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The effect of special exercises on some functional variables and cognitive abilities and their relationship to the level of performance of second-class referees in the game of football

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Abstract

Knowing the effect of special exercises (physical, skill, cognitive) for football referees on the neurotransmitter (serotonin), blood sugar, and cognitive abilities is what this study concluded and aimed to prepare special exercises for physiological fitness, refereeing movements and positions, and to identify the level of serotonin and blood sugar concentrations. And the cognitive abilities and performance level of second-class football referees and the effect of exercises on them, while the research problem crystallized around the lack of uniformity between the referees' decisions, the decline in physical and physiological fitness indicators, and failure in the practical and cognitive tests that qualify for refereeing in higher-level leagues, and in order to unify the decision among the refereeing staff and improve or develop Making the correct arbitration decision based on a harmonious and integrated functional system in leading football matches in the various circumstances to which the referees are exposed and the level of their performance, without limiting the course of training to the physical aspects only, but rather cognitively, physically, skillfully, physiologically, tactically and psychologically, and that the methodology for solving the research problem was through experimental research. The research sample represented second-class football referees in Kirkuk Governorate, and the special exercises varied between physical, skill, physiological fitness, cognitive, tactical and combined exercises between physical, skill, tactical and cognitive to direct the attention of the gentlemen responsible for arbitration to the importance of introducing the above physiological fitness exercises. This constitutes an addition to the concepts of football refereeing, and the most important conclusions were that an increase in the level of serotonin leads to the occurrence of central fatigue as a result of prolonged physiological physical effort, and that a decrease in blood sugar as a result of physical physiological effort is a natural indicator, and the researchers recommend developing scientific training curricula reinforced with attention to fitness. Physiological and the use of modern physiological devices. One of the sustainable development goals supported by the research is to maintain and enhance the health and physiological fitness of football referees, which is an essential aspect of the referee's qualifications for managing and refereeing matches and achieving sustainable sports, economic and social development.

Keywords serotonin, blood sugar, football referees

Introduction:

The importance of the research lies in knowing the effect of special physical exercises for football referees on the neurotransmitter serotonin, blood sugar and cognitive abilities, in order to improve or develop the correct refereeing decision-making

based on a harmonious and integrated functional system in leading football matches in the various circumstances to which the referee is exposed and at a high level. Without limiting the course of training to the physical aspects only, but rather cognitively, physically, skillfully, physiologically, tactically and psychologically, as well as the

correct positions and movements on the field in mobile and static playing situations, through exercises prepared for this purpose that varied between physical, skill, physiological fitness, cognitive, tactical and combined physical exercises. Skillful tactical knowledge, which constitutes an addition to the concepts of football refereeing with the aim of developing the level of performance in the match among second-class football referees. It is certain that the disparity in the levels of referees (second-class) are performance facts that emerged from the evaluation of performance by the referees' evaluators, which can make minutes The details of performance requirements, including physiological fitness, are influential in the success of match management because of the importance of serotonin and blood sugar indicators, as the former is linked to fatigue and the latter to energy, and the two together affect the referee's concentration, which requires high physical fitness and training in conditions similar to matches. The research problem crystallized around the lack of The uniformity of the referees' decisions, the low physical and physiological fitness indicators of the research sample, and the failure in the practical and cognitive tests that qualify for refereeing in the highest leagues, and since cognitive abilities have a prominent place in football refereeing and the arbitration decision, especially because they lead to the correct interpretation of the arbitration material by making the decision on the field of play or the theoretical exam, The researchers followed a vision that could be exploited to develop referees, which enhances the effectiveness of the referee's refereeing performance (level), by paying attention to increasing the effectiveness of the positions, movements, and special exercises prepared by the researchers. The purpose of the study (research objectives) was to prepare special exercises for second-class football referees, to

identify the level of serotonin and blood sugar concentrations and the cognitive abilities of second-class football referees, to identify the effect of special exercises on the neurotransmitter serotonin and cognitive abilities, and to identify the effect of exercises. Special and its relationship to the level of performance of second-class football referees. The researchers first hypothesized: There are statistically significant differences between the results of the pre- and post-tests among the members of the research sample for the control and experimental groups in special exercises and some functional variables and cognitive abilities and their relationship to the level of performance, in favor of the post-tests. Secondly, there are statistically significant differences between the results of the pre- and post-tests among the members of the research sample in the level of performance. In favor of post-tests. The areas of research were the human field: second-class football referees / Kirkuk Governorate, the temporal field: for the period from 7/1/2023 until 19/3/2023, and the spatial field: the sports and school activity stadium in Kirkuk / the lecture hall in the Olympic Committee representation in Kirkuk. / Al-Hilal Laboratory for Pathological Analysis in Kirkuk / Laboratory of the Scientific Researchers Company in Al-Qadisiyah.

Method and procedures:

Research methodology: The researchers used the experimental method to suit the nature of the problem.

Research sample: Second-class football referees in Kirkuk Governorate, numbering (14) referees. The research sample was chosen intentionally, and the sample was divided into two groups (experimental and control) equally by random method, where the experimental group used special exercises and the control group used exercises approved by the subcommittee of referees, with (7) referees for each group.

Study design:

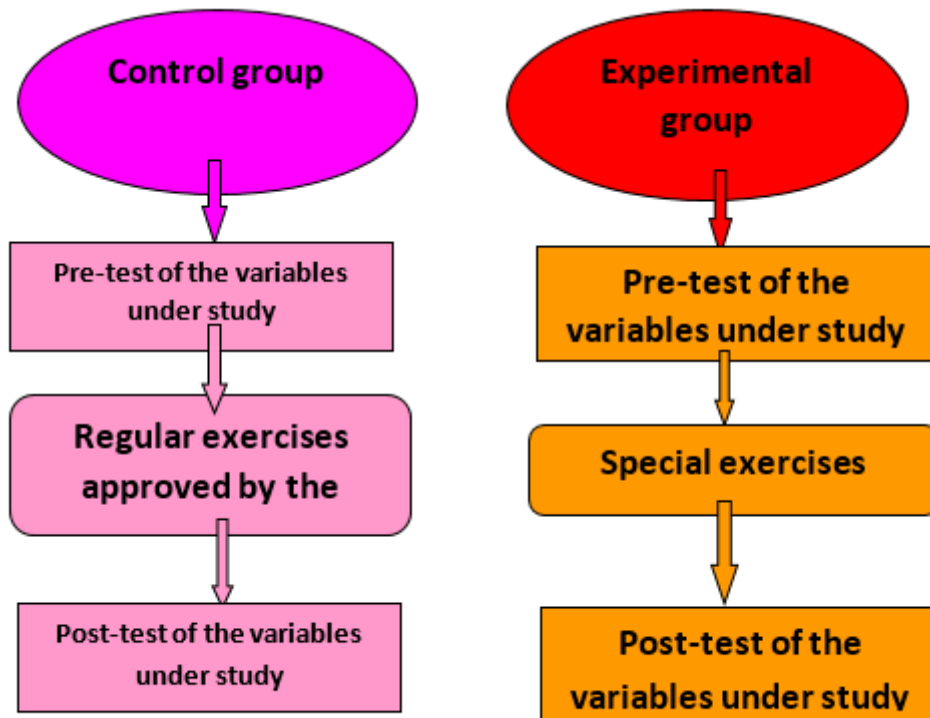


Figure .1 shows the study design

Devices and tools used in research:

- Center fudge blood separation device at a speed of (5000 rpm).
- French-made Spectro photometer.
- The Automatic Elisa Reader is Italian made
- A Chinese-made home glucose measuring device
- Chinese-made Acer DATA Show projector.
- Medical syringes capacity (5 ml).
- Blood storage tubes (tubes).
- Chemicals (cats)
- Chinese-made SEWAN stopwatch
- Assistant referee flag (DIADORA), whistle, and soccer ball (NIKE), size (5), number (6).

Studied variables:

Cognitive abilities include (fouls, misconduct, and offside), which are the articles of the Football Law through which direct or indirect free kicks or penalty kicks are calculated, as well as reasons for warning and expulsion.

Biochemical indicators include:

- 1- Serotonin: (before effort, immediately after effort) It can be defined as one of the important neurotransmitters for the brain. This substance plays an important role in regulating a person's mood and mental health by increasing nerve nutrition. It is 5-hydroxytryptamine, or 5-HT for short, which is a neurotransmitter. Monoamines are synthesized in serotonergic neurons within the central nervous system and in endogenous chromaffin cells in the digestive system.
- 2- Blood sugar: (before effort, immediately after effort) the molecular weight of glucose is (C₆H₁₂O₆). Glucose is transported through the blood stream from the liver or pancreas to the body's cells, and it is the main energy source for the body's cells, and the sources of sugar are the liver or food directly, (Allawi Abdel Fattah) (The blood sugar concentration or glucose level is between (4.4 to 6.1 mmol/L) or (79 to 110 mg/dL), and the normal level of glucose in the blood is about (90-100 mg/dL), and the glucose level rises some

grams after meals for an hour or two, and the glucose level is usually lower in the morning before breakfast), (3).

Tests used:

Cognitive ability tests:

- Test description: It is a test codified by the International Federation (FIFA) for all articles of the Law of the Game. It contains a number of arbitration cases, aiming to measure the referees' knowledge aspect of the Law of the Game.
- Objective of the test: to measure cognitive abilities (errors, misbehavior, and sneaking)
- Tools used: an indoor hall, a projector (data show), a computer (lap top), a form to test the cognitive aspect of arbitration cases after it was translated into Arabic by the Central Referees Committee of the Iraqi Football Federation, pens for the answers.
- Test conditions: The disc was programmed by FIFA, and after the arbitration case is presented, a time interval of (10) seconds appears so that the referee can put his answer in the designated field of the measurement form.
- Calculating the grade: The laboratory must place two choices for the answer (a choice for a technical error and a choice for a disciplinary penalty) out of seven choices, in addition to an eighth field, which is the reason, which is included in the answer. It must state if there was a technical error, and in the case of a correct answer to the two choices, it receives one score. If he makes a mistake in choosing one of the two choices, he will not receive any score (zero). Thus, the highest score in the case of correct answers for all cases is (10) and the lowest is (zero). Likewise, the tester must give two answer choices out of five in the event of the presence of infiltration. In the event of a correct answer to the two choices, he gets one mark. However, if he makes a mistake in choosing one of the two choices, he does not get any score (zero). However, in the case of the absence of infiltration, he gives The tester chooses one answer out of five choices and also gets one mark. Thus, the highest mark in the case of correct answers for all cases is (10) marks and the lowest is (zero).

Testing and measuring biochemical indicators:

- A. Serotonin: The concentration of serotonin in the blood is measured using an (Elisa Reader) device, based on the optical spectrum, after drawing a blood sample before and immediately after effort, separating it, and analyzing it in a laboratory.
 - B. Blood sugar: Blood sugar is measured before breakfast using a home glucometer (using a small drop of blood) before and immediately after exercise.
- Performance level tests: The researchers communicated with the evaluators of the referees in the research sample in order to evaluate their performance level. The evaluation is done through a special, modern electronic form approved by the Central Iraqi Football Federation / Central Referees Committee for the season (2022 - 2023) and for all referees with a change. Category and league, and the evaluator is present inside the match field and evaluates the referees according to the refereeing performance according to criteria formulated in this form that includes (important refereeing decisions, educational materials, control of the match, physical fitness, movement and positions, cooperation and teamwork with other referees and development points for the referees) and is given to the referees A score between (7 - 10). The referee's grade depends on the level of difficulty and ease of the match, as follows (difficult, moderate difficulty, easy). The researchers were keen to adopt the evaluation of one referee in three matches after collecting the matches' grades, extracting the arithmetic mean for the three grades, and adopting One score and discussed statistically.

Exploratory experience:

The exploratory experiment was conducted at exactly 3:00 pm on Friday, January 13, 2023, at Al-Thawra Sports Club, which was conducted on (4) referees from outside the research sample in order to know the effectiveness and validity of the tools used in the research, and the time The time taken for each exercise as well as the total time for all exercises during the training unit.

Main experience:**Pre-tests:**

The pre-tests were conducted at ten in the morning on Friday, corresponding to January 13, 2023, for the functional tests, and at four o'clock in the evening on Saturday, corresponding to January 14, 2023, for the cognitive tests for the experimental and control groups.

Training curriculum:

The training curriculum began on Sunday, January 15, 2023, at 2:30 pm, and the researchers prepared (20) special exercises. These exercises include aspects (physical - skill - cognitive - physiological). They are an exercise for movements, taking position, and cooperation between referees. Refereeing skills (signals) for referees, a refereeing exercise in small squares, a cooperation exercise in scoring the goal from different distances, a running exercise varying distances and speeds, and cognitive exercises to analyze the arbitration cases (considerations) for each decision and interpret it in cases of mistakes, misconduct, offside, and reasons for warning and expulsion, in cooperation with a team. Auxiliary work: These exercises were applied in the period before the competitions for the second division and the Iraqi Premier Youth Football League for the 2022/2023 season. The aim of them is to develop referees in making successful and correct refereeing decisions that contribute significantly to developing the level of referees' performance. The training curriculum may include the following:

1- The curriculum takes (physical exercises - skills - cognitive - physiological exercises, arbitration situations, and arbitration decisions) for a period of (8) weeks and at a rate of (3 training units per week) for the days Sunday - Tuesday - Thursday, with a total of training units amounting to (24 training units), and that one training unit includes The

cognitive aspect, then physical, skill, and physiological exercises. The total time for one training unit is (1:30 hours)

- 2- Taking into account the suitability of the content of the curriculum with the abilities and abilities of the referees to achieve the goal that was set for this, as the training load was taken into account in terms of (intensity - volume - rest periods), using high-intensity interval training in order to suit it with the training period in the period before the competitions, that is, after the special preparation period. It started with a moderate intensity level (70-80%), and it was determined and calculated by means of the pulse, which ranged between (150 - 170 p/min) to judge. As for the volume, it was through repetitions of each exercise and with rest periods appropriate to this intensity.
- 3- The principle of gradualism was taken into account in developing the vocabulary (special exercises), which expresses in a realistic and effective way the conditions to which second-class football referees are exposed and according to their physiological, physical and skill capabilities. The exercises were applied in the main section of the training unit.

Posttests for the research sample:

The post-tests were conducted at ten in the morning on Friday, corresponding to March 17, 2023, for the functional tests, and at four o'clock in the evening on Saturday, corresponding to March 18, 2022, for the cognitive tests for the experimental and control groups. The same conditions for the pre-tests were met, with the same times, tools, and supporting work team.

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

Results:**Presentation the results of the serotonin test:**

Table .1 shows the results of the serotonin test.

Statistical methods	Measuring unit	Pre-test		Post-test		T value Calculated	T value Tabular	Type sig
		Mean	Standard deviation	Mean	Standard deviation			

		n						
Control group	Nano grams/ml	75,111	6,240	82,538	6,661	4,061	2,160	Sig
Experimental group		74,111	8,277	83,738	3,894	4,541	2,160	Sig

Presentation blood sugar test results:

Table .2 shows the blood sugar test results

Statistical methods	Measuring unit	Pre-test		Post-test		T value Calculated	T value Tabular	Type sig
		Mean	Standard deviation	Mean	Standard deviation			
Control group	milligram/dL	101	16,389	94,142	11,155	2,100	2,160	Non sig
Experimental group		99,928	16,940	92,357	12,105	2,346	2,160	sig

Presentation the results of the cognitive abilities test:

Table .3 shows the results of the cognitive abilities test

Statistical methods	Measuring unit	Pre-test		Post-test		T value Calculated	T value Tabular	Type sig
		Mean	Standard deviation	Mean	Standard deviation			
Control group	Degree	4,07	1,49	5,35	2,23	1,92	2,160	Non sig
Experimental group		5,5	1,65	5,85	2,24	0,499	2,160	Non sig

Presentation performance level results:

Table .4 showing the performance level results

Statistical methods	Measuring unit	Pre-test		Post-test		T value Calculated	T value Tabular	Type sig
		Mean	Standard deviation	Mean	Standard deviation			
Control group	Degree	7,9	0,42	8,1	0,22	1,77	2,160	Non sig
Experimental group		8	0,27	8,2	3,22	1,57	2,160	Non sig

Discussing:

Discussion of the results of the serotonin test for the two research groups in the pre- and post-tests:

It is clear from Table (1) that the calculated (t) value was greater than the tabulated (t) value in

the tests, which indicates that the sample had increased serotonin concentrations in the numerical posttests, as significant differences appeared between the pre and posttests for the two research groups and in favor of the posttests, and this is attributed The researchers attributed the

increase in serotonin concentrations to the fact that physical effort and special exercises raise this neurotransmitter and it works to increase nerve conduction within certain limits, but if it rises excessively, it is negative and causes nervous fatigue. (Al-Khalidi) confirms, "Neurotransmission is induced when there is a sufficient amount of the characteristic neurotransmitter released from a presynaptic nerve, and upon release, the neurotransmitter binds to the receptor on the postsynaptic membrane, and that normal concentrations range between (101 - 283) ng/ml" (2)

Discussing the results of the blood sugar test for the two research groups in the pre- and post-tests:

Table (2) shows the results of the pre- and post-tests for blood sugar, where it was found that there were significant differences between the pre- and post-tests, in favor of the post-tests, in the T value for the experimental group. As for the control group, it was non-significant. The researchers attribute this result to special exercises for the stomach and physical effort in reducing Blood sugar reached normal levels and as a result of these tests and the appearance of the sugar level in the tests within (Al-Khalidi), (the normal level before breakfast is (80-110) milligrams/dL, and in that way fuel (glucose) is released in parallel with physiological physical activity), (2), this indicates the presence of a significant effect that contributes to blood adaptation as a result of organized training.

Discussing the results of the cognitive abilities and performance level of the two research groups in the pre- and post-tests:

Table (3) and (4) show the results of the cognitive abilities tests and the level of performance, where it was found that there were significant and non-significant differences between the pre- and post-tests. The researchers attribute the reason for this to the effectiveness of the cognitive approach that was applied to the research sample, which enabled them to have knowledge of the law in cases of mistakes, misconduct, and infiltration, but it was close. Grades from the results of the pre- and post-tests in the test and the matches due to the difficulty of the matches for the sample because

they are inexperienced. In all cases, the referee must be at a distinguished level in understanding the vocabulary of the laws so that he is at a high level that expresses the trust granted to him according to the law. Therefore, the referee is required to be "equipped with knowledge of the rules and laws of the game, which is what is important in it, and this is what was confirmed by (Mahmoud, and et al)." That "the referee's decisions are final and cannot be disputed and are considered final upon the end of the match" (4), which is confirmed by (Al-Badri, Mohsen) (the referee must be able to apply the provisions of the law, and impose his control and authority over the course of the match, since the purpose of setting laws is to punish mistakes Only intentionally and in violation of the law) (1). The study (Ula & Israa) indicated, "The two researchers concluded that there was a significant development in the endurance levels of the aiming arm as a result of training on the Vertimax device" (5). The study (Lamyaa, & Zainab) indicated, "Concerning the use of (Tabata) style exercises according to scientific training foundations to raise the efficiency of short race runners during training and competitions, and adopting the exercises prepared by the two researchers as basic data when training runners for the effectiveness of 100m hurdles" (6). The study (Abeer, & Other) indicated" The research results: (using the exercises and some of the dietary supplements have positive effect on improving some of the physical abilities, speed and accuracy of smash shot skill for badminton young players)." (7). The study (Abeer, & Other)" The results showed that the level of myoglobin in the muscles within the normal limits when using the method of continuous training of badminton players.3. Exercise according to the continuous training method has led to the development of some special fitness elements and basic skills of badminton players" (8).

Conclusions:

The following results are evident from the previous presentation of the research data:

- An increase in the level of serotonin leads to the occurrence of central fatigue as a result of long physiological physical effort.

- A decrease in blood sugar as a result of physiological physical effort is a normal indicator
- An increase in the level of referees' performance as a result of special exercises and their impact on physiological fitness.
- The time limit is insufficient and requires long-term preparation

Recommendations:

At the conclusion of this research, the researchers consider it necessary to write down some suggestions that they deem appropriate in this regard, which are:

- developing scientific training curricula supported by attention to physiological fitness and the use of modern physiological equipment.
- Moving towards conducting comprehensive periodic physiological examinations and not being limited to traditional examinations for referees.
- Calling for more such studies and research in the field of arbitration, physiology, women football referees and the rest of the refereeing ranks in order to shed light on the problems that referees and sub- and central referee committees suffer from and develop successful solutions to those problems.

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Appendix (1)

A model for a special exercise

Exercise name: Signals and decision making (judgmental skills)

Purpose of the exercise: physical and skill (development of refereeing skills).

Exercise duration: (2) minutes

Equipment and tools used: football field, whistle, flags, banners, and a ball.

Description of the performance: There are referees on a football field and it is divided into two halves lengthwise. In the first half of the field there are (4) players playing with the ball, as well as in the other half of the field (4) players. On both sides of the field there is an assistant referee with the flag. When the coach gives an instruction to the referee The first assistant begins to set off, and upon reaching the goalposts, he moves sideways between them, then quickly sets off with the players and the ball to make a decision on the situation that occurred in the far half of him. Likewise, the second assistant referee also takes a decision on the situation that occurred in the far half of him, and the arena referees are in the middle of the field and his decision is supported. For assistant referees.



Appendix (2)

A sample-training unit

Unit purpose: Physical and cognitive (developing refereeing skills) Unit time: 90 minutes
Location: Sports activity field Date: 1/15/2023 Today: Sunday

Name of the statistician: Assist. Prof. Dr. Saadallah Saeed Majeed

The party that benefited from the research: The Referees Committee of the Football Association – Kirkuk

Time	Details	Repetition	Time exercise	Intensity	Rest between repetitions	Rest between exercise	Total time of exercise
30 minute	Cognitive training: inside the hall Explaining the articles of the football law and amendments thereto for the year						

	2023 and showing video films of arbitration cases						
50 minute	Preparatory section Physical training: on the field of play Warm up: light jog around the playground Then flexibility and acceleration exercises (20m x 3)	3		%50			20 minute
	Main section Exercise (1) signals and decision making Exercise (2) refereeing skills and diagonal movement to referee the arena Exercise (3): physical exercise, table tennis, speed run (150 m)	6 4 14	2 minute 2 minute 30 second	%70 %70 %70	2minute 2minute 30second		22 minute 14 minute 14 minute
10 minute	Concluding section Light jogging on the field, relaxation, stretching, abdominal exercises, discussion with the participants, and asking them cognitive questions			%30			

تأثير تمارين خاصة في بعض المتغيرات الوظيفية والقدرات المعرفية وعلاقتها بمستوى اداء حكام الدرجة الثانية بلعبة كرة القدم

علي مهدي هادي الجمالي 1 ، هشام عطا عبد الحسين الجبوري 2
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مستخلص البحث

ان معرفة تأثير تمارين خاصة (بدنية ، مهارية ، معرفية) لحكام كرة القدم في الناقل العصبي (السيروتونين) وسكر الدم والقدرات المعرفية، هو ما تلخصت اليه هذه الدراسة وهدفت الى اعداد تمارين خاصة للياقة الفسيولوجية وتحركات ومواقف تحكيمية، والتعرف على مستوى تراكيز السيروتونين وسكر الدم والقدرات المعرفية ومستوى الاداء لحكام الدرجة الثانية بكرة القدم وتأثير التمارين عليهما، في حين تبلورت مشكلة البحث حول عدم التوحيد بين قرارات الحكام وانخفاض مؤشرات اللياقة البدنية والفسيولوجية والفشل في الاختبارات العملية والمعرفية المؤهلة لتحكيم الدوريات الاعلى درجة، ومن اجل توحيد القرار بين طاقم التحكيم وتحسين او تطوير اتخاذ القرار التحكيمي الصحيح المبني على منظومة وظيفية منسجمة متكاملة في قيادة مباريات كرة القدم في مختلف الظروف التي يتعرض لها الحكام ومستوى ادائهم , دون حصر مجريات التدريب بالجوانب البدنية فقط وانما معرفياً وبدنياً ومهارياً وفسيولوجياً وخططياً ونفسياً، وان المنهجية لحل مشكلة البحث كانت من خلال البحث التجريبي، وتمثلت عينة البحث في حكام كرة القدم الدرجة الثانية في محافظة كركوك، وان التمارين الخاصة تنوعت بين بدنية ، مهارية ، لياقة فسيولوجية، معرفية ، خططية و تمارين مركبة بين بدني مهاري خططي معرفي لتوجيه نظر السادة المسؤولين عن التحكيم إلى أهمية ادخال التمارين اللياقية الفسيولوجية اعلاه، ما يشكل إضافة للمفاهيم الخاصة بتحكيم كرة القدم وان اهم الاستنتاجات كانت ان زيادة نسبة السيروتونين تؤدي الى حدوث التعب المركزي نتيجة الجهد الفسيولوجي البدني الطويل ، وان انخفاض نسبة السكر بالدم نتيجة الجهد الفسيولوجي البدني هو مؤشر طبيعي ، ويوصي الباحثان الى وضع مناهج تدريبية علمية معززة بالاهتمام باللياقة الفسيولوجية والاستعانة بالأجهزة الفسيولوجية الحديثة، من اهداف التنمية المستدامة التي يدعمها البحث هو حفظ الصحة واللياقة البدنية الفسيولوجية وتعزيزها لحكام كرة القدم وهو أمر أساسي من مواصفات الحكم لإدارة وتحكيم المباريات ولتحقيق تنمية رياضية ، اقتصادية واجتماعية مستدامة.

السيروتونين ، سكر الدم ، حكام كرة القدم

الكلمات المفتاحية