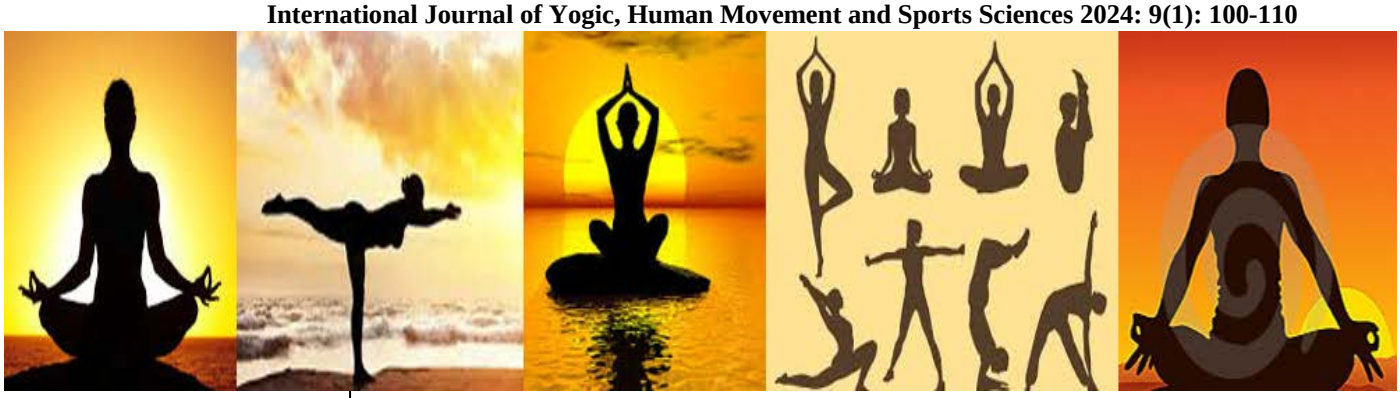
International Journal of Yogic, Human Movement and Sports Sciences 2024: 9(1): 100-110



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2024; 9(1): 100-110

www.theyogicjournal.com
Received: 03-12-2023
Accepted: 07-01-2024

Dr. Ali Bukheet Hassan
Assistant Professor, University of Kufa, Faculty of Physical Education and Sports Sciences, Najaf, Iraq

Ali Dawood Abdul Reda
Assistant Lecturer, University of Kufa, Faculty of Pharmacy, Najaf, University of Kufa, Iraq

Dr. Mayasa Abd Ali Kadhim
Assistant Professor, University of Kufa, Faculty of Physical Education and Sports Sciences, Najaf, Iraq

Corresponding Author:
Dr. Ali Bukheet Hassan
Assistant Professor, University of Kufa, Faculty of Physical Education and Sports Sciences, Najaf, Iraq

The effect of explosive exercises and water exercises on different surfaces on some physiological indicators, abilities and physical indicators of 100 m runners under 20 years of age

Dr. Ali Bukheet Hassan, Ali Dawood Abdul Reda and Dr. Mayasa Abd Ali Kadhim

Abstract
The purpose of this paper is to preparing water exercises on different surfaces and explosive exercises to develop some of the physical abilities and physiological indicators of 100 m runners under 20 years of age and identifying the effect of water exercises on different surfaces and explosive exercises on some of the physical abilities and physiological indicators of 100 m runners under 20 years of age and knowing the difference in the effect. Between the training program based on water exercises and explosive exercises, the research was conducted in the period from (1/7/2022 to 1/4/2023) and on a sample of runners from Najaf Governorate under 20 years old. The number of the sample reached (10) runners and they were divided into two groups. Two equal experiments, one representing explosive exercises and the other aquatic exercises. Each group (5) runners was formed after conducting the homogeneity and equivalence processes. The appropriate tests specified by the researcher were also chosen, taking into account the opinions of experts and specialists, while conducting the exploratory experiment on a group of players from outside the basic research sample, with the use of tools and the means to assist in the research. Pre-tests were conducted on the two experimental groups, and then the method prepared by the researcher was applied: explosive exercises and water exercises for both experimental groups, which amounted to (8) weeks (24) units, each week three units, and the time of one unit was (90) minutes, after which the Posttests for both groups. Then, the research results were processed using the statistical package (SPSS). The researcher came up with specific and important conclusions, the most important of which was that there was an improvement in all the physiological indicators investigated (vo2max, disability, oxygen debt, and heart rate) for the 100 m runners (under 20 years old) for the first and second experimental groups that used explosive exercises. There is also an improvement in all the physical variables investigated and the achievement (100 m) for 100 m runners (under 20 years old). For the first and second experimental groups, and in light of these conclusions, the researcher recommended the necessity of trainers adopting 100-meter runner training in explosive exercises, even if only in some parts of the training curricula. It is necessary for trainers to pay attention to physiological indicators, as they are indicators of the adaptation of the functional systems in the body and their influence in revealing the training situation, especially the indicators studied. Emphasizing on coaches and those in charge of the training process the necessity of conducting tests for the physiological indicators related to the effectiveness or game before preparing any training curriculum and not relying on physical tests only.

Keywords: Water exercises, runners, SPSS

Introduction
Scientists and researchers always strive to obtain new things in science and all fields and develop them through research and investigation of facts that help advance scientific progress in all its fields, including sports and other related sciences. Being workers in the sports community, we must make efforts to reach the best levels by conducting studies. Field and laboratory research that leads to directing training in a correct scientific direction leads to good results and high ability to achieve without harming the athlete's health. On the contrary, it aims to raise the athlete's health level and identify the obstacles that may arise during training (Murab, 1985) [1].

Sports training, as it is known, is a science in itself, and researchers seek to discover the reasons and justifications that help the coach develop the athlete's ability by providing the correct scientific foundations. Sports training, from the physiological point of view, is "a group of exercises or directed physical efforts that lead to adaptation or change." Functional in the body's internal systems and organs to achieve a high level of athletic achievement" (Al-Basati, 1998) [2].

Athletics is one of the sports that occupies a prominent and important position in the programs of the Olympic Games, as it has become practiced in various countries of the world due to the educational and pedagogical goals it achieves, as well as improving physical efficiency, and thus contributes to improving performance in various sporting events, and on this basis it is considered A measure of the progress and advancement of nations. Coaches use the correct method of training in all sporting events, and among these activities is short-distance running, which has an important impact on the internal functional changes of the runner and raises the level of his efficiency, whether physically, functionally or physiologically. It is one of the most important athletics events that has witnessed great development. Likewise, measuring some indicators Physiological factors that occur in the body as a result of practicing these activities and the extent of physiological adaptation that occurs for the 100 m race. The advanced level that occurs in the world, especially in athletics and breaking records, has become one of the characteristics of this era. Therefore, the researcher decided to choose a method aimed at developing the physical elements and indicators. Physiological training in an integrated manner, by choosing explosive exercises that lead to developing the athlete's level

The importance of the research lies in explosive exercises and water exercises, which are one of the training systems through which the researcher seeks to develop the digital achievement effectively in the 100 m under 20 level and identify the most important obstacles that prevent players from progressing and preparing the best training programs for them to overcome the difficulties they face in achieving the achievement. This is through the development of physical abilities and physiological indicators coaches use the correct method of training in all sporting events.

Research problem

The requirements for the 100 m event are characterized by high components of physical abilities. Therefore, trainers are required to place selected exercises that develop physical and motor qualities and abilities within the training program in a way that is proportional to the contribution of each of these qualities and abilities to performance requirements.

The researcher decided to develop the level of the players by using water exercises and new explosive training exercises. It also became clear to the researcher that most of the local coaches do not pay attention to the physiological and functional indicators of the competition, but rather their focus is more focused on other aspects. Therefore, the researcher decided to study this problem and develop appropriate solutions to it through exercises. Water and explosive exercises to develop some physiological indicators and some physical abilities among 100-meter runners under 20 years of age.

Research objective

- Preparing water exercises on different surfaces and explosive exercises to develop some of the physical abilities and physiological indicators of 100 m runners under 20 years of age.
- Identifying the effect of water exercises on different surfaces and explosive exercises on some physical abilities and physiological indicators among 100 m runners under 20 years of age.
- Knowing the difference in effect between a training program based on water exercises and explosive exercises.

Research hypotheses

- The training program based on explosive exercises has a positive effect in improving the achievement of 100 m event runners under 20 years of age.
- The training program based on water exercises has a positive effect in improving the achievement of 100 m event runners under 20 years of age.
- There is a difference in the effect between the training program based on explosive exercises and the training program based on water exercises.

Research fields

- **Human field:** (100) runners under 20 years old in sports clubs in Najaf Governorate.
- **Time field:** (1/7/2022) to (1/4/2023)
- **Spatial field:** Najaf Sports Club Stadium / Najaf Governorate.

Research methodology and field procedures

Research Methodology

In solving its problems, all scientific research resorts to choosing a method that is compatible with the nature of the problem, and the method "is the method or method that the researcher follows in his research or study of his problem and arriving at solutions to it" (Al-Issawi, Al-Issawi. 2001) [3], so the researcher used the experimental method (and with the design of two equal groups), as The experimental method "represents the most honest approach to solving many scientific problems in a practical and theoretical manner" (Allawi, and Rateb, 1999) [4]. Table (1) shows the experimental design of the research.

Table 1: Shows the design of the work of the two research groups (the first experimental and the second experimental)

Groups	Pre-test	Training program	Post-test
First experimental	▪ Tests for physiological indicators ▪ Physical tests ▪ Completion test	The training program is according to the percentage of contribution of explosive exercises	Achievement in all research variables
Second experimental	The same tests were applied to the first experimental group	The training program is according to the percentage of contribution of water exercises	Achievement in all research variables

Community and sample research

The research community was limited to runners under (20) years of age for the 100 m running competition in the clubs of Najaf Governorate, and they numbered (14) players. A sample

of (10) players was selected, and (4) players were excluded for non-compliance. They were randomly distributed into two groups, a first experimental group that trained according to explosive exercises, and a second experimental group that trained according to water exercises, with (5) players for each group.

Homogeneity and equivalence

Sample homogeneity: In order to avoid overlapping influences that may affect the results of the research due to the individual differences existing among the players and to reach a single level for the sample, some variables that represent the characteristics of the sample have been identified for the purpose of ensuring their homogeneity in those variables that are considered influential in the experiment and which must be controlled, which are (Chronological age, Length, mass, training age) and Table (2) shows this

Table 2: Shows the Sample homogeneity

Variables	Measuring unit	Mean	Median	Std. Deviations	Skewness	Result
Length	Cm	168,75	169	3,768	0,521	Homogeneity
Mass	Kg	66,187	65,5	3,673	0,917	Homogeneity
Chronological age	Year	18	18	0,730	0	Homogeneity
Training age	Year	3,062	3	0,521	0,112	Homogeneity

It appears from Table (2) that the values of the skewness coefficient are limited to (±1), which indicates homogeneity Individualizing the sample in the above variables.

Equivalence of the two research groups

In order for the researcher to be able to attribute the differences that occur in the results of the post-tests for the variables under study to the effect of the experimental factor, the researcher resorted to verifying the equality of the two groups by using the t-test for independent samples, as shown in Table (3).

Table 3: Shows the equivalence of the two research groups

Variables	Measuring unit	First experimental group		The second experimental group		T value calculated	Level Sig	Type of significance
		Pretest		Pretest				
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
VO2 MAX	L/min	36.38	5.52	35.39	4.78	0,174	0,864	Non sig
Oxygen deficiency	L/min	.85*0*	0.33	0.90	0.30	0,308	0,763	Non sig
Oxygen debt	L/min	33,62	5.54	32.44	4.78	0,464	0,650	Non sig
Heart rate after exertion	p/m	182.75	7.57	183,25	6,30	0,144	0,888	Non sig
Graduation in speed for the first 30 m	m/s	4.24	.03	4.23	.01	0.909	0.379	Non sig
maximum speed (60-30)m30m second	m/s	3.11	0.05	3.13	0.19	.244	.831	Non sig
The time of the previous stages is 60 m	m/s	7.35	0.06	7.36	0.085	0.47	6.66	Non sig
Endurance speed (100-60) m, the last 40 m	m/s	4.39	0.05	4.38	0.05	2.191	0.60	Non sig
Achievement 100 m	m/s	11.74	0.11	11.74	0.15	0.994	0.394	Non sig

Through Table (3), it becomes clear to us that the value of the test significance level (sig) is greater than the significance level (0.05), and for all variables under study, therefore, the test significance is not significant.

Field research procedures

Determine search variables

After reviewing many scientific sources, the research variables were identified and presented to some experts and specialists. They were agreed upon in a way that was compatible with the research problem, and were as follows:

1. Physiological variables: These include the following

A. Maximum oxygen consumption (VO2 MAX)
B. Oxygen deficiency
C. Measurement of oxygen debt.
D. Heart rate after physical exertion.

2. Physical abilities variables

A. Gradation in speed
B. Maximum speed
C. Speed tolerance
D. The explosive ability of the legs

Description of the measurements and tests used in the research

Description of measurements of physiological indicators

- Maximum oxygen consumption (VO2 MAX)
- Measurement of oxygen debt.
- Oxygen deficiency.
- Pulse after effort.

First: Measure (maximum oxygen consumption, oxygen debt, oxygen deficit, pulse after exertion)

The variables were measured accurately, through two devices (Fitmate Pro) and an exercise bike (MONARK), as the player performs the (Wingate) test on the bike, after placing the mask to measure (VO2max) on the player's face after completing the entry of the required data into The device, as well as the program for the exercise bike (MONARK), and after completing all requirements for the devices to operate, the test begins and the work is carried out according to the conditions of the (Wingate) test. After completing the test, data on the maximum oxygen consumption rate (VO2max) and the pulse rate after the effort are recorded.

The deficit and oxygen debt were measured through the following

The required resistance is extracted through Table (4) and according to body weight (Al-Hazza, 2008) [5].

Table 4: Shows the amount of oxygen consumption during physical exertion using an exercise bike at different abilities

Bike resistance (kg)	Oxygen consumption (L/min) oxygen required
0.5	0.6
1	0.9
1.5	1.2
2	1.5
2.5	1.8
3	2.1
3.5	2.4
4	2.8
4.5	3.1
5	3.5
5.5	3.8
6	4.2
6.5	4.6
7	5

Description of the physical tests used in the research

The first test: running (30) meters from a high start (Al-Dulaimi, 2016) [6]

- **Purpose of the test:** to measure acceleration speed.
- **Description of performance:** The tester stands behind the line (running from a high start) and upon hearing the start signal, he runs at full speed until the 30 m line. The time is calculated from the time the laboratory begins to move until it reaches the 30 m line.
- **Tools and devices used in measurement:** A legal 100-meter running field, a stopwatch, and a whistle.
- **Recording:** The recorder records the time taken by the tested runner on his form in seconds, to the nearest (0.01) of a second.

The second test: Runner (30) m from the flying start (Al-Dulaimi, 2016) [6]

- **Purpose of the test:** Measuring maximum speed.
- **Description of performance:** The tester stands behind the first line. When he hears the start signal, he runs until he crosses the third line. The tester's time is calculated starting from the line monitor's signal at the moment the tester reaches the second line until he reaches the third line.
- **Tools and devices used in measurement:** A stopwatch, and three parallel lines drawn on the ground. The distance between the first and second line is (10) m and the second and third line is (30) m.
- **Recording:** The recorder records the time taken by the tested runner on his form in seconds, to the nearest (0.01) of a second.

The third test: Runner (80) meters from the flying start (Al-Dulaimi, 2016) [6]

- **Purpose of the test:** To measure speed endurance.
- **Description of performance:** The tester stands behind the first line (running from the high start) and upon hearing the start signal, he runs at full speed until he crosses the third line. The time is calculated for a distance of (80) meters from the second line monitor's signal until the player reaches the third line.
- **Tools and devices used in measurement:** A legal running field of 100 m, a stopwatch, a whistle, and three parallel lines drawn on the ground. The distance between the first and second line is 10 m and the second and third line is 80 m.
- **Recording:** The recorder records the time taken by the tested runner on his form in seconds, to the nearest (0.01) of a second.

Fourth test: standing long jump (1)

- **Purpose of the test:** To measure the explosive ability of the legs.
- **Description of the performance:** The tester stands behind the rise line with his feet slightly apart and his arms high. After that, the arms are swung forward, down and behind, with the knees bent in half and the torso tilted slightly forward. After the position, swing the arms forward forcefully, extending the legs along the torso and pushing the ground with the feet forcefully in an attempt to jump forward as far as possible.
- **Tools and devices used for measuring:** Chalk, measuring tape, and soft earth (Jafra).
- **Recording:** The distance it jumps is recorded for the laboratory, starting from the inner edge of the ascension line until the last trace of the laboratory close to the ascension line.
- **Note:** The feet are raised together. They are also landed together, and each laboratory has two attempts, the best of which is recorded.

Exploratory experience

First exploratory experience

The first exploratory experiment was conducted on Thursday, March 12, 2023, at four in the afternoon, at the Najaf International Stadium track, on a sample of (2) players from the research community. The goal of this experiment was the following:

1. Ensure that the playground and tools used are valid and suitable for tests.
2. Measuring the time of physical tests.
3. Knowing the extent of the research sample's response to physical tests.
4. Practical training for the researcher and the assistant work team, to identify the negatives and positives that accompany the application of tests in terms of requirements and method of work.
5. Determine the maximum time for each exercise used in the training units (stress)
6. Knowing the field difficulties that the researcher may face during the application of exercises in the training units
7. Knowing the time required to apply the vocabulary of prepared exercises.

Second exploratory experiment

The researcher conducted the second exploratory experiment on Tuesday, 17/3/2022, at four in the afternoon, in the physiological laboratory of the College of Physical Education and Sports Sciences / University of Kufa, on a sample of (2) players from the research community, and the goal of this experiment was the following:

- Practical training for the physiology laboratory staff in order to optimally use physiological devices in order to facilitate the process of testing the player in order to obtain physiological variables.
- Identify the time it takes the player to undergo physiological tests.

Scientific foundations of tests

Validity of the test: Validity is one of the most important conditions for a good test and one of the most important basic

concepts in the field of tests and measurement. A valid test is one that succeeds in measuring what it was designed for (39). The researcher used content validity by presenting the tests. Experts and specialists in the field of training, testing and measurement, and in this way the researcher achieves the validity of his tests in measuring the purpose in question.

Reliability of the test: Reliability of the test means "the extent of the accuracy of the test in measurement and the consistency of its results when applied multiple times to the same individuals" (Al-Dulaimi, 2016) [6] (40), and for the purpose of extracting the reliability coefficient, the researcher used the test and retest method, and then extracted the coefficient values. Pearson correlation between the results of the first and second tests after (5 days) as shown in table (5).

Objectivity of the test: Objectivity is defined as "describing the capabilities of the laboratory as they actually exist, not as we want them to be" (Al-Yasiri, and Majeed, 2003) [7] (41). For the purpose of identifying the objectivity of the tests, the researcher used the arbitrators' scores for the test scores during the retest, as a coefficient was used. Pearson correlation between the scores of the first judgment and the second judgment. All tests showed high objectivity, as shown in Table (5).

Table 5: Shows the scientific foundations of the tests (reliability coefficient, objectivity coefficient) for the physical tests used in the research.

No	Tests	Reliability coefficient	Objectivity coefficient	Type of significance
1	Graduation in speed	0,860	0.994	Sig
2	Maximum speed	0.82	0.774	Sig
3	Endurance speed	0.681	0.789	Sig
4	The explosive ability of the legs	0.772	0.699	Sig

Main search procedures

Pre-tests

The researcher conducted pre-tests on the research community for the two groups (the first experimental group, the second experimental group) regarding the study variables (physiological variables and physical variables) on two days (and Sunday and Monday) corresponding to 4-6/2/2022, at four in the afternoon at the Najaf International Stadium track., and the Physiology Laboratory at the College of Physical Education and Sports Sciences / University of Kufa, and the tests were according to the following sequence: -

- **The first day:** Physical tests were applied (graduation in speed, maximum speed, speed endurance, and explosive ability of the legs)
- **The second day:** VO2max and Wingate tests on the Fitmate Pro and the MONARK exercise bike to extract physiological variables.

Implementing the components of the training program

The researcher presented it to the experts, and it was revised and produced in its final form.

Table 6: Shows the general framework of the training program

Training unit time	Number of weekly training units	Total number of training units	Duration of the training program
(90) minutes	(3)units	(24) units	(8) weeks

Table 7: Shows a model Division of the training unit

T	Parts of the training unit	The goal	Content	Time	
1	Preparatory work	General warm-up	Jogging - general exercises	(5) minutes	
		Special warm-up	Acceleration exercises	(15-20) minutes	
2	Main	Developing physical qualities and abilities	Leg flexibility exercises	3 minutes	(60) minutes
			Explosive power exercises for the legs	10 minutes	
			Speed progression exercises	9.5 minutes	
			Maximum speed exercises	10 minutes	
			Speed strength exercises for the arms	8 minutes	
			Speed endurance exercises	10.5 minutes	
			Strength exercises characterized by speed for the legs	9 minutes	
3	Final	Returning the body to its normal state	Calming and relaxation exercises	(5-10) minutes	
٦				(90) minutes	

Post-tests: The researcher conducted the post-tests as follows:

After completing the implementation of the various exercises according to the energy production systems, post-tests were conducted on the research groups (the first experimental and the second experimental), and this was on (Tuesday and Wednesday) corresponding to (10-9/6/2022), as the researcher took into account the same conditions that Pre-tests were conducted in terms of the sequence of tests.

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

Results and Discussion

Presentation and discussion of the results of the pre- and post-tests for the two experimental groups for the variables under research

Presentation of the results of the pre- and post-tests for the first experimental group (water exercise training group) for physiological indicators

Table 8: Shows the arithmetic means, standard deviations, T-value calculated for the correlated samples, the test significance level, and the significance of the difference for the pre- and post-tests of the (second experimental) group for the physiological variables

Variables	Measuring unit	First experimental group Pre-test		First experimental group Post-test		T value calculated	Level Sig	Type of significance
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Vo2 max	L/min	36.38	5.52	39.39	4.78	18.34	0.000	significance
Oxygen deficiency	L/min	0.85	0.33	29. 0	26. 0	8.41	0.003	significance
Oxygen debt	L/min	33.62	5.54	38.50	5.24	2.48	0.042	significance
Heart rate	P/m	182.75	7.57	177.50	7.39	16.75	0.000	significance

Presentation of the results of the pre- and post-tests for the first experimental group (explosive exercise group) for physiological variables

Table 9: Shows the arithmetic means, standard deviations, T-value calculated for the correlated samples, the test significance level, and the significance of the difference for the pre- and post-tests of the (second experimental) group for the physiological variables**.**

Variables	Measuring unit	Second experimental group Pre-test		Second experimental group Post-test		T value Calculated	Level sig	Type of significance
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Vo2 max	L/min	35.92	4,78	43.43	4.16	4.54	0.003	Significance
Oxygen deficiency	L/min	0.90	0.30	0.25	0.21	6.18	0.000	Significance
Oxygen debt	L/min	32.44	4.78	40.80	4.16	4.95	0.002	Significance
Heart rate	P/m	183.25	6.30	171.50	6.42	5.27	0.003	Significance

Discussing the results of the pre- and post-tests for the two experimental groups for physiological variables

The results presented in Tables (8) and (9) for the tests (oxygen deficiency and oxygen debt) showed that there were significant differences between the pre -and post-tests for the two experimental groups (the first explosive exercise training group, the second aquatic exercise training group) and in favor of the post-tests, and the researcher attributes The reason for the significant difference for the members of the first group (the explosive exercises training group) is due to the training methods and methods that were used and applied to the members of the first group. so Repetitions and continuation of sports training lead to functional adaptations, and this is what helped the members of the first group (the explosive exercise training group) to develop, which indicates that the effect of the training approach based on the use of exercises on different surfaces, which led To develop the physiological variables) oxygen deficiency, oxygen debt) among members of the first experimental group ,and the researcher believes that the nature of the training curriculum using explosive exercises The various training methods it contains are organized in a way that determines the level of the ideal relationship between the components of the load (volume, intensity, restand) in a manner that is commensurate with the goals set for the training units, as well as the comprehensiveness and integration of the training curriculum and its interest in various aspects of preparation. " The mutual and interconnected relationship between physical and physiological variables and (Xesis, 2011) [8] other complex characteristics remains based on integration in the content of physical training in the training curriculum (42), especially since the exercises used in the curriculum were consistent with the capabilities of players in this age group." This is in addition to the opinions and suggestions .Modern training has proven that the use of explosive exercises in training can lead, from a physiological standpoint, to a full effect on the organic systems, which develops the athlete's ability at the level of physiological variables (oxygen deficiency, oxygen debt), which calls for the necessity of multiple training methods and the resulting effect. Multidimensionality in functional device (Dick, 2000) [9].

As for the difference obtained for the members of the first experimental group (explosive exercises) for the variables (oxygen deficiency, oxygen debt), the researcher attributes it to his use of various exercises in explosive exercises, including various anaerobic exercises (high-intensity exercises and aerobic exercises). Weight training and other exercises (Abdel Fattah, 2001) [10] prepared by the researcher and applied to members of the second experimental group, as they were codified according to scientific foundations appropriate to muscular work, as the training units prepared by the researcher helped improve the physical and physiological ability of the players, as noted, and this resulted from his use of the exercises. Anaerobic exercise, which is characterized by high intensity and leads to a deficiency in the oxygen needed to produce energy. This phenomenon is called oxygen deficiency, and the reason is the result of extreme and semi- extreme physical loads that were practiced repeatedly . That is, the oxygen deficiency expresses the oxygen that the muscles need and is not available during the first seconds of exercise. Exercise: The individual athlete can compensate for this deficiency during the remainder of the exercise or competition, if the intensity of the work used is low, and to provide for this deficit, the body can provide it within a short period of time and supply more oxygen that the muscles need to supply the energy required for the work it is doing, and that Training on a continuous and regular basis causes development and functional adaptations to the circulatory and respiratory system, and this leads to filling this deficit. confirmed, stating that "organized training leads to functional changes in the body's systems, including the heart and circulatory system. Well-trained individuals can Adapting to the functional changes that occur in the body's systems as a result of muscular effort and continuing with this effort (Abdel Fattah, 2001) [10].

The researcher believes that anaerobic training (with a lack of oxygen) is for a certain period of time, that is, the external oxygen that the body obtains through breathing does not enter into the energy production process because it needs many chemical reactions in order to release energy, while anaerobic

effort requires speed in releasing energy, which is Which leads to a process of borrowing oxygen to fill the resulting shortfall (oxygen deficit). The process of compensating for this deficit comes through the presence of sufficient rest periods for hospitalization to compensate for this deficit. Believe that the increase in oxygen consumption during the hospitalization period occurs to respond to Oxygen that is borrowed from the body during the performance of physical activity. Oxygen debt is a term given to the amount of oxygen that the athlete consumes during the recovery period during the race and during the low rate of the race or after the end of the race, so that the oxygen consumed exceeds the oxygen required for motor performance, so the percentage of excess oxygen is used. In filling the oxygen deficit that the player has become guilty of during the match, it is equivalent to the volume of anaerobic energy that was expended ,and this oxygen volume is usually calculated by the amount of oxygen in excess of normal use, and this is what confirmed in "The oxygen debt is the amount that the respiratory system is able to provide during Effort can therefore be calculated after physical effort through the limit between the amount of oxygen consumed after effort and reaching normal consumption during rest" (Jassim, and Muslim, 2010) [11].

From this, the researcher concludes that the various exercises in training, water exercises prepared by the researcher, which focused on working with the anaerobic system phosphate, Lactic acid helped the individuals in the second experimental group to develop the variables (deficit and oxygen debt) because it caused functional adaptations to the circulatory-respiratory system and thus led to a decrease in the percentages shown in the tables above.

The results presented in Tables (8) and (9) for heart rate after physical effort also showed that there were significant differences between the pre- and post-tests for the two experimental groups (the first explosive exercises training group, the second aquatic exercises training group) and in favor of the post-tests .The researcher attributes that The reason for the significant difference for the members of the first experimental group is due to the physical exercises that were used in the training curriculum, as they had clear effectiveness through regularity in the training units, which in turn led to changes in the body's functional systems, especially the heart and circulatory system, and this is consistent with what he indicated. That "regularity in sports training brings about functional changes in all functions of the human body, especially the functions of the heart and circulatory system. Well- trained people can adapt to the functional changes that occur in the body's systems as a result of muscular effort and continue to exercise." (Abdullah, 2000) [12] Performing this effort, one of these changes is an increase in the number of heartbeats The researcher also believes "that water exercise training has a significant impact on heart health, especially on heart rate, and through this variable we can infer the amount of development that the training has brought about, and this is what it says". (Sprit *et al*., 2015) [13] Aquatic exercise training can lead to significant and positive changes in some cardiovascular parameters. These include a better ability to carry oxygen, a lower heart rate, and lower systolic blood pressure

As for the difference obtained for the members of the second experimental group (water exercises) in the variable (heart rate after exertion), the researcher attributes it to the use of the various water exercises training curriculum that was prepared and applied to the members of the experimental group ,and this is because the athlete was exposed to effort (aerobic and anaerobic), as Fox & Mathews believe that" the type of physical effort is considered the most important factor that affects the heart rate, as an increase in the pulse during effort is a natural reaction to the effort exerted to meet the body's need for energy, which the heart and blood circulation work to provide by increasing Heart rate or stroke volume confirms, "What happens during physical effort is an increase in the heart rate, and this increase results from the increased demand for oxygen and energy sources ,which are transmitted through the blood to the muscle cells to produce energy, as the heart rate reaches during oxygen physical effort." (Al-Kaabi, 2007) [14]. To less than 170 beats per minute. While the heart rate reaches during deoxygenated physical exertion to more than 180 strokes per minute Presentation of the results of the pre- and post-tests for the first group (explosive exercises group) for physical variables and achievement.

Table 10: Shows the arithmetic means, standard deviations, T-value calculated for correlated samples, the test significance level, and the significance of the difference between the pre- and post-tests for individuals in the first group for physical variables and achievement

Variables	Measuring unit	First experimental group Pre-test		First experimental group Post-test		T value Calculated	Level sig	Type sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Graduation in speed for the first 30 m	m/s	4.24	0.03	4.04	0.04	79.200	0.000	sig
Maximum speed (60-30) m 30 m second	m/s	3.12	0.01	3.05	0.007	15.65	0.000	sig
The time of the previous stages is 60 m	m/s	7.36	0.008	7.09	1.78	4.33	0.012	sig
Endurance speed (100-60) m the last 40 m	m/s	4.38	0.00	4.17	0.01	54,000	0.000	sig
Achievement 100 m	m/s	11.74	0.025	11.26	0.010	67.88	0.000	sig

Presentation of the results of the pre- and post-tests for the second group (water exercise group) for physical variables and achievement.

Table 11: Shows the arithmetic means, standard deviations, T-value calculated for correlated samples, the test significance level, and the significance of the difference between the pre- and post-tests for individuals in the second group for physical variables and achievement

Variables	Measuring unit	The second experimental group, pre-test		Second experimental group Post-test		T value Calculated	Level sig	Type of significance
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Graduation in speed for the first 30 m	m/s	4.23	0.008	4.16	0.01	7.18	0.002	Significance
Maximum speed (60-30) m 30 m second	m/s	3.13	0.01	3.11	0.01	2.82	0.04	Significance

The time of the previous stages is 60 m	m/s	7.36	0.01	7.27	0.01	14.23	0.000	Significance
Endurance speed (100-60) m the last 40 m	m/s	4.36	0.01	4.33	0.02	3.58	0.02	Significance
Achievement 100 m	m/s	11.72	0.01	11.60	0.01	18.97	0.000	Significance

From what was presented in Tables (10) and (11)) it is clear that there are significant differences between the pre- and post-tests of the physical abilities test) gradual speed in the first 30 m - maximum speed (60-30) 30 m - time of the previous stages 60 m - speed endurance) (100-60)m The last 40 m - completion is 100 m (and in favor of the post-tests for the two experimental groups (the first explosive exercises training group, the second aquatic exercises training group), and the researcher believes that the reason for the development of the first experimental group is due to the curriculum prepared by the researcher, which had a major role in developing and raising the level of Special endurance and the completion of a 100-meter run among members of the first experimental group (explosive exercise training group), as a number of exercises applied by the first group focused on special endurance. This test is one of the tests that indicates the development of achievement and specific performance, and the development that occurred in the training group using explosive exercises is due to the nature of the exercises that relied on developing the endurance for the event, and this is what the sources confirmed that "exercises that use exercises that help advance the endurance of the event." effectively and increase the individual's ability to perform motor performance second experimental group to the water exercises that were applied by the sample of the second group over a period of (8) weeks and in the amount of (3) training units, which made this difference, as the exercises were according to scientific foundations and with diverse and different environments, which keeps the player away from boredom. Which occurs due to the fixed environment in training ,and the water exercises contained (units for training Variety) which led to the development of special tolerance, which in turn It led to the development of the 100 m achievement, which in turn worked to prepare the players for better performance, which led to an increase in the ability to link physical performance to achievement. The nature of the training was explosive exercises prepared in a way that focused on strength and speed because the nature of the 100 m performance requires that quick start and finish of the race. Maintaining the level and rate of speed in the middle distance , which is done in several stages, namely starting at full speed, and this requires high-intensity training, then maintaining this speed, i.e. speed endurance, then special endurance, brings the athlete to a certain level of achievement, and this requires strength, speed, endurance, flexibility, agility, and all physical qualities and training. Water exercises provide these requirements, and water training means a training program designed for different activities and games in order to provide many variations to reduce the risk of injuries. It also means variation in practicing various other sports and activities that work to improve performance and achievement.

Presentation and discussion of the results of the tests (post - post) for the two experimental groups for the variables under research.

Presentation of the results of the tests (post - test) for the two experimental groups for physiological variables.

Table 12: It shows the value of (t) calculated for independent samples, the test significance level ,and the significance of the differences between the test results (post-test) for the two experimental groups for physiological variables

Variables	Measuring unit	First experimental group		Second experimental group		T value Calculated	Level sig	Type of significance
		Post test		Post test_				
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Vo2 max	L/min	43.5	4.01	39.47	5.01	2.22	0.020	significance
Oxygen deficiency	L/min	0.25	0.21	0.29	0.26	14.96	0.000	significance
Oxygen debt	L/min	40.80	4.16	38.50	5.24	5.44	0.000	significance
Heart rate	P/m	177.56	6.12	177.5	7.382	2.29	0.030	significance

Discussion of the results of the tests (post - test) for the two experimental groups for physiological variables

Through the results that appeared in Table (12), which indicate that there are significant differences between the two experimental groups) the explosive exercise group The first, and the second aquatic exercise group) in post-tests of physiological variables deficit and oxygen debt and in favor of the first experimental group Explosive exercises group, and the researcher attributes the reason for these differences To the explosive exercises that were applied by the first experimental group, which created adaptations to the body's functional systems due to their exposure to Maximum and sub- maximal physical loads. When performing high-intensity work that exceeds the anaerobic threshold, we see that the rate of oxygen consumption increases gradually until it reaches the stage of fatigue without a steady state in the rate of oxygen consumption. However, after stopping the performance of physical effort, we notice that the oxygen rate does not return to its normal form (before performing the physical effort), but rather requires a period of time that is longer or shorter according to the adaptive capabilities of the athlete's body systems ,and this is what the loads changed. Maximal and sub- maximal in explosive exercises .Therefore, the total volume of oxygen consumption during the recovery period from physical effort that exceeds the rate of consumption at rest (the difference between them) is called the oxygen debt, which represents the difference between the physical effort's need for oxygen .The body's ability to provide it and the decrease that occurs in the ability to provide oxygen at the beginning of physical effort is called oxygen deficit. As for the oxygen debt, it represents the rate of oxygen consumption after the end of the effort. Brauha believes that' increasing the possibilities for the effect of motor coordination and increasing the phenomenon of conditioning Capacities, their growth and better mobilization to take advantage of load, comfort and energy supply and improve functional standards (50)

The exercises prepared by the researcher according to physiological principles and cross-training helped in the stabilization phase when the rate of oxygen consumption equals the rate of its use by the working muscles, and thus we notice a decrease in the oxygen deficit little by little, and this is what we also notice in the second experimental group.

Abu Al-Ela states, "The efficiency of muscle work is linked

to the presence of a large percentage of oxygen in the muscles or its transfer from the lungs to the muscles involved in movement through aerobic and anaerobic interactions, and the percentage increases as the pulse rate increases, as the highest absolute consumption of oxygen appears in young people whose average age is 20- 25 years "(Abdel Fattah, 2001) [10].

Through what was presented and discussed in the results of the tables above, we arrive at the fact that any physical work characterized by a competition nature or a physical nature (general - private) aims to prepare and equip the players

For competition, it must overlap with the work of other sciences, and it must be based primarily on its connection with those sciences, whether from a physical and physiological perspective (method of performance and rationing of effort) or through reliance on (body mass), which plays a decisive role in choosing intensity and rationing, and this is completely linked. With the knowledge of (biomechanics) ,and pointed out that, "The training principles are built using the body mass and the weight added to it in order to develop and develop the working muscles in order to confront the additional resistances" (Karim, (2010) [16]. (All that was mentioned is necessary to be done within the appropriate training methods for the stresses set, and this is what the researcher worked on, as the focus was on the training to address the weaknesses and shortcomings in performance, as well as creating a diverse training environment so that the training at the same time is interesting, with a high load, and is influential, and this is what The researcher worked on it while codifying explosive exercises for the research sample.

The results presented in Table (12) for heart rate after physical effort also showed that there were significant differences in the post-tests between the two experimental groups (the explosive exercises training group, the aquatic exercises training group) and in favor of the first experimental group (the explosive exercises training group), and the researcher attributes The reason is the difference in training load variables. The experimental group was exposed to exercises of varying intensity, as well as a higher level of training stress than the second experimental group, because each training load was different from the other.

Presentation the results of the tests (post - test) for the two experimental groups for physical variables and achievement.

Table 13: Shows the value of (t) calculated for independent samples ,the test significance level ,and the significance of the differences between the test results (posttest) for the two experimental groups for physical variables.

Variables	Measuring unit	Second experimental group is a post-test		Second experimental group is a post -test		T value Calculated	Level sig	Type of significance
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
Graduation in speed for the first 30 m	m/s	4.04	0.007	4.16	0.02	10.51	0.000	significance
Maximum speed (60-30) m 30 m second	m/s	3.05	0.01	3.11	0.01	6,000	0.000	significance
The time of the previous stages is 60 m	m/s	7.09	0.010	7.27	0.016	21.51	0.000	significance
Endurance speed (100-60) m the last 40 m	m/s	4.33	0.020	4.33	0.022	0.000	1.000	non significance
Achievement 100 m	m/s	11.26	0.015	11.60	0.020	29.93	0.000	significance

Discussing the results of the tests (post - post) for the two experimental groups for physical variables and achievement

Through the results that appeared in Table (13), which indicate that there are significant differences between the two experimental groups explosive exercises training group, the second aquatic exercises training group and for both experimental groups in explosive abilities (Gradient in speed, reaction time - maximum speed - Speed endurance) and running 100 meters after using the two experimental methods.

The researcher attributes the reason for this development to the application of the vocabulary of the two training programs, which contained training loads based on scientific foundations of size, intensity, and rest commensurate with the capabilities of the research sample, as most experts and specialists in sports training point out that One of the most important elements of physical fitness that affects the level of achievement of a 100-meter run is special endurance, as this event requires a quick start and finish of the race and maintaining the level of speed in the middle of the distance., citing Barrow Sfeld, refers to endurance. Special, which is one of the most important physical characteristics that determine the level of achievement in the 100 m running event (Hassan, 2005) [17]. the researcher believes that the exercises used by the two groups, whether (explosive exercises training group The first, the training group, the second water exercises (although there is an advantage for the second experimental group), has brought about a significant development in the completion of the 100-meter runner, and this development is due to... To improve the level of personal endurance, and this is reflected in the development of the level of achievement in the 100 m runner. These changes occurred after the application of the two training curricula To improve your endurance, which showed a good level of performance in running (100 m) unless There is an advantage for the first group (explosive exercises training group), as it showed significant differences in abilities (graduation in speed, reaction time - maximum speed and achievement), but the interpretation of the results obtained by the first group is There are exercises that were used in the curriculum at a high level, which had a positive impact on the aforementioned characteristics, and this in turn led to the development of achievement. Accordingly, the physical effort that the athlete exerts in those exercises is anaerobic effort once and mixed effort the second time, and this is what requires the effectiveness of (100 m). The athlete must exert maximum physical effort while running while working against gravity in order to cover that distance in the shortest possible time. On the other hand, there is a connection between strength, speed, and endurance. Strength training leads to the development of speed endurance and speed endurance training leads to the development of speed endurance. Performance endurance, i.e. special endurance.

The researcher also believes that the development of physiological variables (among players) reflected positively on achievement and physical tests.

Explosive exercises its effect differs from water exercises, and thus the functional efficiency of the circulatory system for members of the first experimental group was better. Hussein indicated that "the high load during training achieves the

development of the functional efficiency of the athlete's circulatory system due to the importance of the vital role played by this system''. (Fox, *et al*, 2000) [18] The researcher attributes the presence of significant differences in favor of the first experimental group (explosive exercises) in the progression of speed due to the exercises designated for this stage that were carried out by the first experimental group, such as explosive power training with plyometric exercises in the deep jump, weighted jump, triple jump, and long jump from standing position. The necessary physical exercises can be prepared for each technical stage of the competition according to each mechanical indicator and its associated physical ability (Karim, 2010) [16].

Therefore, development exercises at this stage were devoted to developing the basic requirements in launching abilities and increasing speed, as (The ability to push a stationary body forward quickly requires attention to developing explosive ability to a large degree. A runner who lacks explosive ability is unable to run (30) meters). At maximum speed (Dintimam, BG. (1984) [19]. start exercises that are subject to the direct influence of the relationship between the starting support force and the reaction of the support, as the starting support force is according to the relationship (force For distances (30-20-10) m, " the ability to move from zero speed and gradually increase to it while overcoming the resulting resistance to reach the maximum possible speed, and this is clearly evident in the (100) m race, specifically immediately after the start " (Al-Lami, 2012) [20], and that these basic exercises in running are supportive of the previous exercises and fulfill their function in development, and that all the exercises that the first experimental group was assigned to in implementing the requirements of this stage have provided them with the elements of excellence in launching ability gradual speed. There are also significant differences in maximum speed in favor of the first experimental group, explosive exercises. The researcher also attributes the lack of differences in force endurance, as we see that there is no time difference in the force endurance phase between the two experimental groups. This is due to what the (speed endurance) phase imposes on Requirements that are affected by the time of completion, so we find varying levels of runners in the stage of gradation in speed in terms of the strength of starting from the starting supports and the gradation in speed in terms of time and distance. As for the speed endurance stage, its requirements are greater and its development is more difficult, as (training elements include maximum speed, speed endurance, strength, ability, flexibility, neuromuscular reactions, and mental preparation (Yargan, 2010) [21]. What proves this phenomenon is that the time difference is the smallest at the maximum speed stage. The runner (Bolt) in the World Championships) 2009, (which was previously mentioned when he set the world record of 9.58 seconds, had a time of 20 meters, the third of the distance. The race is (1.67) seconds. As for the eighth place runner (Button), who recorded) 10.34) seconds in this race, his time at the third (20)m was) 1.80) seconds, as it appears that the time difference between them is (20)m. It is 0.13 seconds, and this represents the smallest difference in time despite the large difference in completion time between them, which amounted to (0.76) seconds, and Table 14 shows that.

Table 14: Shows the 40-60m runner time at the 2009 World Championships

Runners	Bolt	Tyson	Powell	Thompson	Billy	Pions	Jumpers	Patton
The time of enemy (40) m	4.64	4.70	4.71	4.71	4.73	4.74	4.75	4.85
The time of the enemy (60) m	6.31	6.39	6.42	6.45	6.48	6.52	6.50	6.65
Running time (20) m (40-60) m	1.67	1.69	1.71	1.74	1.75	1.78	1.75	1.80

Likewise, among the reasons imposed by the capabilities and capabilities of the runner, there are those who have a fast start, but are characterized by a weakness or decrease in their speed in the remaining part of the race distance, and there are those who are characterized by a weak start, but they show good speed for the rest of the race distance (Al-Lami, 2012) [20]. The difference in achievement between the two groups in favor of the first group is due to the fact that the exercises in this stage were specialized in increasing endurance to lack of oxygen, increasing energy stores (ATP-PC), and vitality and activity of the nervous system upon succession of nerve signals, through the effect of basic fast running exercises, such as running for distances (120 - 100-80 m, using plyometric exercises characterized by speed, jumping hurdles, running with jumps, jumping, and continuous forward jumping. "Developing speed for the short-distance runner is achieved by developing and developing the strength that is characterized by speed." (Allawi, and Abdel Fattah, 2000) [22]. The development of strength characterized by speed is in accordance with the principles and controls of intensity, volume, and the goal to be achieved in implementing exercises with resistances appropriate to the body weight and linked to the amount of work performed and the short period of time. "The physical loads must match the goals set in the training unit in terms of the amount of physical load and the system." energy (Musa, 2009) [23]. What indicates the importance of this stage over the other stages in its impact on completion time is that it has the highest percentage of contribution among the most important capabilities in the competition.

Conclusions and Recommendations

Conclusions

Based on the results reached by the researcher through applying the training curricula prepared on the research samples, he reached the following conclusions**-:**

- There is progress in all the physiological indicators investigated (vo2max, disability, oxygen debt, and heart rate) for 100 m runners (under 20 years old) for the first experimental group that used explosive exercises.
- There development It has to be in all Physiological indicators Researched (vo2max And disability parents Oxygen And blows Heart) for 100 m runners (under 20 years old) for the group Experimental The second used water exercises**.**
- There is an improvement in all the physical variables investigated and the achievement (100 m) for 100 m runners (under 20 years old). For the first experimental group that used the explosive exercise method**.**
- There is an improvement in all the physical variables studied and the achievement of 100 m (100 m) for 100 m runners (under 20 years old). The second experimental group used water exercises
- There was an advantage for explosive exercises over water exercises in most physiological indicators
- There was an advantage for explosive exercises over

water exercises in most physical abilities and in achieving 100 m.

Recommendations

According to conclusions reached, the researcher recommends the following

- The researcher recommends the need for trainers to adopt 100 m runner training in explosive exercises, even if some parts of the training curricula**.**
- Need for trainers to pay attention to physiological indicators, as they are indicators of the adaptation of the functional systems in the body and their influence in revealing the training situation, especially the indicators studied**.**
- Emphasizing on coaches and those in charge of the training process the necessity of conducting tests for the physiological indicators related to the activity or game before preparing any training curriculum and not relying on physical tests only
- The researcher recommends using water exercise training as its training methods or Components of the training load play a role in the functional adaptations that occur in athletes
- Necessary to pay attention to exercises that develop and develop muscle strength because of their major role in overcoming various resistances in all sporting activities**.**

References

1. Murab SR. Introduction to Mathematical Biochemistry. Baghdad: Dar Al-Kutub Printing; c1985.
2. Al-Basati AA. Rules and Foundations of Sports Training and Its Applications. Alexandria: Mansha'at Al Maaref; c1998.
3. Al-Issawi AF, Al-Issawi AR. Scientific Research Methods in Islamic Thought and Modern Thought. Beirut: Dar Al-Marateb Al-Jami'a; c2001. p. 13.
4. Allawi MH, Rateb OK. Scientific Research in Physical Education and Sports Psychology. Cairo: Dar Al-Fikr Al-Arabi; c1999. p. 215.
5. Al-Hazza HBM. The Physiology of Physical Effort, Theoretical Foundations and Laboratory Procedures for Physiological Measurements, Part 1. Riyadh: Scientific Publishing and Printing Press; c2008. p. 49.
6. Al-Dulaimi NAZ. Foundations and Rules of Scientific Research. Amman: Dar Al-Safaa for Publishing and Distribution; c2016. 1st edition. p. 161.
7. Al-Yasiri MJ, Majeed MA. Measurement and Evaluation in Physical Education and Sports. Amman: Al-Warraq Publishing and Distribution Foundation; c2003. 1st edition. p. 78.
8. Xesis M. Muscle and Fitness. Soriet Sport Review. 2011;78-1.
9. Dick FBSC. Soccer Training Principles. London; c2000. p. 231-232-2.
10. Abdel Fattah AAA. Development and Measurement of the Maximum Oxygen Consumption for Middle- and Long-Distance Running Competitors. Cairo: International Amateur Athletics Federation, Regional Development Center. 2001;24:86-87.
11. Jassim A, Muslim A. Physiological Foundations of the Respiratory System. Basra: Al-Nakhil Press; c2010. 2nd edition. p. 78.
12. Abdullah IM. The Effect of Using Different Methods of Interval Training on a Number of Functional Variables and Achievement in the 400-Meter Runner. Unpublished doctoral thesis, College of Physical Education, University of Mosul; c2000. p. 70.
13. Sprit, *et al*. Anaerobic Metabolism During High-Intensity Exercise in Harrears. In: Exercise Metabolism Human. Human Kinetics, Champaign, IL.; c2015. p. 21.
14. Al-Kaabi JR. Physiological and Chemical Foundations of Sports Training. Doha: Qatar Press; c2007. p. 57.
15. Fattah AAA. Previously mentioned source; c2003. p. 46.
16. Karim SA. Applications of Biomechanics in Training and Motor Performance. Dar Al-Kitab; c2010. p. 177.
17. Hassan QH. Physiology, Its Principles and Applications in the Sports Field. Mosul: Dar Al-Hekma Press; c2005. p. 78.
18. Fox EL, Matthews D. Interval Training Conditioning for Sports and General Fitness. W. B. Saunders Co. Philadelphia; c2000. p. 65.
19. Dintimam BG. How to Run Faster. NY Leisure Press; c1984. p. 35.
20. Al-Lami AH. Football Learning and Training - for Project and Planning. 1st edition. Al-Qadisiyah: Iraq Edition; c2012. p. 21.
21. Yargan S. Sport-Science Research and Training Center, NSA by IAAF; c2010. p. 81.
22. Allawi MH, Abdel Fattah AAA. Physiology of Sports Training. Cairo: Dar Al-Fikr Al-Arabi; c2000. Ed. p. 138.
23. Musa MA. Modern Sports Training. 1st edition. Basra: Al-Nakhil Press; c2009. p. 166.