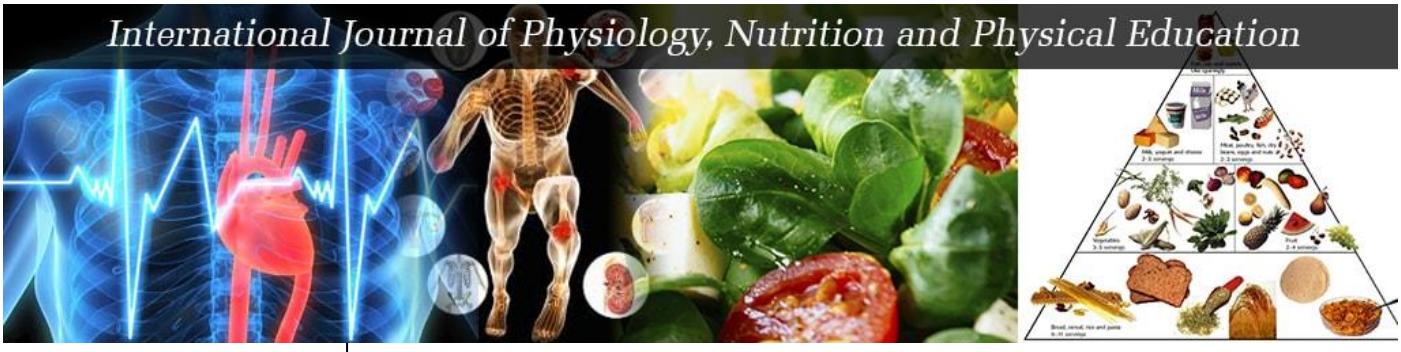

ISSN: 2456-0057
IJPNPE 2023; 8(2): 483-489

www.journalofsports.com
Received: 15-07-2023
Accepted: 23-08-2023

Dr. Ali Hussein Sagheer
College of Physical Education and Sports Sciences, Wasit University, Iraq

Amjad Jassim Nassif
College of Physical Education and Sports Sciences, AL-Mustansiriya University, Iraq

Ahmed Nayyef Batwli
College of Physical Education and Sports Sciences, Wasit University, Iraq

Corresponding Author:
Dr. Ali Hussein Sagheer
College of Physical Education and Sports Sciences, Wasit University, Iraq

Special exercises according to the effect of aerobic and anaerobic effort on developing some physiological variables and speed of recovery among young 400 m runners

Dr. Ali Hussein Sagheer, Amjad Jassim Nassif and Ahmed Nayyef Batwli

DOI: https://doi.org/10.22271/journalofsport.2023.v8.i2g.2841

Abstract
The purpose of this paper is to know the effect of special exercises for aerobic and anaerobic effort on some physiological variables in the blood of young 400m runners. The researchers used the experimental approach due to the nature of the problem and the procedures for solving it. The sample represented (12) 400m competitors who were divided into two groups (6) control, (6) experimental, and (2) for the exploratory experiment, where the researchers drew a blood sample and measured the pulse after performing the procedure. Their warm-up time included a time of (15) minutes, after which the test was conducted to run a distance of 400 meters. After completing the test, the work team measured the pulse of the testers, after which blood was drawn from the sample members and the pulse was measured after the end of each minute until the tenth minute. Thus, the researchers concluded, after conducting tests for injuries in the laboratory, that significant differences appeared in the pre- and post-tests for the research variables with aerobic and anaerobic effort within the blood variables under study, and also by taking into account conducting periodic follow-up examinations for the players according to the study variables by measuring the percentage of blood variables, red and white blood cells, platelets, and hemoglobin percentage. Continuously and for different periodic periods of time and attention should be paid to it because it affects the basic and acidic blood chemistry and energy production in the muscles and thus hinders the work and performance of the muscles and the accumulation of waste in the blood and weakens the neuromuscular work and the continuation of the training units to perform the best in effectiveness and work in the presence of effective physiological variables for the process of transporting blood to the muscles. Thus, not hindering the work of the muscles and the percentage of their effective performance in the exercise, the performance of the training units, whether within the aerobic and anaerobic effort, and the speed of recovery for the variables under study for the sample members.

Keywords: Aerobic effort and anaerobic effort, blood physiology

Introduction
The role of the training process and the development it has achieved in all its arts and requirements. Experts and researchers believe that work to prepare physically and functionally for all body systems is necessary and of great and urgent importance in reaching the highest ranks, levels and sporting achievements. The levels that many countries and sports teams have reached and the progress that has occurred because of the close connection between the science of sports training and all sciences, especially physiology, anatomy, medicine, kinesiology, and others. Therefore, the physiology of sports training has great importance in the development of the sports level. This is what prompted experts and researchers to pay attention to sports training, sports physiology, and the biochemical changes that occur as a result of training in their research and studies and to reach important results in research and investigation, especially athletics, which has an important role in the field of sports. And obtaining medals for its many activities, physiological and biochemical development in the work of muscles in the body's systems, increasing physical and psychological health, improving performance, and providing the organization of a healthy way of life to obtain body

strength and psychological health in its special energy requirements, since running is considered one of the activities that requires the production of a large quantity. Of energy in a very short period of time, while other activities require different distances to produce energy for a different period of time, and other types of activities require varying degrees between both types of energy production, whether for short or medium activities (1:59).

Therefore, working on using sports training methods and types that take place in different conditions must be taken into account, analyzed and studied, because correct training based on scientific foundations helps to achieve the required level and reach high achievement, as Obaid points out, quoting A'id Fadl Melhem, that training "is The process of creating appropriate (physiological) adaptations in the athlete's vital systems to the appropriate conditions and nature of the athlete to reach global achievement in his specialized sport."(2:22)

Therefore, the oxygen and non-oxygen systems determine the presence or absence of stored oxygen within the muscle to produce (CP - ATP - V2o max) the energy in running events that are not less than (10) seconds and not more than (2) minutes. Therefore, the share of the aerobic system and the anaerobic system during short- and medium-distance running competitions is primarily due to the extent to which each of the three energy production systems overlaps in the work required during each competition, and to the production of energy, both aerobically and anaerobically, through which the extent of the matching and similarity of the length of the period of intensity of work in each race without rest is determined. Hence the importance of researching special exercises and their effect on aerobic and anaerobic effort on some physiological variables of the blood and returning the speed of recovery to the normal state of the sample members in the 400 m youth run.

Research problem

Through what has been achieved in the work of organ functions in performing aerobic and anaerobic physical effort, which are considered the two important factors in raising the requirements for the level of athletic achievement for each event, if they are used correctly and appropriate to the physical and functional capabilities of the athlete, and knowing the state that the athlete reaches after performing sports training is important. According to well-studied scientific programs, achieving good performance requires knowing the normal state at rest and the pre- and post-exertion state of the energy systems (CP - ATP - VO2 max), while noting the changes occurring between the two states to avoid the athlete reaching a state of injury, effort, or excessive training work. Most studies are interested in knowing the importance of the functional responses that occur in sporting events, especially the 400 m event, and the extent of the positive and negative responses of these responses in order to reach the best level of achievement and reach the summit to win medals. Therefore, the problem has been identified: it is not possible to reach a specific performance level unless the athlete's physiological functions are in harmony. Therefore, the research problem lies in the extent of the impact of special exercises for the aerobic and anaerobic efforts of 400m runners, according to the variables that these two efforts cause, on some blood variables of red blood cells, eggs, hemoglobin, and platelets as a result of performance requirements and the speed of returning to the normal state of recovery and returning to work again to perform training modules for individuals. The sample.

Research objective

- Preparing special exercises for the aerobic and anaerobic efforts of the sample members.
- Knowing the effect of these exercises on blood variables and the speed of recovery for individuals in the research sample.

Research hypotheses

- There are statistically significant differences between the pre- and post-tests of anaerobic effort in blood variables, speed of recovery, and performance for the sample members.
- There are statistically significant differences between the pre- and post-tests between the aerobic effort in blood variables and the speed of recovery and performance for the sample members.

Research fields

- **Human field:** Young runners from the National Center for Sports Talent Welfare and Baghdad Clubs - Ministry of Youth and Sports, and runners from Baghdad clubs in the 400 m race.
- **Time field:** (26/6/2023) to (5/9/2023).
- **Spatial field:** Ministry of Youth and Sports, National Center for Sports Talent Welfare Stadium, and Physical Education and Sports Sciences Stadium - University of Baghdad.

Define terms

Aerobic effort

It is a moderate-intensity physical activity that enables an individual to continue practicing it continuously for several minutes without feeling noticeable fatigue that prevents him from continuing. (3:2).

Anaerobic effort

It is the increase in the pulse rate, which is the oxygen deficit that occurs during the physical effort exerted, which (Mohamed Tawfiq) pointed out, quoting Fox Mathews. The level of oxygen consumption is less than what is required to supply adetosine triphosphate (ATP), because any exercise feels the oxygen deficit in which it is present. The anaerobic phosphagenic and glycolytic system is ready to stimulate the need for ATP during exercise. This means that exercises with a short duration and high intensity create an oxygen deficit during the exercise period, and the need is met from the main source of energy, ATP, through the anaerobic system. (4: 154)

Research methodology and field procedures

Research Methodology

The researchers used the experimental method because it suits the nature of the problem and the method of solving it.

Community and sample research:

The sample was chosen intentionally from the runners of the National Center - Ministry of Youth and Sports and the Baghdad clubs who ran 400 meters, and they numbered (14). The sample represented a percentage of (80%). (12) were chosen intentionally to conduct the tests, and (2) were excluded from the exploratory experiment from outside the research sample and from the community the origin. They were divided into two groups (6) each (control and experimental)

Table 1: Shows the homogeneity of the sample in anthropometric measurements

No.	Variables	Measuring unit	Mean	Std. Deviations	Median	Skewness
1	Length	Cm/m	178, 08	4.13	178	0.873
2	Biological age	Year	18	2.057	18	0.981
3	Mass	Kg	72.6	7.429	71	0.605
4	Training age	Year	3, 05	2.012	3, 1	0.745

Table 2: Shows the arithmetic mean, the standard deviation, and the calculated and tabulated t-value for the sample equality for the variables under study

Variables	Pre-test		Post-test		T value Calculate	Tabular (T) value	Type sig
	Mean	Std. Deviations	Mean	Std. Deviations			
Red blood cells	6, 26	0, 56	6, 63	0, 63	10, 21	3, 19	Non sig
White blood cells	4, 10	0, 21	3, 27	3, 27	7, 24	3, 19	Non sig
Platelets	193	42	207	47	4, 25	3, 19	Non sig
Hemoglobin	73, 6	7, 7	102	12	15, 7	3, 19	Non sig
1500 m running test	4, 34	36	4,11	11, 13	9, 31	3, 19	Non sig
Vertical jump from a standstill	2, 35	19, 19	2, 48	11, 19	9, 31	3, 19	Non sig
Achievement of running 400 metres	50, 30	0, 04	49, 05	0, 27	2, 14	3, 19	Non sig

Methods used tools, devices, and laboratory materials used in the research

Means of collecting information

- Arab and foreign sources
- International Information Network (Internet).
- Registration Form.

Devices and tools used in research

- Legal athletics stadium.
- Electronic calculator.
- Stopwatch (2).
- Japanese-made photographic camera.
- Blood separation device (Center Fusion).
- A cool box to store blood.
- Medical injections.
- Cotton and sterile material.
- Tubes for storing blood.
- Katat chemicals.
- Pulse measuring device (3).

Exploratory experiment

The researchers conducted the exploratory experiment on 6/22-23/2023, where they conducted the physiological test, anaerobic ability test, and vertical jump from a standstill. On June 23, 2023, they performed a 1,500-meter aerobic endurance test and completed a 400-meter run.

The researchers conducted physiological tests to estimate the level of variables that occur on some blood components, including red and white blood cells, platelets, hemoglobin, a vertical jump test, and anaerobic capacity.

Then the researchers consulted a group of experts (see appendix 3) and specialists in the field of training physiology and microscopic laboratory assistants, for the purpose of identifying the most important variables occurring in the blood as a result of aerobic and anaerobic effort, and to learn about the analyzes and procedures related to that.

After ensuring that the sample included the specifications required by the test and defining the sample, the researchers conducted the test to be implemented in order to control the research procedures and obtain the validity of the analysis of the variables, which were as follows:

- Not eating breakfast or anything else on the day of the main experiment.
- Reduce fat intake the day before performing the experiment.
- Do not engage in violent sports activities the day before performing the main experiment.
- Introducing players to the importance of research and the benefits sought from it.

Physical tests for sample members

First test: Vertical jump test from a standstill (5:95)

- **Test name:** Jumping up from a standstill. (anaerobic capacity)
- **Purpose of the test:** To measure the explosive power of the legs (anaerobic capacity).
- **Tools used:** A smooth wall at a suitable height. Then the tester extends his arms up at full extension for the purpose of knowing the first mark, then records the number, noting that the heels are touching the ground. The tester swings the arms down and back while bending the torso forward and down and bending the knees to a right angle only. Then the tester extends the knees and pushes with the feet together to jump up while swinging the arms forcefully forward and up to reach them to the maximum possible height for the purpose of marking the second mark. On 6/23/2023, the researchers conducted a procedure

Second test: 1500 m running test

- **Purpose of the test:** To measure the aerobic capacity of the laboratory.
- **Tools:** A legal athletics field, a stopwatch, assistant referees, cones (6),
- **Specifications:** The laboratory runs for a distance of 1500 meters, three laps and (300 meters) around the stadium.
- **Recording:** The laboratory records the race distance covered by the minute and to the nearest fraction of a second.

Completion test in a 400 meter sprint

- **Purpose of the test:** to measure the achievement of running (400) meters.
- **Description of the performance:** The test begins immediately after the completion of the warm-up process by instructing the tester at the starting line, where the tester assumes a sitting position, after which the launcher gives the signal to start around the field for one lap of a 400-meter run, and at this moment the timekeepers start

the stopwatches, and when the laboratory reaches the finish line, the stopwatches are stopped.

- **Recording:** It is recorded to the nearest 0.01 of a second through (3) two timers.

Pre-test

Pre-tests were conducted on 6/26/2023 for physiological tests and an anaerobic ability test for vertical jumping (Sergeant), and on 6/27/2023 a 1500 m running test and a 400m running test were conducted.

Programs for special exercises

The researchers prepared programs for special exercises according to the development of both aerobic and anaerobic endurance from 28/6/2023 - 5/9/2023 within the various running and jumping exercises within the intensity, volume, rest and repetition for two units per week (Sunday and Wednesday), where the units included jumping exercises on boxes and hurdles to develop Aerobic capacity and different runs (500 m - 600 m – 800 m - 1000 m), where the required intensity is of different sizes and intensity to develop the aerobic capacity of the competitors and to develop the functional physiological systems under study.

Post-test

Post-tests were conducted on September 4, 2023 for physiological tests and an anaerobic ability test for vertical jumping (Sargeant). On September 5, 2023, a 1500-meter running test and a 400-meter running test were conducted.

Statistical methods

The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Results and Discussion

Presentation, and analyze the results of the aerobic effort

Table 3: Shows the arithmetic mean, the standard deviation, the calculated and tabulated T-value, and the significance level for the variables under study before and after the effort for the experimental group

Variables	Pre-test		Post-test		T value Calculate	Tabular (T) value	Type sig
	Mean	Std. Deviations	Mean	Std. Deviations			
Red blood cells	6, 26	0, 56	6, 63	0, 63	10, 21	3, 19	Sig
White blood cells	4, 10	0, 21	3, 27	3, 27	7, 24	3, 19	Sig
Platelets	193	42	207	47	4, 25	3, 19	Sig
Hemoglobin	73, 6	7, 7	102	12	15, 7	3, 19	Sig
Vertical jump from a standstill	2, 35	19, 19	2, 48	11, 19	9, 31	3, 19	Sig
1500m running test	4, 34	0, 36	4, 11	11, 13	9, 31	3, 19	Sig
Achievement of running 400 metres	50, 30	0, 04	49, 05	0, 27	2, 14	3, 19	Sig

The tabular (t) value is (3.19) in front of a degree of freedom (4-1 = 3) and a significance level (0.05).

It is evident from Table (3) of the results of the pre- and post-tests for the anaerobic and aerobic efforts for blood variables (red blood cells, white blood cells, platelets, hemoglobin, and the completion of a 400-meter run). The value of the differences of the arithmetic means for the red blood cells before the effort is (6.26) and with a standard deviation of (0). 56) After the effort, the arithmetic mean reached (6.63) and standard deviation (0.63), and the calculated T value reached (10.21), which is greater than the tabulated T value (3.19). This means that the difference is significant and in favor of the posttest.

The value of the arithmetic mean of white blood cells before the effort was (4.10) and with a standard deviation of (0.21). After the effort, the arithmetic mean of the effort was (3.27) and a standard deviation of (3.27), and the calculated T value was (7.24). It is greater than the tabular (t) value (3.19). This means that the difference is significant and in favor of the posttest.

The value of the arithmetic means of platelets before the effort was (193) and with a standard deviation of (42). After the effort, the arithmetic mean was (207) and a standard deviation of (47). The calculated (t) value was (4.25), which is greater than the tabulated (t) value. (3, 19) This means that the difference is significant and in favor of the post-test.

The arithmetic mean value of hemoglobin before the effort was (73.6) and with a standard deviation of (7.7). After the effort, the arithmetic mean was (102) and a standard deviation of (12). The calculated T value was (15.7), which is greater than the T value. Tabular (3, 19). This means that the difference is significant and in favor of the post-test

The value of the arithmetic mean for the vertical jump with anaerobic effort from stability before the effort was (2.35) and with a standard deviation of (19.19). After the effort, the arithmetic mean was for the effort (2.48) and with a standard deviation of (11.19), and the calculated value of (T) was (9.31) is greater than the tabular (t) value (3.19). This means that the difference is significant and in favor of the post-test.

The arithmetic mean value for running 1500 m before the aerobic effort was (4.43) and with a standard deviation of (19.19). After the effort, the arithmetic mean was (0.36 effort) and a standard deviation of (4.11), and the calculated value of (T) was (9.31). Greater than the tabular (t) value (3.19). This means that the difference is significant and in favor of the posttest.

The arithmetic mean value for completing a 400-meter run before the effort was (50.30) and a standard deviation of (0.04). After the effort, the arithmetic mean was (49.05) and a standard deviation of (0.27), and the calculated T value was (2.14). It is greater than the tabular (t) value (3.19), which means that the difference is significant and in favor of the post-test.

Table 4: Shows the arithmetic mean, standard deviation, and T-value calculated for the blood variables before and after the effort for the control group for the variables under study

Variables	Pre-test		Post-test		T value Calculate	Tabular (T) value	Type sig
	Mean	Std. Deviations	Mean	Std. Deviations			
Red blood cells	5, 26	0, 56	5, 63	0, 63	9, 21	3, 19	Sig
White blood cells	3, 10	0, 20	3, 26	3, 26	7, 23	3, 19	Sig

Platelets	191	41	206	46	4, 24	3, 19	Sig
Hemoglobin	72, 6	7, 6	101	11	15, 6	3, 19	Sig
Vertical jump from a standstill	2, 11	18, 10	2, 25	11, 21	15, 06	3, 19	Sig
1500m running test	4, 38	0, 38	4, 11	0, 21	9, 41	3, 19	Sig
Achievement of running 400 metres	51, 21	0, 14	50, 06	0, 14	2, 14	3, 19	Sig

The tabular (t) value is (3.19) in front of a degree of freedom (4-1 = 3) and a significance level (0.05).

It is evident from Table (4) of the results of the pre- and post-tests for anaerobic and aerobic effort for blood variables (red blood cells, white blood cells, platelets, hemoglobin, and 400-meter running achievement). The value of the differences of the arithmetic means for the red blood cells before the effort is (5.26) and with a standard deviation of (0). 56) After the effort, the arithmetic mean reached (5.63) and standard deviation (0.63), and the calculated T value reached (9.21), which is greater than the tabulated T value (3.19). This means that the difference is significant and in favor of the post-test.

The value of the arithmetic mean of white blood cells before the effort was (3.10) and with a standard deviation of (0.20), and after the effort the arithmetic mean of the effort was (3.26) and a standard deviation of (3.26), and the calculated T value was (7, 23) It is greater than the tabular (t) value (3.19). This means that the difference is significant and in favor of the post-test.

The value of the arithmetic mean of platelets before the effort was (191) and with a standard deviation of (41). After the effort, the arithmetic mean was (206) and a standard deviation of (46). The calculated (t) value was (4.24), which is greater than the tabulated (t) value. (3, 19) This means that the difference is significant and in favor of the post-test.

The arithmetic mean value for hemoglobin before the effort was (72.6) and with a standard deviation of (7.6). After the effort, the arithmetic mean was (102) and a standard deviation of (11). The calculated T value was (15.6), which is greater than the T value.) Tabular (3, 19). This means that the difference is significant and in favor of the post-test

The value of the arithmetic mean for the vertical jump from stability was the aerobic effort before the effort (2.11) and with a standard deviation of (18.10). After the effort, the arithmetic mean was the effort (2.25) and a standard deviation of (11.21), and the calculated value of (T) was (15.06) is greater than the tabulated value (3.19). This means that the difference is significant and in favor of the posttest.

The value of the arithmetic mean for running 1500 m of the antenna before the effort was (4.38) and with a standard deviation of (0.38). After the effort, the arithmetic mean was the effort (4.11) and a standard deviation of (0.21), and the calculated value of (T) was (9, 41) It is greater than the tabular (t) value (3.19). This means that the difference is significant and in favor of the posttest.

The arithmetic mean value for completing a 400-meter run before the effort was (51.21) and a standard deviation of (0.14). After the effort, the arithmetic mean was (50.06) and a standard deviation of (0.14), and the calculated T value was (2.14). It is greater than the tabulated (t) value (3.19), which means that the difference is significant and in favor of the post-test.

Table 5: Shows the arithmetic mean, standard deviation, and T-value calculated for the blood variables before and after the effort for the experimental and control group for the variables under study

Variables	Experimental		Control		T value calculated	Tabular (T) value	Type sig
	Mean	Std. Deviations	Mean	Std. Deviations			
Red blood cells	6, 63	0, 63	5, 63	0, 63	9, 21	3, 19	Sig
White blood cells	3, 27	3, 27	3, 26	3, 26	7, 23	3, 19	Sig
Platelets	207	47	206	46	4, 24	3, 19	Sig
Hemoglobin	102	12	101	11	15, 6	3, 19	Sig
Vertical jump from a standstill	2, 48	11, 19	2, 25	11, 21	15, 06	3, 19	Sig
1500m running test	4, 11	11, 13	4, 11	0, 21	9, 41	3, 19	Sig
Achievement of running 400 metres	49, 05	0, 27	50, 06	0, 14	2, 14	3, 19	Sig

From Table (5), we see the following: There are significant differences between the post-tests between the experimental and control groups, in favor of the group that used anaerobic effort, as it reached the T values calculated before the effort. There were no significant differences in the post-tests between the two research groups, as the T values calculated were (9.21 - 7.23 - 4.24 - 15.6 - 15.06 - 9.41 - 2.14). And tabular (3, 19) with a significant level of significance and in favor of the pre-test.

Presentation, and analyze the results of recovery speed for anaerobic effort

Table 6: Shows the rate of recovery speed (for anaerobic effort)

Pulse rate Rest time	Pulse rate after direct effort	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
61,8	157,6	124,7	115	108	97	86	84	81	77	73	69

Table (6) shows the pulse rate at rest (61.8) p/min, immediately after exertion (157.6) p/min, at the end of the first minute (124.7) p/min, and at the end of the second minute (115) p/min. At the end of the third minute (108) p/min, at the end of the fourth minute (97) p/min, at the end of the fifth minute (86) p/min, at the end of the sixth minute (84) p/min, and at the end of the seventh minute (81) p/min, at the end of the eighth minute (77) p/min, at the end of the ninth minute (73) p/min, and at the end of the tenth minute (69) p/min.

Discussing the results of anaerobic effort

It is clear from Table (6) that the number of red blood cells increased in the results of the post-test, given that the value of

the results of the post-test is greater than the value of the results of the pre-test. The researchers attribute that the number of red blood cells increases when performing intense physical effort. Muslim states, "The increase in red blood cells increases after. Physical activity of high intensity and short duration" (6:98)

Abdel Fattah states, "The increase in the production of red blood cells by the bone marrow is due to a decrease in the amount of oxygen in the blood" (7: 121).

Likewise, an increase in the number of white blood cells appeared in the results of the post-test, given that the value of the results of the post-test is greater than the value of the results of the pre-test. The researchers attribute that the number of white blood cells increases when performing intense physical effort, and Al-Skar states "the increase in white blood cells attached to the wall of the blood vessels at the time of rest." It is pushed into the blood circulation during physical exertion" (8: 135).

The platelet count also appeared to increase in the results of the post-test, given that the value of the results of the post-test is greater than the value of the results of the pre-test. The researchers attribute that the number of platelets increases when performing physical effort.

The hemoglobin percentage also appeared higher in the results of the post-test, given that the value of the results of the post-test is greater than the value of the results of the pre-test. The researchers attribute that the body needs hemoglobin when a muscle contracts and relaxes, because it is the basic substance for transporting oxygen from the lungs to the cells of the working muscles. Salman mentions, quoting Jumah Muhammad Awad "The percentage of hemoglobin increases after strenuous exercise due to the participation of a large group of muscles in performing the exercise, and the participation of this large number of muscles requires a large amount of oxygen, which is necessary for the process of oxidation and the release of energy, and this need for this amount of oxygen requires a large amount of a substance." Hemoglobin is the only substance with the ability to combine with oxygen and carry it to the cells to continue the process of oxidation and release energy (9:113).

From a physical and functional perspective, training aims to bring players to physiological physical fitness based on knowledge of the various functions of the body and taking them into consideration when planning training operations. As for the achievement variable, the post-test differences showed differences in the achievement of the sample members within the research requirements for the physiological variables that directly affected the achievement as a result of the development in the physiological and medical fields and the speed of respiration for the sample members.

Table 7: Shows the average recovery speed (for aerobic effort)

Pulse rate Rest time	Pulse rate after direct effort	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
51, 7	147, 4	114, 5	104	97, 1	86	75	73	66	61	58	61

Discussion of recovery speed for aerobic effort

It is clear from Table (7) that the player's pulse rate decreases after performing the physical effort at the end of the first minutes compared to the rate immediately after the effort, and the return of the player's internal organs to their normal state begins before the physical effort is performed. Salama states, "Oxygen consumption decreases rapidly during the first two or three minutes of the recovery process. It then slows down until it reaches a constant rate equal to resting levels. Accordingly, the first phase of it is known as the rapid phase or the rapid phase, while the next phase is known as the rapid phase." The slow or slow stage, as previously mentioned" (10: 393)

As the players' pulse reached (86) p/min in the fourth minute and in the tenth minute to (61) p/min, which means it reached a normal state. The recovery stage is the return of the heartbeat to normal after performing an effort in a short period. At this stage, oxygen is available that reaches the working muscles, which works to remove lactic acid. After that, the pulse rate begins to decline, and this helps the player restore his capabilities and functional abilities to perform the next effort, especially in the requirement of the sample members and the speed of recovery.

Conclusions and Recommendations

Conclusions

- Anaerobic exercise showed an effective effect on blood variables (red blood cells, white blood cells, platelets, and hemoglobin), in favor of the post-test and the completion of the 400m run.
- Aerobic effort appeared effective and influential in the blood variables under study and in favor of the post-test and achievement among sample members, but less than the requirements of anaerobic physical effort.

Recommendations

- Trainers must conduct follow-up tests of blood variables continuously and for different periods of time and pay attention to them, because they affect the chemistry of energy, both energy within the requirements of anaerobic and aerobic capacity.
- Conduct other studies on blood variables using different intensities and different distances.
- Use appropriate exercises to develop the work of the athlete's functional systems.
- It is necessary for trainers and specialists to take into account the state of recovery and the values of its return to its normal state after performing the physical effort.

References

1. Ibrahim Salem Al-Skar and others: Encyclopedia of the Physiology of Track Competitions, 1st edition, Caerobico, Al-Kitab Center for Publishing; c1998.
2. Enas Yassin Obaid. The effect of aerobic and anaerobic training at two different altitudes above sea level on some physical abilities and functional variables among elite 1500 m runners, Master's thesis, University of Baghdad; c2008.
3. Bashar Banwan Hassan, Ihab Tariq Hilal. Rehabilitation Exercises and a Designed Device (Laser Balance) and their Effects on (Muscle Strength, Range of Motion, and Motor Balance) for Football Players after ACL Surgery. Wasit Journal of Sports Sciences. 2023;16(3):10-34.
4. Hazza bin Muhammad Hazza. The Physiology of Physical Effort, Theoretical Foundations and Scientific Tests for Physiological Measurements, Part 1, Kingdom of Saudi Arabia, Scientific Publishing and Press, King Saud University; c2010.
5. Bahaa El-Din Ibrahim Salama. Biochemical

Characteristics of Sports Physiology, 1st edition, Caerobico, Dar Al-Fikr Al-Arabi; c2008.
6. Sari Ahmed, Norma Abdel Razzaq. Physical Fitness and Health, 1st edition, Jordan, Wael Publishing House; c2001.
7. Rushdi Fattouh Abdel Fattah. General Fundamentals of Physiology, 2nd edition, Kuwait, That Al Salasil Printing and Publishing, 219.
8. Raysan Khouribet Majeed. Biochemical and physiological analysis in sports training, Basra, Dar Al-Hekma Press; c1991.
9. Muhammad Sobhi Hassanein. Measurement and Evaluation in Physical Education and Sports, 3rd edition, Part 1, Caerobico, Dar Al-Fikr Al-Arabi; c1995.
10. Muhammad Subhi Hassanein, Hamdi Abdel Moneim. Scientific foundations of volleyball and methods of measurement, 2nd edition, Al-Kitab Center for Publishing; c1997.
11. Muwaffaq Asaad Mahmoud Al-Hiti. Sports training lectures delivered to master's students, College of Physical Education, Anbar University; c2012.
12. Hassan BB. Sports injuries and modern rehabilitation techniques. Al-Mizan Press, Al-Najaf Al-Ashraf. ISBN: 978-9922-20-373-7.

Appendix (1)
Shows the experts

Name	Specialties	Affiliations
Prof. Dr. Rafi Hamdan Al-Kubaisi	Training Physiology	Al-Isra University College, Department of Physical Education and Sports Sciences
Prof. Dr. Ikhlas Hussein Dahham	Swimming Physiology	College of Physical Education and Sports Sciences - Al-Mustansiriya University
Assist. Prof. Dr. Wissam Sahib Hassan	Swimming Physiology	College of Physical Education and Sports Sciences - Al-Mustansiriya University

Appendix (2)
Shows Names of experts and specialists

Name	Specialties	Affiliations
Prof. Dr. Rafi Saleh Al-Kubaisi	Training Physiology	University of Baghdad, College of Physical Education
Prof. Dr. Salim Hassan Jalab	Sports Medicine	University of Baghdad, College of Physical Education
Assist. Prof. Dr. Muaad Ibrahim Salman	Training physiology	Al-Mustansiriya University, College of Basic Education, Department of Physical Education
Assist. Prof. Dr. Osama Ahmed Hussein	Training physiology	University of Baghdad, College of Physical Education

Names of laboratories for pathological analyses
1. Russell Laboratory for Pathological Analysis.
2. Ramadi Laboratory for Pathological Analysis.
3. Al-Rahma Medical Laboratory.
4. Muhammad Awad Jameel, chemist, Ramadi General Hospital.

Appendix (3)
Assistant work team
1. Abbas Fadel Jamil / Bachelor of Science - Biology Department - Russell Medical Laboratory.
2. Ibrahim Khalil Hamad / Bachelor of Science - Biology Department - Al-Rahma Medical Laboratory.
3. Omar Sabah Jameel / Master's in Physical Education - Physiology Training
4. Hamza Mahmoud Merhej / Master's in Physical Education - Learning to fly.
5. Muhammad Obaid Jameel / Master's in Physical Education - Sports Medicine.
6. Ismail Omar Hindi / Master's in Physical Education - Volleyball Training.
7. Ammar Hamdi Abdel Rahman / Bachelor's degree - Management and Economics