

Effect of Endurance Exercises of Multiple Kinetics Pathways with Taking a food Supplement on Erythropoietin Level and Some physical Variables for Soccer Juniors

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Introduction and research problem

The countries of the world are striving to achieve scientific progress through the use of strategies and scientific approaches to modern sports training theories in order to prepare young people from all sides and reach the integration of sports performance in football and the consequent achievement of the best results and reach the highest levels.

Muwaffaq Majeed Al-Mawla (2010 AD) believes that for a certain success in football, a high level of physical fitness is required because the time of the match is long and the pauses are few and far between, and the rule of one team with high physical fitness is clear from another team, especially at the last time of the match that requires some positions on the field From the player perpetual and continuous movement. (15:87)

Endurance, in its general and specific types, is considered one of the most important physical requirements, which is of great relative importance for football players, because the match requires them to continue to perform with great effectiveness in the performance of special motor activity and to face fatigue resulting from

muscular work and aerobic and anaerobic work characterized by speed and strength. (161:1) (38:6) (17:4)(4:17)(161:1)(38:6)

Sayed Abdel-Maqsoud (1992) indicates that the endurance characteristics that the athlete needs in team games, including football (playing endurance), are related to the degree of change and diversity of special motor performances (competition transactions), in addition to the lack of predetermining the level (degree) of competition load (intensity of competition).) and the performance time that can be prolonged, which makes it clear that the coach in football needs to set the maximum possible requirements when determining the required degree of load. (40:6,41)

And Amrallah Al-Bassiti (2016 AD) shows that football activity requires the player to move continuously with or without the ball for large distances and perform special movements of different degrees of intensity during the time of the match. . (32:3)

Iron is one of the very necessary minerals for the body, as it enters the formation of the protein hemoglobin) responsible for transporting oxygen to

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all cells of the body, and it has many functions in the body such as metabolism, breathing, the immune system and growth processes, so the body always tries to maintain a balance between iron Lost, absorbed and stored, and some may suffer from iron deficiency, which necessitates resorting to one of the ways to treat this deficiency, such as taking nutritional supplements and iron pills. (22,31,20,23)

Ferritin is one of the types of proteins found in the blood serum that generally reflects the total iron stores in the body. Therefore, the ferritin measurement is the most widely used measure to predict the total iron stores in the body. (22, 36, 20)

Several studies indicate that following up the serum concentration of ferritin is one of the most important measurements for endurance players in general and not only those with anemic history, as the results indicate that low ferritin is one of the most important reasons responsible for fatigue and low performance even in the presence of normal levels of hemoglobin, which (more than 12 g / dL), and these studies confirm that a person can be considered to have low levels of ferritin in the blood when it ranges between (12 - 40 mg/liter). (35, 21, 23)

Rodenberg et al. confirms. RE, et al (2007), Peeling, P, et, al (2008) that once iron stores and iron transporters are depleted from ferritin, the body cannot maintain the production of normal levels of hemoglobin. And performance levels of athletes. (31, 30)

Erythropoietin, as defined by Annaheim S, et al (2016 AD), is a

hormone that is primarily produced by the kidneys, and plays a major role in the production of red blood cells (RBCs), which transport oxygen from the lungs and to the rest of the body. This examination measures the amount of erythropoietin in the blood. (17)

Jekmann, W (2011), Anaheim and Annaheim. S, etal (2016) agree that the amount of erythropoietin released depends on the low level of oxygen, and the ability of the kidneys to produce it, and the increase in the production and release of erythropoietin continues until oxygen levels in the blood rise to normal concentrations, or Near normal concentrations and then production decreases, the body uses a dynamic feedback system to help maintain adequate levels of oxygen and a relatively constant number of red blood cells in the blood, however if a person's kidneys are damaged and not enough erythropoietin is produced, a number of Too few red blood cells and a person becomes anemic, similarly if a person's bone marrow is unable to respond to stimulation from EPO the person may become anemic. (26, 17)

Ji, P (2016) indicates that the production of red blood cells is controlled by the hormone erythropoietin, and the hormone erythropoietin is produced by the kidneys as a result of a lack of oxygen in the body and an increase in the androgen hormone in addition to the erythropoietin hormone. The process of forming red blood cells needs iron. (27)

And because football depends heavily on endurance, so endurance

exercises are one of the important things that help the coach to prepare players with high physical efficiency that allow them to perform ideally throughout the match without reaching stress, but endurance training and methods of developing it represent a major problem in football in particular. This is due to the players feeling apathy, boredom and a feeling of rapid fatigue as a result of performing traditional endurance exercises, which gives special importance to endurance exercises with multiple kinetic paths that work to improve the various elements of physical fitness.

The researchers noticed, by watching the local matches and comparing the performance of the Egyptian General League players with the European League players, a low level of endurance, and this appears significantly during most matches, as many teams cannot complete the match until its end with the same ability of physical efficiency with which the match begins. This is evident, especially in the last third of the match time, and this often causes slow and monotonous matches with the inability of the defeated team to compensate for the apparent lack of endurance in football, so it is necessary that endurance training receive a greater share of the training load directed to football players. Young people and adults and a relatively large space for its development due to the specificity of its effective and integrated impact on multiple determinants (physiological_ kinetic_ physical) and its relationship to the level of achievement in matches, especially

with the clear observation of what most football teams suffer, especially young people, from a clear weakness in the levels of physical and technical performance of their players during matches.

Several studies (21) (32) (34) indicate that erythropoietin has an important role in the formation of red blood cells, as it is produced by the kidneys and liver when oxygen levels in the cells are low, and then the hormone stimulates the bone marrow, which in turn produces more red blood cells. And follow-up of the serum concentration of ferritin is one of the most important measurements for endurance players in general, as the results indicate that low ferritin is one of the most important reasons responsible for fatigue and low performance even in the presence of normal levels of hemoglobin (more than 12 g/dL). The timing of taking an iron supplement, especially for athletes, is very important, because exercise increases levels of inflammation after exercise, as levels of cytokines increase in the blood in response to those infections, which increases the liver's production of the hormone hepcidin, which leads to a decrease in the process of iron absorption. Therefore, it is advised not to eat Iron supplements immediately after exercise and for up to 6 hours.

Therefore, the researchers thought of conducting the current study as a scientific attempt directed towards knowing the effect of developing endurance in various kinetic pathways with taking a nutritional supplement on the level of erythropoietin and some

physical variables for junior footballers.

Research goal:

The research aims to "the effect of endurance training of various kinetic paths with taking a nutritional supplement on the level of the hormone erythropoietin and some physical variables for football juniors under 16 years old" by identifying:

1- Effect of endurance training of various kinetic pathways on the level of some physiological variables (erythropoietin - iron - ferritin) for football juniors under 16 years old.

2- The effect of endurance exercises of various kinetic paths on some physical variables (periodic respiratory endurance - speed endurance - force endurance - transitional speed- strength characterized by speed) for football juniors under 16 years old.

3- Identifying the percentages of improvement in the level of some physiological and physical variables under consideration for football youth under 16 years old.

Research hypotheses:

1- There are statistically significant differences between the tribal and remote measurements in the level of some physiological variables (erythropoietin hormone - iron-ferritin) for football juniors under 16 years old in favor of the post measurement.

2- There are statistically significant differences between the tribal and remote measurements in the level of some physical variables (periodic respiratory endurance- speed endurance- force endurance- transitional speed- strength

characteristic of speed) for football youth under 16 years old in favor of the dimensional measurement.

3- The rates of improvement vary in the physiological and physical variables under consideration for football juniors under 16 years old.

Search terms:

-Endurance exercises with a variety of motor paths:

A set of running exercises of different intensity performed in multiple directions and in different shapes and distances that help increase the players' ability to adapt and face fatigue for the longest possible period of time." (57:34)

Hormone Erythropoietin

It is a glycoprotein hormone secreted by the liver and kidneys and acts as a primary regulator of red blood cell production. (252:5)

Search procedures

Research Methodology

The researchers used the quasi-experimental approach by designing one experimental group with two measurements, before and after.

Community and sample research

The research community was determined from football juniors under 16 years old in the Gharbia region, and the researchers selected a sample of (15) youths in an intentional way from soccer juniors under 16 years old at Samanoud Sports Club who are registered with the Egyptian Football Association and participants in the Gharbia region league season 2020-2021.

Data collection methods

The researchers used the means of data collection in the

implementation of the research procedures, from the selection of tests of physical and physiological measurements and the training content, and the implementation of the training program, which are:

1-References and research related to the study : The two researchers reviewed the zinternational information network in order to identify the most important Arab and foreign research related to the current study.

2-Tests and measurements used:

Through the reference survey of some scientific references and scientific studies related to the current research trends:

First: Physiological measurements such as: Rodenberg et al. study. RE, et al (2007) (31), Harper. J et al. J, et al (2015 AD) (23), Anaheim S, et al (2016 AD) (17), Peeling et al (2008 AD) (30). The most important results were: Identification of physiological variables (erythropoietin hormone - iron – ferritin.)

Second: physical tests such as: The study of Adel Al-Fadi (2009 AD) (7), Muhammad Hassanein (2007 AD) (12), Muhammad Al-Junaidi (2005 AD) (9), Amr Allah Al-Busati (2016 AD) (3), which used the physical tests associated with the subject of the research , in order to determine the appropriate tests to measure endurance of various kinetic paths, and the most important results were: Determining suitable tests for the types of endurance (respiratory periodic endurance - speed endurance- force endurance-transitional speed - force characterized by speed)

Research hypotheses:

1- There are statistically significant differences between the tribal and remote measurements in the level of some physiological variables (erythropoietin - iron - ferritin) for football juniors under 16 years old in favor of the post measurement.

2-There are statistically significant differences between the tribal and remote measurements in the level of some physical variables (periodic respiratory endurance- speed endurance- force endurance-transitional speed- strength characteristic of speed) for football youth under 16 years old in favor of the dimensional measurement.

3-The rates of improvement vary in the physiological and physical variables under consideration for football juniors under 16 years old.

Search terms:

Endurance exercises with a variety of motor paths:

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Implementation of dimensional measurements

Post-measurements of physiological measurements and physical tests were carried out at the end of the period set for implementing the training program, from Saturday 21/11/2020 to Monday 23/11/2020, according to the order in which the tribal measurements were made.

Statistical treatments: The researchers used some statistical treatments that fit with the nature of the research (objectives, hypotheses, and procedures), which are: arithmetic mean, arithmetic median, standard deviation, skew coefficient, correlation coefficient, parametric tests (Mann Whitney, Coxson, Kruskal Wallis) and the percentage. for rate of improvement.

Presentation and discussion of results

Table (3)
The significance of the differences between the results of the pre- and post-measurement in the physiological measurements under study n=15

tests	measure unit	ranks	No.	average of rank	total ranks	value (y)	morale level
erythropoietin hormone	(IU/L)	negative	15	8,00	120,00	3,499*	0,000
		positive	0	0,00	0,00		
iron	Ug/(dl)	negative	15	8,00	120,00	3,411*	0,001
		positive	0	0,00	0,00		
ferritin	Ng/(Ml)	negative	15	8,00	120,00	3,420*	0,001
		positive	0	0,00	0,00		

*Tabular value (y) at the level of significance (0.05) = (1.96)

Table (3) shows that there are statistically significant differences between the tribal and remote measurements of the research sample of football juniors under 16 years of age in all physical tests in favor of the post-measurement, as the value of (y) calculated for these tests ranged between (3,411, 3,499) greater than its value At the level of significant significance (0.05) in favor of the dimensional measurement.

The results of this study by the authors are consistent with those of Rodenberg et al. RE, et al (2007) (31) found that iron supplementation may help raise levels of iron stores in the blood as well as levels of iron transporters of ferritin, thus increasing the ability to produce normal levels of hemoglobin. It also agrees with Burden, R, et al (2015) (19) that increasing iron stores has many positive effects on the performance of endurance athletes as a result of increased levels of oxygen binding with hemoglobin due to the activity of iron-dependent oxidative enzymes. The development of aerobic capacity for athletes through the results

of measuring maximum oxygen consumption.

It also agrees with the results of Harper. J. Harper et al. J, et al (2015)(23), Rodenberg et al. RE, et al (2007 AD) (31) that iron in the body helps in metabolism, growth processes and respiratory efficiency, so it is necessary to balance the lost, absorbed and stored iron, and in the event of iron deficiency, it is necessary to resort to taking nutritional supplements and iron pills to treat this imperfection.

The results of the increase in erythropoietin hormone levels agree with the results of Peeling, P, et al (2008 AD) (30), as a result of the evidence resulting from increased levels of ferritin and hemoglobin, as erythropoietin plays the most important role through its secretion from the kidneys in increasing the levels of red blood cells. .

It agrees with the results of Anaheim S, et al (2016) (17) that increasing erythropoietin levels controls mitochondrial biogenesis in skeletal muscle, which works on mitochondrial biogenesis and its

relationship to the development of exercise performance.

The researchers attributed this improvement to the standardized training program and what it contains of exercises similar to the nature of performance in football in multiple directions and various distances for different forms of endurance and repetition of movements with and without the ball, which has a clear positive impact on improving and increasing the performance of players for those physical tests.

Based on those results that were reached and the agreement of many

studies, the positive impact of endurance training of various kinetic paths on the physiological measurements of young people becomes clear. Therefore, the researchers believe that the first hypothesis of the study, which states that "there are statistically significant differences between the pre and post measurements in the level of some physiological variables (hormone). Erythropoietin - iron - ferritin) for football juniors under 16 years old in favor of dimensional measurement" has been achieved.

Table (4)

The significance of the differences between the results of the pre- and post-measurement in the physical abilities under discussion n=15

tests	measure unit	ranks	No.	average of rank	total ranks	value (y)	morale level
Respiratory cyclic endurance (test 1.5 mile "2,414 km")	time (d)	negative	0	0,00	0,00	3,411*	0,001
		positive	15	8,00	120,00		
Transition speed (30m sprint)	time (s)	negative	0	0,00	0,00	3,307*	0,001
		positive	14	7,50	105,00		
bearing speed (5 x 30m)	time (s)	negative	0	0,00	0,00	3,413*	0,001
		positive	15	8,00	120,00		
muscular capacity (modified vertical jump)	distance (m)	negative	15	8,00	120,00	3,411*	0,001
		positive	0	0,00	0,00		
endurance force (Leaning prone from standing)	number (degree)	negative	15	8,00	120,00	3,421*	0,001
		positive	0	0,00	0,00		

*Tabular value (y) at the level of significance (0.05) = (1.96)

Table (4) shows that there are statistically significant differences between the tribal and remote measurements of the research sample

of football juniors under 16 years in all physical tests in favor of the post measurement, as the value of (y) calculated for these tests ranged

between (3,307, 3,421) greater than its value At the level of significant significance (0.05)

The findings of the two researchers are in agreement with the results of the study of Helgard, Engin, and Wslove (2004 AD) (24) that there is an improvement in the physical and physiological variables under study through the post-measurement of the control group that uses the direction of regular endurance training and this is due to the nature of the program The one used by this group depends on the aerobic direction with relatively long training times, medium intensity and short rest periods.

The results of this study are in agreement with the results of the study of Muhammad Al-Junaidi (2005)(9), Muhammad Hassanein Al-Metwally (2007)(12), Adel Al-Fadi and others (2009) (7) that the standardized training program, which contains different types of endurance exercises besides Regular training leads to an improvement in the level of physical characteristics, both individual and compound, and the presence of an increase in the percentages of improvement of these physical components was due to the application of suitable loads for aerobic and anaerobic exercises, which reflected its impact on increasing the level of physiological capacity and then improving the level of performance of various endurance tests and the emergence of positive changes And differences of improvement in favor of

the dimensional measurement of the junior research sample.

It also agrees with what was indicated by Essam Abdel-Khaleq (1990) and Syed Abdel-Maqsoud (1992) that sports activities, including (football) differ in terms of endurance requirements according to the distinctive characteristics and nature of each activity, where the special endurance is a direct result of the endurance link the general with some other physical components, meaning that each sports activity has a special type of endurance with distinct characteristics that differ from the other sports activity. (124:8),(48:6)

This agrees with what Aziz et all (2007 AD) (18) mentioned on the necessity of developing trends in both aerobic and anaerobic work in the preparation stages and merging them in proportions commensurate with the level of the players and the different training objectives that the coach is working to achieve.

Through the results that have been reached, the researchers see that the second hypothesis, which states that “there are statistically significant differences between the tribal and remote measurements in the level of some physical variables (respiratory periodic endurance - speed endurance - force endurance - transitional speed - speed-distinctive strength) for junior footballers. Under 16 years in favor of dimensional measurement” has been achieved.

Table (5)
Percentage of improvement rate in the results of the physiological measurements under consideration for football juniors under 16 years old (n=15)

Tests	measure unit	application	SMA	Intermediate teams	Percentage of improvement rate
erythropoietin hormone	(IU/L)	pre	8,600	4,000	46,511%
		post	12,600		
iron	Ug/(dl)	pre	53,26	52,863	99,242%
		post	106,13		
ferritin	Ng/(MI)	pre	38,433	14,166	36,860%
		post	52,600		

Table (5) displays the percentages of improvement rate between the two measurements, before and after, in the physiological measurements, which ranged between (36.860%, 99.242%) in favor of the post measurement.

Table (6)
Percentage of improvement rate in the results of the physical tests under consideration for football juniors under 16 years old (n=15)

Tests	measure unit	application	SMA	Intermediate teams	Percentage of improvement rate
Respiratory cyclic endurance (test 1.5 mile "2,414 km")	time (d)	pre	15,416	4,155	26,954%
		post	11,260		
Transition speed (30m sprint)	time (s)	pre	4,128	0,128	3,217%
		post	4,000		
bearing speed (5 x 30m)	time (s)	pre	4,561	0.546	13,614%
		post	4,014		
muscular capacity (modified vertical jump)	distance (m)	pre	27,800	7,083	20,305%
		post	34,883		
endurance force(Leaning prone from standing)	number (degree)	pre	46,000	11,400	19,860%
		post	57,400		

Table (6) displays the percentages of improvement rate between the two measurements, tribal and remote, in physical ability tests, which ranged between (3.127%, 26.954%) in favor of the post-measurement.

The researchers believe that this improvement in the physiological and physical variables resulted from the application of the training program directed in the direction of endurance and the techniques of its contents in different directions and distances and

with various degrees of load, which led to an increase in physiological capacity, and a high level and efficiency of physical performance for junior footballers.

This was indicated by Sayed Abdel-Maqsoud (1992) (6) for the existence of perfect mutual relations between training and the level of development of both physical characteristics and physiological measurements.

These are consistent with the results of the study of Adel Al-Fadi and others (2009) (7) and what he mentioned that the high level in the physical variables of football players leads to a simultaneous improvement in the physiological variables and the vital functions of the body systems.

It also agrees with the study of Impellizeri et al (2006 AD) (25), Valamatos et al (2007 AD) (33) that there are statistically significant differences in the physiological variables associated with the physical performance of junior footballers after the application of the training program proposed.

The results also agree with the results of Sinclair et al. (2005 AD) (32) that endurance training has one of its most important effects as it leads to an increase in capillaries and an improvement in the ability to carry oxygen in the blood by increasing oxygen delivery to muscle and skeletal cells and thus improving the ability to exercise Sports have athletes.

This is consistent with what Abul-Ela Abdel-Fattah (1997) mentioned that the high level of the player's aerobic potential leads to an increase in

his physiological ability to resist increased production of lactic acid and thus the timing of increasing its concentration in the blood is delayed, as well as when the anaerobic capacity increases, the efficiency and capacity of vital organizations improve, and the concentration of blood decreases This is due to an increase in the metabolic efficiency of aerobic energy production, which reduces reliance on anaerobic energy, and the lack of lactic acid after training may be due to both processes together. (169:2)

This is one of the important foundations that the researchers followed in choosing and implementing training contents of varying intensity levels for endurance training with various paths, which was clearly reflected on the physical tests and physiological variables of football juniors, which led to an improvement in the level of juniors in the research sample.

From this previous presentation, the third hypothesis, which states that "the rates of improvement in the physiological and physical variables under consideration for football juniors under 16 years old" vary, has been achieved.

Conclusions

In the light of the study, its objectives, the method used and the research sample, and in the framework of the statistical treatments used for the data and results, and within the limits of the research sample, the researchers reached:

1-Endurance training of various kinetic paths with taking a nutritional supplement has resulted in an

improvement in the level of physiological variables (erythropoietin-iron- ferritin) for football juniors under 16 years old.

2 -Endurance exercises of various kinetic paths with taking a nutritional supplement have resulted in an improvement in the level of physical abilities (periodic respiratory endurance- speed endurance- force endurance- transitional speed - strength characterized by speed) for football juniors under 16 years old.

3 -Endurance exercises of various kinetic paths with taking a nutritional supplement have a positive effect on the level of physiological variables and physical abilities under consideration for football youth under 16 years old.

Recommendations

Based on the conclusions reached by the research, the researchers recommend the following:

1-Using the proposed training program for endurance exercises of various kinetic paths under consideration for football youth under 16 years old.

2-Allocating a relatively large space for endurance exercises of various kinetic paths in order to develop the level of physical fitness for football juniors.

3-Conducting more research in the physiological field and being guided by other functional variables related to the quality of performance to know the effect of endurance exercises of various motor pathways directed to age groups in football

4-Conducting other similar studies on samples of different age, gender, and sports activity.

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