Vital capacity
0.00	D.	8.99		190	0.09	2.770	0.24	2.580	How many	Test Cooper 12) d(
0.00	D.	4.84		-2.98	9.96	159.78	10.5	162.76	Per second	Running test (800) m
0.01	D.	3.60		-8.01	7.2	336.215	13.6	344.225	Per second	Running test (1500) m

Note that the tabular t is below the significance level of  $1.743 = 0.05$

Table No(5).It illustrates the arithmetic mean of the standard deviation and the value of " T " of the differences between tribal measurements and a posteriori experimentalgroup

Indication level value	Statistical semantic	The calculated t value	S2	The difference between the two averages	Tribal and dimensional measurements, experimental and control group				measuring unit	Statistical data  Functional and physical variables
					after me		Tribal			
					the second group		The first group			
					P <sub>2</sub>	Q±	P <sub>1</sub>	Q±		
0.00	D.	7.69		-3.2	1.92	63.9	2.91	67.1	N / d	The pulse at rest
0.00	D.	4.46		15.7	4.79	147.8	11.91	163.5	N / d	Pulse after effort
0.00	D.	-7.58		420	122.07	4.510	164.01	1090	Milliliter	Vital capacity
0.00	D.	-7.04		240	0.14	2.860	0.15	2.620	How many	Test Cooper 12) d(
0.00	D.	-6.99		-16.36	4.04	145.39	14.8	162.75	Per second	Running test (800) m
0.00	D.	14.02		-38.17	7.47	307.592	13.4	345.763	Per second	Running test (1500) m

Note that the tabular “t” value below the significance level of 0.05 is (1.734)

Table No(6) Represents the dimensional measurements of the control and experimental group

Indication level value	Statistical semantic	The calculated t value	Grandpa/ t a second	Tribal and dimensional measurements, experimental and control group				measuring unit	Statistical data
				after me		Tribal			Functional and physical variables
				the second group		The first group			
				P <sub>2</sub>	Q±	P <sub>1</sub>	Q±		
0.00	D.	3.55		1.92	63.9	2.57	65.3	N / d	The pulse at rest
0.00	D.	3.64		4.79	147.8	8.15	155.7	N / d	Pulse after



									effort
0.00	D.	-2.30		188.0	4510	144.5	4410	Milliliter	Vital capacity
0.00	D.	2.37		0.14	2.860	0.09	2.770	How many	Test Cooper( 12) d)
0.02	D.	4.23		4.04	145.35	9.96	159.78	Per second	Running test (800) m
0.01	D.	12.0		7.4	307.392	7.2	336.215	Per second	Running test for (1500) m

The tabular t value at a significance level of 0.05 = 1.734

Degree of freedom:  $n + n - 2 = 18$

### Discussing the results:

When discussing the results, especially those that are of interest to us in the main, and to clarify the effect of the training program, we had to compare the table for the experimental and control groups, especially the dimensional measurements, as in Table No. (6), which explains the computation of the value of "t" for the results of the dimensional measurements of the control and experimental group in the physical functional variables And the digital, where the pulse rate at rest was  $(65.3 \pm 2.57)$  bpm in the post measurement for the control group, while it was  $(63.9 \pm 1.92)$  bpm in the post measurement for the experimental group, as it became clear that there are statistically significant differences at a significance level of 0.05 in favor of the post measurement For the experimental group.

As for the pulse after the effort, the rate of pulse after the effort was  $(155.7 + 8.17)$  beats per minute in the post measurement of the control group, while it reached  $(147.8 \pm 4.79)$  in the post measurement of the experimental group.

From this it is evident that there are statistically significant differences in favor of the post measurement in the pulse rate at rest and after exertion, as the calculated value of "t" for the pulse at rest was 3.55, which is greater than the tabular value of T (1.734).

We attribute this progress in the low pulse rate during rest and after the effort to the training program and its wave pattern in training 1 low: 1 high in addition to rationing the training load, which led to the occurrence of the process of adaptation and harmony between the functional devices and the intensity of the load. As Muhammad Hassan Allawi and Abu Al-Ela Abdel Fattah (1984) indicate, the heart rate at rest is lower, the

longer the running distance, and this is what we emphasized in the training program where special training units were allocated to cross-country training (12: 226).

The results of our studies also agree with what Coats (1981) also indicated, as he confirms that endurance training leads to structural changes in the heart muscle that lead to its growth as a result of improved blood circulation and an increase in the number of capillaries in the muscle, as well as the size of the heart may reach twice or Three times the normal size. As for the vital capacity, the results of the research indicated that there are statistically significant differences in the vital capacity in favor of the experimental group, and we explain this progress in improving respiratory function is its adaptation to the training loads of the training program, and this is what the study of Fain Al-Batal (1987) indicated that aerobic exercise achieved better Results in vital capacity measurements (10:50) and because our program relied primarily on long distance aerobic training.

The results of our study are consistent with the study of Mahmoud Mustafa (1989), where he confirms that the amount of vital capacity can reflect the integrity of the respiratory equipment and clarify the individual's training status is greatly affected by organized physical training. In his study of runners, it has been shown to increase their levels of vital capacity, with a very large difference from non-practitioners of physical activity, and he added that the same athletes who have higher levels of vital capacity more than their peers were able to achieve excellent levels of athletic performance (14:25). As for choosing Cooper, the results showed statistically significant differences in favor of the experimental group, as the use of low-intensity aerobic training during our training in the proposed program led to this progress and as the low-intensity training works to develop general endurance, and this is what Salim Hasani's study indicated. Salem (1992) argues that a low-intensity training method has a positive effect on the level of general meditation (4: 5). As for the development of the digital level of running (1800, 1500 m), which we believe represents the axis of the development of the endurance level and is also the focus of our research problem that we put in mind, we see in Table No. (6) that there are statistically significant differences at the level of 0.05 in favor of the experimental group in the two tests Mentioned.

We attribute the reason for the advancement of the digital level of running the 800-meter mainly relying on the training program, where the principle of the rise-taking model was taken in the construction of training units, where we can start with light training, which is at an intensity level of 50-60% of the maximum intensity, and then start gradually until we finish with the training unit The last in the training week with a training unit of maximum intensity or less than the maximum, taking into account the situation of the 800m race or training and placing it during the training units of high intensity.

From the foregoing, these results are consistent with the views of Bastwais Ahmed (1999), which confirms that training with high-intensity training actions is not limited to the player's ability to consume oxygen, but also affects the cross-sectional area of the muscles and thus positively affects the elements of speed and force characteristic of speed in the direction of endurance, where Training in the direction of speed for 800m players is working to improve the digital level, and thus some consider that the 800m race is one of the races that are almost considered sprints (2: 307). We have also taken into consideration the principle of the training competition for the development of the digital level to run 800m, 1500m, where we started with the 100m, 300m, 600m race in the first training units of the first weeks of training and ended with the 1500m race in the last training session in the last training weeks. All these influences gave their fruits. And it led to the digital level progress of the two tests mentioned. With this, we have achieved our main goal, which is that the proposed training program has positively affected the development of the level of endurance and on some functional and physical variables, thus achieving the hypotheses of our above research.

### **Conclusions:**

In light of the results of the research and its conduct, we can conclude the following:

1. The proposed experimental program had a positive effect on developing the tolerance characteristic of the experimental group.
2. The development of the endurance trait leads to the development of some of the physiological characteristics under consideration.
3. The use of the interval training method was suitable for developing the endurance characteristic of the experimental group.

### **Recommendations: We may recommend the following:**

- 1- We recommend the implementation of the proposed training program represented by (48) training units, at (4) units per week, and in its wave-like method of intensity.
- 2- We recommend using the wave method in training
- 3- Paying attention to functional measurements as an indicator to legalize the training load.
- 4- We recommend conducting other similar studies to identify the effect of endurance on the level of skill or respiratory performance.

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