

## **Effectiveness of Ischemia and Hyperemia exercises for upper limb on lactic and pH levels and their relation to Horizontal kinetic energy and record achievement level of swimmers 200 meters crawl stroke**

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### **Introduction and Research Problem:**

The scientific and technological progress plays a major role in the advancement of sport in all countries of the world, especially swimming, because of the progress in various training methods to achieve the highest level of sports and record height, especially in swimming crawl stroke on the abdomen, which was the result of various experiments and research in the field of swimming training.

In this regard, All of "Frank Al Fadhli" (2016), "Ian McLeod" (2016), "Nick Baker" (2015), "TalhaHossamEldin" (2014) and "Zaki Mohammed Hassan" (2014) And SMichael Brooks (2013) agreed that Physiological abilities, especially those related to blood variables and energy production, are the main component in obtaining the highest levels, which have a positive effect on the physical and basic motor abilities of the swimmers, especially

the transition speed of the swimmers in water, considering that the nature of the water contribute to the recognition of the different nature of the body work in this state . It also helps to understand how the body moves during swimming, when the swimmer performing a certain movement has a mechanical energy called kinetic energy. This energy varies according to its position during the movement according to the controlling part of the movement. The range of motion and its speed depends on the amount of work done by the muscles of the body. This is a mechanical quantity that is directly proportional to the speed of the swimmer. Kinetic energy according to the horizontal distance cut, and because the energy from the tow arms is the basis in the speed of the body forward in accordance with the horizontal direction of the swimmers crawl stroke and loss of this energy and the omission of dealing directly without

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attention to them leads to loss of power and cut J series movement thus losing speed (8:32), (9:185), (7: 241), (٢٨: ٤٧٢), (٣٤: ٣٢٩), (٢٤:٦٢٥).

Both of Nick Baker (٢٠١٥), Mohammed Fawzi (٢٠١٤), Vilas-Boas JP (٢٠١٢) and Angie Turuip ٢٠١٢(J. Troupe, UngerechtsB (٢٠١٢) and Dick Hannula (٢٠١٠) refer to The physiological relationship in Biomechanics is that the theories of the physiology of motor energy and its development and its integration with the physical and mathematical laws required the coach to understand movements at the level of the small muscle cell and on the level Functional mechanisms and the effect of the internal strength of their phosphate compounds on the body, where mechanical changes are a product of chemical changes. The chemical energy (in the cell) is transformed into mechanical energy through a certain mechanism that moves the liberated energy into kinetic energy, And muscular extinction considering that energy metabolism is all chemical changes of the responses that occur in the body during the production of energy for a job, the gradual decrease in mechanical energy mechanically

depends on the decline in the level of physiological

processes and gradually to the swimmer's sense of tiredness caused by metabolic waste and perhaps the most important start of the deposition of lactic acid to start its release from the muscles to the bloodstream because of The Oxygen Debt and the emergence of the lactate threshold of the eclectic difference of chemical changes in muscles of the arms and The most important of which is the increase in the anaerobic capacity of the body (1: 238), (22: 677), (36:411), (28: 61-66), (37: 167-171).

Both of HarukoShin-ichi (2016), Asaad Adnan Aziz (2013), FalahTaha Hamo (2012), Zabby Knox (2009) and Bahaa El Din Salama (2008) agree That the lactic acid ionizing and releasing hydrogen ions strongly affect the other particles of small size and charge positive and therefore can change the size and shape of the original, so it is accompanied by a functional change in the efficiency of swimming performance, especially the muscles of the upper limb of the swimmers crawl stroke because these muscles It happens the burden of Pull and push, So lead to plus Hydrogen ions to induce functional change in those

dominant muscles to pull the body forward by reducing the activity of enzymes by The breaking down of sugar and glycogen in these muscles and the retraction of phosphate composites from ATP prevent the Network from releasing calcium (cA ++). It is an insulator of the calcium bonding with the troponine. Thus, the action decreases the normal rate of the muscle by reducing the output of the force produced by the muscle and racing with the calcium ions to form Links with the troponine and builds up on the cross bridges and prevents the overlap of the actin and myosin strings and thus the resistance of the process of constriction and expansion. The process of linking the physiological and mechanical content in the movement of the limbs is related to the levels of muscular action in these limbs where The muscle mass produced by the energy required for the events of rapid muscle contractions in the longest possible period associated with the maintenance of those contractions according to the need of muscles throughout the race to convert this chemical energy into mechanical work in the upper limb as the part of the strong force pushing the body forward to swimmers 200 meters crawl

stroke at the depending of the legs, which consume more of the chemical energy in their phosphatic compounds for the length of the muscles and as a small percentage of the momentum, so the trainer must find a method of training increase the chemical energy compounds in the arms to obtain oxygen supply In order to maintain the speed of the swimmer throughout the race period and achieve a remarkable record the achievement, the method of training (ischemia and hypermia) has the obvious effect of converting and translating the chemical energy into a mechanic function in the form of forward moving kinetic energy that enables the swimmer to achieve aremarkable recordachievement (3:86) ,(4: 281-283), (36: 61-66), (4:10), (23: 285-275), (41: 482).

The sources added that this method is one of the modern training methods for sports training and is performed by closing the artery in the working muscle for a specific period ranging from 3 - 4 minutes where the oxygen level within the muscle tissue by blocking the passage of arterial blood flow (oxygenated blood) to the cells, due to occurrence of a case (ischemia)which means training in oxygen depletion. This process reduces the supply of tissues in

blood and increases the consumption of oxygen and nutrients. The accumulation of lactic acid in the muscles and the release of a large amount of vascular endothelial material, causing the expansion of blood vessels topically and when the case of ischemia, the artery is open and allow the passage of arterial blood naturally (Hyperemia) during which the flow of blood to the cells are eliminated from the products of contraction muscle in Oxidation conditions of lactic acid and increase the activity of the enzyme Lactate dehydrogenase (LDH), which helps to convert lactic acid to pyruvic acid by the enzyme Carotene Kneiz (CK) and oxidize large parts of these materials to form large quantities of (ATP) to increase directly the contraction muscle with the energy needed to the activity . The ATP increases the conversion of three quarters of the remaining pyruvic acid into glucose, which stimulates the body to produce and release hormones, enzymes and growth factors naturally to counteract abnormal external stresses and rebalance the internal environment of the body as well as the balance of the (PH) . The ischemia and hypermia training delay the onset of fatigue by stimulating and Motivating some

enzymes responsible for delaying the emergence of fatigue such as lactate dehydrogenases and lactate permease, which first created a relationship between the work of the muscle to the force and the work of the muscle to the endurance (muscular endurance) meaning that the more units of training led to increase muscle strength and at the same time leads to an increase of muscle endurance, contrary to what is consistent and common in all the traditional exercises known and widespread in the world that the work muscle of the force is inversely proportional to the activity muscle Dynamic muscular endurance (5: 9) , (14:78) , (6:52) , (38: 516-521) , (17:752) , (27: 338-341) , (81: 655-665) , (35: 217-222) .

the results of the motor and physiological performance of the most important results that are credible for the reality of the training programs developed in the field of swimming training in particular because of the results of these numbers of quantitative figures finally appear in the form of record achievement as well as the important correlation in the physiological processes of energy and its anaerobic phosphatic compounds and their impact on What happens from movements related to the kinetic

energy acquired by the body by linear transmission is equal to the work necessary to accelerate the body from the state of inactivity to a certain speed, which is expressed by the output of power in the achievement distance of the type of energy that is owned by The ability to use mechanical power indicators and work to determine the effectiveness of the training used and affecting the body's functional devices is one of the most accurate quantitative and qualitative readings on the effect of the force, or not . The training is not carried out because the training load is the burden on the organs of the body and the expression of these devices does not appear except in the performance of mechanical work, which indicates the extent to which the actual use of these devices from the correct translation of the energy system acquired by the swimmer performance in the race. Because kinetic energy =  $1/2 \text{ mass} \times (\text{speed})^2$ . This means the absolute stability of the body mass variable at the expense of increasing the strength of the existing muscle groups in the sense that the change in the horizontal motor energy of the upper limb in the positive or negative reflected on the speed achieved by the swimmer in this

direction (2:64), (11: 164), (31:468), (29: 72-80).

The problem of research is that in the recent swimming championship held at the University of Minya, the researcher found the reluctance of swimmers participating in the championship for the 200 meters crawl stroke through the work of the researcher in the field of swimming . The researcher found that the 200-meter crawl stroke depends primarily on the lactic acid system in the production of energy, which is the main impediment to bear the speed of the swimmer and thus the low level of record achievement in this race .The kinetic energy of the strong forward to the arms(upper limb)becomes very tired as lactic acid ionizes and releases hydrogen ions. It is strongly influenced by the other molecules of small size and positive charge. Therefore, it can change its size and its original form. This leads to a functional change in the muscles, especially the arms,because they are 90% of the burden of pushing and performance in crawl swimming and thus inhibit the increased concentration of hydrogen ions on the reconstruction of phosphatic compounds in the muscles controlling the performance and racing with calcium ions to form bonds with the troponin

and thus resistance to contraction and extinction in the strings of actin and myosin of the arms and low rates of pull and horizontal push forward and therefore reflected on Reducing the level of record achievement, and find a method of training based on increasing the debt oxygen, which is used to cover the duration of the activity of the contest 200 meters crawl stroke and help in the generation of horizontal kinetic energy of the arms As the largest part of the Strong push to swimmer. One of the most difficulties faced by the coach is to choose a training method that controls the training of the limbs, especially in the movements of arms (upper limb) which has the burden of continuous and rapid payment to maintain the speed of the race without interruption the length of the competition period with the accumulation of lactic compounds in the blood was the reason for choosing the method of training (Ischemia and Hyperemia) as a way to train the dominant limbs on the main thrust in the 200-meters crawl stroke by blocking the passage of arterial blood flow (blood oxygenated) to the cells and the occurrence of the case of Ischemia in preventing blood flow within the arteries low oxygen level The muscle tissue is accompanied by the accumulation of lactic acid in

the muscles and then the opening of the artery and allow the passage of arterial blood naturally (hyperemia), which increases the flow of blood to the cells in a large amount exceeding 140 times the normal exercises, which in turn lead to the arrival of blood carrying oxygen and food to the ends of the muscles, Which increases the strength and endurance during performance and removes the rate of internal strength and physical efficiency and development of the level of motor and mechanical work of horizontal kinetic energy of the arms by removing the residues of cellular reaction caused by lactic acid through PHeffectiveness of ischemia and hyperthermia exercises for the levels of lactic acid and blood pH in relation to horizontal kinetic energy and the record achievement level of swimmers 200 meters crawl stroke .

#### **Research Objectives:**

**The current research aims to identify the following:**

- 1- Effectiveness of ischemia and hyperthermia exercises of the upper limb on the lactic levels of the swimmer 200 meters crawl stroke (at research) .
- 2- Effectiveness of ischemia and hyperthermia exercises of the upper limb on the pH of the swimmer 200 meters crawl stroke (at research) .

3- the correlation of the effectiveness of ischemia and Hyperemia exercises of the upper limb of both levels of lactic and pH of a side and horizontal kinetic energy and the level of record achievement of swimmers 200 meters crawl stroke (at research) on the other side .

**Research Questions:** To achieve the research objectives, the researcher impose the following hypotheses :

1- Are there statistical differences at the level of 0.05 between the tribal and post-tribal measurements in the levels of lactic, pH, Horizontal kinetic energy and the record achievement of the experimental group? In what direction, if any, of tribal or post-tribal measures?

2- Are there statistical differences at the level of 0.05 between the tribal and post-tribal measurements in the levels of lactic, pH, Horizontal kinetic energy and the record achievement of the control group? In what direction, if any, of tribal or post-tribal measures?

3- Are there statistically significant differences at the 0.05 level between the mean of the post-tribal measures in the levels of lactic, pH, Horizontal kinetic energy, and record achievement levels of the experimental and control groups? And which direction, if any?

4- Are there a percentage improvement and Modified blaks gain ratio between the two measures of the experimental and control groups in the lactic, pH, horizontal kinetic energy and record achievement levels of swimmers 200 meters crawl stroke (at study)? And for which groups, if any?

5- Is there a correlation between the levels of lactic and pH (at study) of the experimental group (the research sample) on the one side? And between the horizontal kinetic energy and the level of record achievement of swimmers 200 meters crawl stroke (research sample) on the other side? What if it exists?

**Terms used in the study:**

**Ischemia Hyperemia**

**exercises:** Is a scientific method that relies on the results of anaerobic work by deliberately placing the muscles working under the anaerobic conditions Anaerobic Ischemia (blocking the arrival of arterial blood of the organ) using the Arterial Closure Apparatus (ACA) and give a physical load and then open the device to cause the so-called status of hyperactive Reactive Hyperemia (increase in blood flow to the organ after a temporary closure of the organ's flow rate) (12: 5) .

**pH:** pH is the number used by chemists to show the

concentration of hydrogen ions in a solution. The pH ranges from 0 to 14, the pH below (7) indicates that the solution is acidic and the pH above (7) indicates that the solution is basic (Alkaline) neutral solution such as pure water is neither acidic nor basic and has pH (7) at 25 ° and letters (pH) short for the hydrogen voltage (42:33), (68:12).

**Horizontal kinetic energy:** It is a kind of energy that the body possesses because of its movement. It is equal to the work required to accelerate an object from a state of dormancy to a certain velocity. It multiplies half of the mass of the body in a speed box and its unit of measure is Joule (J).

**Previous studies :**

- Sebastian Kos & et al (2018) Study entitled "Dynamic Blood Oxygen Level-Dependent Magnetic Resonance Imaging of Foot and Calf Muscles: Aging Effects at Ischemia and Postocclusive Hyperemia in Healthy Volunteers" (32).
- Costa, Fernando &etal(2018)Study entitled "Intravascular Source of Adenosine During Forearm Ischemia in Swimmers: Implications for Reactive Hyperemia" (31)
- Corcoran, Halea&etal(2018) Study entitled "Laser Doppler

Imaging of Reactive Hyperemia Exposes Blood Flow Deficits in Swimmers Model of Experimental Limb Ischemia" (30).

- Barstow, Thomas &etal(2017) Study entitled "Changes In the blood Scattering During Forearm Ischemia and Reactive Hyperemia" (17).
- Nicholas V.Todd & Alan Crockard Study entitled "Quantitative Measurement of Flow Diastolic Blood Volume after Training Ischaemia Arm in wrestler"(27).
- Yukinori Maruo,&etal (2017) Study entitled "Stress distribution prevents ischaemia and bone resorption in residual ridge For wrestlers ,Atherosclerosis" (40).
- LaghiPasini PL &etal(2017) Study entitled " Adenosine and chronic ischemia of the lower limbs" (25).
- Romualdo Belardinelli & et al (2017) Study entitled " the effects of exercise training in patients with ischemic and Hyperemia cardiomyopathy referred for cardiac rehabilitation,"(30).
- Behar D.L. Rothman &et al (2017) Study entitled "Spectroscopic Investigation of the Recovery of Energy and Acid—Base Homeostasis in the For swimmer body after Prolonged Ischemia,"(18).
- Samy Gordon & et al (2017) Study entitled "The Use of



Vacuum Compression Therapy on Ischemic Lower Limbs by Changes in Venous Blood Gases and Serum Lactate, Vascular Surgery"(15) .

- Manso Fillho & Kearns (2016) Study entitled " Muscle, tendon, and somatotropin responses to the restriction of muscle blood flow induced by Ischaemia and Hyperemia training,"(19) .

- yimberly T & et al (2016) Study entitled "Ischaemia and Hyperemia training to enhance physical function of older adults with knee osteoarthritis,"(39) .

- Alyssa Banford Witting & et al (2015) Study entitled " Effects of 10 Weeks Walk Training With Leg Blood Flow Reduction Ischaemia and Hyperemia on Carotid Arterial Compliance and Muscle Size in the Elderly Adults,"(16)

- Murat Karabulut, & Guillermo Perez (2015) Study entitled " Effects of low-intensity, elastic band resistance exercise combined with blood flow and restriction Ischaemia and Hyperemia on muscle activation,"(26) .

**Study plan and procedures:**

**Study Approach :**

The researcher used the experimental process because of its suitability to the nature of the study. It used one of the experimental designs, which is experimental design of two groups, one experimental and the other one controlling the tribal and post-tribal measurements of both .

**Community and Sample Study:**

The sample included (10) swimmers for the experimental group and (10) swimmers for the control group and the application of tribal measurement and post-tribal on both experimental and control groups, and included the sample swimming team of Minia University 2017/2018

**moderation of the sample members in the study variables:**

The researcher examined the extent of the distribution of the experimental and control groups in the light of the following variables: Growth rates (age, height, weight), blood variables (lactic levels, pH) and variable (horizontal kinetic energy) 200m crawl stroke .

**Table (1)**

**Mean, mean, standard deviation and skewkurt in variables  
In search of the whole sample (n = 20)**

skewnes	standard deviation	mode	Mean	measruing unit	Variables	μ
0.00	0.512	22.5	22.5	Year	age	1
0.321	5.92	173.5	172.85	Centimeter	height	Growth rates
-0.314	5.960	76	75.45	Kg	weight	
1.787	0.6063	12.90	12.68	MELIMOL	lactic levels	Blood variables
0.740	0.27721	0.00	0.49	P.H	pH	
0.846	0.0371	4.2	4.26	Joules	horizontal kinetic energy arms	6
0.846	0.0371	4.28	4.26	minute	record achievement level of swimmers 200m crawl stroke	7

Table (1), which refers to the mean, standard deviation, mode, and skewkurt of the variables (at study) of the sample of the research sample before the experiment. It shows that the coefficient of spacing ranged

between (-0.30), (0.32) (+3). This means that these variables fall within the normal temperate mean, indicating the homogeneity of the research sample in the variables (at study).

**Table (2)**

**The mean, median, standard deviation, and skewkurt in the variables under consideration for the experimental and control groups before the implementation of the research experiment (n1 = n2 = 20)**

Control group				experimental group				measruing unit	variables	μ
skewknes	standard deviation	mode	Mean	skewkurt	standard deviation	mode	Mean			
0.484	0.516	22	22.4	-0.48	0.51	23	22.6	Year	age	Growth rates
0.207	6.272	173.5	173.3	0.49	5.85	171.5	172.4	Centimeter	height	
0.099	6.172	76	75.9	-0.83	6.03	76	75	Kg	weight	
1.80	0.6310	12.70	12.62	1.98	0.6011	12.90	12.70	MELIMOL	lactic levels	Blood variables
0.066	0.2370	0.63	0.07	1.102	0.2978	0.30	0.40	P.H	pH	
0.691	0.039	4.26	4.20	0.00	0.066	4.28	4.26	Joules	horizontal kinetic energy arms	6
0.691	0.039	4.26	4.20	0.00	0.066	4.28	4.26	minute	record achievement level of swimmers m crawl stroke 200	7

It is clear from Table (2) that the skewkurt coefficients of the experimental and control groups in all the variables

(atresearch) are limited to +3, 3 indicating the moderation of the distribution of the sample in the variables (at research).

**Table (3)**  
**The significance of the differences between the two tribal measures of the two experimental groups And the control in the variables at research (n1 = n2 = 20)**

Level of functional	(t)Values	Differences between the two averages	Control group		experimental group		Measuring unit	variables		p
			sta	Mean	sta	Mean				
Not significance	0.39	0.2	0.516	22.4	0.516	22.6	Year	age	Growth rates	1
Not significance	0.74	0.9-	6.272	173.3	5.853	172.4	Centimeter	height		2
Not significance	0.74	0.9-	6.172	75.9	6.036	75	Kg	weight		3
Not significance	0.32	0.08	0.6310	12.62	0.6011	12.70	MELIMOL	lactic levels	Blood variables	4
Not significance	1.21	0.12-	0.2370	0.07	0.2978	0.40	P.H	pH		5
Not significance	0.45	0.01	0.053	4.20	0.0566	4.26	Joules	horizontal kinetic energy arms	6	
Not significancel	0.45	0.01	0.039	4.20	0.0561	4.26	minute	record achievement level of swimmers m crawl stroke 200	7	

The value of (t) tabular at the level of significance(0.05) = 1.812

**Table (3) shows the following:**

There were no statistically significant differences between the experimental and control groups in the variables at research. The calculated values (T) were less than the tabular value of (0.05) indicating their equivalence in these variables.

**First :Data collection tools:**

First: Instruments and tools: The researcher identified the tools used in the research according to the following conditions

- Be effective in measuring specific aspects of research.

- To have scientific transactions of validity, coefficient and objectivity.

**A- Scientific devices:**The researcher used the following scientific instruments

- Stopwatch is 1/100 of a second.
- A Japanese video camera of the type (sony) with high frequency speed.
- Tripod to install the camera.
- Count for calculating the courses of the armsdurhngswimming.
- Medical balance (weight) in kg.
- Qabbani balance to determine body mass within water.- Lactate Pro .

- Kinova kinetic analysis program (kinova).
- Blood test strips (PH) in the blood (test strips).

The researcher compared some devices to apply measurement on other devices of the same type and in the same circumstances gave the same results, indicating the validity and coefficient of the results of those devices.

**B- Tools:** The researcher used the following training tools:

- Handbables (H.P) Variety of shapes.
- Two feet fixed (P.B). - whistle.
- Cones. - Fins. -boards. - Sand balls. - centimeter Measuring tape.
- swimming pool 50 m x 21 m. - Rubber ropes (ASATIC) - Pressure bar for upper limb .

**Second-tests :** The researcher used the following tests

- Analysis of lactic levels in the blood (**Annex 1**).
- PH Test (P.H) (**Annex 2**).
- Swimming test (200 m) (**Annex 4**).

**Third-Equations (Annex 3):**

The researcher used the equation to determine the total horizontal kinetic energy to the arms by finding the total kinetic velocity

of the arms by applying an equation (Total horizontal displacement of the arms ÷ stroke time) Using the kinova program and then applying the law by finding the total horizontal kinetic energy of the two arms ( $1/2 \text{ mass} \times \text{square total kinetic velocity of the two arms}$ ) For swimmers 200 m crawl stroke .

**Scientific transactions for Tests at research:**

The researcher calculated the scientific transactions for the tests at search from the validity and coefficient stability of the period from Saturday, 3/2/2018 to Tuesday, 6/2/2018 .

**A: The validity:** validity of the tests (at research) was calculated by the validity of the peripheral comparison on a survey sample similar to the research community and outside the basic research sample. Their number are 16 swimmers . their marks were ascendingly to determine the highest quartile, and their numbers were four (4) swimmers, the significance of the differences between the quarters was calculated shown in Table (4) .

**Table (4)**

**Indication of differences between the highest and lowest quartiles in the tests at search Man-Witney-Labrometric Method (n = 8)**

(Valuesz)	W	U	Lower Quartile(n =4)		Upper Quartile (n =4)		Measruing unit	variables		ρ
			Total grade	Average grade	Total grade	Average grade				
١.١٥-	14.00	٤.٠٠	٢٢.٠٠	٥.٥٠	١٤.٠٠	٣.٥	MELIMOL	lactic levels	Blood variables	١
٠.١٨-	17.50	٧.٥٠	١٧.٥٠	٤.٣٨	18.50	٤.٦٣	P.H	pH		٢
٢.٠٣-	١١.٠٠	1.00	11.00	2.75	25.00	6.25	Joules	horizontal kinetic energy arms		٣
٢.٠٣٣-	١١.٠٠	١.٠٠	١١.٠٠	٢.٧٥	٢٥.٠٠	٦.٢٥	minute	record achievement level of swimmers m crawl stroke ٢٠٠		٤

Table 4 prove statistically significant differences between the top four and lowest four quadrant groups in the tests (at research) and in the direction of the highest quartile group. The probability of error is a function at 0.05 indicating the validity of these tests and their ability to Discrimination between groups.

**b- the coefficient :** To calculate the coefficient of the tests (at

research)the researcher used the method of applying the test and re-applied it to a sample of (16) sixteen swimmers from the research community and from outside the original sample and in In interval time between application and re-application period of (3) three days.Table (5) clarifies the correlation coefficients between the application and re-application .

**Table (5)  
The correlation coefficients between the application and re-application in the tests at study (n = 16)**

correlation	re-application		application		Measruing unit	variables		ρ
	sta	Mean	sta	Mean				
0.473	0.877	12.92	0.962	12.86	MELIMOL	lactic levels	Blood variables	١
0.575	0.243	5.56	0.248	5.58	P.H	pH		٢
0.410	0.046	0.238	0.047	0.235	Joules	horizontal kinetic energy arms		٣
0.344	0.063	4.277	0.067	4.274	minute	record achievement level of swimmers m crawl stroke ٢٠٠		٤

• The value (r) of the scale significance at (0.05) = 0.27

Table (5) shows that the correlation coefficients between the application and the re-application of the tests at

researchchanged from 0.58 to 0.75, all of them are statistically significant. The calculated values (r) are greater than the

tabular value (r) at the significance level (0.05) Indicating the stability of these tests .

### **Proposed training program:**

Design of the proposed ischemia and Hyperemia exercises for the upper limb on lactic and pH levels and their relation to Horizontal kinetic energy and record achievement level of swimmers 200m crawl stroke, The researcher reviewed many specialized scientific references as well as previous studies such as Sebastian Kos, 2018, 36 Costa Fernando, 2018, 35 and Barstow Thomas, 2018), (25), Hossam Al-Muhr (2012), (8) and personal interviews (specialized and trained teachers) to identify the duration of the program and duration of the training program. During the different training stages and distribution ratios within the program.

#### **A- The objective of the proposed training program:**

- Effectiveness of ischemia and hyperthermia exercises of the upper limb on the lactic levels of the swimmer 200 meters crawl stroke (at research) .
- Effectiveness of ischemia and hyperthermia exercises of the upper limb on the pH of the swimmer 200 meters crawl stroke (at research) .
- the correlation of the effectiveness of ischemia and Hyperemia the exercises of the upper limb of both lactic and pH

levels of the side and horizontal kinetic energy and the record achievement level of swimmers 200 meters crawl stroke (at research) on the other side .

#### **B- Conditions for selecting exercises:**

- The exercise is related to the same direction of the kinetic and time path to perform the skills at research.
- Targets should be commensurate with the needs of the research sample for training (ischemia and hypermia) .
- The training is subject to strict technical supervision and continuous evaluation as being of a special nature .
- Taking into consideration individual differences and diversity in training .

**C- The contents of the training program:** The experts' opinions in the field of specialization indicated the time distribution for the stages of the training season and the number of daily training units per week as well as the time of the daily unit, the components of the training load during the training periods, the ground-to-water ratio, the appropriate training load for the program and the physiological, during the period of implementation of the program .The program included (12) twelve training weeks during the period from 12/2/2018 to 12/5/2018, and the (3) units weekly with a total of (36)

training units throughout the implementation of the program . The researcher followed a load of (2:1) .the first processing period included (4) weeks, the second processing period (3) weeks, and the evaluation period to reach the sporty form (5) weeks. The program also included the basic part of the training unit for the implementation of the exercises (ischemia and hypermia) of the upper limb (Lactic and pH levels) and their relation to horizontal kinetic energy and the record achievement level of the

swimmers 200 meters crawl stroke .

**D- Program Timeline:**

Through the opinion of the experts and to inform the researcher of some references found that the most appropriate way to arrange the steps of the programs are as follows:

- Implementation period: three months / 12 weeks .
- Number of units: (3) three units per week .
- Total number of units: (36) thirty-six training units .

**Table (6)  
Determining the total time of the program in the weeks  
was distributed at intervals**

the program	Calendar period	Second Processing Period	first processing period	Period Content
Units ٣٦ minute ١٠٣٠	Units ١٠ minute ٤٠٠	Units ٩ minute ٨١٠	Units ١٢ minute ١٠٨٠	number of units Total time of units

**E. Formation of the program:**

**Table (7)  
Distribution of load at program intervals**

Average	load severity	Degree of load	Weekly load cycle	load Period
(١ : ٢) and the degree of pregnancy is 85% higher than the maximum swimmer can afford	%٧٠	Average	(١ : ٢)	first processing period
	%٨٠	high	(١ : ٢)	Second Processing Period
	%١٠٠-٩٠	Maximum	(١ : ٢)	Evaluation Period

**First: intensity of load :**

Many experts in the field of sports training in general and training of swimming sport, especially agreed that the minimum training intensity is

(60%) of the Maximum Pulse Rate, It expresses the medium intensity and reached a maximum of 85% to 95%: 100% . The maximum intensity

of therate, which expresses the high intensity. In range of this Equation the researcher has identified the appropriate intensity of the beginning of the proposed training program for the training of ischemia and Hyperemia of the upper limb of lactic and pH the levels and their relationship to Horizontal kinetic energy and record achievement level of swimmers 200 meters crawl stroke and compensation in the equation Carvonin Which states :-

- Pulse Rate = Training Ratio% (Maximum Pulse - Pulse Comfort) + Pulse Comfort

- Percentage of training% = 60%.  
Maximum pulse = 208 - (0.7 × age) .

- The average pulse during rest = 70 beats / minute .

**Second: Repetition:** Most experts in the field of training agreed that repetition is meant by the frequency of training per week and the minimum frequency (3) three times a week

**Third: The constantly period:** Most of the experts in the field of training agreed on the intended period of work during the performance of the training dose and its minimum at the beginning of the training (120 s) for the maximum load and 90 s for the

load below the maximum and 60 s for the average load .

#### **F- Executive Steps for Research :**

**1- AssistantsAnnex (5):** The use of a specialist doctor in vascular surgery to guide the researcher to optimize the use of the training method used , avoid any errors in training , determine the conditions of tying tapes on the upper limb , determine levels of pressure and avoid the negative cases resulting from pressure .

**2- The exploratory study:** The researcher conducted the exploratory study on 2/2/2018 to 6/2/2018 , in order to determine the suitability of the contents of the program at study for the sample of the research and the suitability of the tools and the extent of the contribution of the training to the abilities of the sample members and the assistants understanding the method of measurement and the extent of discovery the limitations and weaknesses that appear during the implementation of the tests and treatment of those aspects that appear at the application and the order of performance of each test and determine the interval between the tests . The pilot study resulted in the



identification and codification of the various exercises used in the proposed training program as well as health tools used and their suitability for the research and the assistants' understanding for the purpose of the research and measurement method.

**3 - Tribal measurements:** The tribal measurements were made in the research variables of the two research groups on Saturday, 9/2/2018.

**4 - application of the program:** The implementation of the training programs (12) weeks. It was applied in the period from 11/2/2018 to 11/5/2018 by (3) units per week, where the unit time (60 - 90-120) minutes in Training Unit. The researcher took care that the training is as follows:

The researcher carried out the proposed training program for the ischemia and Hyperemia exercises for the upper limb with the experimental group. As for the control group, the traditional method was followed in the training. The two groups were trained in the same conditions

and the same size where the warming-up and closing is consolidated. The difference in the main part of the training unit for the sample and the training program.

**5- post-tribal measurements:**

After completing the application of the program, the researcher carried out the post-tribal measurements of the experimental group and the control group on Thursday 12/5/2018 under the same conditions as in the tribal measurement.

**Statistical method used:** In light of the research objectives and hypotheses, the researcher used the following statistical methods: Arithmetic Mean, Median, standard deviation, skewness, T Test, correlation coefficient, Mann-Whitney Test, percentage change, ETA<sup>2</sup> Test, and Modified Blak's gain ratio, has been satisfied by the researcher level of significance at (0.05).

**View and discuss the results :**

**Table (8)**

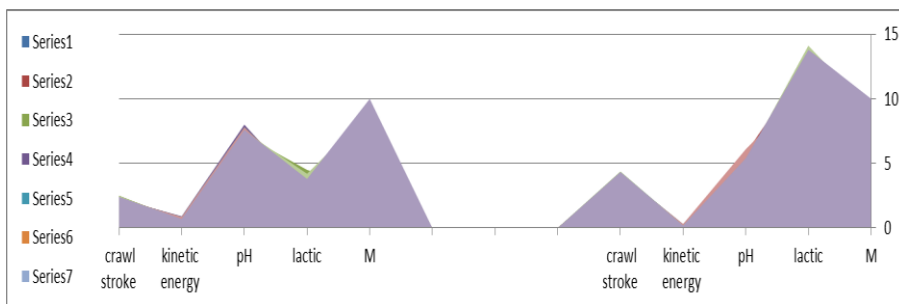
**the mean of the differences and the value of ETA 2 and the strength of their effect between the tribal and remote indices of the experimental group members in the variables (at study) (n = 10)**

Power of impact	Level of significance	ETA2	value (t)	error	Percentage ratios of change rate	Average differences	Average post-tribal measurement	Average tribal measurement	Measuring unit	variables	r	
strong	significance	0.98	33.09	0.27	11.19	6.12	3.6	12.72	MELIMOL	lactic levels	Blood variables	1
strong	significance	0.98	18.83	0.11	4.01	2.2	7.63	5.43	P.H	pH		2
strong	significance	0.92	06.82	0.03	18.31	0.0169	0.23976		Joules	horizontal kinetic energy arms		3
strong	significance	0.99	06.82	0.03	44.26	1.89	2.38	4.27	minute	record achievement level of swimmers 200 m crawl stroke		4

\*The value of (t) the tabular at the level of significance (0.05) = 1.943

Table (8), which indicates the arithmetic mean and the value of the significance of (t) and the value of ETA 2 and the strength of their effect between the tribal and post-tribal measures of the control group members in the variables (at study) . There were statistically significant differences at level 0.05 between the tribal and post-

tribal measurements of experimental group members in blood variables (lactic levels, pH), the total horizontal kinetic energy of the two arms, and variable record achievement of the swimmers 200 meters crawl stroke (at study) and the value ranged between (0.92), (0.99) and strongly (strong) effect.



**Form (1)**

**Diagram showing the significance of the differences and the value of ETA 2 and the strength of influence between the tribal and post-tribal measurements of the experimental group members in the variables (at study)**

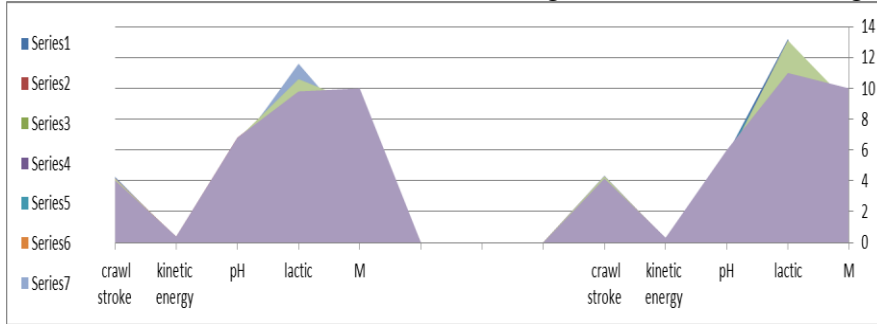
**Table (9)**  
**the mean of the differences and the value of ETA 2 and the strength of their effect between the tribal and remote indices of the control group members in the variables (at study) (n = 10)**

Power of impact	Level of significance	ETA2	value (t)	error	Percentage ratios of change rate	Average differences	Average post-tribal measurement	Average tribal measurement	Measuring unit	variables		
strong	significance	0.17	1.943	0.06	4.43	0.06	11.08	12.64	MELIMOL	lactic levels	Blood variables	1
strong	significance	0.03	4.02	0.14	11.01	0.14	6.2	5.56	P.H	pH		2
strong	significance	0.32	1.40	0.24	12.0	0.23	0.2857	0.2469	Joules	horizontal kinetic energy arms		3
strong	significance	0.10	1.40	0.24	0.53	0.24	4.22	4.265	minute	record achievement level of swimmers 200 m crawl stroke		4

\*The value of (t) the tabular at the level of significance (0.05) = 1.943

Table (9), which indicates the arithmetic mean, the value of the significance of (t), the value of ETA 2 and the strength of their effect between the tribal and post-tribal measures of the control group members in the variables (at study), shows that there are no statistically significant differences at level 0.05 between the pre- and post- in the blood variables (lactic

levels), the total horizontal kinetic energy variable of the two arms, and the variable of the record achievement of the swimmers 200 meters crawl stroke (at study) and in the direction of the post-tribal, except for the pH variable, which indicates significant differences between (0.10), (0.53) And strongly impact ranged from (Weak), (average) .



**Form (2)**

**Diagram showing the significance of the differences and the value of ETA 2 and the strength of influence between the tribal and post-tribal measurements of the control group members in the variables (at study)**

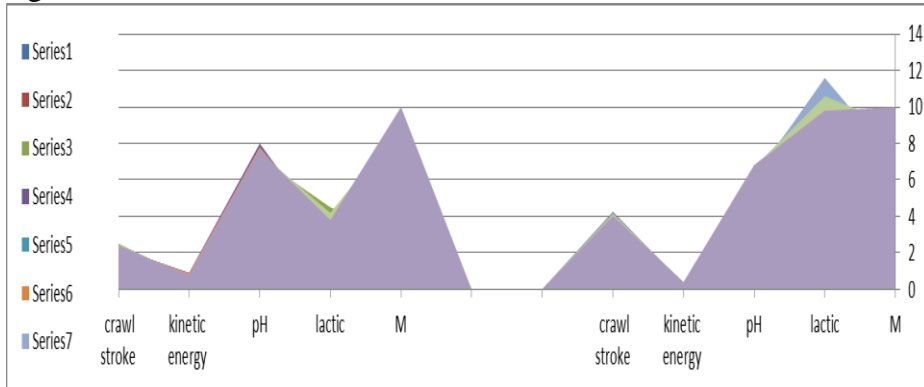
**Table (10)**  
**The mean of the difference and the value of ETA 2 and the strength of its effect between the two post-tribal of the experimental and control groups in the variables (at study) (n = 10)**

Power of impact	Level of significance	ETA2	value (t)	error	Percentage ratios of change rate	Average differences	Control group		experimental group		Measruing unit	variables		r
							sta	Mean	sta	Mean				
strong	significance	0.98	32.11	0.26	71.87	9.2	0.230	12.8	0.011	3.6	MELIMOL	lactic levels	Blood variables	1
strong	significance	0.90	10.24	0.13	22.06	1.42	0.274	3.2	0.226	7.62		pH		2
strong	significance	0.91	06.24	0.030	62.16	0.47	0.277	0.28	0.10	0.706	Joules	horizontal energy arms	kinetic energy arms	3
strong	significance	0.99	06.24	0.02	42.60	1.84	0.02	4.22	0.08	2.38	minute	record achievement level of swimmers 100 m crawl stroke		4

\*The value of (t) the tabular at the level of significance (0.05) = 1.943

Table (10), which indicates the arithmetic mean, standard deviation, value of the significance of (t), the value of ETA 2 and its effect on the two measures of the experimental and control groups in the variables (at study) shows that there are statistically significant differences between

the experimental group and the control of the two post-tribal measures in all the variables (at study) and in the direction of the members of the experimental group and the value ranged between (0.91), (0.99) and strongly (strong) effect.



**Form (3)**

**Diagram illustrating the significance of the differences and the value of ETA 2 and the strength of their effect between the two post-tribal of the experimental and control groups in the variables (at study)**

**Table (11)**  
**The mean, the percentage of improvement, and Modifiedblaks gain ratio of the experimental and control groups in the variables (at study) (n1= n2=20)**

Modifiedblaks gain ratio	interest ratio	percentage of improvement	Control group			experimental group			Measruing unit	variables		p
			improvement	post-tribal	tribal	improvement	post-tribal	tribal				
4.28	Experimental	77.26	4.43	12.08	12.64	7.75	3.1	12.22	MELIMOL	lactic levels	Blood variables	ε
7.75	Experimental	28	11.81	7.2	5.56	4.81	7.72	5.43	P.H	pH		σ
1.33	Experimental	82.68	16.12	1.2887	1.246	7.831	1.7866	1.2347	Joules	horizontal kinetic energy arm		γ
2.98	Experimental	43.22	1.938	4.22	4.26	4.26	2.38	4.27	minute	record achievement level swimmers 200m crawl stroke		ν

• The efficiency of the Modifiedblaks gain ratio = (2.1)

It is clear from Table (11) which refers to The mean, the percentage of improvement, and Modifiedblaks gain ratio of the experimental and control groups in the variables (at study) to the following :

- The percentage of improvement in all the variables (at study) of the experimental and control

groups in favor of the experimental group, and their improvement rates ranged between (67.26%) and (29%).

-The average Modifiedblaks gain ratio in the variables (at study) ranged from (4.28), (1.33) to the experimental and control groups .

**Table (12)**

**The correlation matrix between the variables at study in the post-tribal measurements of the experimental group swimmers (n = 10)**

ε	ζ	ψ	ι	Measruing unit	variables	p
swimmers 200m crawl stroke	horizontal kinetic energy arm	P.H	Lactic acid			
			1.00	MELIMOL	lactic levels	ε
		1.00	0.90 -	P.H	pH	
	1.00	0.92	0.98 -	Joules	Horizontal kinetic energy	γ
1.00	0.99	0.92	0.98 -	minute	record achievement level of swimmers 200 meters crawl stroke	ν

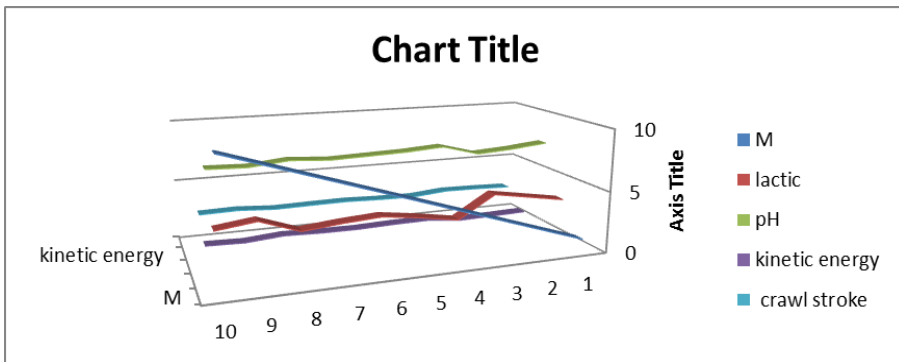
\* The value of (r) the tabular at the level of significance (0.05) = 0.417

It is clear from Table (12) which refers to The correlation matrix between the variables at study in the post-tribal measurements of the experimental group swimmers of the following :-

- There is a positive correlation between the (horizontal kinetic energy) of the two arms on one side and the pH on the other, and the level of record achievement of the 200 m crawl stroke on one

side and the total horizontal kinetic energy of the other .

-There is a negative correlation between the blood variables on one side and the lactic levels on the other side and the variable (total horizontal kinetic energy of the arms) on one side and the blood variable in the lactic levels on the other, record achievement of swimmers 200 meters crawl stroke) on one side and the blood variable in (lactic levels) on the other .



Form (3)

**Diagram illustrating The correlation matrix between the variables at study in the post-tribal measurements of the experimental group swimmers**

**Discussion and interpretation of the results :**

returning to the results of Table (8) which indicates the arithmetic mean and the value of the significance of (t) , the value of ETA 2, the strength of their effect between the tribal and post-tribal measures of the control group members in the variables (at study) . There were

statistically significant differences at level 0.05 between the tribal and remote measurements of experimental group members in blood variables (lactic levels, pH), the total horizontal motor energy of the two pairs, and variable record achievement of the swimmers 200 meters crawl stroke (at study) and the value ranged

between (0.92), (0.99) and strongly (strong) effect.

The researcher attributes these differences to Effectiveness of ischemia and Hyperemia exercises for upper limb on lactic and pH levels and their relation to Horizontal kinetic energy and record achievement level of swimmers 200 meters crawl stroke. This is illustrated by blood variables (lactic levels - pH), Horizontal kinetic energy and record achievement level of swimmers 200 meters crawl stroke. The differences between the tribal and post-tribal measurements of the experimental group in the blood variables in both the lactic levels of the experimental group. The percentage of the tribal measurement (12.72), whereas in the experimental group The mean difference was (3.6) with an average difference between the tribal and post-tribal measurements (9.12) and a standard error rate (0.27) with a calculated value of (33.09) and a percentage of change rate of (71.69) with a statistically significant value and a value of 2 (0.98) Strong), and for the pH variable The differences were clear between the tribal and the post-tribal measurements, where the percentage of tribal measurement was (5.43) while in the post measurement (7.63) with an average difference between the tribal and the post-

tribal measurements, It was 2.2 with a standard error rate of 0.11 with a calculated value of (18.43), with a percentage change of (40.51), a statistically significant value of (0.95), and Strongly impact (strong). The effective effect of the experimental group (ischemia and Hyperemia) in the total Horizontal kinetic energy variable was significant. The differences between the tribal and post-tribal measurements of the members of the experimental group were (0.23976) and in the post-tribal was (0.7566). The tribal and post-tribal measurements reached (0.5169) with a standard error of (0.03) and a calculated value of (56.82) and a percentage change rate of (68.31) with a statistically significant level and a value of ETA2(0.92) The variable of the record achievement of the swimmers 200 meters crawl stroke the final outcome of the relationship improvement in the variables of the search of blood variables represented in (lactic - pH levels), which reflected the variable Horizontal kinetic energy of the arms increase the rate of motor ability of the upper limb muscles, because of increasing offset distance compared (4.27), while in the post measurement (2.38) with an average difference between the tribal and post-tribal measurements (1.89), the difference between the tribal and

post-tribal measurements of the experimental group. By a standard error of (0.03) and the value of  $t$  calculated it amounted to (56.82) , a percentage of the rate of change was (44.26) , the level of Dalal statistical value amounted to  $ETA_2$  (0.99) and strongly (strong) effect.

The relationship between both lactic and pH levels in the blood is inversely related because the accumulation of lactic acid in the blood increases the acidity of the blood towards the reverse direction of the pH in the sense of a change in the pH balance in the blood. (7) degrees, the characteristics of muscle contraction will change, especially in the upper limb acquired the strength of pulling the body forward . Therefore, the swimmers are well trained in the control exercises and control of lactic acid and hydrogen ions with blood . The associated chemical changes turn this energy (Kinetic) energy to produce a function that moves the chemical energy into kinetic energy that serves the contraction and muscular extensibility by loading the muscle into the anaerobic work products which are produced only in the lack of oxygen . This leading to increase muscle strength in the responsible directions such as increasing the section area Muscular in those dominant muscles on the upper limb and especially swimmer 200 meters

crawl stroke achieving a remarkable record achievement, so the training of (ischemia and hypermia) effective effect of increasing the muscle circumference due to increase blood flow through the muscle tissue significantly for the lack of arterial oxygen da Of the muscles by 25% of the normal limit. With the use of hypermia increased blood flow in the muscles isolated oxygen about three times helped in the direction of blood towards alkalinity, also carries the lack of oxygen and associated with the occurrence of the phenomenon (Oxygen debt) as a result of the adaptation made by using this system of training, During the Special preparation period and competitions .

These results are consistent with the study of Sebastian Kos (2018) (32), the Corcoran, Halea study (2018), (20) Costa Fernando study (2018), (21) the Barstow study Thomas Barstow, Thomas "(2018) (17) Dynamic Blood Oxygen Level-Dependent Magnetic Resonance Imaging of Foot and Calf Muscles: Aging Effects at Ischemia and Postocclusive Hyperemia in Healthy Volunteers , Laser Doppler Imaging of Reactive Hyperemia Exposes Blood Flow Deficits in Swimmers Model of Experimental Limb Ischemia , Intravascular Source of Adenosine during Forearm Ischemia in Swimmers , Changes



In the blood Scattering during Forearm Ischemia and Reactive Hyperemia .

By presenting, interpreting and discussing Table (8), the answer to the first question of the research hypotheses is determined statistical differences at the level of 0.05 between the tribal and post-tribal measurements in the levels of lactic, pH, Horizontal kinetic energy and the record achievement of the experimental group(The research sample)And in the direction of post-tribal measurement .

returning to the results of Table (9) which indicates the arithmetic mean, the value of the significance of (t) , the value of ETA2, the strength of their effect between the tribal and post-tribal measures of the control group members in the variables (at study), shows that there are no statistically significant differences at level 0.05 between the pre- and post- In the blood variables (lactic levels), the total horizontal kinetic energy variable of the two arms, and the variable of the record achievement of the swimmers 200 meters crawl stroke (at study) and in the direction of the post-tribalmeasure, except for the pH variable, which indicates significant differences between (0.10) , (0.53) And strongly impact ranged from (Weak), (average) .

The researcher attributes the absence of statistical significance differences in these variables in both the blood variables and the variable total horizontal motor energy of the two arms and variable record achievement level of swimmers200 meters crawl stroke . This is because of the lack of actual benefit from the traditional program to bring about the actual morphological change of swimmers in biological oragans , except for variable (P.H)So that there was no significant internal change in the other variables at reseach, although the researcher took into consideration the total time of the program, the number of training units and the number of units . In addition to the time distribution of the units. Physical preparation on the general and private physical elements according to its importance to blood variables, total motor kinetic energy of the two arms and the record achievement level of swimmers200 meters crawl stroke . In addition to the different exercises that were developed for the swimmers of the control group, which took into account the intensity required and mastered according to the pulse factor in both rest and after effort .

These results are consistent with the study of Behar D(2018), (18) Corcoran, Halea (2018), (20) and Yukinori

Maruo, (2018) (40) Spectroscopic Investigation of the Recovery of Energy and Acid-Base Homeostasis in the For swimmer body after Prolonged Ischemia , Laser Doppler Imaging of Reactive Hyperemia Exposes Blood Flow Deficits in Swimmers Model of Experimental Limb Ischemia , Stress distribution prevents ischaemia and bone resorption in residual ridge For wrestlers ,Atherosclerosis .

By providing, interpreting and discussing Table 9, the answer to the second question is determined from the hypothesis of the research, even partially, which states that there are statistically significant differences at level 0.05 between the tribal and post-tribal measurements in the pH variable of the control group (sample) Post and in the post .

Returning to the results of Table (10) which indicates the arithmetic mean, standard deviation, value of the significance of (t) and the value of ETA<sup>2</sup> and its effect on the two measurements of the experimental and control groups in the variables (at study) shows that there are statistically significant differences between the experimental and the control groups of the two post-tribal measures in all the variables (at study) and in the direction of the members of the

experimental group and the value ranged between (0.91), (0.99) and strongly (strong) effect .

The researcher attributes the superiority of the experimental group to the control group in view of the application of the proposed training program for ischemia and Hyperemia exercises for upper limb on lactic and pH levels and their relation to Horizontal kinetic energy and record achievement level of swimmers 200 meters crawl stroke .The training of an (endurance speed) is one of the necessities of the training process for short-cours swimmers in need of kinetic energy in the muscles controlling the performance in swimmers crawl, especially 200 meters to rely on the upper limb as an effective way to move the body forward, so This tybe of muscle training is firstly linked to the ability of the upper limb muscles to bear fatigue and endure the pains resulting from the rise of acidity of blood, due to the accumulation of lactic acid at a rate more than how to get rid of it . Thus increase the transfer of the effectiveness of hydrogen ions to influence strongly on the other molecules of small size and positive charge . Thus, it can change its original size and shape . This lead to a functional change in reducing the efficiency of swimming

performance and inhibition of the basic enzymes in the process of the synthesis and thus deterioration of the mechanism of contractility by controlling the release of calcium because the change of concentration of calcium ion . It can change the activity of muscle Luifat especially upper limb muscles on the performance of the swimmers 200 m crawl stroke .As it represents 80% of the body's driving force, accompanied by increasing acidity, low conversion of phosphorus (b) to the effective form (A) and inhibit phosphofructocyanase (PFK). In addition to the basic H + function . The muscle is more acidic and low in correlative calcium is also reduced by the attraction of troponin to CA ++. Thus, troponin is less likely to bind acetylene and myosin binding sites and ATP enzyme is less effective due to low PH, which leads to slower ADP release. As a whole determined by the rate of continuity of the speed of the crossbridge cycle, thus the mechanical ability decreases working of the arms muscles to pull the body forward and decrease the total energy of the arms in performance . As mentioned previously, access to training solutions of modern training methods control the training of upper limb muscles in particular .It is the most important factors that help in the

existence of large differences in the results of search variables between the experimental group that followed the training of (ischemia and hypermia), which helped to end the race faster and the differences between the experimental and control groups, test the superiority of the experimental group of the control group in the variables (atrsearch) in the blood variables(lactic levels) . The mean differences between the two post-tribal measurements was (9.2), with a standard error rate of (0.26), with a calculated value of (32.11), a percentage of a change rate of (71.87), a statistically significant level, and an ETA value of (0.98), While the pH variant was in the direction of the upward trend towards the equivalence between the acid and the alkali and even the tendency towards alkalinity. The mean difference between the two post-tribal measurements was (1.43) and a standard error rate was (0.13) with a calculated value of (10.34).Percentage ratios of change rate was (23.06) with a statistically significant level, and a value of ETA2 reached (0.85) and strongly influenced (strong) . Both blood variables in both lactic and pH levels were associated with an improvement in the total horizontal kinetic energy of the arms without any impediments to the upper limb muscles in performing their

mechanical work and even taking advantage of every possible muscle contraction away from the pain caused by acidity of the muscles, with differences between the two post-tribal measurements of (0.47) and a standard error rate of (0.035) with a calculated value of (56.24), a percentage of a change rate of (62.16) and a level of Statistical significance value amounted to  $\eta^2(0.91)$  and strongly influenced (strong). The correlation between the improvement of both the blood and kinetic variables of the experimental group (at study) for the proposed training program for ischemia and hypermia training improved the record achievement level of swimmers 200 meters crawl stroke and helped to end the race faster and the differences between the two post-tribal measurements were (1.84), with a standard error rate of (0.03), a calculated value of (56.24) and a percentage change rate of (43.60). At a statistically significant level, the value of  $\eta^2$  reached (0.99) strongly (strong) effect.

These findings are consistent with the study of Nicholas V Todd (2017) 27, the study of Laghi Pasini PL (2017) 25 and the study of Romualdo Belardinelli (2018): Quantitative Measurement of Flow Diastolic Blood Volume after Training Ischaemia Arm in wrestler ,

Adenosine and chronic ischemia of the lower limbs , the effects of exercise training in patients with ischemic and Hyperemia cardiomyopathy referred for cardiac rehabilitation .

**By presenting,** interpreting and discussing Table (10) the answer to the third question of the research hypotheses is determined statistical differences at the level of 0.05 level between the mean of the post-tribal measures in the levels of lactic, pH, Horizontal kinetic energy, and record achievement levels of the experimental and control groups (The research sample) And in the direction of the experimental group .

Returning to the results of Table (11) which refers to The mean, the percentage of improvement, and Modified blaks gain ratio of the experimental and control groups in the variables (at study) The percentage of improvement was in all the variables (at study) of the experimental and control groups in favor of the experimental group, and their improvement rates ranged between (67.26%) and (29%). The average Modified blaks gain ratio in the variables (at study) ranged from (4.28), (1.33) to the experimental and control groups .

The researcher attributes the percentage of improvement and statistical significant differences between the experimental and

control groups in favor of the experimental group . The actual benefit of the experimental group of the effectiveness of ischemia and hyperthermia exercises of the upper limb of lactic and pH levels , and their relation to the horizontal kinetic energy and the level of records achievement of swimmers 200 m crawl stroke . This type of race is characterized by heavy performance, which lasts for a relatively long period producing high amounts of lactic acid, sometimes reaching 14 mmol / L or more than the anaerobic threshold where lactic acid is collected in the muscle fibers in the areas of Neuromuscular communication, This impedes the arrival of nerve signals and does not reach the muscle fibers in a fluid way. This reduces the possibility of contraction and rapid expansion of the muscles controlling the performance in the race, especially the upper limb muscles so the level drops and the ability of horizontal kinetic energy of this work is accompanied by a doubling of the metabolic pressure of the muscle cells, causing swelling. The swelling cells compress the ends of the sensory nerves, causing pain to appear in the muscles. This pain may continue in the muscles until the end of the performance. The use of lactic acid and pH concentration levels in the blood as a mean of monitoring the intensity of

physical training or identifying the improvement of the proposed training program for the exercises . It is one of the most important factors used in the proposed training program for the experimental group for the training of ischemia and Hyperemia, with a percentage of the rate for the experimental group (lactic levels) were (71.69%) from the control group (4.43%) with a difference of (67.26%) and in favor of the experimental group with an average gain rate of (4.28%) . Which had an effect on the experimental group exceeded the case of fatigue and skipping the performance of the maximum stress without considering that the concentration of 3-2 mmol / l is low and an indication that the effort below the level of anaerobic threshold .The result of low levels of lactic in the blood of the experimental group and non-skewed The threshold . This was reflected on the pH level, which was equal to and even alkaline, where the percentage of improvement for the experimental group of the pH level was(40.51%) from the control group (11.51%) with a difference of (29.00%) and for the benefit of the experimental group with an average rate of gain ( 2.61). The improvement of the horizontal kinetic energy potential of the two arms had a clear effect and evidence to increase the rate of work in the

upper limb muscles . It was credited with increasing the pulling distance without fatigue or pain due to the absence of concentrations of lactic levels. This is a proof of the effectiveness of the ischemia and heperemia training of the experimental group .Because the concentration of lactic levels is equal to the elimination rates. Therefore, the acidity of the upper limb muscles and the better sign of the pulling . The experimental group improvement in the total horizontal kinetic energy variable was (68.31%) of the control group (16.13%), with a difference of (52.18%), and for the experimental group with average gain rate (52.18). The record achievement of the swimmers 200 meters was the largest evidence of the effectiveness of the ischemia and hepramia of the experimental group (at study) . As the final outcome of the improvement of blood variables of (Lactic - pH levels) as a result of the improvement of the Horizontal kinetic energy variable of the arms, so reflected on the record achievement variable of swimmers 200 meters crawl stroke, where the rate of improvement for the experimental group was (44.26%) from the control group (0.938%) with a difference of (43.32%) and in favor of the experimental group. And

Modfielblaks gain ratio an average (2.69) .

These findings are consistent with the study of RomualdoBelardinelli (2017) (30), the study by Samy Gordon (2017) (15) and the Manso Fillho study (2018) (19) the effects of exercise training in patients with ischemic and Hyperemia cardiomyopathy referred for cardiac rehabilitation, The Use of Vacuum Compression Therapy on Ischemic Lower Limbs by Changes in Venous Blood Gases and Serum Lactate , Muscle, tendon, and somatotropin responses to the restriction of muscle blood flow induced by Ischaemia and Hyperemia training .

By presenting, interpreting and discussing Table (11) the answer to the fourth question of the research hypotheses is determined statistical a percentage improvement and Modfielblaks gain ratio between the two measurements of the experimental and control groups in the lactic, pH, horizontal kinetic energy and record achievement levels of swimmers200 meters crawl stroke (at study) And for the benefit of the experimental group .

Returning to the results of Table (12), which refers toThe correlation matrix between the variables studied in the remote measurements of the

experimental group swimmers (The research sample), There is a positive correlation between the (horizontal kinetic energy) of the two arms on one side and the pH on the other, the level of record achievement of the 200 m crawl stroke on one side and the total horizontal kinetic energy of the other . There is a negative correlation between the blood variables on the one side and the lactic levels on the other side and the variable (total horizontal kinetic energy of the arms) on the one side and the blood variable in the lactic levels on the other, recod achievement of swimmers 200 meters crawl stroke on the one side and the blood variable in (lactic levels) on the other .

The researcher attributs the existence of this correlation relationship to all the variables of the research, namely, blood variables (lactic levels, pH), the variable total horizontal kinetic energy of the two arms, and the variable level of record achievement of the swimmers 200 meters crawl stroke to follow the experimental group of the proposed training program for the exercises of (ischemia and hypermia). It has an effective and clear effect on the experimental group (at study) where the negative correlation between blood variables represented in (lactic-pH levels), which reached (-0.95) because the relationship between levels of lactic and pH inversely .Which means,The

lower the levels of lactic in the blood, the higher the pH (pH) to reach the balance of acid and alkaline . It sometimes to the direction of alkaline and indicates the speed of the disappearance of lactic of blood or concentrations do not exceed the threshold of anaerobic differences because there is a balance between the production rates of levels of lactic acid and ratios While the correlation between the variable (total kinetic energy of the two arms) and the (lactic) levels in the blood, which reached the correlation between them (-0.98), while the positive correlation between the variable (total kinetic energy of the two arms) And variable (a As pH), which amounted to (0.92) The work is the change in kinetic energy according to the ability of the muscle to have the strength of contraction that helps move the body from one place to another and for the swimmier the work is the power produced when moving the parties against resistance, and the possibility of using mechanical power indicators and work in determining the effectiveness of drills And the effect on the upper limb muscles of the experimental group (at study), which is necessarily reflected on the pulling power of swimmers200m . While the negative correlation of the record achievement variable of the 200 m swimmercrawl stroke with the

blood variable (lactic levels) which reached (-0.98) crawl stroke. And positive correlation with the blood variable in pH (0.99) considering that the rate of work has increased in the muscles of the upper limb and also increased the pH towards the alkalinity and thus become the upper limb muscles function without obstructing the work of the cross bridges in the completion of the slip. For actin and myosin strings and thus reflected on the level of record achievement of swimmers 200 meters crawl stroke to follow the experimental group (at the search) for the training program (ischemia and hypermia) which led to the speed of recovery after the performance of violent or long-term high-intensity, because after the completion of the training of the blood flow in a larger quantity may exceed (7) seven times the blood flow in the normal training, which works to speed the displacement of waste and the products of anaerobic work accumulated on the working muscles. Thus rebalancing the internal environment of the body as well as the balance of the (PH), and thus remove the maximum muscle strength of the player, which can not be obtained from any other method of training by loading the muscle with the work of anaerobic products produced only in a few oxygen. Muscle strength In charge of trends such

as increasing muscle-sectional area.

These findings are consistent with the study of Manso Filho (2017) (19), Kimberly (2017)(32), the study of Alyssa Banford (2018) (16) Murat Karabulut "(2017) (32) Muscle, tendon, and somatotropin responses to the restriction of muscle blood flow induced by Ischaemia and Hyperemia training, Simultaneous Dynamic Blood Oxygen Level-Dependent Magnetic Resonance Imaging of Foot and Calf Muscles: Aging Effects at Ischemia and Postocclusive Hyperemia in Healthy Volunteers, Effects of 10 Weeks Walk Training With Leg Blood Flow Reduction Ischaemia and Hyperemia on Carotid Arterial Compliance and Muscle Size in the Elderly Adults, Effects of low-intensity, elastic band resistance exercise combined with blood flow restriction Ischaemia and Hyperemia on muscle activation.

By presenting, interpreting and discussing Table (12) the answer to the Fifth question of the research which refers to The correlation matrix between the lactic and P.H levels (at study) of the experimental group swimmers (search sample) on one side, and between (horizontal kinetic energy), the record achievement of the 200 m crawl stroke (search sample) on



the other side .There is a positive correlation between the (horizontal kinetic energy) of the two arms on one side and the pH on the other, and the record achievement level of the 200 m crawl stroke on one side and the total horizontal kinetic energy of the arms on the other . There is a negative correlation of the blood variables between the pH on one side and the lactic levels on the other side, the variable (total horizontal kinetic energy of the arms) on one side and the blood variable in the lactic levels on the other, record achievement of swimmers 200 meters crawl stroke) on one side and the blood variable in (lactic levels) on the other .

### **Conclusions:**

Within the limits of the problem of research and its importance and in light of its objectives and the hypotheses and nature of the sample and within the framework of statistical treatments and interpretation of the results and discussed the researcher was able to reach the following

### **conclusions :**

- Effectiveness of ischemia and hyperthermia exercises of the upper limb on the lactic levels of the swimmer 200 meters crawl stroke (research sample) .
- Effectiveness of ischemia and hyperthermia exercises of the upper limb on the pH of the swimmer 200 meters crawl stroke (at research),where the

percentage of change in these variables between (71.69% :40.51%) .

- Effectiveness of the upper limb extremities of ischemia and hyperthermia on blood variables (lactic levels, pH) (at study) led to variable improvement (total kinetic energy of the two arms) and variable The percentage of change was(68.31%:44.26%) .

### **Recommendations:**

In the light of the results of the study, within the scope of the field and the sample carried out, and according to the conclusions reached, the researcher recommends the following:

- 1- Mainstream the use of the proposed training program for the upper limb of ischemia and hyperthermia on the levels of lactic and pH and their relationship with the horizontal kinetic energy and the record achievement level of 200 meters crawl stroke.
- 2- The interest in the aspects related to kinetic and mechanical variables, such as horizontal kinetic energy of the arms to determine the dynamics of the dominant performance and speed in swimming because of its importance in directing training programs and methods towards these parts of the dominant performance .
- 3- the need to use the functional variables in swimming training programs and try to link them with the kinetic variables (mechanical) because they give

quantitative and accurate results to judge the training load and the effectiveness of training programs used .

4- the need to use modern equipment in the measurement and evaluation of the field because of the provision of time and effort and credibility of its standard and keep pace with the systems of progress and development in the field of swimming training .

5- Work on the dissemination of training (ischemia and hypermia) for the training of the limbs because of their effectiveness to the development of all aspects of the physiological, kinetic and skill of the limbs in general .

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