

Predicting the Level of The Effect of High and Low Humidity Levels on The Saturation of Hemoglobin With Oxygen According To Some Physical, Functional Variables And The Accuracy Of Scoring For Football Players (A Comparative Study)

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Abstract: *There is no doubt that climate changes (the level of air humidity) have a clear impact, directly or indirectly, on the level of performance of players in general and football players in particular. Since the football game spends the interest of most people, it was necessary to search hard to raise the level of its performance and its development. The importance of research lies in knowing the effect of humidity in different degrees (high humidity or saturated with humidity, low humidity or dry) at the level of hemoglobin saturation (Hb) sports body with oxygen (2O) through prediction according to physical and functional variables and accuracy of scoring for the player Football. The researchers used a descriptive method. The comparison method is appropriate to solve the research problem. The number of the research community reached (22) players. After that, the sample was chosen in a simple random way (lots) and their number was (10) players after excluding (4) players for use in the exploratory experiment. The researchers used the SPSS statistical system to extract the results of the tests. The most important conclusions are: (1) The adaptation of the wet climates exercises increases the ability of functional devices to perform in dry climates, (2) It was found that the higher the humidity of the air, the higher the body temperature after performing physical exertion and consequently the increased heart rate and breathing and the cause of fatigue of the players of the research sample. The most important recommendations are: (1) The necessity of training the players in the atmosphere of hypoxia, such as high humidity, for example, to increase the development of the work of the functional devices in anticipation of sudden climatic climates during the game. For players.*

Key words: 1- Moisture level (high humidity or saturated with humidity, low humidity or dry) 2- Hemoglobin oxygen saturation level (2OHb) 3- Prediction 4- Physical variables (performance tolerance, speed tolerance) 5- Functional variables (heart rate (RH), respiratory rate, systolic arterial pressure (SBP) 6- scoring accuracy.

I. INTRODUCTION

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Football game is one of the games that had a distinctive interest in the sports field which invited specialists and interest to devote all their efforts and scientific consultations and harness the rest of science in order to elevate this game to high levels and search for all physical, functional, skill and psychological reasons to advance the best achievements and achieve goals. Climate changes have an effect on the regulation of functional devices and the nature of their adaptation, including high or low humidity in the atmosphere, and their effect on the percentage of saturation of hemoglobin with oxygen within the athlete's body and its role in energy manufacture and lower body temperature and the proportion of Sweat and hospitalization. The importance of research lies in the knowledge of the effect of moisture to varying degrees on the saturation level hemoglobin of the body sport oxygenated by predicting according to the physical and functional variables of the football players.

The Problem

The problem of the research lies in the lack of knowledge of the coaches of the effect of changing levels of air humidity on hemoglobin saturation with oxygen and its effect on the physical and functional aspects of football players. The problem can be formulated by the following question: Does the change in air humidity levels affect the saturation of hemoglobin with oxygen and its effect on physical and functional variables and the accuracy of scoring for footballers?

The Aims

The study aims at:

- 1- Identifying the effect of high humidity levels on saturation of hemoglobin with oxygen according to some physical and functional variables and accuracy of scoring for football players.
- 2- Knowing the effect of low humidity levels on the saturation of hemoglobin with oxygen according to some physical and functional variables and the accuracy of scoring for soccer players.
- 3- Identifying the differences in the effect of low and high humidity on the saturation of hemoglobin with oxygen according to some physical and functional variables and the accuracy of scoring for football players
- 4- Predicting the level of the effect of high and low humidity levels on the saturation of hemoglobin with oxygen according to some physical and functional variables and the accuracy of scoring for football players.

The researchers imposed the presence of statistically significant differences in the effect of low and high humidity in the saturation of hemoglobin with oxygen according to some physical and functional variables and the accuracy of scoring for football players.

The Hypotheses

- 1 - There is a statistically significant relationship between the high humidity levels and the prevalence of hemoglobin with oxygen according to some physical and functional variables and the accuracy of scoring for football players.
- 2- There is a statistically significant relationship between the low humidity levels and the prevalence of hemoglobin with oxygen according to some physical and functional variables and the accuracy of scoring for football players.
- 3- There is a statistically significant relationship between low and high humidity levels on saturation of hemoglobin with oxygen and in favor of high humidity levels.

II. THE SCOPE OF THE STUDY

1-5-1 The Human Domain: Al-Hussein district sports club footballers for the sports season 2019 for the 22-category applicants

1-5-2 Timeline: From 1/6/2019 to 1/10/2019

1-5-3 Spatial domain: Al-Hussein Sports Club hall in Basra

III. RESEARCH METHODOLOGY AND FIELD PROCEDURES:

2-1 Research Methodology:

The nature of the research problem requires researchers to choose the approach that best suits the solution to their research problem. So researchers used the descriptive approach in a comparative way that is appropriate to solve the research problems.

Research Society and Sample:

The researchers chose their research community in an intentional way. The community are the players of Al-Hussein district Sports Club in Basra, the category of football is applicants for the 2019 sports season which is (22). Thus, (4) players were excluded to apply the exploratory experiment. While the research sample was chosen by simple random method (lottery), whose number is (10) players.

2-3 Tests and measurements used in the research:

2-3-1 physical tests:

2-3-1-1 Circular Skill Test: ⁽¹⁾

The purpose of the test: The purpose is to measure performance tolerance

Tools used: stopwatch, 6 columns, three barriers, footballs

Performance description: This test is performed in the form of stations on the half-pitch lines. The player, when hearing the whistle, begins to bounce the ball into a circle with a diameter of (2 m) and a number (30 times). Then, it is followed by running with the ball with jumping at three hurdles the distance between one hurdle and another (1 m). If the player passes the ball from underneath the crossbar, then he runs to the ball towards the corner to kick the ball into a circle drawn in the penalty area. Then, he follows it to aim (5) balls from outside the penalty area. Then, he goes from the second side by making a jagged run (zakzak) with the ball between (6) characters. The distance between one person and another is (2m). Then, he passes with a colleague and then the enemy (20m) twice one time without a ball and twice to the other ball. Then, he runs quickly to the starting place repeating the performance a second time after taking a minute's rest

Recording: computes the performance time for both trials.

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(1) Taha Ismail and others: Football between theory and practice (physical preparation), Dar Al-Fikr Al-Arabi, Cairo, 1989., P. 261.

Test conditions: It gives the player a one-minute rest period between the first and second tournaments.

2-3-2-1 Speed test:

Test name: Rolling the ball 30 x 5 times continuously. ⁽¹⁾

The goal of the test: to measure speed tolerance

- **The tools used:** (stopwatch - 2 people - football - measuring tape - whistle)

- **Description of the test:** From the high starting position behind the starting line and behind the person and with the beep, the player rolls the ball at full speed to the end of a distance of 30 m and turns around the second person and returns to the starting line to rotate around the first person repeating the performance 5 times continuously

Calculating time: Calculates the time taken back and forth five times and is recorded for the closest second and one time.

2-3-2 Functional Measurements:

2-3-2-1 Measuring the saturation of hemoglobin with oxygen: The researchers used the direct method to measure the saturation of hemoglobin with oxygen in the blood using the oximeter device, since the device is fixed on the index finger of the right hand after the completion of the physical effort directly.

2-3-2-2 Measurement of the heart rate (RH): Abu El-Alaa Abdel Fattah and Mohamed Sobhi Hassanein (1997) defined it as the wave that can be felt when it passes through the arteries near the surface of the skin. This wave is coming as a result of a wave of force that rushes with Blood rush from the ventricle when the heart muscle contracts, and spreads through all arteries thanks to the elasticity of these arteries. ⁽²⁾

The player's heart rate was measured by attaching an electronic watch to the player's hand and recording the reading that appears on the watch immediately after the completion of the physical tests.

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(1) - Mahmoud Abu Al-Enein: Adapted from Abu Ali Ghaleb, Defining Standard Levels for Some Elements of Fitness in Football, Master Thesis, University of Baghdad, College of Physical Education, 2000, p. 106.

(2) - Abu El-Ela Abdel-Fattah and Mohamed Sobhy Hassanein: Physiology and morphology of the athlete, methods of measurement and evaluation, Dar Al-Fikr Al-Arabi . I 1,1997, p. 59.

2-3-2-3 Measuring the respiratory rate: The number of breaths was measured in one minute by calculating the number of inhalations and the number of exhalations for a player after the end of physical tests directly by one of the members of the competent auxiliary staff.

2-3-2-4 Measurement of systolic arterial systolic blood pressure (SBP): It is the "lateral pressure on the walls of blood vessels arising from the passage of blood in and the resistance of the walls of the vessels to its passage". Arteries for blood flow (peripheral vascular resistance). ⁽¹⁾ Arterial blood pressure was measured immediately after performing physical tests and during rest and from a position on the chair using the English-made (mercury) arterial blood pressure device.

2-3-3 Goal Scoring Test ⁽²⁾

Test goal: It measures scoring accuracy

Instruments used: football field, 10 football balls - a tape to set the scoring area for the test - a tape.

Test Procedures: (10) soccer balls are placed in different places on the line and inside the penalty area. As shown in Figure (1), the player scores in the areas indicated in the test according to their importance and its difficulty, and in a sequence, one after the other, provided that the test is performed from a running position. The test starts from a ball (1) and ends in the ball (10).

Method of registration: The number of injuries that enter or affect the four goals specified in each side of the goal and with any feet from the feet is calculated by calculating the score for each ball from the ten balls as follow:

- (3) scores when scoring in the field (3)
- (2) Two marks when scoring in the field (2)
- (1) One point when scoring in the field (1)
- (0) Zero than other scoring areas.

It gives the player only one try.

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1. Fadel Kamel mentioned: An Introduction to Physiology in Athletic Training, Amman, Arab Society Library for Publishing and Distribution, 2011, p. 175.

2. - Zuhair al-Khashab and others: Football, part 1, 2nd ed., Mosul, Dar Al Kutub for printing and publishing, 1999, p. 214.

2-4 Physical Effort

The researchers prepared a physical effort using the TREAD MILL device with a physical effort for (12) minutes or until the physical effort was exhausted (70-80%) of the maximum speed and the voltage started quickly (6 km / h) for a period

of (6) minutes and increased (3 km / hour) to become (9 km / hour) for a period of (4) minutes. Then, it increases (3 km / hour) until the final speed (12 km / hour) and for a period of (2) minutes.

2-5 Exploratory experience:

The researchers conducted their exploratory experiment on Thursday, 06/13/2019, on a sample of (4) players. The players were excluded from the sample after conducting the tests and measurements. After that and to ensure the stability of the measurement, the same test was repeated and on the same sample and in the same conditions for the two measurements after nine days on 22/6/2019 as the calculated value (R) reached (0,826) which is greater than Table (R) value of (0,693) and significance level (0.05).

2-6 Procedures for the experiment

The researchers conducted the first major experiment for physical tests on the research sample after performing a warm-up in a high degree of humidity (air saturated with humidity) and at a rate of (80%) humidity on Sunday corresponding to (23/6/2019) at nine in the morning in the hall of Al-Hussein Sports Club. Then, the heart rate (RH) was measured.

RH is measured after performing the physical effort directly and through the electronic clock tied at the hand of the player. The researcher can record the reading and measuring the number of breaths within one minute by calculating the number of times inhalation and the number of exhalations for the player and the measurement of arterial blood pressure and during rest and from the sitting position on the chair as well as measuring the level of saturation of hemoglobin With oxygen. After completion of physical tests, one can check the scoring accuracy. On Tuesday, 25/6/2019, the test is repeated in the same temporal and spatial conditions, with a change in the degree of air humidity, as the degree of air humidity reached (20%), a degree (dry air not saturated with moisture), depending on the weather observatory at Basra International Airport and after the warm-up procedure was done Measuring career and physical variables and scoring accuracy in the same way as the first.

The researchers used the Statistical Package (SPSS) to process data and extract search results obtained from research measurements and tests.

IV. PRESENTING AND DISCUSSING THE RESULTS

3-1 Presenting and discussing the results of tests, physical and functional measurements, and the scoring accuracy for hemoglobin saturation with oxygen in dry and humid climates.

No.	Variables	The unit measurement	Arithmetic mean for dry climates	Arithmetic mean for wet climates	Arithmetic mean difference	Standard deviation of differences	Standard error	The value of calculated t	significance	The result
1	Endure performance	min	4.57	5.09	0.52	0.373	0.118	4.40-2	0.002	Moral
2	Withstand speed	sec	23.31	25.97	2.657	1.607	0.508	5.22-8	0.001	Moral
3	Systolic arterial	Mm Hg	134.28	142.48	8.20	3.550	1.122	7.30-3	0.000	Moral

	pressure SBP									
4	R.H. Heartbeat	Z / d	154.4 2	164.99	-10.57	5.584	1.766	5.98 -8	0 .000	Mora 1
5	Respir atory rate	Once/ min	33.25 3	38.053	-4.80	2.736	0.865	-5.54	0 .000	Mora 1
6	Accura cy of scoring	degree	17.08	14.23	2.85	1.252	0.396	7.20 7	0 .000	Mora 1
7	The percentage of saturation of hemoglobi n	Micom ol / L	95.64	92.64	2.99	2.48	0.753	3.97 3	0 .003	Mora 1

The researchers attribute the reason for these changes to the existence of significant differences in the level of physical and functional variables and the accuracy of scoring among the players in dry and humid climates after performing the physical effort that the athletic training and physical efforts increased the body's need to create and produce energy and get rid of the effect of fatigue. It can affect negatively the level of physical and skill performance. The researcher agrees (Rafie Saleh and Hussein Ali), when he says when practicing sport, the body is subject to functional and chemical changes especially with regard to energy production and disposal of carbon dioxide, which requires disposal of waste and thus an increased rate And breathing depth.

1- Rafi Saleh Fathi and Hussein Ali Al-Ali: Theories and Applications in Mathematical Physiology, Baghdad, 2009, p. 150

As well as an increase in the rate of systolic pressure as a result of physical performance and as a result of an increase in the heart rate and consequently an increase in blood pumping from the heart to the body, which generates an increase in arterial pressure. The researchers agree with (Fadhil mentioned) as the increase in systolic pressure during training may reach 175 mmHg while it does not increase Diastolic pressure except in a simple way. ⁽¹⁾

As for the increase in the number of breaths after performing the physical effort, the oxygen deficiency resulting from the physical performance became corrupted, which increased the amount of hemoglobin in the blood as a result of the loss of a quantity of body fluids and plasma. This is called the work of nervous stimuli inside the lungs to stimulate the alveoli from supplying the largest amount of oxygen to replace the body and to achieve Balance in body tissues and cells. The researchers agree with (Haider Shabeeb) in saying "Exercise in moderate conditions has the ability to provide physical pregnancy requirements by increasing the number of heartbeat and cardiac output and the number of breathing times to provide the body with the oxygen and increasing the amount of hemoglobin in the blood and disposal of energy waste as a result of energy production processes. ⁽²⁾

The researchers also attribute the cause of these changes to the existence of significant differences in the level of physical and functional variables and the accuracy of scoring among the players after performing the physical effort in humid (saturated humidity) atmospheres that the exercises in high-humidity spheres cause a decrease in the level of physical and skill performance of the player due to the loss of large amounts of Energy during training with less oxygen delivery to rebuild and replace lost energy has a negative impact on fatigue and its reflection on the level of performance and some sources indicate that "the increase in the density of humid atmospheres in the atmosphere affects a negative impact on the level of players' performance due to a lack of The density of oxygen in the air layer.

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adhil Kamel, ibid, p. 217.

2-Hydar Shabib Abd Ali: The effect of physical exertion at high and moderate temperatures on saturation of hemoglobin with oxygen and respiratory reserve and some immunological activity and index of circulatory system and soccer precision targeting, Master Thesis, College of Physical Education and Sports Science, Basra University, 2019, p. 82.

This affects the level of physical and skill performance because it reduces the oxygen supplied to the blood, especially during the physical effort. The players must distribute the effort in hot and humid climates to reach the largest amount of oxygen for the working muscles ⁽¹⁾.

Likewise, the increase in humidity in the atmosphere has a negative impact on the functional research variables due to the body's need for oxygen after performing the physical effort and since the low oxygen density in the near-Earth air layer in humid climates increases the speed of breathing and the speed of the heart rate and thus increasing the systolic pressure of the body . And some sources mention "The reason for the increase in breathing in relation to high-humidity (saturated with humidity) atmospheres is that increasing the high humidity in the air will lead to a decrease in the density of free oxygen in the atmosphere close to the ground because of the increase in the density of humidity in those climates, since the athlete needs a high amount Of oxygen, which requires increased breathing to bridge the shortage of oxygen during performance and when inhaling air loaded with high moisture, which is (atoms of evaporated water), it works to block the respiratory openings in the lungs and thus the lack of 2O access to the lungs, which requires doubling the process of tuna Q high levels to compensate for the body of oxygen. ⁽²⁾

The researchers agree with (Hashim Al-Kilani) in stating that the moisture of the air results from the evaporation of water and becomes in its gaseous state, which is one of the stages of the water cycle in the atmosphere. The water vapor in the air increases as the percentage of evaporation of the ground water increases and affects the proportion of air gases. ⁽³⁾

The researchers agree with (Abdulaziz Abdel-Baeth) that the density of water vapor at high temperatures is more than the density of dry air at the same temperatures. Therefore, mixing water vapor with dry air causes a decrease in air density and the more water vapor in the air, the less density. ⁽⁴⁾

1. www.963105.article.aleat.com

2. Water Vapor. 2012, 15 Retrieved May. Specific Heat.

3. Hashem Adnan Al-Kilani: Physiological Foundations of Sports Training, 1st edition, Al Falah Library for Publishing and Distribution, 2000, p. 327.

4. Abdel-Aziz Abdel-Baeth Hamid: Meteorology for ships officers and shipowners, 1st edition, 2002, p. 59.

Accuracy of scoring is one of the skills that need a high muscular focus with a choice of angle and speed of directing the ball towards the goal and the more the physical burden on the players as a result of the intensity of performance with high humidity of the atmosphere increased the fatigue of the players and thus the effect on the level of sensory nervous stimuli. It is negatively affected the nervous system muscular. It is the source of the accuracy of scoring. The researchers agree with

(Dhia Nagy) "that directing voluntary movements towards a specific goal requires a high sufficiency of the muscular nervous system, especially the sensory organs of the muscles and the eyes, so the soccer player must have the ability to determine the place where he can send the ball to in the proper timing and speed Required, while maintaining the distribution of physical effort during the match, to avoid muscular nerve fatigue, which affects the accuracy of scoring. ⁽¹⁾

The high humidity in the air can lead to a high temperature of the human body due to the evaporation of sweating outside the body after the performance of the physical effort, which causes restlessness and fatigue on the athlete, which reflects negatively on the level and accuracy of performance. And some studies indicate that the high humidity in the atmosphere after performing the physical effort due to the lack of evaporation of sweating out of the body as a result of humid climates and body heat, so the person feels fatigue more easily, which affects the level of performance and thus posing a risk to human health. ⁽²⁾

1. Dhia Nagy: The effect of overlapping complex exercises in developing some basic soccer skills, Master Thesis, College of Physical Education, University of Baghdad, 2003, p. 22.

2. - Edited. 2019 - 4 - 4) evedRetri com . upmcShare , Effects OF Humidity on your Body , URGENT CARE.

3-2 Presenting and discussing the results of tests, physical and functional measurements, scoring accuracy, correlation coefficients, and the contribution ratios of the research variables with hemoglobin saturation with oxygen in humid climates.

Table (2) Shows the calculated value (F), correlation coefficient and contribution ratios of physical, functional and skill search variables with hemoglobin saturation with oxygen in humid climates

Variables	Fixed amount	Coefficient	The Value of f		Temperature	Correlation coefficient R	Contribution rate R2
			Sig	Calculated			
Endure performance	45.789	1.067	0.004	2.241	9	0.955	0.912
Withstand speed		0.085				0.987	0.974
Systolic arterial pressure SBP		0.071				0.978	0.956
R.H. Heartbeat		0.395				0.997	0.994
Respiratory rate		0.022				0.962	0.925

Accuracy of scoring		0.585				0.973	0.946
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Prediction formula for hemoglobin saturation = constant magnitude + (first coefficient * performance tolerance) + (second coefficient * velocity tolerance) + (third coefficient * systolic arterial pressure SBP) + (coefficient IV * heart rate RH) + (coefficient V * respiratory rate) + (Sixth factor * scoring accuracy)

Prediction equation for hemoglobin saturation = $(47.59) + (1.067 * 5.09) + (0.085 * 25.97) + (0.071 * 164.99) + (0.395 * 38.053) + (0.022 * 142.48) + (0.585 * 14.23) = 47.59 + 46.966 = 92.64$

It has been shown through Table (2) that the prediction equation, which was conducted on a sample consisting of (10) football players which shows that the high humidity of the atmosphere has a negative impact on the level of saturation of blood hemoglobin with oxygen and the reflection of this is an inverse reflection on the physical and functional variables and the accuracy of scoring, i.e. an increase in the percentage Air humidity reduces the rate of saturation of hemoglobin with oxygen. Thus, it affects the level of physical performance as well as career and its negative reflection on the accuracy of scoring for football players after performing physical effort.

The researchers attribute the high humidity of the air with the performance of the physical effort on the walking belt, which increased the body temperature as a result of the retention of sweating due to the presence of a high humidity in the atmosphere, and thus affects the level of contraction and muscular nervous expansion, and thus affects the physical performance and accuracy of athletic skill. The researcher agrees with (Ali Jalal Aldin) The high temperature leads to a decrease in neuromuscular contraction and thus fatigue and fatigue. ⁽¹⁾

Likewise, the increase in the rate of sweating leads to a decrease in the blood plasma, which in turn causes an increase in the heart burden and a decrease in the venous return as a result of pumping blood to the skin to reduce the body temperature, which leads to fatigue of the body's functional systems and the appearance of fatigue, which is a major factor in reducing physical and skill performance. ⁽²⁾

1. Ali Jalal Al-Din: Principles of Physiology, First Edition, Egypt, 2007, p. 168
2. Haider Shabib Abd Ali: ibid, p. 106.

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

- 1- Adaptation to wet climates exercises increases the ability of functional devices to perform in dry climates.
- 2 - There was an effect of the physical effort that the researcher used on a research sample in dry and humid climates on the research variables.
- 3- There are differences in the percentage of saturation of hemoglobin with oxygen in dry and humid climates.
- 4 - It appears that physical performance in humid climates has a significant negative effect on physical and functional variables and scoring accuracy
- 5- It was found that the higher the humidity of the atmosphere, the higher the body temperature after performing the physical effort, and consequently the increased heart rate and breathing, and the fatigue of the players in the research sample.

Recommendations

- 1- The necessity of training the players in the atmosphere of lack of oxygen, such as high humidity, for example to increase the development of the work of the functional devices in anticipation of a sudden climatic atmosphere during the game

2- Attention to training the players on different atmospheres (dry or wet) to adapt the physical and skill performance and functional equipment of the players.

3- The necessity of taking into account the location and weather conditions (dry or wet) to determine the nature of the performance and the nature of the clothing, food and drink of the players before and during the performance of the physical effort of the players.

VI. REFERENCES

- [1] Abdel-Aziz Abdel-Baeth Hamid. (2002). Meteorology for ships officers and masters, 1st ed..
- [2] Abu El-Alaa Abdel-Fattah and Mohamed Sobhi Hassanein. (1997). Physiology and Mathematics of Mathematics, Methods of Measurement and Evaluation. 1st ed. Dar Al-Fikr Al-Arabi.
- [3] Al-Din, Ali Jalal. (2007). Principles of Physiology. 1st ed. Egypt.
- [4] Ali, Haider Shabib Abd. (2019). "The effect of physical exertion at high and moderate temperatures on saturation of hemoglobin with oxygen and respiratory reserve and some immunological activity and the index of circulatory system and football scoring accuracy," PhD thesis, College of Physical Education and Sports Science, University of Basra, 2019.
- [5] Dia Nagy. (2003). "The effect of overlapping complex exercises in developing some basic soccer skills", Master Thesis, College of Physical Education, University of Baghdad.
- [6] Fadhil Kamel. (2011). An Introduction to Physiology in Athletic Training, Amman, Arab Society Library for Publishing and Distribution.
- [7] Hashim Adnan Al-Kilani. (2000). Physiological Foundations of Sports Training, 1st edition, Al Falah Library for Publishing and Distribution,
- [8] Mahmoud Abu Al-Enein. (2000). "Adapted from Abu Ali Ghaleb, Defining Standard Levels for Some Elements of Fitness in Football", Master Thesis, University of Baghdad, College of Physical Education.
- [9] Rafeh Saleh Fathi and Hussein Ali Al-Ali. (2009). Theories and Applications in Mathematical Physiology, Baghdad.
- [10] Taha Ismail et al. (1989). Football between theory and practice (physical preparation), Dar Al-Fikr Al-Arabi, Cair.
- [11] Zuhair al-Khashab et al. (1999). Football, part 1, 2nd ed., Mosul, Dar Al Kutub for printing and publishing.

