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The effect of oxygen exercises on stem cells and some chemical variables of junior's basketball players

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Abstract

Aerobic exercise plays an essential role in biochemical processes that require the presence of oxygen during exercise. Aerobic exercise differs from anaerobic exercise, which does not require the presence of oxygen during exercise. The research aimed to identify the effect of some aerobic exercises on stem cells and some chemical variables. As for the research problem, with the large number of players' requirements, the large number of injuries, and the emergence of many health and physical problems, the two researchers decided to delve into this problem and try to find solutions. The sample of the research community consisted of 12 players representing the Kanaqen Sports Club for junior basketball, and aerobic exercises were applied to them as indicated. The results of the research indicated that there were significant differences between the pre- and post-tests in the chemical variables studied. In the pre- and post-tests, stem cells increase in the case of the post-tests compared to the pre-tests as a result of tissue formation, as aerobic exercise has a positive effect on the increase in stem cells in the blood.

Keywords: Stem cells: They are the cells from which all other cells that perform specialized functions are generated.

1- Introduction to the research:

1-1 Introduction and the importance of the research:

At the present time, the world has witnessed Significant scientific and technical progress in applying modern scientific and technological foundations in the sports field, which has contributed to raising the scientific level in general and the sports level in particular in the stages of learning or training and at all levels. As is known, progress at the sports level is a matter of adaptations of Functional and biochemical were in the internal systems, and according to these adaptations, the individual's functional capabilities increase, which vary in degree of influence according to the nature of each activity, the time of practice, and the style of performance. "Identifying the physiological changes that occur in the body during the performance of a specific physical activity is important, which obtaining information about describing and interpreting the functional changes resulting from performing different physical loads or repeating them helps in understanding the medical and biochemical laws on which these changes are based, and thus they can be controlled and increased in effectiveness (Ibrahim Hanafi, Ahmed Nasr, 1984). The game of basketball requires building a good aerobic base that prepares The circulatory and respiratory systems work for more intense work, and work to develop endurance and add energy to the slow-twitch muscle mechanisms after establishing the aerobic foundation, training takes place in the anaerobic technique (Imad Mohieddin 1995). Training in the junior stage is the technical stage of development, during this stage the player learns the basic skill elements to play and compete properly in parallel with the basic tactical elements and preparing and preparing training in different forms to cover the various situations that the player is exposed to in competition. (Mohamed Kishk, Amrullah 2000). As for adult stem cells, they are unspecialized and incompletely divided cells. Their importance lies in their ability to form any other type of cell in the body. They are

also present in tissues such as bones and are transmitted to the blood. They are present in humans at all ages, children and adults alike, and their number decreases as a person ages. One of the functions of these cells is to repair and replace damaged body cells. These cells have the ability to remain in their basic state or specialize to become more complex cells such as bone or muscle cells.

There are two basic types of stem cells: embryonic cells, which are cells extracted from the fertilized egg, and adult stem cells. Adult stem cells are also found in adult humans. In this regard, Muhammad Adel Rushdi and Hussein Heshmat point out that the goal of studying stem cells in the sports field is:

1- Choosing an athlete from a young age in terms of physical, mental and health excellence.
2- Identify the effect of aerobic and anaerobic training on the concentration of stem cells in the body and develop appropriate training programs to increase training and improve the physical and mental performance of the athlete.
3- Study the effect of different exercises on stem cell growth factor (SCF) and depend on it in selection processes.
4- Identify the diversity of genes that regulate the work of stem cells and determine their functions, complications and growth.
5- The possibility of using stem cells in the treatment of orthopedic sports injuries - tissue and ligament injuries.
6- The possibility of using stem cells to treat blood diseases such as anemia and immunity.
7- Physical activity is an essential factor in the development of stem cells and other basic cells in the body.

8- Physical activity is an effective indicator of activating the growth of stem cells and other growth factors in the body. (Mohamed Adel, Hussein Heshmat 2011).

The importance of the research comes from giving aerobic exercises and observing its effect on some chemical variables and stem cells of juniors basketball players. I hope that this study will contribute to helping coaches when preparing the curricula, especially in team games, because it depends on a number of players and depends on different their physiological and functional specifications and knowledge of the most important physiological variables which occurs during effort and rest to service of sports in Iraq.

1-2 Research problem:

Aerobic exercises are considered the main basis for all exercises, as this type of exercise can be continued for a longer period than anaerobic exercises, even though it requires supplying the body with oxygen, because it does not cause what is called oxygen debt, and this type produces the desired physiological effects in terms of improving the body's ability on the absorption of oxygen and its distribution between the cells of various body tissues.

Through the researcher's access to scientific studies and references related to scientific developments and activities such as genes and stem cells and their relationship to sports training, in order to reach the highest level in the field of sports training, it was concluded that identifying and measuring the characteristics of stem cells may benefit the sports field in terms of selecting the outstanding player. This is because stem cells are the basis for working through red blood cells that transport oxygen, and stem cells also produce white spherical cells, which are considered the basis of immune production in the body, in addition to the possibility of transforming them into bone fibers and other fibers, transforming into any tissue of the body. In

addition to the importance of stem cells in selecting the outstanding player, the effect of aerobic training can be identified, which allows the coach to plan the appropriate training programs to train to achieve the best physical performance. Also, in addition to the lack of our Iraqi library for research in the field of basketball concerned with mobilizing young people in terms of studying their chemical variables and stem cells, Therefore, the researcher decided to address this problem.

1-3 Research objectives:

The research aims to

1- Identifying the effect of oxygen exercises on the characteristics of stem cells of junior basketball players.

2- Identifying the effect of oxygen exercises on some chemical variables of junior basketball players.

1-4 Research hypotheses:

1- There are statistically significant differences in the post-tests for the experimental group at stem cells.

2- There are statistically significant differences in the post-tests for the experimental group at the chemical research variables.

1-5 Areas of research:

1-5-1 Human field: A sample of (12) players for the Khanaqin Sports Club for juniors, aged (17-18) years, for the year 2024.

1-5-2 Temporal field: 15-1-2024 until 15-3-2024.

1-5-3 spatial field: halls for players.

2- Research methodology and field procedures:

2-1 Research Methodology:

The researcher used the experimental method because it is the most appropriate method to solve the research problem, as the experimental method is one of the most accurate types of methods and the most sufficient in arriving at accurate and reliable results.

"The experimental method represents a distinct method as it can best be understood through comparison and by proving the existence of a causal relationship that includes comparison between groups (Mahmoud Annan 2004).

2-2 The research sample:

The objectives that the researcher sets for his research and the procedures he uses will determine the nature of the sample he chooses. The researcher must choose his research sample as it is a true representation of the community of origin, with the main condition for this sample being met, which is "the possibility of generalizing its results to the original group selected from it" (Mohamed Labib, Hamad Bashir 1983). To achieve these objectives, the research sample was chosen intentionally for the 2023-2024 season, with ages specified by the Iraqi Central Basketball Federation, which are 16-18 years. The research sample was composed of 12 players, and then the researcher conducted a homogenization process in some of the research variables, such as total height. For the player, the total weight of the player, the training age of the player. Accordingly, the measurements were determined by performing a torsion coefficient law treatment after extracting the arithmetic mean, standard deviation, and mode for the sample, and Table No. (1) shows this.

Variables	Arithmetic mean	standard deviation	The loom	Torsion coefficient	The result
the weight	69.43	6.26	70	-0.09	Homogenic
height	186.12	9.06	185.5	0.08	Homogenic
Chronological age	17.3	0.62	18	-0,73	Homogenic
Training age	2.70	1.61	2	0,42	Homogenic

Table No. (1)

It shows the arithmetic mean, standard deviation, and torsion coefficient for the research sample

2-3 Search devices and tools:

1- Arab and foreign sources and references.

2- A medical scale to measure the player's total weight in kilograms.

3- A rectameter device for measuring length in centimeters.

4- Centrifuge device to separate plasma from blood components.

5- Ampoules containing anticoagulant fluids.

6- A box for storing blood samples to place blood sample tubes.

7- Sterile syringes for injections and drawing blood samples.

8- Cotton and alcohol for disinfection.

9- Legal basketball court.

2-4 Search implementation procedures:

The researcher conducted an initial exploratory experiment on a sample that was identified after they were excluded from the main experiment sample and, due to special circumstances, they were not able to continue conducting the main experiment. An experiment was conducted on 7/1/2024 on "6" players. Then, on 15 January, 2024, the researcher took a blood sample before performing the oxygen exercises to measure the number of stem cells using special analyzes (CD34) and (CD45), and to measure some chemical variables (Na+, Ca++). Then

the researcher applied aerobic exercises within the training program on the research sample until 10 March, 2024. Then, on 13 March, 2024, the researcher took a blood sample after completing the application of aerobic exercises in order to measure the research variables studied, and sent the blood samples to a laboratory private analysis.

2-5 The statistical methods used:

The ready-made Spss program found in computer systems was relied upon, and the researcher used the following statistical methods:

1- Arithmetic mean.

2- Standard deviation.

3- Torsion coefficient.

4- t-test.

5- Correlation coefficient.

3- Presentation and analysis of results:

3-1 Presentation results:

Table (2) shows the arithmetic means, standard deviations, and the calculated and tabulated T value for the research sample for both the pre- and post-test in the stem cell measurement test.

	Tests	arithmetic means	standard deviations	*Calculated T*	Tabulated T	Significance level
1	pre-test	50.25	11.668	8.571	2.021	significant
2	post-test	56.3	8.922			
* Under 11 degrees of freedom and an error level of 0.05						

Table (3) shows the arithmetic means, standard deviations, and the calculated and tabulated T value for the research sample for both the pre- and post-tests in the test for measuring sodium levels in the blood.

	Tests	arithmetic means	standard deviations	Calculated T	Tabulated T	Significance level
1	pre-test	129.937	0.226	11.411	2.021	significant
2	post-test	134.177	0.273			
* Under 11 degrees of freedom and an error level of 0.05						

(Table 4) shows the arithmetic means, standard deviations, and calculated and tabulated T values for the research sample for both the pre- and post-tests in the test for measuring calcium levels in the blood.

	Tests	arithmetic means	standard deviations	Calculated T	Tabulated T	Significance level
1	pre-test	4.008	0.206	14.044	2.021	significant
2	post-test	4.433	0.253			
* Under 11 degrees of freedom and an error level of 0.05						

3-2 Discussion and analysis of results:

It is clear from Table No. (2) of the pre- and post-tests of the stem cell research group that there are significant differences between the pre- and post-tests. The results showed that there are significant differences between the pre-test and the

post-test in the stem cell measurement test in achieving the calculated T value (8,571). This is compared to the tabular T value of (2.021), which indicates that there are significant differences between these two tests for the post-test. This study is consistent with the results of a study by Bonsignore et al (2002), which indicated the positive effect of aerobic programs on improving stem cells to a high degree and increasing their activity through continuous physical training. Zaldivar et al (2007) confirm that many researches emphasize the role of pressures in consulting blood stem cells, as these researches explained the important role of pressures resulting from sports practice, such as running and swimming, as well as stationary and moving bicycles, as these affect the increase in blood stem cells. The researcher believes that the increase resulting from aerobic training is the result of the pressures resulting from training, which positively affects the increase in stem cells in the blood in order to compensate in various tissues, whether muscle tissue, white or red blood cells, and other blood components. It is also clear from Table No. (3) of the pre- and post-test measurements in the sodium research group that there are significant differences between the pre- and post-tests. The results showed that there are significant differences between the pre-test and the post-test in the sodium measurement test in achieving the calculated T value (11.411), which is Compared to the tabular T value of (2,021), which indicates that there are significant differences between these two tests for the post-test. The researcher attributes this development in the level of Na+ in the blood to the effect of exercise in the research sample, and this important increase contributes to the process of muscle contraction. The researcher believes that this increase is due to an increase in blood plasma concentration as a result of the

loss of a large amount of water that accompanies the performance of physical effort, which results in a decrease in plasma volume and thus an increase in the level of sodium in the blood. This increase is not due to the secretion of the hormone destamone, as it does not directly affect the increase sodium is from the renal tubules, as the positive sodium ion is the most concentrated ion in the fluid outside the cells, and from a scientific standpoint it is an element with an electrical property, as when an action potential is available, many of these ions pass through the acetylcholine channels due to the strong negative potential within the muscle membrane. Which amounts to 80-90% millivolts, which pulls the positively charged sodium into the muscle fiber to balance the muscle voltage (Matson, L.G and 1993 Tran, Z). By observing Table (4) in the results of the chemical tests for the test measuring the percentage of calcium Ca+ for the research sample, the experimental group, in the pre- and post-test, the results showed that there were significant differences between the pre-test and the post-test in the test measuring the percentage of calcium Ca+ in achieving the calculated T value (14,044), which is compared to the tabular T value of 2.021, which indicates a significant difference for the post-test. Adel Abdel Basir states: "The source of calcium from food is milk, eggs, vegetables, cheese, and dry legumes. Its function is the formation of bones and teeth, blood clotting, nerve conduction, and muscle activity. Its deficiency leads to rickets, stunted growth, muscle spasms, and softening of the bones a lack of calcium leads to preventing the absorption of some other salts (Adel Al-Basir 1999). Calcium is absorbed in the small intestine, and vitamin D helps absorb it, regulate its transfer between cells, and maintain its percentage. As calcium levels decrease in the blood, this vitamin begins to

absorb more calcium. The higher the percentage of calcium, the less the amount of absorption, in order to balance its normal percentage in the body (Gross, M and Kumar, R 1992).

4-onclusions and recommendations:

4-1 Conclusions:

1- There are significant differences between the pre- and post-tests in stem cells as a result of the exercises for the post-test.

2- There are significant differences between the pre- and post-tests in the chemical variables sodium and calcium as a result of the exercises for the post-test.

4-2 recommendations:

depending on the results of the research, the researcher recommends the following:

1- Pay attention to aerobic training to increase stem cells to compensate for damaged cells.

2- The need for sports federations to pay attention to this type of research.

3- The competent authorities provide modern laboratory tools to conduct analyzes of athletes' stem cells, as well as apply and benefit from the results of studies.

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