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The Digital Indicators Determination for the Period of Cardiac Rest ST and Its Response With Its Extreme Performance Intensity and Its Relationship With the Percentage of Lactic Acid and Blood PH for The Footballers

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Abstract

The importance of the research lies in determining numerical indicators to evaluate the periods of the cardiac rest(ST)and the extent of their interaction to the maximum performance of the athlete with the changes that occur in the values of lactic acid and PH blood to maintain the performance of high football players without disruption or fatigue affecting the level of performance accuracy, as for the research problem, the researchers noted that there are no clear numerical indicators for the periods of cardiac rest and their relationship to extreme performance, as well as the lack of knowledge of the relationship of cardiac rest, lactic acid and blood PH during the maximum performance of football players. The research aims to determine the criteria (degrees and standard levels) for the periods of cardiac rest ST for footballers to the excellent level in Basra Governorate, also to identify the level of lactic acid and pH blood for football players for the excellent degree in Basra Governorate, learning about the relationship between the periods the cardiac rest(ST)and the level of lactic acid and pH blood of football players for the excellent degree in Basra Governorate. As the research sample has reached to (60) players after excluding (9) players representing the goalkeepers in addition to the injured players. That the researchers have used the Statistical Package (SPSS) to deal with the data and extract the results that have been obtained from the measurements of the research, as the most important conclusions were: finding the criteria (standard levels and degrees) that serve as the objective guide for the assessment of the level of the adaptation and training.Also the most important recommendations, it is to adopt the criteria that the researchers have extracted in the evaluation processes of adaptation and training as well as for forecasting and classification selection for football players.

Key words: *Measuring the cardiac res t(ST), Measuring the concentration of lactic acid in the blood, PH blood measurement*

The Introduction

The development of the sciences and their interconnectedness have become an evident in all the milestones and milieus of modern science, including sports sciences, which have invited the researchers in this science to search for everything that would advance or influence on the sporting aspects, including football, which is characterized by fun and excitement in all societies, as the blood circulatory system is one of the systems that has a direct impact on the reality of the footballers, so it has become necessary to reveal all the particles of the blood circulatory system,

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including the cardiovascular system, which is the active organ of the circulatory system, including the periods the cardiac rest(ST) for the athlete, lactic acid and PH blood during the maximum performance of the athlete.

The importance of the research

The importance of the research lies in identifying numerical indicators to assess the periods of cardiac rest ST and how do they interact with the athlete's maximum performance as well as the changes that occur in the values of lactic acid and blood pH to maintain the performance of high football players without disruption or fatigue that affect the level of performance accuracy.

The Research problem: By the two researchers examining a lot of sports morals, that they observed the absence of clear numerical indicators for periods of cardiac rest and their relationship to the extreme performance, as well as the lack of knowing of the cardiac rest with the lactic acid and the blood PH during the maximum performance of the football players.

The Goals of the Research

1-Determining the criteria (the degrees and standard levels) for the periods of cardiac rest ST for football players for the excellent level in Basra Governorate.

2-Identifying the level of the lactic acid and pH blood of the footballers for the excellent level in Basra Governorate.

3-Knowing the relationship between the periods of the cardiac rest(ST)and the level of lactic acid and blood pH of the football players to the excellent level in Basra Governorate.

The Research Domains:

1-The Human Domain: Players of Basra Governorate Clubs to the football excellent level for the 2018-2019 sports season for advances.

2-The Temporal domain: From 1/3/2019 to 1/5/2019

3-Spatial domain: Dr. Hassan Al-Rubaie's laboratory which is located in the Briha area and Al-Masfaa Laboratory for pathological analyzes in the region of Bariha. Cardiac work with the ECG

The Research methodology and the field procedures

The Research Methodology: The researchers have adopted the descriptive approach using the appropriate survey method to solve the research problem

The research community and sample: the search community represented by the players of Basra Governorate clubs for the excellent level of football for the 2018-2019 sports season, that the number of them is 69 player

As for the research sample, it has reached 60 players, after excluding 9 players who are goalkeepers in addition to the injured players.

The Research tools and devices

The researcher has used the following tools

Plastic (Tube)				
Medical injection at size about (5 cm 3)	Cotton + sterile material	Computer	Photographic camera	(Centrifuge)
ECG device	The moving belt device**(READTMILL)**	METER PH device	device (Test Lactate Blood Meter)	Lactic acid measuring device(meter Test Pro Lactate)

The Procedures of the field research

1- Measuring thecardiac rest(ST)

The cardiac rest period was measured by using the ECG method in Al-Faihaa Teaching Hospital by the specialist * after performing the physical effort on the TREAD MILL.

1- Measuring the concentration of lactic acid in the blood.

The concentration of the lactic acid in the blood was measured by a (Test Lactate Blood Meter), as it is measured in the field and after performing the test requirements where the index finger was pricked to the laboratory,as the second drop of laboratory blood was taken, after five minutes of the completion of the test.(That drawing blood from the player after five minutes of the rest is the best time for spreading thelactic acid from muscle to blood.))[1](

After placing a drop of blood on the test strip (Ki^+) where the descending reading of the seconds starts on the device screen a time of (59) seconds down to (1) seconds after which the reading of its concentration of lactic acid in the blood will appear.

The Lactic acid meter parts:

1- Meter Test Pro Lactate.

2-The left (drills) (Lancets).

3- Strip Check, which is the key to operate the device.

4- The measurement tape for the lactic acid (Strip Calibration).

5-Calibration tape or assessingtape (strip Calibration).

6- Two batteries to operate the device.

7- Carrying case.

2- Measuring the blood's pH

After performing the blood drawing from the players, it was placed in special tubes (Tupe) as the player's name was registered on it, then the blood was treated through a centrifuge at a rate of (4000 rpm) for a period of (5) minutes during which the plasma was isolated from other blood components,then the blood pH was measured by using the METER PH device, which is based on the change in the voltage through the electrode (Electrode Glass) due to the difference in the concentration of hydrogen ionsin the test solution (serum) (H^+) relatively to the reference electrode (Electrode Calomel), that the appropriate time for measuring the lactic acid in the blood is from 3 to 5 minutes in order to give an opportunity for the lactic acid to move from muscle to blood. As (Shaker Al-Sheikhly)quoting from (Gulnaikand others: 1986), stated that they are preparing a period of (5) minutes that is very suitable for the purpose of drawing blood and measuring the concentration of the lactic acid after completing the exercise) [2] (.

The Physical effort

The researchers have designed a physical effort on the TREAD MILL device with a maximum intensity (maximum) until the physical effort was exhausted or the pulse reached (180 b / m). As the physical effort was as follows:

The physical effort starts with a speed (6 km / hour), the speed gradually increases every (20 seconds) (2 km / hour) to reach (16 km / hour) with a slope of 10 degrees.That the performance continues until the exhaustion of the physical effort or the pulse reaches (180 b/ m), after which the heart enters into the critical state.

Exploratory experience

The researchers conducted the exploratory experiment on (Wednesday) on the date of 3/6/2019 on 10 players from the same sample in order to verify the safety of the devices and the tools which are used for testing also to identify the

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[1] -Muhammad Ali Al-Qit: Jobs of Athletic Training Members, Applied Entrance, Arab Thought House, Cairo, 1999, p. 27.

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[2] -Shaker Mahmoud Zainal Al-Sheikhly: The effect of standardized training methods from vartelike in developing speed tolerance, concentration of lactic acid in the blood and completion of running 400 meters and 1500 meters: PhD thesis, College of Physical Education, University of Baghdad, 2001, pp. 53-54. .

difficulties that faced the researchers during the performance of measurements with the ability of the assisting cadre on the measurements at the time of measurements.

The main experiment

The researchers conducted the main experiment on (Wednesday) 3/3/2019 on the research sample which is consisting of 60 players at nine O'clock in the morning in the Naft al-JanoobClub Sports hall which is continued for two months.After the players warm up and climb up one after the other to perform the physical effort which was sat up on the TREAD MILL, then the researchers' measurement is done after the drawing of the blood.

The researchers have used the Statistical Package (SPSS) to treat the data and extract the results which is obtained from the measurements of the research.

4- Presenting and discussing the results:

4-1 Presenting the results of the cardiac rest period and the percentage of the lactic acid and blood pH for football players:

After the researchers have reached to the results through the use of statistical treatments,also to achieve the research goal for finding the standard degrees to the test for a period of cardiac rest by obtaining the raw dataas (it requires the conversion of the raw degrees into standard degrees, which is a way for determining the relative state of the raw degrees, therefore these degrees can be interpreted and evaluating their results))[1](

So the researchers have presented Table (1)

Table (1)

N.	Statistical tests	Measurement unit	Arithmetic mean	Standard deviation	Standard error	Highest degree	Lowest degree
1	cardiac rest	Second	0.1010	0.0011	0.00018	0.14	0.03
2	Lactic acid	Ml/Lit	5.7	0.86	0.014	6.55	4.83
3	Blood PH	Degree	7.271	0.0931	0.0015	7.36	7.17

As the researchers converted the raw degrees to the standard degrees in a sequential manner to test the cardiac rest period for the footballers

Table (2)

Shows the raw and standard degrees in a sequential manner to test the cardiac rest period for football players, knowing that the fixed amount = (0,0011)

The Degrees							
Standard	Raw	Standard	Raw	Standard	Raw	Standard	Raw
1	0.0471	26	0.0746	51	0.1021	76	0.1296
2	0.0482	27	0.0757	52	0.1032	77	0.1307
3	0.0493	28	0.0768	53	0.1043	78	0.1318
4	0.0504	29	0.0779	54	0.1054	79	0.1329
5	0.0515	30	0.079	55	0.1065	80	0.134
6	0.0526	31	0.0801	56	0.1076	81	0.1351
7	0.0537	32	0.0812	57	0.1087	82	0.1362
8	0.0548	33	0.0823	58	0.1098	83	0.1373
9	0.0559	34	0.0834	59	0.1109	84	0.1384
10	0.057	35	0.0845	60	0.112	85	0.1395
11	0.0581	36	0.0856	61	0.1131	86	0.1406
12	0.0592	37	0.0867	62	0.1142	87	0.1417
13	0.0603	38	0.0878	63	0.1153	88	0.1428
14	0.0614	39	0.0889	64	0.1164	89	0.1439
15	0.0625	40	0.09	65	0.1175	90	0.145
16	0.0636	41	0.0911	66	0.1186	91	0.1461

[1]-Muhammad Hassan Allawi, Muhammad NasruddinRadwan: Measurement in Physical Education and Sports Psychology, Cairo, Rose Al-Youssef Foundation, 1988, p. 179.

17	0.0647	42	0.0922	67	0.1197	92	0.1472
18	0.0658	43	0.0933	68	0.1208	93	0.1483
19	0.0669	44	0.0944	69	0.1219	94	0.1494
20	0.068	45	0.0955	70	0.123	95	0.1505
21	0.0691	46	0.0966	71	0.1241	96	0.1516
22	0.0702	47	0.0977	72	0.1252	97	0.1527
23	0.0713	48	0.0988	73	0.1263	98	0.1538
24	0.0724	49	0.0999	74	0.1274	99	0.1549
25	0.0735	50	0.1010	75	0.1285	100	0.156

Table (3)

It shows the standard levels and their ratios in the normal distribution curve, raw degrees, modified standard degrees, number of players and percentages for a cardiac rest period

Levels	**Raw degrees**	**Standard modified degrees**	**Num. of Players**	**Percentage**
Very good(4.86)	0.0471 - 0.068	20 - 1	2	% 3.33
good(24.52)	0.0691 - 0.09	40 - 21	8	% 13.33
Medium(40.96)	- 0.112 0.0911	60 - 41	38	% 63.33
Accepted(24.52)	- 0.134 0.1131	80 - 61	9	% 15
weak(4.86)	0.156 - 0.1351	100 - 81	3	% 5

The researchers attribute the reason for the players obtaining different degrees and levels in the time of cardiac rest of the ST wave due to the fluctuation in the work of the heart muscle and the extent of its association with the breathing process and the process of filling the deficiency which is resulting from the increase in the number of heart beats (heart rate), as the time of a heart beat whenever it is reduced to (0.3) seconds, this is largely reflected in the time period between ST which expresses a short period of relative inactivity to the cardiac rest(ST) (heart rest),therefore, we see that the rapid rise in the heart rate gives an indication to the adaptation status of the player and the extent of the training process's contribution to the harmony between the breathing process (inhalation and exhalation) where the former works to increase the heart rate and the other works in slowing the cardiac cycle with the decreasing of the pulse rate.

So the researcher agrees with what was confirmed by Abu El-Ela Ahmed Abdel-Fattah and Mohamed Sobhi Hassanein (1997) ((It was noticed that some athletes have fluctuations in the interstitial periods. This fluctuation in the cardiac cycle is mainly related to breathing, as time gradually decreases in the cardiac cycle (the heart rate increases) during inhalation, also the opposite occurs during exhalation, slowing heart rate occurs and heart rate decreases ..., as this phenomenon is called Arthmia Resiratoria.

This phenomenon was noticed in many athletes, as it takes the form of a reflection which is related to the change in the central tension of the confused nerve, NervusVagus, during breathing operations….. This condition is one of the signs of the functional state of the heart)))[1](

The researchers also believe that the increase in the heart rate reflects negatively on the cardiac rest(ST), which is an important stage of returning venous blood and its quantity in the left ventricle and its fullness, which the matter that affects the amount of the pushing blood which it is the primary work of the heart muscle in supplying the body and muscle cells with oxidizing blood and melted glucose sugar which are considered the basis for the energy release process to continue the muscle work and also continuing the physical effort.((There are some effects on blood dynamics (Heamody namica blood circulation) as a result of this phenomenon: systole irregularities, especially in

[1] -Abu El-Ella Ahmed Abdel-Fattah and Mohamed SobhiHassanein: Physiology and Resources of Mathematical Physiology and Measurement Methods for Orthodontics, 1st Floor, Cairo, Dar Al-Fikr Al-Arabi, 1997, p. 41.

some early cases of excess systole, in this case as a result of reducing diastole, as a fact of matter, the heart cavity do not take the appropriate opportunity for fullness, as a result of pushing blood in the early cases, the state of excess contractility may decrease or even disappear completely, that the blood pressure does not increase significantly)))[1](

The researchers also see the reason of the difference and measurements between the players to the nature of physical effort and intensity of performance with the ability of the players to resist overcoming the effort through the work of the heart according to its best productivity as well as the extent of the ability to control the increase in cardiac output, also the extent of the possibility of benefiting from the size of the reserve blood in the heart cavity and its adherence to the size of the circulating blood in a manner that is proportional to the level of intensity of the physical effort as it reaches its maximum limit, so this gives an indication that the higher intensity of the muscular action whenever the pump from 140 - 150 b/ m for the heart rate, the adaptation process is better..

The researchers agree with what was confirmed by Abu El-Ella Ahmed Abdel-Fattah and Mohamed Sobhi Hassanein (1997) as whenever the response is normal which it calls for the pressure changes and the pulse rate when the percentage of increase in pulse rate coincides with the percentage of increase in pulse pressure ...,in this case, the systolic pressure rises and the diastolic pressure decreases, as the normal response is considered acceptable, so it indicates that the adaptation for physical effort has been as a result of the increase in the size of the cardiac impulse, that is evidenced by the increasing in pulse pressure, as the increase in systolic pressure reflects the strength of the contraction of the left ventricle of the heart, while the reducing the diastolic pressure reflects the decrease in arterial tension in helping to deliver blood to the tissues, it can also be considered an increase in the rate of pulse and the non-change of diastolic pressure from the normal variables.)[2](

The researchers agree with what was confirmed by (Frank Starling-the Heat of Mechanism -) who asserted that ("the more the heart was filled with more blood during diastole the amount of blood being greater which it is pumped to the aorta and pulmonary, in other words, the heart pumps a pump with physiological limits of all the blood that reaches to the left and right side without allowing large amounts of it to accumulate in the veins, as this mechanism is called the inner ability of the heart to adapt when changing the size of blood which is coming to it.)[3](

Table (4)

It shows the relations between cardiac rest **(ST)**, lactic acid and **PH** blood of football players

Statistical treats / Variables	Measurement unit	Arithmetic mean	Standard deviation	Accounted R Value	Sig	The Result
cardiac rest	Second	0.1010	0.011			Significant
lactic acid	Mmol / l	5.7	0.86	0.81	0.000	
PH blood	degree	7.271	0.0931	0.79	0.002	Significant

The researchers attribute the reason for the existence of the inverse relationship between the accumulation of the lactic and the period of cardiac rest (ST) to the individual variables among the players, as well as for the adaptation processes and the training operations according to the lactic system which needs relatively long periods to create a state of compatibility between the accumulation of the lactic and the pulse rate by relying on an important base in the science of sports training which is the continuity, as we note the decreasing in the lactic appears after the fourth month of training according to physical work with a lack of oxygen, which leads to an increase in the rate of pulse which does not reach to the critical state, therefore the lack of a high increase in the rate of pulse leads to an increase in the rate of cardiac rest (ST).As the researchers agree to what was indicated to it (Ausama Sabeeh, quoting from Muhammad Reda), that the levels of training and athletic forma affect the rate of the rest of functional body systems, recovering their healing, that the athletes who are in a degree of training and high athletic form will have

[1] -Abu El-Ella Ahmed Abdel-Fattah and Mohamed SobhiHassanein: ibid (1997), p. 43
[2]-Abu El-Ella Ahmed Abdel-Fattah and Mohamed SobhiHassanein: a previously mentioned source (1997), p. 84
[3] -Gatin and Hall: The Reference in Medical Physiology, translated (Sadiq Al-Hilali), World Health Organization, 1997, p. 135.

physiological reactions with less specific training stimuli, thus the time which is required for the rest of their functional devices to be restored and recovered could be lesser.)[1](

The correct relationship between work and the rest works to create equal values in terms of time to compensate for renewable materials at rates higher than the original levels, that the knowing methods for successive training operations, as the basic principle is to stabilize the breaks, either gradually increasing the stress or stabilizing the stress and shortening the rest periods gradually, as this method works to compel the internal organs to work according to the variable requirements and work for completing recovery of the materials that he consumed during the exercise according to biomechanical processes commensurate with the conditions of the match.

The researchers also attribute the existence of a correlation between the decrease in the value of the (PH) and the periods of cardiac rest to increase the viscosity of the blood, thus reduce the speed of blood flow and venous blood that which return to the heart, that leads to an increase in the pulse rate to compensate the decrease in the amount of pushing blood, as this is at the expense of the size of the strike and the cardiac output to supply the muscles with oxidized blood for continuing the muscle work freely, therefore, we see that the process of continuous and regular training works to create a state of high adaptation for the work of vital organizations to resist the decrease in the values of the (PH),as this has to do with getting rid of accumulations of muscular work, getting benefit from it as energy sources, the matter that which leads to not increasing the acidity of the blood in a way which affects the work of the heart)[2](.

The researchers agree with the findings of (Kamal Zaki Kamil 2016), which shows the large contribution of the (PH) blood base ... ... when performing a high-intensity physical effort under conditions of low oxygen intake, this leads to increase the energy output in the non-oxygenic way, containing in it Lactic acid and carbonic acid which increases as a result of the Co_2 increase, also the increase in these acids leads to a decrease in the (PH) blood, which leads to a reduction in the work of the functional organs and the inability of the muscles to continue working)[3](.

The Conclusions

1- Criteria have been found (standard level sand degrees) that serve as the objective evidence for the assessment of adaptation and training.

2 - The lowering of the period of resting the heart **(ST)**, resulting the higher of the pulse rate, as this increases the lactic in the blood, which leads to the appearance of fatigue early and vice versa.

3- An increase in the acidity of the blood coupling with an increase in the rate of pulse and lactic, which leads to an increase in the viscosity of the blood, as this appears through the positive correlation.

The Recommendations

1- Adopting the criteria that the researchers extracted in evaluations of the adaptation and training, as well as for predicting, selection and classification for the footballers.

2- Adopting these criteria as criteria for judging the phenomenon from inside, as well as comparing it with standard (ideal) judgements to know the level of the development as well as the possibility of competition in matches.

3- The linking among the pulse rate, the lactic acid and blood(pH) in the training process through inducing of adaptation cases by using hypoxia exercises.

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[1] -Osama Sobeih Mustafa: Designing and codifying complex tests and predicting the level of training indicator in terms of some physical and biochemical variables by hand, PhD thesis, College of Physical Education, University of Basra, 2014, p. 104..

[2] -Osama Sobeih Mustafa: The same previous source, 2014, p. 104.

[3] -Kamal ZakiKamel: Design and codification of tests to measure speed and power elongation in terms of some functional and biochemical variables for advanced boxers in Basra Governorate, Master Thesis, College of Physical Education and Sports Science, Basra University, 2016, pp. 96 - 97.

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