



## THE EFFECT OF COMPETITION LOAD ON THE CONCENTRATION OF LACTIC ACID AND SOME BLOOD ELECTROLYTES AS AN INDICATOR OF SOME PHYSICAL ABILITIES OF YOUNG FOOTBALL PLAYERS

Assist. Prof. Dr. Khalid Oudah Gashyyish<sup>1</sup>, Prof. Dr. Aqeel Muslim Abdul Hussein<sup>2</sup>

<sup>1,2</sup>Physical Education and Sports Sciences, Al-Muthanna University, 66001 Iraq

[Physics1984@yahoo.com](mailto:Physics1984@yahoo.com)

### Abstract

The rapid development that is taking place in the field of scientific research has taken a mistake in progress and advancement, which has become one of the requirements of our current time, and the sports field is one of these areas that has been affected in this development as an important element in the integrated numbers, if research in the field of physical and sports sciences becomes one of the characteristics of developed countries to achieve High achievements through the manufacture of champions by developing their physical, skill, planning and career level. The development of sports performance has taken a great deal of space, as we notice that athletes break records in a familiar manner every year and that the increase in competitions in all sports, especially the football game, which requires exceptional efforts from workers in the field of training in order to increase scientific knowledge of the impact of the effort of the match on the vital devices in the athlete's body in order to develop scientific programs and legalize training loads in a manner commensurate with the athletes' ability and in order to achieve functional adaptation that reflects the development in the level and according to these adaptations the athlete's functional capabilities increase.

**Keywords:** Lactic Acid, Skill, Competition, Phosphagine, Football Game

### Introduction

The effect is according to the nature of each activity, the duration of the competition and the style of performance. And as it is known that the load of competition in the game of football requires a level of high functional adaptation and this requires the player to be in one level during the competition, as the game consists of two halves in its general form, or the match may continue to additional periods, and sometimes the match is not decided except Through penalty kicks and this extra time makes there a physical burden when the match continues for more than two halves, which leads to a decrease in the level of players during the match. Knowing the level of each player through which the player's physical and functional condition can be evaluated, and through which he can participate in training and competition.

Therefore, identifying the changes that occur as a result of the impact of the competition load will help those in charge of the training process to understand the foundations of those variables, and then to identify the physical ability of each player, through which it is possible to stand on the training process and the development of the physical and functional level of the players, and through the foregoing came the importance of research in Identifying the most important biochemical changes that occur in players as a result of the competition, which is an

indicator of some physical abilities in order for the coaches to benefit from them and to reach the players in the football game to the best level.

### **Research Problem**

The competition in football naturally requires a high physical level so that the player can continue at a stable and stable level during the course of the match without a decline or weakness in performance, and as it is known and through our knowledge in this area as workers in the Premier League, we noticed that most of our clubs in the game Football suffers from great difficulties, especially when matches last more than the official time, especially in matches that must be decided by the exit of one of the two teams. Most of the Iraqi clubs, through this research and study of biochemical variables, through which it is possible to determine the player's physical condition and thus reach results and solutions that we can benefit from in evaluating the players' level and predicting their physical abilities.

### **Research Objectives**

1. Recognizing the effect of competition load on the concentration of lactic acid, sodium salts, calcium and potassium in the blood of young football players.
2. Identifying the differences in the concentration of lactic acid and blood electrolytes between the pre-measurement and after the end of the first half and after the end of the second half for the players.
3. Identifying the relationship between the concentration of lactic acid, blood electrolytes and kinetic speed of the research sample players.

### **Research Hypotheses**

1. There are significant differences in the concentrations of lactic acid and blood electrolytes between the pre-measurement and after the end of the first half and after the end of the second half.
2. There is a significant correlation between the concentration of lactic acid and blood electrolytes and the kinetic speed of young football players for each half of the match.

### **Research Areas**

1. The human field: the young football players in Al-Samawahh club participating in the Premier League season (2021/ 2022)
2. Time range: 1/25 to 3/28/2022.
3. The spatial domain: the Olympic stadium in Samawahh and the Al-Laith laboratory for pathological analyzes in Samawahh.

### **Research methodology and field procedures**

#### **Research Methodology**

The researchers used the descriptive approach using the survey method as the best method to achieve the objectives of this research, as it is ((a method that depends on the study of reality or phenomenon as it exists in reality and is concerned with being an accurate description and expressing it qualitatively or quantitatively))

#### **Research community and sample**

The researchers identified the research community and they are the young players in the Samawah club participating in the Premier League for the season (2020-2021) in football, and

their number is (24) players representing the youth team of the Samawah club, and then the sample was selected and they are the main players and their number (11) players through Conducting a friendly match in the Olympic stadium in Samawah. The researchers were keen that the main players participate in this match throughout the time of the match to ensure the impact of the match effort on all participating players, and in order to avoid influences that may affect the results of the research, some variables have been identified. The samples that represent the specifications of the sample for the purpose of ensuring its homogeneity, and Table (1) shows this.

Table (1) It shows the homogeneity of the sample members

Indication level	degree of freedom		F <sub>life</sub>	Variables
0.068	30	2	2.942	sodium
0.065	30	2	3.006	potassium
0.090	30	2	2.616	Calcium
0.070	30	2	2.916	Lactic

It appears from Table (1), which presents the Levine test, that the hypothesis of equality of variances (homogeneity of variances) is true, because the result of the Levine test is not significant (the significance value is greater than 0.05)

#### Devices and auxiliary tools for research

- Self-testing blood device.
- Vacuum tubes for blood preservation.
- Manual pipette, medical syringe (syringe) to draw blood with medical cotton.
- Dell (Lapton) calculator.
- Manual electronic calculator (Casio) of Japanese origin.
- Japanese-origin electronic stopwatch, number (2)
- Chalk.
- Medicine ball (5 kg), measuring tape.
- Cool Box.
- A blackboard.

#### Steps of Conducting The Research

##### Experimental Experiment

The two researchers conducted an exploratory experiment on Saturday, 5/2/2022 at exactly four o'clock in the afternoon at the Samawah Olympic Stadium on a sample of (6) players from the research community. The purpose of the exploratory experiment is:

1. Identifying the validity of the devices and tools used in the research.
2. Identifying the obstacles and difficulties facing the researchers and the assistant work team.
3. Identifying the validity of field and laboratory tests and their suitability for the research sample.
4. Knowing the time taken to take the tests.

5. Knowledge of the efficiency of the assistant work team.(\*)

**Tribal tests**

The tribal physical tests of the research sample were conducted on Saturday, corresponding to February 12, 2022 at four o'clock in the afternoon in the Samawah Olympic Stadium. With the help of a specialized medical staff headed by Dr. Laith Saeed, blood samples were drawn from each player in the resting position and placed in the designated blood preservation tubes and numbers were fixed on them indicating each player, and the blood samples were examined in the laboratory of Al-Hussein Teaching Hospital at (9) in the morning before breakfast This is for the purpose of identifying the level of (sodium, potassium, calcium, lactic acid concentration)

**Physical exams**

**Test: Run (30 m) from the beginning of the plane**

**Purpose of the test: To measure the maximum speed.**

**Tools needed: Electronic stopwatch.**

Two lines (30 m) apart, and a third line (10 m) away from one of the two lines, are drawn for the start of the run from that line, provided that the time occurs from the moment the laboratory reaches the measurement start line to the end line.

- Objective of the test: acceleration of the total running time (acceleration)
- Description of the performance: The tester stands with his front foot behind the starting line. Run from standing. When he hears the start signal, he runs from the first line. The start time starts with a signal from the line observer:
- Record the time to the nearest ten (1/10) second.
- Only the last (30 m) time is recorded out of (40 m)
- Purpose of the test: To measure the speed characteristic of the muscles of the legs.
- Hardware and tools:
- A blackboard fixed to the wall with its lower edge raised off the ground by a distance (150)cm) to be inserted after that from (151 cm) to (400 cm). The board can be dispensed with by placing markers on the wall with a line or a piece of chalk.
- Performance Specifications: The lab dips the distinguished hand in the mains. The lab raises his arm in full extension to make a mark on the board. Then the lab performs from a specific area from the jumping area by taking a run of about (3) steps to jump from the movement to the maximum distance he can reach to make another mark. With the entire arm extended, each laboratory has three attempts to score the best of it.
- Recording method: The distance between the first mark and the second mark expresses the amount of strength that the tester has of the speed characteristic of the legs, measured in centimeters.

**Measuring the concentration of variables**

It included measuring the important indicators in some blood electrolytes and lactic acid

through the process of drawing blood. A blood sample was drawn from the players with an amount of (5 cc) and in a resting position by Dr. Laith Saeed Jabbar, where the blood was drawn on the day of the test corresponding to 12/2/ 2022 at nine in the morning, and the analysis doctor confirmed that the sample did not eat any type of food (12) hours before the analysis and the variables to be measured are:

### The main experience

The two researchers conducted the main experiment by conducting a friendly match between the Al-Shabab team and Al-Muthanna Club of the first degree in the Olympic Stadium in Al-Muthanna on Saturday 19/2/2022. The researchers were keen that all the sample members participate in the match. From the players (rest time), i.e. without any effort. As for the procedures after the end of the first half, the first dimensional procedure included drawing blood immediately after the end of the first half by a specialized medical staff, in order to obtain concentrations (sodium, potassium, calcium). The concentration of lactic acid was done after (5) minutes, which is the best period for the transfer of lactic acid from the muscles to the blood. A blood sample is taken from each player using a (Lactic Prometer) device. Sterile alcohol is placed on the player's finger after which a special needle is pricked. Measure the blood sample the first time and take it the second time to avoid the appearance of lactic salts and thus affect the results of the lactic acid and put it on the strip list, where it requires only about (5) microliters of blood, and the result can be known in less than a minute and then it is recorded The score is in the player's data each time it is measured and the blood for each player is kept in blood preservation tubes and is numbered with a fact that indicates blood is drawn after the end of the first half.

As for the procedures after the second half, it includes the process of drawing blood after the completion of the second half and the match, and with the same procedures in the first dimensional procedure. The blood is saved in blood preservation tubes (tubes) marked by a name and a symbol for each player referring to the second dimensional drawing so that the samples are transferred to the laboratory by The auxiliary staff is dealt with in the same way in the pre-test.

### Statistical means

The researchers used the statistical package Spss and extracted the following from it:

1. Arithmetic mean.
2. The standard deviation.
3. Levin's test.
4. Shabbir-Walak test.
5. Analysis of Variance (F) test
6. Least significant difference (L.S.D)
7. The linear regression equation.

Presentation and discussion of the results

Table (2) Arithmetic means and standard deviations for the three periods

standard error	standard deviation	SMA	Variables	Period
0.74326	2.46510	146.4455	sodium	Period
0.23152	0.76788	4.0182	potassium	
0.02382	0.07901	1.1673	Calcium	

0.02660	0.08824	0.7136	Lactic	After the first half
0.77460	2.56905	143.0000	sodium	
0.20012	0.66374	4.2636	potassium	
0.05060	0.16784	1.1091	Calcium	
0.08899	0.29514	4.3355	Lactic	
0.34962	1.15955	141.2364	sodium	After the second half
0.10879	0.36081	3.8273	potassium	
0.02374	0.07874	1.1000	Calcium	
0.11146	0.36968	7.7264	Lactic	

Table (2) of the characterization statistics presents the mean and standard deviation values for the three periods of stress, where we note that the average values for the period before the effort for the four variables (sodium, potassium, calcium, lactic) came respectively (146%, 4%, 1%, 1%)

As for the mean values for the period after the first period for the four variables (sodium, potassium, calcium, lactic), they came in succession (143%, 4%, 1%, 4%), while the average values for the period after the second half came for the four variables (sodium, potassium, Calcium, lactic) came respectively (141%, 4%, 1%, 7%)

It also appears from the same table that the values of standard errors for the three periods and for all variables were small compared to the averages, and this indicates that the samples represent the population more accurately than the best representation. Before looking at Table (3) for the comparison between variables, it is important to verify the hypothesis of homogeneity of variances using the (Levene) test, as well as to verify the hypothesis of the moderation of the distribution.

Table (3) The calculated value of the Shapiro-Walok test and its level of significance for the three groups in the research variables

Indication level	degree of freedom	calculated	Variables	the group
0.154	11	0.893	sodium	before the effort
0.771	11	0.960	potassium	
0.238	11	0.909	Calcium	
0.032	11	0.840	Lactic	
0.510	11	0.939	sodium	After the first half
0.573	11	0.944	potassium	
0.059	11	0.861	Calcium	
0.026	11	0.834	Lactic	
0.215	11	0.905	sodium	After the second half
0.124	11	0.886	potassium	
0.042	11	0.849	Calcium	
0.445	11	0.933	Lactic	

It appears from Table (3) that the Shapiro-Wak test is not significant because all significance values are greater than the standard criterion (0.05), meaning that the distribution is normal for all variables in the three periods.

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Table (4) Test value (F) and significance level

indication statistic	level indication	value (F)	Average variance	Degree Freedom	Total Contrast	Contrast source	Variables
Moral	0.000	24.638	87.329	2	174.659	between groups	sodium
			3.545	30	106.336	within groups	
				32	280,995	total	
insignificant	0.272	1.361	0.526	2	1.053	between groups	potassium
			0.387	30	11,604	within groups	
				32	12,656	total	
insignificant	0.352	1.083	0.015	2	0.029	between groups	Calcium
			0.14	30	0.406	within groups	
				32	0.435	total	
Moral	0.000	2272.697	131,681	2	263.363	between groups	Lactic
			0.058	30	1.738	within groups	
				32	265.101	total	

It seems that the difference between the three groups (before the effort, after the first period, after the second period) in the search variables (K, Calcium) based on the degree of freedom (2, 30) is insignificant at  $P > 0.05$ . It also seems that the difference between the three groups (before effort, after the first period, after the second period) in the research variables (sodium, lactic) based on the degree of freedom (2, 30) is not significant at  $P < 0.05$ .

Table (5) It shows the significant differences between the arithmetic means for the level of achievement of samples for the three periods in the variables Research (sodium, lactic) with a test value (L. S. D.).

Statistical significance	Indication level	average difference	periods	Variables
Moral	0.000	4.02727	Before the effort - after the first half	sodium
Moral	0.000	5.42727	Before the effort - after the second half	
insignificant	0.091	1.40000	After the first half - after the second half	
Moral	0.000	3.62182 -	Before the effort - after the first half	Lactic
Moral	0.000	-6.91727	Before the effort - after the	

			second half	
Moral	0.000	-3.294545	After the first half - after the second half	

**It appears from the above table that**

First: The sodium variable: The value of the significance level accompanying the value of (L.S.D.) (0.091) is greater than (0.05), which indicates the random differences between the two arithmetic means for the two periods (after the first half - after the second period) The two values of the significance level accompanying the value of (L.S.D.) (0.000, 0.000) are less than (0.05), which indicates the significant differences between the two arithmetic means for the two periods (before effort - after the first half), (before effort - after the second half)

Second: The lactic variable: All values of the significance level accompanying the value of (L.S.D.) (0.000, 0.000) are less than (0.05), which indicates the significant differences between the two arithmetic means for the three periods (before effort - after the first half), (before effort - after The second half) (after the first period - after the second period) Through the results that appeared in tables (4, 5), it was found that there is a significant difference between the measurements in the level of sodium and lactic acid in favor of the measurement after the first half, and after the end of the second half, and this confirms that at the end of the match there is more concentration in the variables. The researchers believe that high intensity sports activities lead to an increase in sodium and lactic concentrations in the blood as a result of high physical exertion during the match period, and that the work system is anaerobic, and this is what our current study continued, as it was shown from Table (5) that there are significant differences in the percentage of The accumulation of lactic acid and sodium between the pre and dimensional measurements after the end of the first half and after the second period) and for the benefit of the second half, and (Bahaa El-Din Salama) stresses that the muscles build the triadenosine phosphate from the cleavage of creatine, and anaerobic energy is released, i.e. in the absence of oxygen, but quickly This energy is depleted within seconds, then the muscles are forced to destroy the stored glycogen in them to restore (ATP) building, to release anaerobic energy and this process results in lactic acid, where there is not enough oxygen (), as playing after the end of the first half and after the rest period did not He completely gets rid of lactic acid, and then the player makes another effort during the second half, and he originally has a percentage of acid in the blood, so the accumulation of acid after the end of the second half is higher than the end period The first half is the result of the accumulated effort by exerting effort during the two halves of the match, and this explains the large differences between the tribal measurements and measurements after the end of the second half compared to the measurements after the end of the first half, as (Raysan Khraibet and Ali Turki) confirm that the maximum intensity of the match and the repetition of skills and movements The many and rapid during the match for many times have led to an increase in the level of lactic in the blood as a result of the completion of the anaerobic process, and that the high physical exertion during the match leads to an increase in the activity of blood circulation, which increases the amount of blood that reaches the working muscles and thus to an increase in the resulting lactic acid, which spreads Outside the working muscles and into the bloodstream, where it transports it to the liver, heart and other non-working muscle fibers



- Predicting the transitional velocity in terms of...
- Extracting linear regression equation model indicators:

In order to evaluate the accuracy of the model for the result, and for the purpose of its generalizability, the model must be able to predict the transitional velocity from ..., when applied to a different sample, the sharp drop in the predictive power of the model leads to the inability to generalize, and therefore the researchers resorted to model quality indicators To verify this command, the results of which are shown in the table

Table (6) Quality indicators of the linear regression equation model

standard error to appreciate	Contribution percentage Modified R <sup>2</sup>	Contribution percentage interpretation factor R <sup>2</sup>	Labs R. link	Variables	
				The result	predictive
0.14362	0.566	0.696	0.834	Transition speed	0

Table (6) shows that the value of the transition coefficient of correlation and ... came in the amount of (0.834), and that the value of the interpretation coefficient (the contribution ratio reached (0.696), and this means that (...) explains a percentage of (69.6%) of the Transmissive velocity. This indicates that the prediction of (transitional speed) does not depend only on variables (...) but on other factors not included in the model, which may be physical, kinetic, skill, physiological, psychological, ... etc. In general, the contribution ratio (R<sup>2</sup>) indicates the amount of variance in the dependent variable (transitional velocity) that is explained by the model and is derived from a sample, while the modified contribution ratio (R<sup>2</sup>) indicates the amount of variance in the dependent variable (transitional velocity) that the model explains if it is derived from the population that I took the sample.

Table (7) It shows the value of the withdrawn test (F) and the value of the level of morale accompanying it

Indication stats	F. value		mean squares	Grades Freedom	sum of squares	Source variance
	Indication level	calculated				
moral	0.031	5.348	0.110	3	0.331	between groups
			0.021	7	0.144	within groups
				10	0.475	total

Table (7) indicates that the value of the level of significance accompanying the calculated (F) value came in the amount of (0.031), which is smaller than the value (0.05), which indicates the significance of the simple linear regression model, and therefore the model represents the relationship between the two variables under consideration and (transitional velocity) best represented.

Extracting the values of the regression equation coefficients (the model)

Table (8) The values of the regression equation coefficients and the significance of the model parameters

Statistical significance	value ( F )		Transactions			
	Indication level	calculated	Modulus value of the metal			The nature of the laboratory
			normative (beta)	standard error	non-standard	
moral	0.030	2.712	-	2.763	7.494	A
insignificant	0.071	- 2.124	- 0.443	0.018	- 0.039	B 1
moral	0.037	2.579	0.597	0.066	0.169	B2
moral	0.017	3.116	0.721	0.571	1.781	B3

Table (8) indicates the significance of the intercept coefficient (a) as well as the regression coefficient - slope (B1, B2, B3), as the values of the level of significance associated with the calculated (t) values were smaller than the value (0.05), which indicates the significance of the two parameters (A, B1, B2, B3) for the model. That the constant magnitude refers to the relationship between the transitional velocity and the predictive variable, where the positive sign of the constant magnitude (B2, B3) indicates that the relationship is direct between the transitional velocity and..., so if the degree of (one degree) is increased the transitional velocity will increase by (0.169) degrees, and if the degree of increases by (one degree), the transitional velocity will increase by (1.781) degrees. While the negative sign of the constant magnitude (B1) indicates that the transitional velocity is inversely related to..., so if one degree... (One degree), the translational velocity will decrease by (0.039) degrees.

**Non-standard equation**

$$y = a + b1 \times x1 + b2 \times x2 + b3 \times x3$$

Standard equation:

$$y = b1 \times x1 + b2 \times x2 + b3 \times x3$$

Whereas:

y = result value (transitional velocity)

a, b = constant magnitude

x = value of the predictor variable

**Conclusions and recommendations**

**Conclusions**

1. There is an increase in the concentration of some electrolytes and lactic acid after the football competition.
2. The system that uses the most energy in football is the anaerobic system with its two parts (phosphagine and lactic)
3. There is a clear effect of the match effort in increasing some salts and lactic acid.
4. There were no clear differences between the first and the second half (sodium, potassium and calcium)
5. Through the quality indicators that appeared to us, it was found that the equation is effective in forecasting.

### **Recommendations**

1. The need to pay attention to anaerobic training (phosphagine and lactic) for football players and to take advantage of the legal rest period during matches to continue muscular work for as long as possible.
2. Taking into account the competition load in the football game during training in order to bring about the physiological adaptations required by the game.
3. The training curricula should contain the type of chemical response to blood electrolytes and lactic acid.
4. The necessity of using the prediction equation, which appeared to be effective in the efficiency of the model through quality indicators.

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