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## **The effect of two different intermittent and continuous training aerobic units on the blood proteins of runners**

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**Abstract**--In fact, prolonged and intense exercise causes changes in the physiological properties of blood and biochemical markers. And sometimes athletes who participate in strenuous exercises need to pay attention to this issue, as intense physical exercise may cause many changes and responses in the human body as well as physical activity and exercise also plays an important role in improving cognitive function in all age groups. Exercising enhances academic achievement and cognitive function in pre-teens, as well as in adults. The study aimed to: Identifying the significance of the primitive differences in the effect of two different intermittent and continuous aerobic training units on the blood proteins of the runners, Recognizing the significance of the subsequent differences between two different intermittent and continuous aerobic training units in the blood proteins of the runners. The researcher assumed: There are statistically significant differences in the primal differences between two different intermittent and continuous training aerobic units in the blood proteins of the runners, There are statistically significant differences in the subsequent differences between two intermittent and continuous training aerobic units in the blood proteins of the runners. The sample of the research was formed after the researcher determined the research community in a deliberate manner with the players of Nineveh Governorate's national team for the Track and field, which numbered (10) players. The researcher used the following statistical means (arithmetic mean, standard deviation, (t-Test) for related samples, coefficient of variation) and using the statistical package (SPSS) version (11.0) for the purpose of statistically

processing the data. The following was concluded: There are significant differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of the unit of intermittent effort in the two album variables, There are significant differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of the unit of intermittent effort in the variable Globlin, There are significant differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of the unit of intermittent effort in the variable fibrinogen, The researcher concluded the following: Using units with different effort and for longer periods and for the same level of the sample under the current study, Comparisons between male and female players applying for the same variables, Conducting other studies on immunological variables.

**Keywords**---effect different intermittent, continuous training, aerobic units, blood proteins runners.

## **Introduction to Research**

### **Introduction and importance of research**

It is known that physical activities and exercise are of great importance in the prevention of many chronic diseases such as: cardiovascular and gastrointestinal diseases, or as an adjunct treatment for patients suffering from such chronic diseases as they reduce the risk of death. Epidemiological studies have demonstrated that: increased blood viscosity, hematocrit, plasma viscosity, red cell aggregation, and leukocyte count is associated with many cardiovascular diseases (Teległów et al., 12 2022)

Physical activity and exercise also play an important role in improving cognitive function in all age groups. Exercising enhances academic achievement and cognitive function in pre-teens, as well as in adults. It can also lead through exercise to reduce cognitive impairment associated with aging, and exercise reduces the rapid cognitive decline associated with neurodegenerative diseases, such as: Alzheimer's disease and Parkinson's. Also, the positive outcome of exercise is not limited to the effect of lifestyle and long-term adaptations, but a single bout of exercise alone, especially aerobic exercise, can have temporary effects on cognition. This is referred to as a 'introductory exercise' and this exercise can be used as a tool to improve cognitive tasks such as attention and learning (Neuvonen, 2022, 52)

However, prolonged and intense exercise causes changes in the physiological properties of blood and biochemical markers, and sometimes athletes participating in strenuous exercise may need to pay attention to this, as intense physical exercise may cause many changes and responses in the human body (Teległów et al., 2022, 11).

During exercise, the cardiovascular system must ensure the supply of working muscles with oxygen (O<sub>2</sub>). The main function of red blood cells during exercise is to transport oxygen gas produced from the inhaled air to the lungs and from there to the tissues through the air barrier (the alveoli), and then move to the blood, so that most of the oxygen is attached to hemoglobin (Hb) found in red blood cells. It is then released to spread to the rest of the cells. The red blood cells also deliver the carbon dioxide (CO<sub>2</sub>) gas produced by the cells to the lung to be released to be exhaled from the body through exhaled air.

Hemoglobin also contributes to the blood's buffering capacity, and the release of adenosine triphosphate (ATP) and nitric oxide (NO) from red blood cells contributes to vasodilation and improved blood flow to working muscles. All of these functions require adequate amounts of red blood cells in the circulatory system (Mairbäurl, 2013, 332). Hence, the importance of the research lies in identifying the effect of continuous and intermittent aerobic effort, and the great importance that this information provides to the community, researchers and those interested in the field of physiology of physical effort, and the science of sports training, scientific results that can be relied upon and benefited from in the development and construction of training programs.

### **Research Problem**

Through the researcher's review of scientific studies and research, I noticed that there is a continuous need to find the best ways and means to improve the level of aerobic functional performance for athletes in physical activities, in which the respiratory system and blood play a large and decisive role to know the effect of effort on improving aerobic and blood work, where its components play both from routines and knowledge. The effect of this on improving aerobic work and increasing the mass of blood cells, as its components play both from proteins dissolved in the plasma.

### **Research Objectives**

1. Identifying the significance of the tribal differences in the effect of two different intermittent and continuous aerobic training units on the blood proteins of the runners
2. Identifying the significance of the dimensional differences between two different intermittent and continuous aerobic training units in the blood proteins of the runners

### **Research Hypotheses**

1. There are statistically significant differences in the tribal differences between two different intermittent and continuous training aerobic units in the blood proteins of the runners
2. There are statistically significant differences in the dimensional differences between two different intermittent and continuous training aerobic units in the blood proteins of the runners.

### Research Areas

1. The human field: the research sample consists of (6) long-distance runners from the Mosul city team.
2. Time range: 2/27/2022 to 3/27/2022
3. Spatial domain: Physiology and Mathematical Biomechanics Laboratory in the College of Basic Education.

### Search procedures

### Research Methodology

The researcher used the descriptive approach as it is the most appropriate approach to the nature of the problem to be studied and as it is the closest to solving problems in a practical way.

### Research community and sample

The research community included (10) players, who are the Nineveh Governorate team for medium and long distances for the category of applicants (\*1). As for the research sample, it included (6) long-distance players at a rate of (60%) of the total number chosen randomly. The researcher was keen to sign the individual sample to a written pledge after informing them of the nature and course of the research experiment (Appendix 2), and it showed the coefficient of variation (\*\*). There is acceptable homogeneity among the members of the research sample, and table (1) shows some information about the members of the research sample, which was obtained through the form for collecting information about the sample members (Appendix 1).

Table (1)

It shows the statistical parameters of some specifications of the research sample

Variables	height	weight	the age	training age	Pulse at rest
Arithmetic mean	175.4	67.34	22	2.6	68.6
standard deviation	3.13	5.51	1.41	0.54	5.45
Variation coefficient	1.78	8.18	6.42	21.06	7.95

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- <sup>1</sup> The trained masters were relied upon to determine the sample.
  - Dr. Abdullah Hassan Ali / President of the Athletics Federation in Nineveh Governorate
  - Coach Fawzi Idriss Thanoun
  - Coach Bashar Shehab Ahmed
  - Coach Nashwan Adnan Alo
  - (\*\*). If the value of the coefficient of variation is less than 30%, this indicates the homogeneity of the sample (Al-Tikriti and Al-Obaidi, 1999, 161.)

### **Devices and tools that were used.<sup>2</sup>**

- Truckmaster electric treadmill rotating tape device, American made.
- Medical Scale Detector, an American-made height and weight measuring device.
- Digital thermometer for measuring ocean temperature and relative humidity, type (Delta trak) made in China
- An oximeter to measure the pulse during rest and effort
- Two (2) electronic manual stopwatches.
- One (1) laptop computer

Medical instruments which include:

- Medical syringes (5cc)
- Alcohol sterilizer.
- medical Cotten.
- Plastic containers (Tips) for keeping samples samples
- Box case for blood preservation and transfusion
- Glass tubes size (10cc)
- Plasma tubes (5cc)
- Medical tape.
- Elastic belt (turca) used to tie it on the humeral area when drawing blood from the body.

### **Analysis tools, which include**

- Centrifuge.
- Elisa device (ELX 800) made by the American company (Bio kit)
- Analysis Kits.
- A device for measuring blood variables for examining a complete blood picture (complete blood picture) from the Italian company Seac.
- A device ((Stago) to measure the protein fibrinogen in the laboratory
- A device ((C311)) from the company ((Roshn)) to measure the proteins albumin and clobin in the laboratory

### **Data collection methods**

The researcher used tests and measurements to collect data, which included the following:

#### **Tests and Measurements for the Homogeneity of the Sample**

##### **Body measurements**

##### **Measurement of body length (cm) and weight (kg)**

The height and weight of the research sample were measured using a device (measuring height and weight) type (Detecto). After turning on the device and whistling it, the player stands on the device barefoot and a member of the

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<sup>2</sup> (\*\*\*) A request was submitted to the Deanship of the College of Basic Education to use some equipment from the Physiology Laboratory of the Physical Education Department (Appendix.(

assistant work team moves the metal plate to touch his head. After installation, the indicator that represents the length of the player in centimeters is read, and the weight is recorded after the reading is settled on the electronic screen. The figure represents the weight in kilograms and to the nearest (200) g.

### **Physical tests**

Two different antenna units were identified as intermittent (intermittent) and continuous voltages for the experiment of the current study, as follows:

#### **Periodic aerobic effort unit**

The periodic aerobic effort was determined by taking advantage of the fourth region of the tables (1984 (Fox), as the time was adopted from (4-5 minutes), and included working in it by two groups, and three repetitions for each group so that the time of one repetition was (5 d) and using a rest period ( 1:1/2) between iterations. ((Fox, 1984, 214), thus determining the periodic aerobic stress test by running on the rotating tape device with two groups and a working period of (15 d) divided into three repetitions with positive rest periods of (2.5 minutes) between one repetition and another and negative rest between The two groups measured (5 min) and work intensity (50% - 65%) of the maximum pulse intensity, which ranged between (130 - 150) beats / minute, and the rotation speed of the rotating tape reached (10) km / h.

#### **Continuous aerobic effort unit**

Continuous aerobic effort includes running on the rotating tape for a period of (30 minutes) continuously without interruption with the same work intensity in the periodic air effort, which is (50% 65%) of the maximum pulse intensity, which ranged between (130-150) pulses / minute and at the speed of rotation of the tape device Rotor (10) km / h.

Points that were taken into account when performing the two units:

- 1- The tests of the two air voltage units (periodical and continuous) were conducted at the same time and place.
- 2- The two tests were carried out at moderate temperatures ranging between (22-24 °C) and relative humidity (0 °C), which was controlled by the air-conditioning device (split 3 tons) located in the physiology and biomechanics laboratory in the College of Basic Education, where the two research experiments were applied.
- 3- Unifying the warm-up process in terms of content and timing
- 4- Giving a rest period of (7) days between the periodic aerobic effort test and the continuous aerobic effort in order to avoid any effect of the first test on the second test.
- 5- The research sample was informed not to eat any food or liquid substance, even water, for a period ranging between (10-12) hours before performing the two tests to control the normal plasma volume inside the body and

based on the opinions of specialists in general and sports physiology who were interviewed( \*<sup>3</sup>)

### **Determining the two units of voltage**

The researcher prepared a questionnaire and presented it to the experts and specialists in the field of sports training and sports training physiology and it contains several times for previous research in the same field, where these times were different and represented by drawing tribal blood and direct withdrawal after the completion of the effort

### **Determining the intensity of work with periodic and continuous air voltages**

The intensity of work was determined by the periodic and continuous air voltages of the research sample using the pulse indicator through the following procedures:

- Measuring the pulse rate of the research sample at rest
- Determining the maximum pulse rate for the individuals of the research sample using the following equation (220:- age = maximum heart rate)
- Determine the percentage of intensity used from the maximum pulse rate
- After obtaining these values, the intensity of the air voltage was determined using the following equation:

(maximum heart rate - resting heart rate) x percentage of intensity to be worked on (%) + resting heart rate (Nieman, 2002, 243))

The intensity of the periodic and continuous voltages of the research sample ranged between (130-150) beats / minute.

### **Measurements and functional tests**

#### **Procedures for preparing blood samples**

The procedures for preparing blood samples for the purpose of measuring the blood variables under study included the following steps:

- Venous blood samples were collected using a syringe (5 cm<sup>3</sup>) in size.
- The blood samples were saved in a box case and delivered to the laboratory
- The blood was separated using a centrifuge at a speed of (3000) revolutions per minute and for a period of (20 minutes) to separate the plasma from the cells.
- The plasma obtained from the apheresis process was withdrawn by centrifugation using a small pipette and a device (microbaby.(

### **Analysis of blood proteins**

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<sup>3</sup>Dr. Fadwa Khaled Tawfiq General Physiology College of Veterinary Medicine  
 - Prof. Muhammad Tawfiq Othman, Physiology of Physical Training, College of Basic Education  
 - Prof. Dr. Hadeel Ahmed Al-Faslujah, College of Science / Department of Life Sciences.

The Stago device was used to measure the protein fibrinogen in vitro and the C311 device from Roshn company was used to measure the proteins of albumin and clobin in the laboratory (\*<sup>4</sup>) using the kit type (Cobas of American origin)

### **Main experiment**

The two research experiments included the entry of all the sample members into the laboratory after changing their clothes and sitting in it for a period of (15 d) before making the tribal measurements to ensure that the research sample was exposed to the same experimental conditions. (22-24 m 5) and for the purpose of achieving the objectives of the research, the researcher conducted the test on the sample members on Sunday and Monday (6-7/3/2022) for the periodic training, and on Sunday (13/3/2022) for the continuous training at nine o'clock in the morning. The two experiments included measurements in the conditions of rest, after exertion and recovery periods, which were as follows:

#### **Measurements at rest**

- Measurement of body temperature.
- A venous blood sample was taken from the athlete after sitting in a comfortable position from the elbow fold, Capital fossa, by the specialized biologist (\*) with a value of (5CC.)
- A warm-up was conducted for the player for a period of (5 minutes) by climbing on the rotating tape device and walking or Jog on the machine at a speed (5 km / h)
- Give a rest period of no more than (5) minutes.
- Starting the test after calibrating the rotating tape device at a speed of (10) km / h and an incline of (0.(
- When the player starts running, the timer starts running the stopwatch with the oximeter placed in the player's finger and continuously to know the value of the pulse.

#### **Measurement directly after the effort**

- Venous blood was drawn from the sample individuals from the elbow fold (Capital fossa) (5 CC)

### **Statistical Processing**

#### **The following statistical methods were used**

- Arithmetic mean.
- standard deviation.
- A t-test for the linked samples.

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<sup>4</sup> The blood variables under study were analyzed in Al-Kawthar and Radwan Al-Jamas laboratories. Biologist Muhammad Ibrahim Daoud / Bachelor of Biological Sciences / Al-Kawthar Laboratory for Pathological Analyzes

- Coefficient of variation. (Al-Tikriti and Al-Obaidi, 1999, 161)

The data was processed using the statistical package (SPSS 17), and the extracted values were processed using the (ExCEL) program.

## Presentation, discussion and analysis of the results

### Results

Table(2)

It shows the arithmetic means, standard deviations, and the amount of probability and significance of the research variables before the effort

Statistical parameters Variables	measuring unit	intermittent effort unit		continuous effort unit		Value (t)	probability amount	morale
		Arithmetic mean	standard deviation	Arithmetic mean	standard deviation			
albumin	g/dl	47.60	2.01	48.98	1.66	1.281	0.256	insignificant
globulin	g/dl	26.73	3.90	26.85	4.42	0.147	0.889	insignificant
Fibrinogen	Mg/dl	268.87	70.23	226.43	46.61	1.705	0.149	insignificant

Error percentage (>0.05)

-1From Table (2) it is clear that there are no significant differences between the pre and post tests of the two units of periodic and continuous effort in the variables (albumin, globulin and fibrinogen), as the value of (t) reached (1.281, 0.147, 1.705) at the probability level (0.256, 0.889, 0.149)

Table (3)

It shows the arithmetic means, standard deviations, the amount of probability, and the difference between the two means and the significance of the research variables after the effort

Statistical parameters Variables	وحدة القياس	intermittent effort		continuous effort		value (t)	The difference between the two averages	probability amount	morale
		Arithmetic mean	standard deviation	Arithmetic mean	standard deviation				
albumin	g/dl	50.93	1.15	50.11	1.50	1.743	0.82 for the B O F	0.142	insignificant
globulin	g/dl	27.60	2.69	21.78	10.99	1.094	5.82 for the B O F	0.324	insignificant
Fibrinogen	Mg/dl	273.30	61.66	249.20	46.04	1.714	24.1 for the B O F	0.147	insignificant

The error percentage used (<0.05)

- a. From Table (3) it is clear that there are no significant differences between the pre and post tests for the units of periodic and continuous effort after the effort in the variables (albumin, globulin and fibrinogen) as the value of (t) reached (1.743, 1.094, 1.714) at the probability level (0.142, 0.324, 0.147)
- b. It was found from Table (3) that there are differences in the arithmetic means for the study variables and in favor of the intermittent effort unit, respectively (0.82, 5.82, 24.1)

### **Discussing the results**

Through Table (3), it is clear that there are no significant differences in the research variables after the effort, but there are differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of intermittent training, as the energy expenditure is in the effort and in addition to that in the positive rest that was determined by the table (Fox and Matthews). ) in the fourth region of the effort. Where the method of low-intensity interval training aims to develop special physical abilities such as general endurance, speed endurance, strength endurance, and strength (Ben Asaloun, et al., 2017. p. 13). Which is characterized by moderate intensity, as it reaches in running exercises from (60 to 80%) of the maximum level of the individual, and reaches in strength exercises, whether by using additional weights or by using the weight of the body weight, which ranges between (50 to 60%) from the maximum level of the individual . Continuous interval training aims at, developing general and specific elongation, developing the circulatory and respiratory systems by improving the vital capacity of the lungs and heart capacity, increasing the blood's ability to carry more oxygen, and adapting the individual to physical exertion, which leads to delaying the onset of fatigue (Debeck , & Qasim Asad Qasim, 2017, 45).

One of the studies showed that endurance training is affected by the volume of work and the volume of plasma that is determined by the effort exerted at different temperatures. 1988) Also (Osman, 1990) pointed out that the process of regular training leads to changes in the various cells and tissues of the body. The changes that occur after aerobic exercise are to improve the ability to work muscles in the case of the availability of oxygen, and this improvement is mainly through an increase in both myoglobin and mitochondria. As well as by increasing the stores of glycogen in the muscles.

This is supported by what he (Al-Acho 2010) said, where he “secures the occurrence of functional changes in the players’ body, including blood components that help the players to cope with the conditions of the physical burden imposed on them in line with the performance requirements (competition) without prejudice to the functional level of the players that may lead to a decline in physical performance skills, and planning, especially since the vital components of the blood play an important role in transporting and securing the necessary nutrients, as well as the immune and defensive role, as well as transporting chemicals during physical exertion” (Al-Acho, 2010, 30).

The researcher considers that the insignificance of the difference in the level of albumin may be due to the absence of a significant change in the temperature of the body center in the research sample, as an increase in the temperature of the body center significantly leads to an increase in the ability of albumin as an antioxidant and that what confirms what the researcher went to from the interpretation What was confirmed by (Medina et al, 2010) that the ability of albumin as an antioxidant increases with temperature )Medina et al, 2010,7). In addition, the researcher believes that the lack of morale of the difference may be due to the fact that the intensity of the effort or its duration or both in both the periodic and continuous tests were not sufficient to cause a change in the level of albumin.

### **Conclusions**

- There are significant differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of the unit of intermittent effort in the two album variables
- There are significant differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of the unit of intermittent effort in the variable Globlin
- There are significant differences in the arithmetic averages between the two units of intermittent and continuous effort and in favor of the unit of intermittent effort in the variable fibrinogen

### **Recommendations**

- Using units with different effort and for longer periods and for the same level of the sample under the current study
- Comparisons between male and female players applying for the same variables
- Conducting other studies on immunological variables

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