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Summary of the research

The effect of competition effort on the circulatory system response and the level of cortisol and lactic acid in the blood for advanced wrestlers

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Abstract

The research aimed to identify the differences in the circulatory system response and the level of the cortisol hormone and lactic acid in the blood for the two groups between the two tests before and after the performance of the competition effort, in addition to identifying the differences in the circulatory system response and the level of cortisol and the lactic acid in the blood for the two groups between tests after the competition effort, The researchers used the descriptive method in the survey method in order to suit it to solve the research problem, as the research sample was chosen intentionally from free and Roman wrestling players applying in Diyala province for the weight category (60 - 67 - 72) kg (12) wrestlers out of (18) wrestlers and included two groups, (6) players from free wrestling and they are the first group, and (6) players from Roman wrestling are the second group, and for each weight of wrestlers (2) Wrestlers, and that constituted the percentage of the sample (66,666%) of the original community, as well as the use of appropriate means, tools and devices, and the exploratory experiment was conducted, after which the main experiment was conducted through tests before the effort and then a complete match was made for each wrestler with the same weight of the research and match sample It consists of two rounds, each round of (3) minutes duration, between them (30) seconds, is the competition effort Promise to conduct their own tests look after the competition effort, and then the data was unloaded and processed statistically, and then presented and analyzed and discussed, and the researchers reached several conclusions, namely :

1. The effect of competition effort on the response of the circulatory system and the level of cortisol and lactic acid in the blood of the two groups compared to the period before the competition effort.

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2. The continuous training of the two groups led to a case of functional adaptation and consequently its effect was evident in the measurements of the circulatory system response and the level of cortisol and lactic acid in the blood .

3. The two groups were affected by the competition effort through the response of the circulatory system and the high level of the cortisol hormone and lactic acid in the blood with small differences and they were in favor of the free wrestling group .

The researchers reached several recommendations :

1. Emphasis on special endurance training during the training units for its major role in improving the functional adaptations of the athlete's body .

2. Perform periodic checks for players in order to continue the success of the training process

3. Carrying out similar research on different samples and other functional variables.

Keywords: *circulatory system response, Roman wrestling players, cortisol and lactic acid*

I. Introduction :

The study of the responses to the devices and organs of the athlete's body and the extent of their functional adaptations and their significant role in sports achievement have taken a large part by researchers in recent years, to reveal the impact of physical efforts of large sizes, whether during training units or during competition for organs and organs of the body and the extent of its role in developing Athletic achievement .

The training process always seeks to achieve high accomplishments in all sports, including wrestling, by preparing physically, skilled, and planning wrestlers so that they are able to withstand the competition effort and achieve victory, and this requires functional adaptation of all the organs and organs of the body in order for the wrestler to bear the great burden obtained as a result of the competition effort And to maintain his level throughout the competition period .

And that the circulatory system has an effective contribution to raising the level of physical and skill athletes, as well as raising the level of athletic achievement through its role in the vital processes in the body, as this device works to provide every cell in the body with an adequate amount of blood loaded with food and beneficial materials in order to provide permanent energy To ensure the continued endurance of the physical effort during training and competition, and consequently, the training process continues in a manner that ensures the continuous development in the physical and skill aspect and the occurrence of functional adaptations appropriate to each level the player reaches, as well as the disposal of waste and harmful substances from the body resulting from metabolism operations .

Therefore, workers in the training process must understand the functional variables that occur during the training process or competitions in order to maintain metabolic processes that must be continuous during the physical effort to maintain the level of technical performance throughout the training or competition

period and to stay away from the negative effects that may occur to the wrestler Like different levels of hormones, especially the hormone activity Cortisol and lactic acid in the blood .

The research problem lies in the fact that the great physical effort exerted by the wrestler in a fight during wrestling competitions requires him to possess high-level physical and skill capabilities, in addition to the high functional adaptation of his functional devices that enable him to continue the technical performance throughout the period of the conflict and restore the same effort in the other fight as the wrestling competitions The wrestler is obligated to fight more than a fight during it, and that the functional adaptation of the body's organs and organs is inseparable and continuous with the training process, since it contributes a lot to providing sufficient energy for the motor duty during the training or competition unit, so the researchers decided to study these A problem by knowing the importance of the functional responses that occur to wrestlers when performing the competition effort, the extent of the positive and negative response of this response and the effectiveness of the exercises used because the performance required in the competition must be consistent with the functional adaptation of the athlete's body devices .

The areas of research included the human field of free and Roman wrestling players applying in the Diyala Governorate for the weight category (60 - 67 - 72) kg with (12) wrestlers. The temporal field was for the period from 20/1/2019 to 28/2/2019, and the spatial field in the hall of the wrestling training center in Diyala Governorate – Baquba .

II. Research methodology and field procedures :

- Research Methodology :

The choice of the research method should be appropriate to the research problem in order to reach to solve the problem, so the researchers relied on the descriptive approach and the survey method, with its precise scientific steps of the nature of the research problem and its goals, the descriptive approach "depends on the study of reality or phenomenon as it exists in reality and is concerned as an accurate description It is expressed in qualitative or quantitative terms "(Obeidat and others: 1982: 183). As for the surveys, it is "a comprehensive study reviewed for a relatively large number of cases at a certain time, and this type of studies yields statistics that were extracted and stripped from specific cases" (Wajih Mahjoub: 1988: 222) .

- Research Sample :

" The selection of the sample from the community to be examined is a problem facing the researcher who He wants his sample to be sufficient and representative of the characteristics of the society from which the sample was drawn " (Al-Kubaisi and Al-Janabi: 1987: 68), so the researchers chose the sample intentionally from free and Roman wrestling players in Diyala Governorate, the number of which is (12) wrestlers out of (18) wrestlers, and the sample included two groups, (6) players from free wrestling, the first group, and (6) Players from the Romanian wrestling who are the second group, and for each weight the wrestlers (2) wrestlers, and that constituted the sample percentage (66,666%) of the original community .

- The methods, devices and tools used in the research :

- Means of collecting information :

(Arab sources, observation and experiment, tests and measurement, personal interviews, data registration form, the assistant team) .

- Devices and tools used in the research :

(Medical scale to measure weight (kg) and Chinese-made length, electronic stopwatch number (2), Rossmax electronic pulse meter, Japanese-made (Lactate.Pro^{TM}2) (LT-1730) concentration meter, Korean-made (ichromax^{TM}-W-Reader) blood pressure reading device, Injection (syringes), size (5cc), number (40), gel tube (40), tubes to preserve blood, number (40) (plan tube), vials containing anticoagulant (EDTA 2), number (40), Medical cotton and sterile materials, (Cool Box) , (1) arm tourniquets, lactic acid concentration level kits, (i-chamber) Korean model blood incubator, strips to determine the concentration of Cortisol Hormone (Strip) test , Legal wrestling rug, whistle ,wrestling Uniform, wrestling shoes .

- Determine the research tests :

The researchers selected functional tests for the research on the circulatory system and the level of the cortisol hormone and lactic acid in the blood based on their experience in the field of sports training physiology, namely (measuring the heart rate, systolic and diastolic pressure, the level of the cortisol and the concentration of lactic acid in the blood before and after the competition effort) .

- Tests used in the research :

- Test for pulse, systolic and diastolic pressure before voltage :

Pulse and pressure were measured by a device (rossmax) This device measures the systolic and diastolic pressure as well as the pulse at rest .

- Purpose of the test: Pulse measurement as an indicator of the condition of functional adaptation, as well as the measurement of systolic and diastolic pressure before voltage .

- Tools : Device (rossmax), armchair .

- Performance description: The device is placed on the left forearm of the wrestler and tied by a belt of his own, the hand of the wrestler is raised at a level close to the heart, then the pulse, systolic and diastolic pressure are measured by a button in the device that controls the zeroing and measurement .

- Test for pulse, systolic and diastolic pressure after voltage :

The heart rate was measured by the index and middle fingers on the carotid artery .

- Purpose of the test : Measurement of pulse, systolic and diastolic pressure after competition effort .

- Tools : Stopwatch, device (rossmax), armchair .

- Performance description: The index and middle fingers are placed on the carotid artery in the neck, and we count the number of heart beats during (15 seconds), and the result is multiplied by (4) to obtain the heart rate per minute (Robbins et al., 2002, 58). The systolic and diastolic pressure measurements were done in the same rossmax apparatus in the same way immediately after the competition effort .

- Test for measuring the concentration of lactic acid in the blood :

I use a device (Lactate.Pro^{TM}2) Measuring the concentration of lactic acid in the blood before and after the competition effort (two rounds struggle) The time of each round (3) minutes separated (30) seconds rest, and after (5) minutes from the end of the competition effort (two rounds conflict) the index finger was pricked for each wrestler And taking a drop of the gladiator blood and fixing the percentage of lactic acid concentration in a special form prepared for this purpose (the percentage of lactic acid in mmol) was measured with the help of the medical assistant team, as two devices were used to measure the percentage of lactic acid concentration for both wrestlers in order to set the measurement time .

- Test to measure the level of the cortisol hormone in the blood :

The level of the cortisol hormone was measured before and after the competition effort, the blood was drawn from the research sample in a state of rest (after measuring lactic acid) by the medical assistant team, as the blood was drawn from each wrestler before and after the competition effort by medical injection and then the injection is emptied In tubes (tubes) assigned to each laboratory and according to the test before and after the effort, and then the direct entry of the centrifuge to withdraw the serum, then the serum is withdrawn from the tubes and emptied into new tubes bearing the same sequence of wrestlers' numbers that were written on it before and after the competition effort and then kept in the cold box Allocated for keeping and transporting to the sister To perform the necessary procedures, then serum samples are transferred to the specialized laboratory to carry out laboratory procedures and chemically treat them by means of cortisol hormones by means of the device (ichromax^{TM}-W-Reader) to extract the results by chemical specialists .

- Exploratory experience :

The researchers conducted a pilot study of functional tests (pulse rate, systolic and diastolic pressure, and the measurement of cortisol and the measurement of lactic acid in the blood before and after the competition effort), on Sunday, 27/1/2019 on a sample consisting of (4) wrestlers (2) free wrestlers, and (2) Roman wrestlers and they were excluded from the main experiment, to avoid drawing blood twice and the purpose of the exploratory experience was :

- Knowing the suitability of the tests for the sample level .

- Bypass errors that occur when performing the test .

- Organizing the work and the main experiment procedures represented in its timing and in all its departments .

- Knowing the efficiency of the work team .

- Ensure that the place is suitable for carrying out the tests and the suitability of the tools and devices used .

- Know how to measure and record data .

- Field Research Procedures :

The two researchers conducted their searches on Thursday 31/1/2019 which is (measuring the heart rate, systolic and diastolic pressure, the level of the cortisol hormone and the concentration of lactic acid in

the blood) before the effort, after which a pregnancy was given by the effort of competition by (two rounds conflict), the time of each round (3) minutes separated (30) A second break, and the time-out after each referee's whistle is not from the time of the two rounds, and then tests were performed after the competition effort and in order (first measuring the heart rate directly, then the systolic and diastolic pressure and then the concentration of lactic acid in the blood after (5) minutes and then a test was taken) Level of the cortisol hormone in the blood), after which information was collected and data dumped M conducting statistical transactions in order to achieve the objectives and hypotheses .

- Statistical means :

The researchers used the statistical means appropriate to the subject of the research and they were in accordance with the statistical bag system (spss) .

III. Presenting, analyzing and discussing the results

- Display test results before and after the competition effort in response The circulatory system and the level of the cortisol hormone and lactic acid in the blood for the free wrestling group is analyzed and discussed .

Schedule (1) Demonstrate arithmetic media, standard deviations, calculated (T) value and differences indication for pre- and post-competition tests in the circulatory system response and the level of cortisol and lactic acid in the blood for the free wrestling group

T	Variable tests search	Freestyle wrestling group				Q- F	PF	Values (T) Calculated	indication The differences
		Test before voltage		After effort test					
		-s	P	-s	P				
1	Heart rate test	63.166	2.096	161.5	1.109	98.334	40.893	5.889	moral
2	Systolic pressure test	125.5	3.011	137.5	1.457	12	5.724	5.134	moral
3	Diastolic pressure test	83.333	2.329	94.666	2.049	11.333	5.65	4.912	moral
4	Cortisol level test	20.166	2.161	142.333	4.667	122.167	45.004	6.648	moral
5	Lactic acid concentration test	1.65	0.158	8.451	0.297	6.801	2.623	6.350	moral

Values (T) tabular (2.75) below the significance level (0.05) and freedom degree (5)

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The table shows (1) Results of tests before and after the competition effort in response to the circulatory system and the level of the cortisol hormone and lactic acid in the blood for the free wrestling group, in a pre-stress test for the heart rate, the mean (63.166) and standard deviation (2.096), while the mean (Test after the competition effort (161.5) and with a standard deviation (1.109), and the mean value of differences (98.334) and standard deviation of differences (40.893), and when extracting the calculated (T) value of (5.889) which is greater than the tabular value (T) of (2.75) At the degree of freedom (5) and the significance level (0.05), which indicates that there were significant differences between the two tests before they were sold D effort competition .

In a pre-stress test of systolic pressure, the mean (A standard deviation of (125,015) (3.011), while the test mean after the competition effort (137.5) and a standard deviation (1.457), the mean mean for the differences (12) and a standard deviation for the differences (5.724), and when extracting the calculated and calculated (T) value (5.134) It is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates the presence of significant differences between the two tests before and after the competition effort .

In a pre-stress test for diastolic pressure, the mean (83.333) and a standard deviation (2.329), while the mean in a test after the competition effort was (94.666) and a standard deviation (2.049), the mean value of the differences (11.333) and a standard deviation of the differences (5.65), and when extracting the calculated and calculated (T) value (4.912) which is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates the presence of significant differences between the two tests before and after the competition effort .

In a pre-effort test of the level of the cortisol hormone in the blood, the mean (20.166) and standard deviation (2.161), while the mean in a test after the competition effort was (142.333) and a standard deviation (4.667), and the mean value of the differences (122.167) and standard deviation of the differences (45.004), and when extracting the calculated and calculated value (T) (6.648) which is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates the presence of significant differences between the tests before and after the competition effort .

In a pre-stress test for the concentration of lactic acid in the blood, the mean (1.65) and a standard deviation (0.158), while the mean for a test after the competition effort was (8.451) and a standard deviation (0.297), the mean value for the differences (6.801) and a standard deviation for the difference (2,623), and when extracting the calculated and calculated value (T) (6.350) which is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates the presence of significant differences between the two tests before and after the competition effort .

- Show test results before and after the competition effort in response The circulatory system and the level of the cortisol hormone and lactic acid in the blood for the Roman wrestling group, analyzed and discussed .

Schedule (2) Shows the mean, standard deviations, calculated (T) value and differences indication for pre- and post-competition tests in the circulatory system response, cortisol level and lactic acid in the blood for the Roman wrestling group

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T	Variable tests search	Roman wrestling group				Q - F	PF	Values (T) Calculated	indication The differences
		Test before voltage		After effort test					
		-s	P	-s	P				
1	Heart rate test	64.666	1.813	164.333	1.388	99.667	44.86	5.441	moral
2	Systolic pressure test	128.166	3.67	141.333	1.876	13.167	6.686	4.823	moral
3	Diastolic pressure test	85	2.242	99.5	2.278	14.5	7.75	4.582	moral
4	Cortisol level test	22.666	2.581	158.833	6.147	136.167	54.56	6.112	moral
5	Lactic acid concentration test	1.725	0.132	9.085	0.334	7,36	3.06	5.892	moral

Values (T) tabular (2.75) below the significance level (0.05) and degree of freedom (5)

The table shows (2) Results of tests before and after the competition effort in response to the circulatory system and the level of the cortisol hormone and lactic acid in the blood for the Roman wrestling group. In a pre-stress test for the heart rate, the mean (64.666) and standard deviation (1.813), while the mean (Test after the competition effort (164.333) and with a standard deviation (1.388), and the mean value of differences (99.667) and standard deviation of differences (44.86), and when extracting the calculated (T) value of (5.441) which is greater than the tabular value (T) of (2.75) At the degree of freedom (5) and the significance level (0.05), which indicates the existence of significant differences between the two tests before L After the competition effort .

In a pre-stress test of systolic pressure, the mean (128.166) and standard deviation (3.67), while the mean in a test after the competition effort was (141.333) and a standard deviation (1.876), and the mean value of the differences (13.167) and standard deviation of the differences (6.686), and when extracting the calculated and calculated value (T) (4.823) It is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates the presence of significant differences between the two tests before and after the competition effort .

In a pre-stress test for diastolic pressure, the mean (A standard deviation is (2.242), while the mean of a test after the competition effort is (99.5) and a standard deviation (2.278), the mean value of the differences (14.5) and a standard deviation of the differences (7.75), and when extracting the calculated and calculated (T) value (4.582) It is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates the presence of significant differences between the tests before and after the competition effort .

In a pre-effort test of the level of the cortisol hormone in the blood, the mean (22.666) and a standard deviation (2.581), while the mean in a test after the competition effort was (158.833) and a standard deviation (6.147), and the mean value of the differences (136.167) and a standard deviation of the differences (54.56), and when extracting the calculated and calculated value (T) (6.112) which is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates that there were significant differences between the two tests before and after the competition effort .

In a pre-stress test for the concentration of lactic acid in the blood, the mean (1.725) and a standard deviation (0.132), while the mean in a test after the competition effort was (9.085) and a standard deviation (0.334), the mean value of the differences (7.36) and a standard deviation of the differences (3.06), and when extracting the calculated and calculated value (T) (5.892) which is greater than the tabular (T) value of (2.75) at the degree of freedom (5) and the significance level (0.05), which indicates that there were significant differences between the two tests before and after the competition effort .

Through the two tables (1,2) We find that the results of the tests showed significant differences between the two tests before and after the competition effort and in favor of a test after the competition for the two groups of free and Roman wrestling, and the researchers attribute the reason for that to the presence of functional adaptations of the research sample represented by free and Roman wrestling players that occurred as a result of continuous and continuous training as well On the adaptation of their functional systems to the competition effort that lasts for more than (6) minutes, and this is evident in the adaptation of the circulatory system through a drop in the heartbeat at rest time from the normal limit, and that the functional adaptation of the heart muscle helps to quickly return to the state of hospitalization Recalling (Abul-Ela: 2000: 118) that " by measuring the heart rate can be straightened and the hospitalization of her time " , also points (Abul-Ela: 2000: 248) " The Slow beat rate phenomenon Heart up (40 n/d) One of the most expressive indicators About the high job status Of the heart " , as well as the stability of the systolic and diastolic pressure in the rest period, as well as the competition effort led to an increase in the concentration of the cortisol hormone, especially when the competition was characterized by a very high effort with short rest periods, as it confirms (Thibodeau GA & Patton: 1999:78) that " more cortisol increases occur when there are short breaks and the total volume is high i.e. cortisol responses to increased training volume are variable, and excessive cortisol will encourage the creation and storage of fat " , as well as increased cortisol secretion helps On the speed of metabolic processes, especially those related to carbohydrates, as the hormone accelerates the conversion of clicogen in the liver into glucose as well as amino acids As he explains (Dickerson SS: 2004: 335 - 391) " The cortisol hormone is one of the main hormones that support the training process through its participation in accelerating the processes of metabolizing glucose sugar and carbohydrates by increasing its secretion, providing the energy necessary for the training process and its success in achieving the desired goal." Likewise, when the physical effort increases, the production of lactic acid increases in the muscle, meaning that there is a relationship between the performance effort and lactic acid during the competition effort, which is characterized by the technical performance of grabs and movement within the boundaries of playing on the rug, as the concentration of the acid increases greatly when the wrestler performs the maximum or near maximum activity For a short period, and then it moves to the blood, and as a result of functional adaptation resulting from continuing training and competition, it helps to speed recovery and remove the acid from the muscles and use it to produce energy, as Mentionsed (Krustrup et al: 2006: 1165-1174) that " Training helps to increase

effectiveness Body in Removing lactate from the muscles Produced and transferred to parts Other parts of the body, as it can be used This will ease the acid levels in Muscle produced Thus it allows it to work On the level energy Higher before producing Levels Acids that slow energy production " .

- Display the results of the tests after the competition effort in response The circulatory system and the level of the cortisol hormone and lactic acid in the blood for the groups of free and Roman wrestling, analyzed and discussed.

Schedule (3) Shows the mean, standard deviation, and calculated value (T) of the results of tests after the competition effort in the response of the circulatory system and the level of the cortisol hormone and lactic acid

T	Tests Search variables		the group		Values (T) Calculated	indication The differences
			free Wrestling	Roman Wrestling		
1	Pulse rate test	-s	161.5	164.333	3.568	moral
		P	1.109	1.388		
2	Systolic pressure test	-s	137.5	141.333	3.609	moral
		P	1.457	1.876		
3	Diastolic pressure test	-s	94.666	99.5	3.528	moral
		P	2.049	2.278		
4	Cortisol level test	-s	142.333	158.833	4.781	moral
		P	4.667	6.147		
5	Lactic acid concentration test	-s	8.451	9.085	3.185	moral
		P	0.297	0.334		

in the blood for the groups of wrestling free and Roman

Values (T) tabular (2.22) below the significance level (0.05) and freedom degree (10)

The table shows (3) Tests after competition effort in response to the circulatory system and the level of the cortisol hormone and lactic acid in the blood for two groups of free and Roman wrestling, in the

heart rate test, the calculated value of (T) reached (3.568) which is greater than the value of the (T) tabular value of (2.22) Below the significance level (0.05) and at the degree of freedom (10), this means that there are significant differences between two tests after the competition effort for the free and Roman wrestling groups and in favor of the free wrestling group .

In the systolic pressure test, the value of (The calculated T (3.609) is greater than the tabular (T) value of (2.22) below the significance level (0.05) and at the degree of freedom (10) This means that there are significant differences between two tests after the competition effort for the free and Roman wrestling groups and for the benefit of the free wrestling group .

As for the diastolic pressure test, the value of (Calculated (3.528), which is greater than the tabular value (T) of (2.22) under the significance level (0.05) and at the degree of freedom (10) This means that there are significant differences between two tests after the competition effort for the free and Roman wrestling groups and for the benefit of the free wrestling group .

In testing the level of the cortisol hormone, the value of (Calculated (4.781), which is greater than the tabular value (T) of (2.22) under the significance level (0.05) and at the degree of freedom (10) This means that there are significant differences between two tests after the competition effort for the free and Roman wrestling groups and for the benefit of the free wrestling group .

As for the lactic acid concentration test, the value of (The calculated (3.185) is greater than the tabular value (T) of (2.22) under the significance level (0.05) and at the degree of freedom (10) This means that there are significant differences between two tests after the competition effort for the free and Roman wrestling groups and for the benefit of the free wrestling group .

Through the table (3) We find that the results of the tests showed significant differences between two tests after the competition effort for the two groups of free wrestling and Roman and for the benefit of the free wrestling group, and the researchers attribute the reason for that to the effort that the player writes during the free wrestling is a high effort due to the use of all parts of his body in the conflict, unlike The Roman wrestling player who uses the upper part of his body, therefore the muscles operating in the performance are more in the free wrestling player compared to the Roman wrestling player as well as the changes that occur during the conflict in terms of frequent attack on the two men significantly and continuous defense R as well as counterattack, and this indicates that there is some difference in the functional adaptations of the body systems between free wrestling players than Roman wrestling players, and this effort by the free wrestling player during the competition led to responses in the vital organs of the body in a high proportion to the amount of functional adaptation He reached a result Therefore, the functional ability of each player must be identified by measuring some functional indicators through which the athlete's health condition can be evaluated, as (Abu El-Ela and Mohamed indicate: 1997: 162) that " assessing the athlete's functional condition helps solve many vital problems for athletes, such as diagnosing the training situation and the extent to which an athlete can be allowed to participate in training and competition " .

IV. Conclusion

From the above, the following conclusions were reached :

1. The effect of competition effort on the response of the circulatory system and the level of cortisol and lactic acid in the blood of the two groups compared to the period before the competition effort .

2. The continuous training of the two groups led to a case of functional adaptation and consequently its effect was evident in the measurements of the circulatory system response and the level of cortisol and lactic acid in the blood .

3. The two groups were affected by the competition effort through the response of the circulatory system and the high level of the cortisol hormone and lactic acid in the blood with small differences and they were in favor of the free wrestling group .

The researchers reached several recommendations :

1. Emphasis on special endurance training during the training units for its major role in improving the functional adaptations of the athlete's body .

2. Perform periodic checks for players in order to continue the success of the training process .

3. Carrying out similar research on different samples and other functional variables .

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