

The Effect of Using Ozone Gas on Some Functional Indicators and the Delay of Onset of Fatigue for Wrestlers

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Introduction and research problem:

The considerable increase in the training sizes has become one of the most modern sports training attributes as the vital role of delaying the onset of fatigue has increased too, which directly has become one of the main pillars of the training process, and that conformed with Aly El-Beik et.al. (1994) when he pointed that in order to be benefit from the training load, it is necessary to give interest to the operations of quick getting rid of pressure that faces the athlete that appears in the form of what is known as fatigue, fatigue itself is an important physiological phenomenon which must appear on the player during training so he/she benefits of the training loads, since the training loads do not reach the player to the limits of fatigue and positive changes cannot occur in the vital adaptation process, which is the main factor for developing training and improving the athlete's state to a better level. (10:11)

Mohamed Allawy and Abou-Elela Abdel-Fattah (1994) confirmed that a good preparation for high level athletes depends mainly on regulating an appropriate relationship between load and rest as the athlete has to get rid of fatigue quickly to perform the required training loads at some stage of preparation to finally be in a state of full or relative rest to continue the physical exercises again. (12:3)

El-Sayed Abdel-Maksoud (1992) noted that the fatigue phenomenon in sports training is one of the phenomena that the player has to be in when implementing some of the training loads before entering the hospitalization stage in order to make adjustment or increase efficiency. (4:17)

Technical performance in wrestling requires great effort because the process of transferring oxygen to the working muscles cannot meet the needs of energy due the rapid muscle work, this makes us do training by using modern scientific methods by applying standardized training programs as well as using appropriate methods for the fast return to the normal status to intensify the training loads in order to improve the situation of general and specific training for junior wrestlers.

A wrestler needs intensive training and this makes him always exhausting energy sources of the muscle and the blood, this problem occurs because the wrestler would not find enough time to restore healing and returning to the normal status and this to resume training again so he has to get rid of all manifestations of fatigue resulting from training loads which allow transferring to the vital organs to another phase of hospitalization and this to resume training once again, so the athlete can perform training load despite he did not totally dispose fatigue caused by previous physical load, and without recovery operations as well to get rid of fatigue caused by the effect of training load, causing stress to the musculoskeletal system as well as causing immune suppression and infection of various diseases.

Renate (2002) also pointed that the results of scientific research proved the availability of the necessary amount of oxygen in the blood in many ways able to regain good health and aging resistance and treatment of many diseases which is also important in our lives as it protects the human being in the lower layers of the atmosphere. It also works to increase the immunity of the

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body to assist in the secretion of gamma interferon and interleukin which stimulates the immune system to produce cells that resistant diseases and therefore, the ozone is useful to resist diseases that lead to immune deficiency or malfunction of the immune system and many of the diseases that ozone gas interfere with the treatment. (21:148-149)

While Mohamed Bakry (1994) said that the importance of the means of healing have increased and imposed themselves in the scientific forums and research fields in the recent years as to cope with the growing sports physical loads and motor duties in the field of sports training to achieve a high level of physical performance for athletes, and the concomitant manifestations of fatigue and stress as a result of the increased physical loads. (15:15)

Hussein Heshmat and Nader Shalaby (2003) clarified that a lot of coaches, players and supervisors of sport who use some stimulants and internationally prohibited steroids to delay the onset of fatigue has proven the damage of such means either health wise, psychologically or even physically, some of these materials are:

- Drugs such as amphetamines, hormones and caffeine.
- Blood transfer to the player shortly before the game.
- Diuretics such as Lasik.
- Structural materials, such as testosterone which is a growth hormone.
- Gonads stimuli such as gonadotropins.
- Beta-blockers to expand the blood vessels.
- Processes of replacing urinary by catheter to menstruate the increased steroids.
- Stimuli of the sympathetic system such as ephedrine.
- Using alcohol and marijuana illegally in sport. (7:26)

Abou-Elela Abdel-Fattah (1999) noted that the problem of healing in modern sport training has become as important as increasing the training load which is considered the main method that a trainer uses to affect the athlete to improve the general and specific training and the performance level to achieve sport records, this cannot be done by depending only on the size and the force of the training load and without accompanying the healing processes of the resulting effort as an effect of training load which exhausting the musculoskeletal system and causing immune suppression and infection of various diseases.

Aly El-Beik et al. (1994) also have proven the importance of using hospitalization methods to get rid of the outputs of fatigue phenomenon that connects the individual to the state of stress thus failing to achieve the training objectives. (10:75)

Iman Awad (2000) showed that the ozone gas is derived from the Latin term “smell” and the ozone gas naturally exists in the upper atmosphere at an altitude of about 20:30 kilometers of the earth’s surface forming a thin layer of several of millimeters which form a belt around the globe to save it against the effects of short-wave length high shipment from ultraviolet rays which are emitted continuously and associated with solar activity. (2:10)

Mohamed El-Amin et al. (2005) explained that the ozone gas is made of three oxygen atoms and its chemical symbol is “O₃” and is characterized by a strong smell pungent and a pale blue color while ozone is formed by passing an electric spark through dry pure oxygen gas. (11:14)

Reham Abdel Khaleq (2002) also shows that the physiological effect of ozone gas is due to the release of a certain voltage during starting molecules of gas in the blood, some researchers point that positive physiological effects for this treatment is due to the presence of electromagnetic charge, which may be the reason to the increase of speed of metabolism of some materials in the activity of the body, especially the accumulated lactic acid after a muscle strain. (9:40)

According to Rasha Ryad (2004), the role of ozone gas "O₃" comes as an important means to quickly restore healing and get rid of the remnants of fatigue and stress resulting from the intensification of physical loads as it has a very important impact on human health, because medically ozone is used for the treatment of many incurable diseases. (8:35)

Iman Awad (2007) in another study observed that when ozone enters in a gas-form in the blood, within minutes it crashes productive active peroxides which are able to oxidize and destroy bacterial cell walls, viruses and cancer cells, while healthy cells of the body such as peroxides are not affected because the cells contain in their covers the catalase and glutathione enzymes, which are very strong antioxidants and the exposure to the medical ozone is one of the factors that lead to increased enzyme concentration in the cell walls, and this helps protect the body from free radicals that are generated naturally and permanently along with the metabolic processes as a direct effect on the environmental components, while the physiological effect of this gas is the release of an electric charge with certain voltage during the fission of gas molecules in the blood. Some researchers explain the positive physiological effects for this treatment occur due to the presence of the electromagnetic shipment, which may be a reason to the increase of speed of metabolism of various substances of the activity of the body and of which the first of them is the accumulated lactic acid after muscular stress. (2:34)

Delay of the onset of fatigue:

Ehab Philip Ayoub (2008) notes that many sport coaches, players and supervisors used internationally prohibited and forbidden means and stimulants to delay the onset of fatigue, and it was proven that they caused health damage mentally and physically, some of these materials are amphetamines, blood transfusion before the game, narcotics such as morphine, diuretics such as lasix, structural materials such as testosterone, genital gland stimuli such as gonadotropin, stabilizers and beta for the expansion of the blood vessels and sympathetic system stimulator such as alokdrain and the use of substances such as alcohol and marijuana. (3:17)

Mohamed Hassan Allawy and Abou-Elela Ahmed Abdel-Fattah (1994) showed that many studies and research focused on tracing the curves of fatigue during the performance, although they were different in determining the rates of low level (fatigue), most of them agreed that the performance is decreasing constantly during action, and that there is an inverse relative factor between fatigue and the level of performance as scientists interested in the phenomenon of "the demise of fatigue", and despite the fact that this phenomenon is associated with curves of work, and they vary depending on the individual and the duration of the work and nature, the demise of the fatigue curve can be described as fast in the beginning and then this speed decreases, where the impact of fatigue go away very slowly until the individual returns to his natural state. Manz Manzer has proven that the average restore normalcy to different groups of muscles used for depletion of Ergograph system may reach 82% after five minutes of performing, and 90% after ten minutes, and 95% after twenty minutes. (13:231-232)

Aim of the research:

The research aims to identify the effect of using ozone gas on some functional indicators and the delay of onset of fatigue for wrestlers.

Research hypotheses:

- There are significant differences between the pre- and post-measurements in the physiological variables in the experimental group that used ozone gas O₃ under in favor to the post-measurement.
- There are significant differences between the pre- and post-measurements in favor to the control group in the physiological variables in favor to the post-measurement.

- There are significant differences between the two post-measurements in the experimental and control groups in the physiological variables in favor to the experimental group which used ozone gas O₃.

Search Terms:

Means of restoring healing:

Aly El-Beik et al. (1994) defined the means of restoring healing as the means that can be used during the rest period to restore the player to a near to the normal status in the shortest possible time. (10:5)

Ozone gas:

Reham Abdel-Khaleq (2002) clarified that the ozone gas is pure oxygen that contains three oxygen atoms instead of two atoms only in oxygen that we breathe on Earth and is symbolized by the chemically symbol "O₃". (9:8)

Medical Ozone:

Iman Awad (2000) noted that the medical ozone gas is made when it is activated by high-purity, dry oxygen electrically using private generators called ozone generators, which began manufactured in Germany in (1857) by Siemens Corporation. (2:15)

Ways to provide ozone gas:

Nevin Fawzy (2000) proved that ozone is provided by:

- Taking amount of blood (100-150 cubic centimeters) and adding ozone gas to it and returning them back to the body.
- Through the skin, like using (sauna ozone), where the patient enters a specific cabin and enters his head outside and then displays his body to the mixture of water, oxygen and ozone gas and steam.
- By ozone cream and ozone bag (where the infected organ gets inside then the ozone gas passes in).
- Absorbing the tissues through the tube into the ear or anus or urethra. (16:29)

Alchand and Renate (2000) and Nevin Fawzy (2000) have proven the benefits of ozone in the sports field: There are many benefits to the use of ozone in the sports activity, such as:

- Increasing the percentage of oxygen to the tissues of the body.
- Increasing the production of adenosine tri-phosphate (ATP) and thereby increasing the energy production in the cells and the speed of recovery after effort.
- Delaying the onset of anaerobic fermentation of sugar into the cell after physical exertion and thus reduces the accumulation of lactic acid in the muscles responsible for causing stress and poor physical ability after intense effort, because ozone works on the oxidation of lactic acid and the equivalence of its effect.
- Reducing swelling and pain after the injury and hasten the healing process.
- Reducing (lactic acid) which is responsible for stress and muscle pain and poor performance as it increases the percentage of oxygen to the tissues of the body and increases the production of (adenosine tri-phosphate ATP), which increases the energy in the cells and the speed of recovery after effort.
- Helps in the treatment of arthritis.

- Helps in healing most of the types of pitch injuries.
- Helps in the treatment of osteoporosis and multiple sclerosis.
- Cases of knee roughness, migraine headaches and psychological depression.
- Helps in the treatment of stress, fatigue and exhaustion resulted of modern life as well as the pain of the shoulders and muscles.
- Medical ozone is notably working on improving the athletic performance. (17:4) (16:30)

Side effects of ozone gas:

Alchand and Renate (2000) noticed that the previous research and studies on the ozone pointed out that there are no side effects of ozone but should not inhale ozone gas directly because it may cause irritation in the bronchia. (17:4)

Contraception of using ozone gas in treatment:

Nevin Fawzy (2000) noted that the research and studies have indicated that the use of ozone in the treatment is not useful for individuals infected with one of the following diseases (increased secretion of the thyroid gland, bean anemia disease). (16:30)

Related studies:

The study of Alaa El-Din Mohamed Elewa, Salah Mohamed Asran (1991) entitled “The effect of using certain means of restoring healing for the quick return to the normal state for some physiological manifestations of the wrestlers after the game load” aimed at identifying the effect of some means of restoring healing (inhaled oxygen – reciprocal bandages) on wrestlers during the period of rest after the game. The researchers used the experimental method (pre- and post-measurements) using three groups (two experimental groups – one control group) on a sample of 15 participants in the wrestling championship at the wrestling hall of the Faculty of Physical Education for Boys, Alexandria University who were randomly selected and distributed to three groups, 5 wrestlers for the first experimental group (inhaled oxygen), 5 wrestlers for the second experimental group (reciprocal bandage, cool – warm), and 5 wrestlers for the control group (negative rest). The most notable results were that there was a significant difference to the value of (P) in favor for the group that used inhaling oxygen in the variables of pulse regarding the frequency of breathing and systolic and diastolic blood pressure where inhaling oxygen as a means of restoring the healing has an effective and clear impact on the quick return to the normal state of the body organs and the physiological variables under the study (pulse – respiration – pulmonary ventilation – vital capacity – body temperature – systolic and diastolic blood pressure and that the reciprocal bandage (cool – warm) affected the speed of restoration of healing in the physiological variables under study and come in second place after the group that used inhaling oxygen. (11)

Iman Awad’s study (2000), entitled “Ozone gas is God’s grant to neurologists”, aimed at identifying the benefits of medical ozone in neuropathology, and using medical education in the ozone field and its benefits to assist in the treatment of many diseases. The researcher used the survey method and the sample consisted of patients with neurological disorders. The positive research results were that ozone has cures for various neurological diseases and there were no symptoms for using ozone. (2)

Reham Abdel-Khaleq’s study (2002), entitled “The effect of medical ozone on the fast muscle recovery and the performance level in rhythmic exercises”, aimed at identifying the effect of ozone on the fast muscle recovery and the performance level of the rhythmic exercises players. The

researcher used the experimental method on a sample of students of the Faculty of Physical Education which included 20 female students aged between 20-21 years old and the researcher concluded the following:

- Medical ozone has a positive effect on fast recovery.
- Medical ozone has a positive effect on motor performance level in rhythmic exercises.
- There is positivity in using ozone in fast muscle recovery through lactic acid measurements. (9)

Hassan Zaitoun's study (2016), entitled "The effect of using medical ozone 'O3' on some of the functional and physical variables and fast restoration of healing for wrestlers", aimed at identifying the effect of using medical ozone "O3" on some of the functional and physical variables and the fast restoration of healing for wrestlers. The researcher used a sample of (10) wrestlers and the results of the study showed that there was a significant improvement between the two post-measurements for the experimental and control groups in physical variables (endurance, muscle strength, speed, agility, speed characterized strength) and functional variables (pulse, energy indicator of the heart muscle, red blood cells, hemoglobin, hematocrit, the percentage of lactic acid) in favor to the post-measurement in the experimental group and there were no significant differences in the remaining variables of junior wrestlers. (6)

The study of Medonnell et al. (1995), entitled "Proportion of moderately exercising individuals responding to low-level, multi-hour ozone exposure" of which one of the main objectives is describing individuals' moderate sports training who have been in low levels of ozone for several hours, 68 healthy non-smoking individuals aged from 34:18 years old were selected for the sample passing through two or more with an average of 6.6 hours with rates at 0.0, 0.08, 0.10, 0.12 ppm, the most important results that conforms with the data that has been observed before and the lowest level of exposure levels (TxC), which showed a result of 90% confidence was about 0.2 ppm. While regarding the exposure, which was 12% at a period of 6.6 hours prior to the individuals who have been exposed who experienced 10% of change in their vital functions, also there was a greater effect on young adults than older adults by specific effect of exposure. (20)

Research domains:

- Spatial domain:

The researchers conducted the experiment at the Olympic Club in Alexandria where the ozone gas sessions were provided to the wrestlers under the supervision of a specialized doctor (Prof. Dr. Hamdy Basha)

- Time domain:

The researchers conducted the experiment in the period from 10/6/2016 to 10/7/2016

Method used: The researcher used the experimental method using two experimental and one other officer of the appropriateness of the nature of the search Research sample:

The sample was selected intentionally from wrestlers with a 16 years old average of age and were divided into an experimental group of (5) wrestlers and a control group also of (5) wrestlers. As shown in Table (1, 2) of the statistical demographics and the parity of the data of the sample's (basic and physiological) variables. Attachment (1)

The steps of applying the research experiment:

- Having the permission of the coaches and players after clarifying the objective of the study which includes physiological tests and Ozone sessions for (12 sessions) with a basis of 3 sessions per week.
- Having the permission of the laboratory analysis of the blood at the Benha University to analyze the blood samples.
- Preparing a questionnaire for analyzing the physiological tests. Attachment (2)

Experiment's applying phase:

The research experiment was conducted in one month from 10/6/2016 to 10/7/2016 and it was applied individually for each individual and it was applied as follows:

The researchers conducted the exploratory experiment in order to:

- Calibrating the restameter and validating and calibrating the medical scales used to measure the weight, and training for using them.
- Calibrating the sphygmomanometer and calibrating mercury and making sure of the safety of the stethoscope and its validity for measurement. The researchers followed the following steps:
- Designing a questionnaire for collecting data on the sample by arranging some meetings with respondents.
- Describing the aim and the nature of the research to the respondents.
- Introducing the ozone gas device to the respondents its usage as well.
- Preliminary medical examination on the sample as follows: “measuring the height, weight, blood pressure and pulse”
- Asking the respondents whether if they were infected by any disease recently for conducting the research.

Devices, equipment and data collecting tools used in the research:

- Restameter (for measuring the length in centimeters).
- Medical scales (for measuring weight in kilograms).
- Ozone generator and an oxygen cylinder. Attachment (3)
- 5cm sterile medical syringes for taking blood samples, sterile medical cotton and alcohol for sanitation
- 50 and 60cm syringes, a stethoscope, medical catheters and gel (for the ozone gas doses).
- Tubes for saving the blood samples.
- Sphygmomanometer for measuring the systolic and diastolic pressures.
- A video camera.

A stationary bike (ergometric wheel):

By using Pederson test for the training until physical exhaustion “exhaustive test” according to the aerobic effort system for low intensity physical load and the effort starts at ergometric degree of 50 watts, which increases in 3 minutes to 75 watts and then increases to 125 watts and again increases in the effort every 3 minutes with 25 and 50 watts until the signs of fatigue appears on the player (pulse stability, increased sweating, chilling hand, standstill and the inability to continue switching). Attachment (4)

Research procedures:

Tests and measurements used in the research:

Physiological tests:

- Physiological tests for (heart and blood). Attachment (5)

Pre-measurements:

The researchers applied the physiological tests on the research sample by taking blood samples of each wrestler according to:

- Pulse rate
- Energy indicator for the heart muscle
- Red blood cells
- Hemoglobin
- Blood pressure (systolic and diastolic)
- Lactic acid
- White blood cells
- Hematocrit

Basic experiment:

The researchers conducted the experiment on the wrestlers by applying the pre-measurements for both groups of the research sample after performing physical exertion on the ergometric bike in the laboratory conditions using the Pearson test of physical exhaustion followed by giving rest for (5 min.), and then the researchers conducted physiological tests and took the blood samples. The researchers started the ozone gas sessions on the experimental group by (ozone anal injection) before the actual training for the wrestlers with a basis of 3 sessions per week before the training session. The average concentration of ozone gas "O₃" ranged between 15 to 20 micrograms, and then the researchers scheduled 8 ozone sessions in a basis of two sessions per week before the team starts training this was done under the supervision of the specialized doctor, Prof. Dr. Hamdy Basha.

Post-Measurements:

Post-measurements were conducted on the two groups of the research sample after finishing 12 ozone gas sessions for the experimental group, after that the researchers conducted the post-measurements after applying them just like the pre-measurements in the same laboratory conditions for the physiological variables on 11/7/2016.

Statistical treatments used in the research:

- Arithmetic mean (\bar{x}).
- Standard deviation (p).
- Contortion coefficient.
- Differences test.
- Correlation coefficient.

Presentation and discussion of the results:

Table (3)
Differences between the pre- and post-measurements in the experimental group
for the (physiological) variables after the experiment (n = 5)

Statistical significances Variables	Pre-measurement		Post-measurement		Difference between means		(t) value
	x	±p	x	±p	x	±p	
Systolic blood pressure	161.00	19.49	166.00	4.18	5.00	20.00	0.56
Diastolic blood pressure	73.00	20.80	72.60	5.50	0.40	23.55	0.04
Energy indicator for the blood muscle	472.54	34.47	437.52	14.24	35.02	39.59	1.98
Pulse rate	210.80	5.76	183.80	3.11	27.00	5.96	10.13*
Red blood cells	4.49	0.23	5.38	0.17	0.89	0.06	32.70*
White blood cells	9.52	1.38	8.64	0.27	0.88	1.54	1.28
Hemoglobin	12.98	0.50	14.72	0.29	1.74	0.45	8.64*
Hematocrit	38.42	1.82	45.72	1.33	7.30	2.11	7.73*
Lactic acid	74.98	3.94	26.97	2.05	48.01	4.23	25.38*

Significant at 0.05 = 2.78

Table (3) shows that there is a significant difference between the two measurements in the experimental group at the level of (0.05) for most of the physiological variables in favor to the post-measurement as the calculated (t) value ranged between (7.73 to 32.70), while there was no differences in blood pressure (systolic and diastolic, energy indicator of the heart muscle and white blood cells). These results are consistent with what is confirmed by Mohamed Ouda Khalil (2011) that continuous sport training increases the number of red blood cells and hemoglobin, which improve the maximum oxygen consumption. (14:152)

Bahaa-Eldin El-Safty (1999) confirmed that the sports training leads to a change in blood like the rest of the other organs of the body as the training increases the blood size and the number of red blood cells, and this increases the transfer of oxygen to the muscles. (14:152)

Reham Abdel-Khaleq (2002) also noted that medical ozone has a therapeutic effect in muscle recovery operations and the speed of recovery and returning to the normal status. (9)

The results of Mohamed Ouda Khalil (2011) also confirms that the rate of accumulation of lactic during physical training through the low rate of production in the muscle, and the increase of transfer to non-performing muscle and the increase of oxygen consumption during performance, which helps to produce a large amount of pyruvic acid in addition to the hydrogen ions that enter the mitochondria, so it turns into carbon dioxide and water, while pyruvic acid unites with ammonia to form an amino acid called alanine in the blood and glucose transformed in the liver and notes that the practice of sports training leads to increasing the acid level of alanine in blood, this is the main factor to delay the onset of fatigue resulted of the increase in the accumulation of lactic acid in blood during performing physical loads. (14:152)

Table (4)
Differences between the pre- and post-measurements in the control group
for the (physiological) variables after the experiment (n = 5)

Statistical significances Variables	Pre-measurement		Post-measurement		Difference between means		(t) value
	x	±p	x	±p	x	±p	
Systolic blood pressure	147.00	8.37	168.40	2.07	21.40	7.16	6.68*
Diastolic blood pressure	72.00	4.47	70.80	4.27	1.20	4.15	0.65
Energy indicator of the blood muscle	447.78	13.28	459.30	10.63	11.52	12.12	2.13
Pulse rate	204.80	8.67	192.00	1.58	12.80	9.58	2.99*
Red blood cells	4.55	0.21	5.00	0.12	0.46	0.14	7.43*
White blood cells	9.46	0.42	8.54	0.27	0.92	0.37	5.56*
Hemoglobin	13.32	0.36	14.12	0.44	0.80	0.30	5.96*
Hematocrit	38.52	1.36	41.90	1.08	3.38	0.73	10.41*
Lactic acid	74.63	5.83	45.96	2.64	28.67	3.98	16.10*

Significant at 0.05 = 2.78

Table (4) shows that there is a significant difference between the two measurements in the control group at the level of (0.05) for most of the physiological variables in favor to the post-measurement as the calculated (t) value ranged between (2.99 to 16.10), while there was no differences in blood pressure (diastolic and energy indicator of the heart muscle).

The researchers conclude that this improvement is due to using the traditional training program, which leads to a positive change in some physiological variables: (pulse rate, systolic blood pressure, percentage of lactic, red blood cells, white blood cells, hemoglobin, hematocrit and lactic acid) in favor to the post-measurement in the control group and this conforms with the study of Mohamed Ouda Khalil (2011). (14:153)

Table (5)
Differences between the experimental and the control group
in the (physiological) variables after the experiment

Statistical significances Variables	Experimental group (n = 5)		Control group (n = 5)		Difference between means	(t) value
	x	±p	x	±p		
Systolic blood pressure	166.00	4.18	168.40	2.07	2.40	1.15
Diastolic blood pressure	72.60	5.50	70.80	4.27	1.80	0.58
Energy indicator of the blood muscle	437.52	14.24	459.30	10.63	21.78	2.74*
Pulse rate	183.80	3.11	192.00	1.58	8.20	5.25*
Red blood cells	5.38	0.17	5.00	0.12	0.38	4.11*
White blood cells	8.64	0.27	8.54	0.27	0.10	0.59
Hemoglobin	14.72	0.29	14.12	0.44	0.60	2.52*
Hematocrit	45.72	1.33	41.90	1.08	3.82	4.98*
Lactic acid	26.97	2.05	45.96	2.64	18.99	12.71*

Significant at 0.05 = 2.31

Table (5) shows that there are significant differences between the experimental group and the control group in most of the physiological variables in favor to the experimental group, as the calculated (t) value ranged between (2.52 to 12.71), and this value is significant at the level of (0.05), while there were no differences in blood pressure (systolic and diastolic, and white blood cells). These findings are consistent with the results of the study by Rasha Mohamed (2004) “The ease of intake of medical ozone by anal injecting” where the results were fruitful, effective administration and safe and did not had any negative effect, also the study of Reham Mohamed (2002) showed that the medical ozone has a positive effect on the delay of onset of fatigue and that the ozone gas positively affects the motor performance level in rhythmic exercises and there is a positive effect of ozone on fast muscle recovery through lactic acid. (20), (19) the results of Mohamed Ouda Khalil (2011) confirm that sports training leads to physiological changes of which the most important of these physiological changes are the changes in the circulatory system and the respiratory system as well as the ability to increase oxygen consumption. (14:156-157)

The results of Reham Abdel-Khaleq (2002) showed that the medical ozone has a therapeutic effect in muscle recovery process and fast recovery operations. (9)

The researchers also confirmed that the low concentration of lactate during periods of rest decreases during hospitalization due to the use of oxygen and ozone and the work of cocktail of gases to reduce the lactic acid and contribution to the recovery operations in varied degrees.

This is consistent with what was indicated by Ehab Ayoub (2008) that the medical ozone applications using anal injection or skin exposure might lead to the improvement of physiological processes in blood and lead to a positive impact on the lactic acid, which reduces the speed of composition, as well as getting rid of lactic acid quickly, also oxygen can be useful to remove lactate from the blood of athletes. (3:58)

This is also consistent with what was referred to by Reham Abdel-Khaleq (2002), where the ozone improves blood compounds and improves the physiological processes and circulation leading role in ozone hospitalization and medical uses for athletes operations. (13:60)

Ehab Ayoub (2008) in his study concluded that pulse rate is one of the most important factors for regulating the cardiac pushing size for both low and high rate of physical load or when the individual's efficiency increases, the heart beat rate of athletes may range from 35-45 beat / min., while those of non-athletes may come up to 90 beats / min. (3:61)

This is consistent with the findings by Rasha Mohamed Ryad (2004) regarding the increase of pulse rate after the effort which affects the physical activity on ventricular size at the end of relaxation, and she noted that this conforms with Starling law, which stipulates that the strength of contraction of the heart is proportional to the size of the heart at the end of relax, i.e., the greater the size of the heart the stronger the contraction of the heart and cardiac pushing, this means an increased return of the blood to the heart, which can be explained by an increase of skeletal muscle strength, especially in the lower end where these muscles are working as terminal pumpers which help pumping and returning the blood to the heart during physical exertion. (8:61)

The results of the study are consistent with Mativimko, L. (1979) and Lamb, D (1984) in terms of increasing the number of red blood cells and hemoglobin as they help to provide the body with its needs of oxygen and delay the onset of muscular fatigue resulting from the lack of oxygen and the continuity of the muscles in activity. (19) (20)

Iman Awad (2000) pointed to the importance of the physiological effect of ozone and its positive effect on the revitalization of the circulatory system and the expansion of the blood vessels, which helps to relax and rest muscles. This physiological positive impact and physiological benefits are due to the release of an electric charge of a certain voltage during the start of the gas molecules in the blood also due to the presence of electromagnetic charge working on the speed of food

assimilation and vitalizing the body and the increase of exchanging the gases from and to the working muscles. (2)

Conclusions:

- The pulse rate of the wrestlers decreased from (210.80) b/sec. to (183.80) b/sec. after the experiment.
- Red blood cells in the blood of the wrestlers increased from (4.49) Thousnd/ul to (5.38) Thousnd/ul after the experiment.
- The percentage of hemoglobin in the blood of the wrestlers increased from (12.98) g/dl to (14.72) g/dl after the experiment.
- The percentage of hematocrit in the blood of the wrestlers increased from (38.42%) to (45.72%) after the experiment.
- The percentage of lactic acid in the blood of the wrestlers decreased from (74.98) Mmole/l to (26.97) Mmole/l after the experiment.

Recommendations:

- Giving more interest in using ozone gas as one of the modern methods with medical supervision for healing and delaying the onset of fatigue for athletes.
- Using other ways to intake ozone gas for healing and delaying the onset of fatigue.
- Further research is required to be conducted in medical ozone and sports.
- Educating the coaches and athletes to learn the benefits of using ozone gas to restore hospitalization.

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