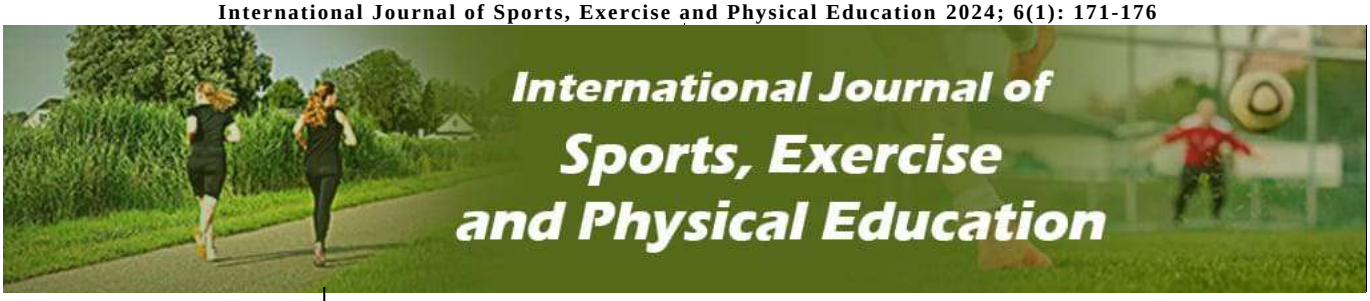

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Comparing some physiological indicators according to the level of skill performance of futsal players in Baghdad

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Abstract
The purpose of this paper is to identifying the level of some physiological indicators according to the level of skill performance of futsal players in Baghdad, and comparing physiological indicators according to the level of skill performance of futsal players in Baghdad. The researcher used the descriptive method using the comparative method, as it is the most appropriate method for the nature of the current research. A group of players represented the research community from Baghdad futsal clubs. The sample was chosen from this community and numbered (30) players representing the clubs (Police, Air Force, Police Mechanisms, Baghdad Municipality, Air Defense) out of (50) players and representing a percentage of (60% of the original community after the goalkeepers, who numbered (10) players, were excluded, in addition to selecting (10) players to conduct the exploratory experiment. One of the most important results reached by the researcher is that: Physiological variables have a significant impact on the level of skill performance during matches, and the group with a good level of players is the one who has good physiological specifications in different proportions.

Keywords: Physiological indicators, skill performance, futsal players

Introduction
Tests and measurements are one of the necessary scientific methods in the sports field because of their prominent role in the process of proper planning and continued progress. Objective testing and accurate scientific measurement have a major role in giving the true indicator of the abilities the player possesses, as they are one of the tools of scientific research and a means of good selection. Tests and measurements have a great impact in determining the different levels of players through the continuous evaluation process and knowing the individual differences in physiological variables and the importance of these variables in the game of futsal, as it is a team sport that receives special attention because of its large audience, as it is characterized by attracting many researchers, followers, and stakeholders. (Rashid, Ahmed, & Raheem, 2022) [13]. On the sports side, due to the enjoyment and enthusiasm it provides to its viewers, many sports institutions have been interested in working on developing this game by developing the physical abilities specific to the game that the football player needs, as it is one of the necessary indicators that indicate the efficiency of the player's internal systems and working to delay the emergence of a condition. Fatigue and the ability to continue performing well and with high efficiency throughout the period of the match that may reach extra time, and here the role of these variables appears in the superiority of the player over the other player or team over the opposing team. (Neama, Salman, & Mahdi, 2022)' [12].
Hence the importance of the study in determining the different levels of performance between good players and weak players and using tests and measurements as an effective means that helps us know their physiological abilities in order to determine individual differences between players and compare the level of skill performance and physiological variables, which are the decisive factor in distinguishing the player early. Because the game of football requires the player to have high specifications that qualify him to reach the highest levels and achieve achievement.

Research problem

The comparative study is of great importance in sports in general and in futsal in particular because it helps the researcher identify the individual differences between the players as they differ in physiological indicators as well as the skill level, as these players are not at the same level and through the researchers observing the players and conducting Personal interviews with the trainers found that there is a discrepancy in level, with the reasons that lead to this discrepancy not being known. Are these reasons due to the physiological or skill aspects, or are there other aspects? Here lies the problem of the research. Therefore, the researcher decided to conduct this study by comparing some physiological indicators according to the level. Skill performance of futsal players in Baghdad.

Research objectives

- Identifying the level of some physiological indicators according to the level of skill performance of futsal players in Baghdad.
- Comparing physiological indicators according to the level of skill performance of futsal players in Baghdad.

Research problem

Research fields

- **Human field:** Baghdad futsal club players (Air Force, Al Shorta, Al Shorta Vehicles, Air Defense, Amanat Baghdad) for the 2023-2024 football season.
- **Time field:** (1/2/2024) to (1/4/2024)
- **Spatial field:** Stadiums and club halls, sample search

Theoretical studies

Testing and measurement

Testing and measurement is one of the most prominent scientific methods by which athletes are detected and talented ones are selected. The earlier the selection process is, the more successful and effective it is, as talent can be refined, developed, and developed through scientific means studied by specialists in the learning and training processes. Thus, it is Tests and standards are "the honest means of achieving good selection, as they are the scientific method guaranteed to provide human potentials that have the appropriate preparations to reach athletic achievement" (Ahmed Khater and Ali Al-Baik, 1998) [2].

As an inevitable result of the development of various sports games and events, this led to the development of tests and the design of modern tests, as they are "one of the means of evaluation, measurement, diagnosis and guidance in the various curricula, programs and plans for all levels and age stages. They play the role of an indicator, as they clearly indicate the extent of progress and success in achieving the set goals" (Kamal Abdel Hamid and Muhammad Sobhi Hassanein. 1997) [4].

Testing and measurement in futsal

Football is one of the activities in which progress depends on the continuous identification of various capabilities in order to identify weak points to strengthen them and strong points to strengthen and develop them. All of this cannot be identified without resorting to testing and measurement, as it is the most accurate scientific method in determining various physical capabilities, skills, Tactical, functional and psychological, as "in order for the coach to recognize the capabilities and capabilities of the player individually, and the team collectively, he must conduct tests and measurements to identify these levels" (Kamal Saleh. 1997) [4]. The benefit of testing and measurement extends beyond the stage of identifying how much the player possesses in The type of characteristic measured to lead to the development of modern training programs that are derived from the test as "the true indicator of the state of training in one or several items in football" (Kamal Abdel Hamid and Muhammad Sobhi Hassanein. 1997) [4] (Rashied, 2024) [1].

Research methodology and field procedures:

Research Methodology

The researcher used the descriptive method using the comparative method as it is the most appropriate method for the nature of the current research.

Community and sample research

The research community was represented by a group of players from Baghdad futsal clubs. The sample was chosen from this community and numbered (30) players representing the clubs (Police, Air Force, Police Mechanisms, Baghdad Municipality, Air Defense) out of (50) players and representing a percentage of (60% of the original community after the goalkeepers, who numbered (10) players, were excluded, in addition to selecting (10) players to conduct the exploratory experiment.

Means of collecting information

- Note.
- Interview.
- Tests and measurements.
- Arab and foreign sources.

Devices and tools used

- Stop Watch.
- Chalk.
- Whistle.
- Adhesive tape.
- Runtastic system for measuring heart rate (manual watch + chest strap).
- Spirometer device to measure vital capacity.
- Medical scale.
- Camera type (Sony).
- Futsal court.

Determine the tests used

The opinions of (Experts and specialists) in the field of sports training physiology were surveyed on how to conduct measurement before starting to apply functional measurements, and after reviewing many previous studies and modern scientific sources, a set of physiological tests and measurements were determined in a way that is consistent with the objectives of the study, which are as follows.

First: Measure the heart rate using the Runtastic system

Measurement method

The player's mass, height and age are entered into the watch via the option buttons next to the watch by entering the menu. After that, the watch is worn with the left hand and a little gel is placed on the Bluetooth strap that is placed on the chest and placed slightly towards the left. From the chest, through which the signal is sent to the watch, as the athlete's heart rate appears on the watch before performing

the effort, and after performing the effort, the heart rate that the athlete reached during the effort appears and is recorded on the registration form immediately after completing the effort, as in the figure (1), as for the voltage test, it is as follows.

Test name: The difference between heart rate before and after exertion. (Bahaa El-Din Salama, 2000) [3]

- **Purpose of the test:** To measure the efficiency of the circulatory system using the horizontal distance (40) meters (43.868) yards.
- **Gender and age level:** 9 years and above.
- **Tools used:** Stopwatches (2), jogging track.

Performance Description:

- The number of heartbeats is calculated by the system before starting the test.
- The tester takes the high starting position behind the start line.
- The timekeeper gives the start signal (take your place - get ready - start).
- When the laboratory covers the distance, the recorder immediately records the number of heartbeats shown in the watch.
- **Recording method:** The difference between the number of heartbeats before and after exertion is calculated for the laboratory, and the smaller the difference indicates the efficiency of the circulatory system, using the following equation: -

Calculating the difference between the two measurements = post measurement - pre measurement

$$\text{Percentage increase in pulse } r = \frac{\text{The difference between the two measurements}}{\text{Pre} - \text{measurement}}$$

Fig 1: Shows the heart rate measurement system

Second: Vertical jump test from a standstill to measure the anoxic phosphagen capacity (Gene, M. Adums, 2000) [11]

- **Purpose of the test:** Measurement of phosphagenic anoxic capacity.
- **Tools:** A wooden blackboard (1.5 m long) with horizontal lines drawn on it, as the distance between one line and another is (2 cm). The blackboard can be dispensed with by placing marks directly on the wall according to performance conditions, a medical scale to measure body weight, and a tape to measure height.
- **Performance specifications:** The tester extends the arm as high as possible to place a mark on the board or wall, then swings the arms back and bends the knees to a right angle position only, followed by pushing with the feet to jump upward to reach the maximum possible height, and the tester is given three attempts. The best result is calculated for him.
- **Registration:** The Phosphagenic anoxygenic capacity in the vertical jump test is calculated according to the following equation.

$$\text{Phosphagenic anoxygenic capacity} = 2.21 * \text{body weight} \sqrt{\text{The distance difference between the two marks}}$$

This capacity is measured in kilograms. M

Third: Measure the vital capacity of the lungs using a spiometer

Measurement method: - The athlete stands holding the spiometer in his hand, then performs a preliminary inhalation and exhalation (1-2) times quickly, then takes into his chest the largest amount of inhaled air he can take, and exhales regularly and continuously until the point at which he has excreted the largest possible amount. From the exhaled air through the mouth, the nose is closed with a clip to prevent some of the exhaled air from escaping from it, as in Figure (2).

Fig 2: Shows a spirometer device to measure vital capacity

Note: A special plastic mouthpiece must be used for each player who places it in the device's horn when conducting the experiment to prevent transmission of infection.

Recording: This experiment is performed three times and records the best digital reading from the device. The researcher extracted the relative vital capacity because it is the most accurate and widely used in the sports field, as it takes into account the player's body weight, as in the following equation: (Essam Abdel Khaleq, 2009) [7].

$$\text{Relative vital capacity} = \frac{\text{Absolute vital capacity}}{\text{body weight}}$$

Main experience

Physiological tests and measurements were conducted on the study sample within two days (1-2/3/2024) so that the players could understand and apply them correctly, as well as taking into account the fatigue factor that may affect the results of the tests and measurements. After that, the results were obtained and then transcribed and dealt with. statistically, and then compare these results with the level of skill performance of the players during the matches using a special form prepared for research.

Determine the level of skill performance

The performance level of the players was determined by the following.

1. Adopting a form to evaluate the level of skill performance during the match for each player.

2. Filming the matches of the players (study sample), as each player plays two matches, and these matches are recorded, and then the level of skill performance of the players is evaluated by seeking the help of a group of assessors for the level of skill performance.
3. After that, each player has a score that represents his level of skill performance, and it is converted into standards, then into levels, and comparison is made according to the levels (See appendix 1 and 2).

Statistical methods

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

Results and Discussion

Identify the significance of the differences between the levels of players in the research variables, the researcher used the one-way analysis of variance (ANOVA) test, as shown in Table (1)

Table 1: Shows the results of the F-test for analysis of variance for player tests

No.	Variable	Source of variance	Sum of squares	Degree of freedom	Mean squares	F value calculated	Level sig	Type sig
1.	Pulse	Between groups	5051.92	2	2525.99	80.58	0.000	sig
		inside the groups	846.23	27	31.35			
2.	Vital capacity	Between groups	27.52	2	13.75	54.37	0.000	sig
		inside the groups	6.84	27	0.26			
3.	Phosphagogenic capacity	Between groups	74697.38	2	37348.69	54.41	0.000	sig
		inside the groups	18531.30	27	686.34			

It is noted from the table that there are significant differences between the levels in all variables, and to identify the least significant difference between the groups, the researcher resorted to using the least significant difference (L.S.D) test, as in Table (2).

Table 2: Shows the value of the least significant difference (L.S.D) test between the three groups of player tests

No.	Type Tests	Variable	Groups	Arithmetic mean	Difference between arithmetic mean	Level sig	Type sig
1.	Phosphagogenic test	Pulse	1-2	175.18- 158.85	16.34	0.000	sig
			1-3	175.18- 138.67	36.51	0.000	sig
			2-3	158.85- 138.67	20.17	0.000	sig
2.		Vital capacity	1-2	12.57- 10.94	1.62	0.000	sig
			1-3	12.57- 9.87	2.70	0.000	sig
			2-3	10.94- 9.87	1.07	0.000	sig
3.		Phosphagogenic capacity	1-2	624.39- 545.40	78.99	0.000	sig
			1-3	624.39- 483.03	141.34	0.000	sig
			2-3	545.40- 483.03	62.36	0.000	sig

Discussing the results of the players' physiological tests

Based on the previous results, there appeared to be significant differences between the three groups (Good, average, and poor) in physiological tests, as the differences were in favor of the (Good) group. By presenting and analyzing the results of measuring heart rate for the three groups, it appeared that there are significant differences in this indicator, and it is attributed The researcher noted that these differences in exercises that tend more to long distances, such as stretching, had an effect on the heart rate at rest and after exertion, as the exchange of the relationship between the effect of the various training methods and methods led to the creation of an effective condition in influencing the organic systems, which was reflected in the development of the condition. Functional function of the heart from a physiological standpoint. One of the results of this development is the tendency of the heart rate to decrease as a result of the increase in the volume of cardiac output in each heartbeat, as well as an increase in the amount of oxygen carried by the same volume of blood (increasing the ability of hemoglobin to combine with the largest amount of However, the volume and intensity of training had an important role in the development of this indicator, as the heart rate after training is inversely proportional to the intensity and volume of training used. The higher the training intensity, the greater its effect and leads to a decrease in the pulse rate during rest or effort. Or after effort" (Abu Al-Ala Abdel Fattah and Ibrahim Al-Shaalan, 1994) [1]. In addition, the heart gradually adapts to a lower beating rate as a result of the increase in the volume of the heartbeat during rest and during effort and the speed of returning to the normal state. This is observed in individuals who practice stretching exercises, and this is what has been shown. The results of the group were (Good) and for all ages.

The researcher attributes the reason for the presence of significant differences in the anaerobic phosphagenic capacity between the three groups and in favor of the (Good) group to the fact that developing this capacity depends primarily on the use of exercises with high intensity and short distances, and as Fox mentioned, "the anaerobic capacity begins to be used by pressure." When the intensity is about 80% of the maximum ability of the player, and in order for the coach to ensure almost complete reliance on anaerobic ability, it is appropriate to train at an intensity of 90% of the player's ability" (Muwafaq Asaad Mahmoud, 2009) [8], in addition to rest periods established according to the principles It is scientifically correct based on the body's ability to take a sufficient rest period to quickly restore the phosphagen energy compounds, whether between repetitions, between sets, and between exercises, as "phosphagenics, especially (ATP), are restored very quickly, within 30 seconds after stopping work, which led to an increase in enzyme activity." Responsible for restoring the formation of ATP, which are the enzyme ATPase and creatine phosphokinase (CPK), as the activity of these enzymes increases (10-15%) (Muhammad Nasr al-Din Radwan, 2003) [9], as the phosphagins, especially ATP, are

restored by (70%). In 30 seconds, while its completion is completed in several minutes. All of this indicates that the exercises and rest times used have a great impact in restoring the formation of phosphagenic energy compounds, as they represent one of the main energy systems in the game of futsal football, as the skills and requirements of this game are of an extreme and fast nature. Such as running quickly with the ball, jumping, and scoring at the goal, which worked to develop the anoxic phosphagenase ability of the group with (Good) scores.

As for vital capacity, the researcher attributes the reason for the differences between the three groups for the vital capacity test and for different ages to the effectiveness of the training curriculum used by the trainers as a result of the researcher's continued monitoring of the training units that were applied to members of the "good" group, which resulted in an increase in mitochondria (Energy houses) within Muscle fibers, in addition to the effects on the heart and circulatory system, such as an increase in capillaries, as well as an increase in the volume of cardiac output as a result of the increase in the size of the heart, as well as an increase in the ability of the muscles to consume oxygen, as the more the muscles are able to consume oxygen and extract it from the blood, this helps in increasing the capacity. Vitality, and this is consistent with what was stated in the sources that "these physiological changes mentioned above come as a result of continuous and regulated physical effort, and that these changes are responsible for increasing the muscle's ability to consume oxygen and produce aerobic energy" (Raysan Khuraibet Majeed, 2001) [6], as "the amount of The vital capacity used increases as a result of regular training, and this increase occurs as a response to the muscles exerting effort and accustoming them to extracting a larger amount of oxygen, which enables the muscle to increase its efficiency and reduce the acidity resulting from metabolism to a minimum" (Najah Mahdi Shalash and Mazen Abdul Hadi, 2010) [10], and the vital capacity It is affected by the level of load intensity and increases as the intensity of sports performance increases.

From the above, the researcher shows that the (Good) group of players is the best in all tests of the research variables, with a discrepancy in the percentages between them and the (Weak and average) groups.

Conclusion and Recommendations

Conclusion

- Physiological variables have a significant impact on the level of skill performance during matches.
- The group with a good level of players is the one who has good physiological specifications in different proportions.

Recommendations

- Paying great attention to physiological indicators because they are among the variables that most influence the level of skill performance.
- Conduct complementary studies to this study in the skill, physical, psychological and tactical aspects.
- Conduct a similar study of the various leagues for futsal players and other age groups and the women's league in various governorates of Iraq.

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Appendix (1)

Skill performance evaluation form

V N	With the chest	Putting out
V N	With the thigh	
V N	The bottom of the foot	
V N	With the competitor	Rolling

V N	Without the competitor	
V N	Far	Shooting
V N	Middle	
V N	Near	
V N	Long	Passing
V N	Medium	
V N	Short	

Note: N /successful attempt, V /failed attempt

Appendix (2)

Shows the raw scores and standards for the level of skill performance of the players and their

Raw scores	Standards	Levels	Number of players	Percentage
9.55	72.17183			
9.25	71.97183			
9	68.92958	Good	9	%30
8.50	63.64789			
8	59.64789			
7.5	56.87732			
7.5	56.87732			
7.25	55.12676			
7	54.3662			
6.90	53.54463			
6.75	52.60563			
6.75	52.60563			
6.65	51.50563			
6.50	50.84507	Medium	17	%56.66
6.35	50.08451			
6.25	49.88401			
6.25	49.88401			
6.20	49.08451			
6	47.32394			
5.90	45.56338			
5.75	44.80282			
5.75	44.80282			
5.70	43.14212			
5.50	42.04225			
5.50	42.04225			
5	40.28169			
4.65	38.52113	Weak	4	%13.33
4.40	37.76056			
3.50	34.76056			
2.50	27.88732			