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The effect of aerobic training according to genetic diversity on some biochemical variables and the digital level to reduce sports injuries in swimming

Lect. Fatimah Hameed Kzar[1], Dr-Yasar Sabeeh Ali, Dr. Assistant Professor. Wafaa Sabah Mohammed Al-Khafaji

Abstract-- *Analysis of the condition of the students (research sample) shows a genetic diversity of ACE I/D, with a 75% frequency of ACE DD, followed by the ACE ID gene isotope by 25%. The aerobic training program has a positive effect on the biochemical variables under consideration, where there were statistically significant differences between the tribal and dimensional measurements in favor of dimensional measurement. Students who have an ACE ID gene respond to aerobic training more than female students who have an ACE DD gene. To emphasize the knowledge of ACE I/D genetic diversity for young people as they approach practice to discover the potential that well-founded training can transform into effective capabilities. Selection of female students in sports and aerobic-games is based on the ace ID gene pattern. Conduct such research on larger and more diverse samples in the field of sports with various collective and individual activities. Study different types of genes nominated to influence physical performance Candidate genes, which may have an effective effect on the development of physical performance and thus may enable us to develop a model for selecting players for different activities in order to achieve the required level of achievement by selecting promising elements.*

Keywords-- *aerobic, exercises, genetic diversity, biochemical variables, digital, swimming, physical education, sports sciences*

Introduction

There is no doubt that the repercussions of the era governed by science and technology imposed on us one way and there is no alternative to his behavior in pursuit of progress, which is the path of scientific research, which has become one of the most important necessities of modern society to reach the highest levels in all areas of life, by recognizing the different abilities and energies god has given to man in an attempt to achieve the greatest possible use of modern scientific theories and develop them to serve society. The human genome project is one of the most important scientific discoveries reached in the modern era, which aims mainly to know the complete genetic structure of man, and this project became the main concern of scientists and researchers in the field of biotechnology, where the huge amount of information it provided contributed to enable them to understand the mechanism of biological systems and solve the code of genetic information. **(Hussein, 2010)**

Literature review

The sports field has been greatly influenced by modern technology in the field of molecular biology, where sports physiology and training are no longer limited to the study of physiological changes at the level of biological organs only, but the nature of modern studies has evolved to the level of study of those changes at the cell level and what is within the cell of fibrosis, muscle wicks, mitochondria and enzymes, and this came as a natural development inherent in the rapid development of scientific discoveries in the field of molecular biology. **(Abu Ala, 2003)** where modern sports training relies mainly on modern scientific knowledge and information, and on taking into account the individual differences between female students in physical, psychological, motor and physiological abilities, in

[1] University of Baghdad Education and sports science
Corresponding Author: fz71avi@yahoo.com

addition to the importance of subjecting sports training programs according to different levels of athletes to achieve the optimal development of players. **(Peter, 2001)** Therefore studies and research in the field of sports is one of the important aspects that help to achieve high mathematical achievements, which can only be achieved through the application of the results of recent scientific theories reached Research, in order to identify different biochemical and physiological changes at the level of different cells and tissues of the body, which are associated and influenced by the genetic structure of the cell, which varies from athlete to athlete. **(Abu Ala, 2003) (Bahaa al-Din, 2008)** points out that genetics is one of the modern sciences that have entered the sports field in the modern era, where developed countries began to work with the theories of this science to reach the highest levels of sports, through the use of modern technology in the field of genes in athletes to help improve and develop performance through the early physical selection and employment of young people, guiding and training them according to their biological characteristics. **(Bahauddin, 2008)** And **(Hussein, 2003)** adds that genes are responsible for 50 percent of the world's population. Differences between athletes in athletic performance, as well as the interpretation of individual differences in performance among athletes, are also credited with explaining what athletes should do in the future to reach higher levels better, so genes may be more important than training in explaining differences in performance. **(Hopkins, 1998)** states that to be a high-performance athlete you need the right genes. He adds that one of these genes has been discovered, ace gene, which symbolizes the enzyme that activates the converted Angiotensin Converting Enzyme, which converts Angiotensin1 into anjutensin2. He points out that a working group in London has found that the ACE gene is active in the muscle tissue where blood flow is regulated, and that this gene comes in two forms: I)) insertion input code, otosion (D) code of cancellation and it is recommended that athletes test DNA because knowledge of ace genetic diversity will help explain individual differences when responding to training. **(Schneider, 2001)** points to the importance of the role of genes, especially ace gene in athletic performance, in order to reach the highest levels of sports and add that ace gene is important in effectively influencing physical performance. **(Hussein, 2003)** considers the ACE gene to be important in determining the athlete's maximum oxygen consumption and the size of the left ventricle of the heart, as well as the gene determines the type of muscle fibrosis. And identify the genetic and molecular foundations of the muscles Structural in terms of its characteristics and its response to sports training at the beginning, and follow-up DNA and its effects on the gene expression responsible for the response to contraction and metabolic effect on the structural system has been discovered within certain limits where it needs further study, and it is important to show the role of genes in the response of the structural muscles to sports training as such experiments will provide sports workers with the necessary information about the molecular mechanism involved in the adaptation of the skeletal muscles. **(Hussein, 2003)** And **(Bahauddin, 2008)** said that aerobic training is a physical performance that takes place at a moderate or slow speed where the amount of oxygen is sufficient for the exertion, i.e. training in the presence of oxygen. Sports training aims to bring about the process of adjustment to perform physical functions with a certain degree of strength for a longer period in the face of fatigue and requires some physiological, chemical and neurological effects, where most of these effects are summarized in two directions, one related to the improvement of air and aerobic energy production systems and the second associated with the nervous system. The problem with research is that scientific research Which dealt with sports training processes in swimming relied on some factors and determinants biological and morphological and psychological and did not care about the aspects related to genetics as a new global trend in the field of sports research in general and swimming sports in particular in order to reach the best ways to achieve sports achievements **(Ahmed, 2003)** and by the knowledge of the researcher and her specialization in swimming attracted her attention the lack of scientific research that dealt with the genes responsible for sports performance in swimming and its relationship to the digital level so the researcher wanted to go through this experiment through the study of the impact of the exercises In accordance with the genetic diversity of some biochemical variables and the digital level of the students of the Faculty of Sports Education and Sports Sciences in swimming. This prompted the researcher to move towards modern and non-traditional scientific methods, by identifying the aerobic training effects according to genetic diversity and its relationship to some biochemical variables and digital level in swimming for students of the Faculty of Sports Education and Sports Sciences, due to the importance of linking genetics and molecular biology and the different effects of sports training. **(Hazam, 2007)**

Methodology

The researcher used the experimental method using the experimental design of one experimental group to conduct tribal and dimensional measurement due to its suitability for the nature of this study.

Table (1) Values of the Arithmetic Average, Intermediate and Twisting Coefficient in the Variables "age-height - weight - digital level"

Skewness factor	Median	Standard Deviation	Mean	Measuring unit	Variable
0.79	18.45	0.189	18.5	year	age
0.85	172	3.511	173	centimeter	height
0.22	64.5	1.369	64.6	Kilogram	weight
-0.120	0.650	1.105	0.641	sec	Digital level in swimming

It is clear from table (1) that the distortion coefficient of the research sample members ranges from +3, indicating the moderation of the distribution of the research sample in the variables (age, height, weight, digital level in swimming) in question. Tools and devices used in the research: a medical balance for measuring weight. Restameter device to measure length. Medical cotton. White alcohol. 5cm plastic singers are used only once. Tubes tested out (Edita) to prevent blood clots. Kolman to save and transport blood. Centrifuge to separate plasma from blood cells. Thermal Cycler DNA analysis device.

- The measurement of the hydrogen-suppressing enzyme (LDH) device (Spectrophotometer) was used to measure the enzyme hydrogen ledled LDH during rest and after the maximum effort of the research sample by withdrawing the blood sample size (3 million) from each player by the competent doctor, using plastic sorrans and then emptying them in test tubes numbered numbers that match the order of the research sample members, and was saved in (Ice Box), until transported to the laboratory. Put in the tube (1 ml of reaction solution (Pyruvate + NADH) with PH solution) at a temperature (37) °C until the temperature is gained, then put

  (20) microliters of serum in the water bath for exactly one minute, then move to the measurement cell (Qofit), and read at wavelength (340 nm) every minute for (3) minutes. The attrition rates are measured when the wavelength (340) nm is based on the NAD composition rate) which is directly proportional to the activity rates. LDH), then calculating the reading rate per minute (A), then taking the average of the three readings, multiplying the resulting result ing x coefficient (0.4796) and the result is equal to the enzyme activity rate and unit/l.

- Lactic acid measurement: The Akport was used to measure the concentration of lactate in the blood for the research sample, and the following steps were followed in the measurement: the device was turned on by pressing the operating key (on), and then fed the device with the code number of the chip pack used to measure lactate. A slide was taken from the slide tray and placed in the hole at the bottom of the device, then opened the edge of the bottom device to show the slide placed in the device. Immediately after the edge of the lower device is closed, (the screen will remain cleared for 60 seconds but the countdown begins to zero), and when the count reaches zero, the device releases a whistle, displaying the value of the lactate with blood.

- Preparation steps for the aerobic training program: reference survey of Arab and foreign scientific references and previous and related research studies. Survey of recent foreign studies from the Internet as well as research topics. Expert opinion poll in order to identify them on the most important exercises used in the aerobic and aerobic training program.

- The foundations and principles of the design of the training program: the training loads of the air training program should be suitable and suitable for the age phase of the research sample. Following the principles and principles of sports training in the design of the training program. The flexibility of the training program should be adjustable by deletion or addition in accordance with the conditions created during the program. Take advantage of previous and associated studies in the design of the training program.

- The foundations and principles of training used in the preparation and design of the training program: warm-up and calming: each training begins with warm-up and ends with calming down. Privacy: There are key elements that must be subject to the specificity of training, including energy production systems - the type of muscle strength required

to perform motor performance - the nature of the implementation of motor performance in different situations. Progress with training pregnancy grades: Pregnancy grades should not be fixed but should increase over time and according to abilities and adaptation. Diversity: The need for a change in training from performance to comfort and easy to difficult. The ripple form of the training campaign: this means the height and fall to carry the training and not to walk at one pace or level.

- Time distribution of the training program: Through the reference survey, the 9-week training program was limited to 3 training units per week, with a daily training unit time of 120 minutes.

Table No. (2) Stages of the Air Training Program

Third stage	Second stage	First stage	Stages of building parts
4	3	2	Week numbers
3	3	3	Training days No. a week
4	4	4	Rest days No. a week
1	1	1	Training unit a day
120 seconds	100 seconds	90 seconds	Daily training unit time

Results

Table (3) Percentage of Ace "ID"Dd" among Female Students in Research

DD	ID	Genetic equivalent
		Percentage
75%	25%	Percentage %

It is clear from table (3) that the frequency of the ace dd of the students samples the research 75% while the frequency of the genetic isotope ACE ID was 25% where the numbers of female students with the genotype ACE

AD 4 female students while the number of individuals with the genotype ACE ID were two students.

Table (4) Indication of Differences and Percentage between Tribal and Dimensional Measurements in Biochemical Variables of the Total Research Sample (Wilkson for grade signal)

Indication	value Z	Percentage of improvement %	Difference between two means	Mean	practice	Measuring unit	Biochemical Variables	
0.01	2.934	48.04	5.24	10.90	before	Mmol/l	Blood lactic	
				5.66	after			
0.01	2.934	10.39	37.00	356.09	before	Unit/L	During rest	Enzyme LDH
				319.09	after			
0.01	2.936	12.19	46.91	384.91	before		Maximum effort	
				338	after			

Table 4 shows that there are statistically significant differences between tribal and dimensional measurements of the total research sample in all biochemical variables in favor of dimensional measurement, where the value of (Z) was statistically significant at the level of indication (0.01), and the rates of improvement in biochemical variables ranged between (10.39%, 48.04%) in favor of dimensional measurement.

The researcher attributes these results in the improvement of biochemical variables to the use of the aerobic training program where the energy supply at the point of deviation of the heart rate is pneumatic, where students consume large amounts of oxygen during the performance of aerobic exercises, and this cycle requires increased use of red blood cells, because they are responsible for carrying oxygen to cells, and therefore the rates of consumption are higher than the consumption of the heart muscle and skeletal muscle to large amounts of lactic acid and converted to perocionic, whether in the heart or muscle, This cycle helps to continue the performance of the sport for a longer period. According to (**Butova, 2009**, **Mohammed, 2002)** the improvement in biochemical variables during physical performance depends not only on the low concentration of lactic acid in the blood during and after the exertion, but also related to the activity of the hydrogen-extractive enzyme (LDH) in the slow and rapid muscle fibers, as the activity of the ldh enzyme that prevails in the rapid fiber supplant encourages the process of converting peruvianic acid into lactic acid, On the other hand, the enzyme (LDH) which is prevalent in slow muscle fibers helps to convert lactic acid into pericacid, and consequently the process of formation of lactic acid in fast muscle fibers occurs faster than in the slow muscle fibers, and this actually occurs during the research experiment, where the increased degree of resistance faced by the student during performance by raising the degree of pregnancy, increases the rate of reliance of the student on the fast muscle fibers to face such fibers of biochemical and physiological properties enable shaping of the functioning of In light of the high level of performance during work on the motorcycle or moving, which results in a higher level of formation of lactate and increased ability of female students to continue to perform. According to these results and in line with them, **(Passarella, 2008**) **(Simeon, 2006)** indicates that the improvement in biochemical variables is due to the presence of training effects with high tensions, which reduce the percentage of lactic acid and reduce its presence in the blood and the speed of its disposal, as part of the acid Lactic is equated with the same blood by vital organizations that maintain the PH level and regulate the concentration of hydrogen ion (H) to the concentration of hydroxyl ion (OH).

Table (5) Indication of Differences and Percentage between Tribal and Dimensional Measurements in the Digital Level of Swimming for the Total Research Sample (Wilkson for grade signal)

Indication	value Z	Percentage of improvement %	Difference between two Means	Mean	Practice	Measuring ring unit	Body variables
0.01	2.820	5.34%	0.034	0.637	before	S	Digital level
				0.603	After		

Table 5 shows that there are statistically significant differences between tribal and dimensional measurements of the overall research sample in the digital level of swimming in favor of dimensional measurement, where the value of (Z) was a statistical function at the level of indication (0.01), and the rates of improvement in the digital level (5.34%) were in favor of dimensional measurement.

The researcher attributes the existence of statistically significant differences in favor of dimensional measurement and improvement in the digital level in swimming for the training of the air training regulated and the training contained for the tolerance of different speeds, as well as the work of the same muscles involved in different situations aimed at delaying the accumulation of lactic acid and the speed of disposal and speed of hospitalization, and was for that positive effect clear in improving the tolerance of speed and performance, which led with aerobic training in the availability of oxygen to a positive effect to develop the level of physical performance. These findings are consistent with **(Mohammed, 2001)** that the less intensity in the similar repetitive exercises, the greater the player's

ability to use air oxygen, so that the work takes the character of speed and performance. This is what (**Bahaa al-Din, 2000)** points out, that genetic factors play a key role in determining the different characteristics and characteristics that differentiate athletes, and that differences in genetic preparations that distinguish athletes from another, affect their performance in general during training and competitions. **(Mohammed, 2002)**

Table (6) Indication of Differences between Dimensional Measurements in Biochemical Variables of the Total Research Sample (Man Whitney) according to ace ID/DD Genetic Diversity

Indication	value Z	Rank sum	Rank Mean	number	Genetic variation	Measuring unit	Biochemical variables	
0.05	2.121	3	1.50	2	ACE ID	Mmol/l	Blood lactic	
		63	7	4	ACE DD			
No Sig.	0.236	53	5.89	2	ACE ID	Unit/L	During rest	Enzyme LDH
		13	6.50	4	ACE DD			
0.05	2.121	3	1.50	2	ACE ID		Maximum effort	
		63	7	4	ACE DD			

Table 6 shows that there are statistically significant differences between the dimensional measurements of the total research sample in lactic acid and LDH enzyme after maximum effort in favor of female students with ACE ID, where the value of (Z) was statistically significant at the level of indication (0.05) each, while there are no statistically significant differences between the research sample in the enzyme (LDH during rest). The researcher attributes this improvement in biochemical variables due to aerobic training effects according to the genetic diversity ACE ID, which varies from athlete to Another, where students with genetic diversity (ACE ID) are characterized by the speed of transfer of lactate from blood and muscles to the heart and non-working muscles, and increase the flow of oxygen-laden blood to the muscles, and also increase the efficiency of working muscles involved in performance for as long as possible without reaching the muscle fatigue, in addition to increasing the activity of the enzyme extractive of hydrogen. Found in muscles (m-LDH) in the speed of conversion of lactate to perocidal and the speed of disposal, thus helping to continue the athletic performance for as long as possible, while students with genetic diversity (ACE DD) are characterized by remarkable slow transfer of lactate from blood and muscles to the heart The non-working muscles and the rapid accumulation of lactate within the muscles and blood, as well as the lack of activity of the hydrogen-extractive enzyme in the muscles (m-LDH) in the conversion of lactate to pericarcepe, which leads to increased accumulation of lactate and the feeling of muscle fatigue of athletes.

Table (7) Indication of Differences between Dimensional Measurements in the Digital Level of Swimming for the Total Research Sample (Man Whitney) according to the Genetic Diversity ACE ID DD

Indication n	Value Z	Rank sum	Rank Mean	Number	Genetic variation	Measuring unit	Body variables
No sig.	2.360	13	0.589	2	ACE ID	D	Digital level
		53	0.629	4	ACE DD		

It is clear from table 7 that there are statistically significant differences between the dimensional measurements of the total research sample in the digital level of swimming in favor of female students with ace ID, where the value of (Z)

was statistically significant at the level of indication (0.05). The researcher attributes this apparent difference in the proportions of change to the different version of the gene owned by the students where the superiority of the students who possess the ACE ID gene, which indicates the response of these students to aerobic training by a higher percentage than the students who possess the ACE DD gene. This is consistent with bahauddin Salama's assertion (2008) that ace gene can be used in the selection of young people as diversity (II), (ID) which produces small amounts of the converted ACE enzyme leads to less blood vessels constriction, which increases the amount of blood received to the muscles, thus increasing the numbers of mitochondria and increasing red blood cells within the muscles, as well as the percentage of red muscle fibers is greater than white muscle fibers and all these qualities are characteristic of aerobic activity players. These findings are consistent with the findings of a study **(Hazem, 2007)** that young people with an ACE ID gene are better physically and digitally improved than those with the ACE DD gene, indicating that these young people are more responsive to aerobic physical work.

Conclusions

1. Analysis of the condition of the students (research sample) shows a genetic diversity of ACE I/D, with a 75% frequency of ACE DD, followed by the ACE ID gene isotope by 25%.
2. The aerobic training program has a positive effect on the biochemical variables under consideration, where there were statistically significant differences between the tribal and dimensional measurements in favor of dimensional measurement.
3. Students who have an ACE ID gene respond to aerobic training more than female students who have an ACE DD gene.
4. To emphasize the knowledge of ACE I/D genetic diversity for young people as they approach practice to discover the potential that well-founded training can transform into effective capabilities.
5. Selection of female students in sports and aerobicgames based on the ace ID gene pattern.
6. Conduct such research on larger and more diverse samples in the field of sports with various collective and individual activities.
7. Study different types of genes nominated to influence physical performance Candidate genes, which may have an effective effect on the development of physical performance and thus may enable us to develop a model for selecting players for different activities in order to achieve the required level of achievement by selecting promising elements.

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