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Original article

EFFECT OF HYPOXIC TRAINING ON CERTAIN BIOCHEMICAL VARIABLES AND COMPLEX SKILLS FOR YOUTH SOCCER PLAYERS UNDER 16 YEARS

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Abstract

Aim.

sports training works to prepare the player for the requirements of playing during the match, while ensuring that the player is bound and freed in making constructive decisions and giving him thinking opportunities to take the appropriate behavior skillfully and dynamically and based on understanding the problem and trying to solve it under the pressure of exercise. And the position it forms in an organized manner is subject to the foundations and principles of modern sports training science. The aim of this study was to investigate the effect of hypoxic training on certain biochemical variables and complex skills for youth soccer players under 16 years.

Methods.

Sample consisted of soccer players in degla Sports Club under 16 years old, where the strength of the basic sample was (32) youths and regulars in the application of the training program, and the sample of the survey studies, numbering (12) youths, was excluded, so that the total of the basic sample became (20) youths, were divided Equally into two groups, one experimental (10 young people), and the other control (10 young people).

Results.

Statistical analyses showed that:

- Statistically significant differences between the averages of the posttests of the experimental and control groups in the tests of motor speed, strength endurance, speed endurance, and periodic respiratory endurance in favor of the dimensional measurements of the experimental group.
- Statistically significant differences between the averages of the post measurements of the experimental and control groups in resting pulse rate, creatine kinase (CK), lactate dehydrogenase (LDH), lactic acid in favor of the post measurement of the experimental group.
- No significant differences. Statistical significance between the averages of the dimensional measurements of the experimental and control groups in (SGOT) enzyme and (SGPT) enzyme.

Conclusions.

Under the conditions of our article, the proposed hypoxic training affected on certain biochemical variables and complex skills for youth soccer players under 16 years.

Keywords: training, breathing, mask

Introduction

Soccer has become a mass sport that attracts a lot of attention and follow-up, which has made it the most popular sport in the world, as it is played by young and old, and its practice is now no longer confined to males only but has become practiced by females as well. Muhammad Kishk, Amr Allah Al-Basati (2000) confirms that sports training works to prepare the player for the requirements of playing during the match, while ensuring that the player is bound and freed in making constructive decisions and giving him thinking opportunities to take the appropriate behavior skillfully and dynamically and based on understanding the problem and trying to solve it under the pressure of exercise. And the position it forms in an organized manner is subject to the foundations and principles of modern sports training science. Hassan Abu Abdo (2001) believes that the physical preparation of Soccer players has become the preoccupation of the technical staff in preparation and planning for the training season through programs that are standardized for load, based on scientific foundations to reach the players to the highest possible level of fitness for Soccer, which is endurance, strength, speed, and agility. Flexibility is the most important component and basic attributes in the daily, weekly, monthly, and annual training plan.

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Oday Al-Nimri (2013) indicates the importance of physical fitness, which is vital for the player, as with its height he is able to run and run and maintain a good level of performance without declining throughout the match, and with its lack the player becomes vulnerable to losing focus and rapid fatigue, and the team that controls the ball throughout the match without dropping the level, endurance training during the game is part of several parts to get more fit and stay in an appropriate position throughout the match, and the Soccer player always needs physical fitness in order to maintain the same level throughout the match.

Amrullah Al-Busaty (2001) adds that forming the training load in terms of its goal and degree during the training season is the basis for improving the physical and functional level of the player. Without studying its effect on the body, it often leads to negative effects that appear during the training season.

Essam Helmy (1998) mentions that every follower of the development of sports levels in the world realizes that sports training has a great importance in preparing, formulating, and developing human capabilities in their various dimensions to detonate the maximum capabilities and energies inside the person towards the desired goal.

It has been noted recently that scientific research has given great attention towards evaluating traditional training methods and working on developing them and finding innovative scientific methods that improve physiological efficiency and digital achievement. Its effects appeared in achieving functional and digital improvement in some sports, and its idea is to rely on reducing the percentage of oxygen inside the body, as it was found that this method has positive effects.

Muhammad Allawi, Abul-Ela Abdel-Fattah (2000) indicated that interest in the subject of hypoxic training has emerged in recent years, and some studies have appeared that call for the use of training with hypoxia to raise the level of athletic performance, given that hypoxic training leads to an increase in oxygen debt using Less physical load intensity while reducing the number of breathing times, which leads to a lack of oxygen even at the cell level. This type of training has been called hypoxia. The term hypoxia has gone through several developments since Barkroft called it anoxemia to describe a state of lack of oxygen in the blood, then Van slick called the term anoxia, meaning without oxygen, until it has become the common term for hypoxia.

Ali Al-Beik (1997) mentions that hypoxic training means training in hypoxia through physical exercises (physical effort) during which the intended control of the breathing process takes place, as the number of breathing times decreases during performance in a calculated manner, which necessitates vital reactions (Such as a rise in pulse rates - a rise in the level of lactic acid in the blood and an increase in oxygen debt) and other vital reactions that work to compensate for the lack of oxygen. These exercises, after adaptation to them, lead to the possibility of meeting working conditions in hypoxia with better efficiency.

Muhammad Al-Qat (2002) indicates that the hypoxic training method has found great demand in recent years and explains that the decrease in the breathing rate reduces the supply of oxygen, which affects the level of performance, and this enhances the effects of aerobic and anaerobic training through independent repetition groups. Some research has applied this method in high and low areas above sea level to know its impact on aerobic capacity and its development, and the results showed a significant increase resulting from training in areas at sea level. Amr Allah Ahmed Al-Busaty (1998) indicates that the Soccer player must possess the physical characteristics that are the cornerstone of the skillful performances that the player possesses and that allow him to perform the match while he is in full physical competence until the end of the match, which requires the presence of vital organs that work with high efficiency to meet all Physical, technical, and tactical requirements.

Rainer Martens (1997) mentions that the Soccer coach must be familiar with the physiological aspects associated with training in general and Soccer training in particular, where the intensity of performance and physiological adaptation of players in developed countries in the field of Soccer is evaluated by identifying some of the physiological and biological responses of these Players continuously to determine the percentage of lactic acid concentration in the blood and use the maximum oxygen consumption VO2 MAX and heart rate H.R to evaluate the physical efficiency and training methods used.

Taha Ismail, et al. (1989), Boutros Rizkallah (1994) agree that the level of performance of soccer players in most countries of the world has risen dramatically, so it was necessary for those in charge of the game to look for ways for our players to keep up with this progress. What distinguishes Soccer now is the high level of fitness of the players to the point of excellence, and thus the player reaches a degree of constancy and stability of the skills that enables him to master them, regardless of the variety of these skills and the changing circumstances. In addition to his technical fitness, there is no longer room for a player who has a high level of skill without being at a high level physically, and thus physical and technical fitness have become inseparable at any stage of preparation, as well as during the match period.

Sobhi Abdel Hamid (1997) confirms that sports training leads to various physiological changes that involve almost all body systems, and whenever these changes are positive in order to achieve the functional adaptation required to perform the physical load efficiently with economy in energy consumed, there is progress in the level of performance.

Bahauddin Salama (2000) mentions that enzymes are those protein substances with a single characteristic that are found in a colloidal state and play the role of a catalyst in all vital reactions that take place within the human body. Or the environment in which it lives, as well as the high temperature, which makes it in an inactive state and thus loses the ability to complete vital reactions, and some enzymes are attributed to simple proteins that are given by hydrolysis (Amino Acids), while others are attributed to Conjugated Proteins where they are linked Other non-protein groups are called associated groups.

Robergs, & Roberts, (2000), Powers, & Howley (1997), Fox (1996) and Matveyev, (1981) agree that enzymes are protein molecules that act as biological catalysts to increase the rate of biochemical reactions. in living cells by controlling metabolic pathways without being altered or consumed in reaction.

Enzymes have distinct structural and morphological characteristics, as Mader & Galliart (2001), McKee & McKee (1996) agree that enzymes consist of amino acid molecules united in peptide chains forming polypeptide chains from which chains of Sides of different charge, which causes repulsion and attraction between them and does not make the enzymatic structure linear Nonlinear always.

Lactic acid is one of the main causes that cause muscle fatigue and this is related to the phenomenon of fatigue, so measuring the blood lactate level is an important indicator of muscle fatigue because the level of blood lactate is a good indicator of performance endurance, and because the response of blood lactate to training is very sensitive, training programs need to be More specialized planning and related to the blood lactate level response.

The enzyme dehydrogenase (LDH) helps to get rid of lactic acid, and an increase in the concentration of this enzyme is accompanied by an increase in the elimination of lactic acid as it is a dehydrogenase, and thus converts lactic acid into pyruvic acid, and beta-endorphins (blood morphine) act as a transporter Chemical, and involved in many physiological processes, and helps to increase the secretion of some hormones such as glucagon and insulin.

Developing the level of physical performance and delaying the onset of fatigue are among the important things that every coach seeks to achieve, and every player tries to reach, as the appearance of fatigue is a physiological problem that negatively affects physical and skill performance, and may prevent the improvement of physical, skill and tactical performance during matches. To the inability to perform the game plan agreed upon during the match because of physical fatigue, which in turn affects the skillful abilities and concentration of the players during the match.

Bialey, (2000) indicates that hypoxic exercises, which are called (training using controlled breathing), are among the best methods used to reduce the concentration of lactic acid in the blood and muscles and increase the body's ability to adapt to oxygen debt, and thus increase the ability to perform and achieve.

With the advent of this method of training with controlled breathing, Hypoxic Training, many researchers and specialists have studied the effects of this method on many variables, including Majdi Abu Zaid (1983) (39), Samira Orabi (1998) , Nabila Labib (1985) (25). , ,del Shehata (1994) , Ashraf Suleiman (1995) and Tarek Ezz El-Din& Ashraf Suleiman (1998) they all agreed on the importance of using hypoxic exercises in training because of their positive effects in developing physical abilities and physiological and biochemical characteristics.

The aim of this study was to investigate the effect of hypoxic training on certain biochemical variables and complex skills for youth soccer players under 16 years.

Methods.

Sample consisted of soccer players in degla Sports Club under 16 years old, where the strength of the basic sample was (32) youths and regulars in the application of the training program, and the sample of the survey studies, numbering (12) youths, was excluded, so that the total of the basic sample became (20) youths, were divided Equally into two groups, one experimental (10 young people), and the other control (10 young people).

Preparing the training program:

After conducting tribal measurements of the physical and skill variables under study, collecting primary data, then analyzing the content of Arabic and foreign scientific references and studies related to research variables within the limits of the researcher's ability, and interviewing the experts in the field of the research problem, the researchers was able to start designing the training program, by identifying the main aspects in preparing the training program. For the preparation period that is appropriate for the U-16 team.

- Maximum load 85 - 100%. Less load than maximum 75-84.
- The average load is 50-74%.
- The interval load degree was formed by the corrugated method (2:1)
- The degree of weekly load was formed by the waveform method (1:2) for the week with maximum, high, and average load.

Methods of controlling the degrees of training load during the training program:

The researchers used several methods to control degrees during the training program, namely:

Change in performance speed:

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Where the researchers followed the high intensity of the training load by increasing the running speed during endurance exercises, as well as increasing the speed of performing the exercises in question, in addition to the speed of performing the skillful and tactical duties, while the researchers followed the reduction of the intensity of the load by reducing the speed in endurance exercises or special exercises for the development of Skill performances are under investigation.

Change in difficulty breathing:

Where the researchers followed the reduction of the air entry rate inside the training mask, of the type of High-Altitude Simulation Mask, by changing the existing filters with the mask.

Form (1)
Training mask

Statistical treatments:

The statistical program (SPSS) was used, as the statistical treatment plan for the primary data included the following statistical methods:

- Mean.
- Median
- Standard Deviation.
- Skewness.
- correlation coefficients.
- T. test.

Results.

Table 1. Characteristics of experimental and control groups (Mean ± SD)

Group	N	Age [years]	Weight [kg]	Height [cm]
Experimental	10	15.31 ± 0.2	69 ± 4.5	170 ± 4.14
Control	10	15.65 ± 0.3	68 ± 4.8	169 ± 4.22

Table 2 shows characteristics of experimental and control groups. There were no significant differences were observed in the variables.

Table 2. Differences significant between posttests for the experimental and control groups

Variables	Unite	Experimental group	Control group	Sign.
		After	After	
Leg power	Cm	36.81 ±0.25	34.74 ±0.78	S
Kinetic speed	Second	7.66 ±0.37	7.89 ±0.22	S
Strength endurance	Freq.	43.15 ±1.62	38.24 ±1. 81	S
Speed endurance	Second	30.53 ±0. 23	32.11 ±0.54	S
Respiratory endurance	Minute	4.06 ±0.74	4.12 ±0.89	S
Complex skills in soccer	Degree	8.37 ±1.74	5.91 ±1.52	S

Table 2 shows that:

Statistically significant differences between the averages of the posttests of the experimental and control groups in the tests of motor speed, strength endurance, speed endurance, and periodic respiratory endurance in favor of the dimensional measurements of the experimental group.

Table 3. Differences significant between posttests for the experimental and control groups

Variables	Unite	Experimental group	Control group	Sign.
		After	After	
Resting pulse rate	Pulse	75.15 ±1.75	77.95 ±1.78	S

Creatine kinase (CK)	IU / L	99.87 ±14.36	111.88 ±13.22	S
Lactate dehydrogenase (LDH)	IU / L	231.56 ±16.26	248.39 ±14. 81	S
enzyme (SGOT)	IU / L	28.13 ±5.35	31.27 ±6.54	N S
enzyme (SGPT)	IU / L	31.16 ±5.81	35.12 ±6.89	N S
lactic acid	mmol/L	1.98 ±0.19	2.11 ±0.17	S

Table (3) show that:

Statistically significant differences between the averages of the post measurements of the experimental and control groups in resting pulse rate, creatine kinase (CK), lactate dehydrogenase (LDH), lactic acid in favor of the post measurement of the experimental group.

No significant differences. Statistical significance between the averages of the dimensional measurements of the experimental and control groups in (SGOT) enzyme and (SGPT) enzyme.

Discussion.

The researcher's attributes this to the good planning of the hypoxic training program and the rationing of the training loads in a scientific manner appropriate to the dental and training stage of the research sample and to the use of the training mask as a major part of the proposed exercises to develop the endurance variables.

The researchers attribute this improvement in the level of endurance and motor speed variables to the fact that hypoxic training is directed directly at the development of these variables, which are considered the most important special physical capabilities required by performance in football. Usually using plyometric exercises or weight training, which works to stimulate the motor units, which leads to the participation many of them, which results in a strong and rapid contraction that increases explosive performance.

In this regard, Talha Hossam El-Din et al. (1997) confirm that the improvement of the vertical jump distance depends on the number of excited fibers. Concerned with work excited to the maximum degree and at the highest rate.

This is confirmed by Adams, et al. (1992) that the activity of the rubber reflex allows excellent transfer of explosive force to the same biomechanically similar movements that require high capacity of the trunk and legs and show their results when performing the vertical jump.

Will Hopkins (1999) adds that hypoxic training improves performance and is important before competition at altitude. John Hill (1999) states that the athletes who used hypoxic training showed positive effects on the level of physical performance.

These results also agree with what was indicated by Ashraf Soliman (1995) that hypoxic exercises are considered one of the important methods that lead to increased improvement in physiological efficiency and vital body systems, which is reflected in the improvement of physical abilities.

Yasser Nour El-Din (1993) (68), Ashraf Suleiman (1995) (11), Magdy Abu Aram (1996) (36), Naglaa Fathy (1996) (54) agree that the greater the improvement in the various physiological factors, the greater the This further improved physical measurements.

Regarding the variable (the number of heart beats before the effort), the reason for the significant differences can be attributed to the fact that the hypoxic exercises used led to immediate responses during training, and thus the continuity for long periods and repetitions led to physiological improvements resulting from those exercises that were commensurate with the nature of the conditions of the football matches that pass. During which it arises in various circumstances, which leads to a decrease in the number of heart beats before exertion. This is confirmed by Abu El-Ela Abdel-Fattah (2003) that the decrease in the number of heart beats results from correct and organized training and the occurrence of appropriate physiological adaptations for effectiveness. He adds that regular training leads to functional changes in the systems of the human body, including the heart and blood circulation. Well-trained individuals can adapt to the functional changes that occur in the systems of the body because of muscular effort and continue with this effort, and one of these changes is the decrease in the heart rate.

Peter (2001) indicates that when training begins, the heart rate increases directly, and with the increase in training intensity, the heart rate increases, and the relationship between training intensity and heart rate takes the form of a straight line, but at high intensity, the heart rate gradually weakens at a certain point. The relationship between training intensity and heart rate takes the form of a curve, and this point at which the straight-line ends represent the heart rate deflection point (HRDP). He adds that the percentage of lactic acid at the point of deviation of the heart rate is about (4) mm / mol, and that at that point the player can continue to perform for as long as possible without feeling tired or stressed because there is a balance between the speed of lactic acid production and the speed of its disposal, and that with an increase Training intensity above that point (HRDP), will lead to a rapid build-up of lactic acid.

This was confirmed by Bernardi (2001) that the use of hypoxic training has an effective effect as it leads to adaptation of the respiratory system and the cardiac system in addition to that it increases aerobic endurance and that the use

of athletes leads to an improvement and development of the level of achievement. This agrees with the findings of the studies of Gamal Abdel-Malik (1997) and Mahmoud El-Madbouly (1999), which indicated that sports training reduces resting heart rates, improves cardiac propulsion, and improves the functioning of the circulatory and respiratory systems.

John Hellmans (1999) mentions that training in a hypoxic environment improved the work of the heart, due to its lower resting pulse rate, compared to the results of training using natural breathing. Ashraf Suleiman (1995) indicates that hypoxic exercises are considered one of the important methods that lead to increased improvement in physiological efficiency and vital body systems, which is reflected in the improvement of the level of physical abilities.

The results of the Medical Academy of Hypoxia (2000) indicate that the hypoxic exercises conducted on the category with the highest levels of sports have positive effects in improving the functional physiological aspects and thus improving the level of athletic achievement.

Muhammad Allawi and Abul Ela Abdel Fattah (2000) mention that hypoxic training works to improve the physiological and biochemical aspects. As for the significant differences in the chemical variables of the blood, the reason can be attributed to the hypoxic exercises. The greater the intensity of the physical load, the higher the rate of lactic acid concentration in the blood. Thus, there is an intervention from the vital organizations to equalize the acidity of the blood and the ability of the various organs and organs of the body to discharge lactic acid in the blood by consuming it as an energy source. It is stored in the form of glycogen in the liver and some of it is excreted in the urine.

And many reliable scientific sources confirm that the change in order for any physiological or biochemical variable to occur must be the effort exerted during the exercises, the method of using them, and the duration of their duration greatly affect these variables so that the noticeable change can occur to them, so get to know the quality and nature of the processes and physiological changes resulting from the body's response and adaptation With training loads so that the trainer plans appropriate training programs.

As for the absence of statistically significant differences between the averages of the dimensional measurements of the experimental and control groups in (SGOT) enzyme, (SGPT) enzyme. The reason can be attributed to the fact that any physical effort performed by the individual leads to an increase consistent with that effort and the type of energy expended in it, as well as the level of physical fitness of the individual.

As for the blood enzyme variables, the researchers attribute the reason for the emergence of differences between the pre and posttests to the dependence of football youths during performance in obtaining a large amount of energy on anaerobic work (phosphate + lactic) and according to the changing playing conditions required by the youths in a state Bouncing balls or the enemy to avoid the opponent, and this requires a great deal of speed and high reaction, which depends on muscular work with maximum strength and speed, as this muscular work depends on the production of anaerobic energy, and that the energy source in the phosphate system is the decomposition of the creatine phosphate compound (CP) stored in the muscles This decomposition is carried out by the enzyme creatine phosphokinase (CPK), as (the breakdown of CP to obtain energy is done by the enzyme creatine phosphokinase (CPK). That is, CP gives energy after being stimulated by the enzyme CPK, and this energy combines with the two phosphate parts and with adenosine diphosphate to give ATP, as the PC-ATP interaction is responsible for supplying the contracting muscles with the maximum speed with the necessary energy needed for this contraction. This interaction depends on the activity of the enzymes that regulate this interaction, including the CPK enzyme, and this explains to us the reason for the improvement of this enzyme. While the researchers attributes the reason for the differences in the LDH enzyme after the effort to the dependence of the youth in football during the matches and as we mentioned earlier in obtaining a large amount of energy on anaerobic work (phosphate + lactic) and according to the changing playing conditions, but after the end of the role of the anaerobic system - phosphate in Rebuild ATP and provide the energy needed for performance, after which the role of the anaerobic-lactic system begins in rebuilding ATP and providing the energy needed to continue performance. The increase in the activity of the enzyme (LDH) as this system depends on providing energy on the decomposition of glucose anaerobically with a series of reactions mediating Enzymes These reactions end with the transformation of pyruvate resulting from the breakdown of glucose into lactic acid, and this transformation is done by the enzyme lactate dehydrogenase (LDH), which leads to an increase in the level of this enzyme after exercise, then it returns gradually to less compared to before training, and this is due to the fact that the rise in lactic acid after effort is less as a result The effectiveness of vital regulators as a result of training and increasing the ability of judgment to endure, as it is known that the enzyme LDH is linked to lactic acid. And that training juniors to increase the ability to withstand strength in competitions makes them able to finish the competition while maintaining the speed of performance and strength for the longest possible period. These physiological adaptations allow to produce more anaerobic energy, and lactic tolerance is developed through:

Improving the work of vital organizations by increasing the activity of the LDH enzyme in the muscles.

Increasing the tolerance of pain resulting from the accumulation of acids, which helps the referee to maintain his speed in matches. Therefore, the ability to withstand the accumulation of lactic acid is of particular importance in success in tournaments, especially in the last stages, and the lack of improvement in these physiological processes leads to an early

appearance of lactic acid in large quantities big. The importance of the LDH enzyme in the biochemical reactions of the anaerobic glycosylation system is evident, by supplying the contracting muscles with energy during exercise, which helps in the oxidation of lactic acid to pyruvate in the presence of NAD as a hydrogen receptor, as well as the acceleration of the reverse reaction known as enzyme intermediate reactions. There are many physiological changes that may occur during the performance of physical exercises, which may cause enzymes to be released from the muscles into the blood, and it is worth noting that until now the mechanism that leads to this occurrence has not been clearly identified. It is interesting that the responses of the enzyme dehydrogenase (LDH) and its analogues resulting from the performance of exercises of different intensities have an effective role in explaining how this type of training affects the release of proteins from different tissues into the blood, and how these changes affect the metabolism of blood lactate.

This, and many recent scientific studies agree that the biochemical changes occurring in the body during anaerobic training necessitate an increase in the activity of the LDH enzyme and many galactose enzymes to provide the energy needed to continue performance, and the extent of the change in the activity of the LDH enzyme also depends on the level of intensity of the training load and the accompanying biochemical processes, and that Since the functional properties of this enzyme during training are evident from the accumulation of metabolites, the role of this enzyme increases when training continues at high intensity.

The enzyme creatine phosphokinase works in reverse on the energy-release enzymes {ATP, CP} of the anaerobic system, as it transfers the phosphate group Pi from ATP when energy is released to form the creatine complex and the ADP enzyme, and in return it carries a phosphate group to this product to form the energy source ATP.

Monitoring differences in the concentration of this enzyme through laboratory tests is very important for players, as it gives an accurate indication of the development of phosphate capacity, especially when using the anaerobic system during sports training.

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