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A Comparative Study on the Level of Troponin Enzyme and Some Motor Abilities of Young and Advanced Basketball Players

Saja Mohammed Hafez 1 ***Duha Mohammed Hafez 2***

sajamohamed47@gmail.com1

Duhamohammed1986222@gmail.com2

Faculty of Physical Education and Sport Sciences, Maysan University1,2

ABSTRACT

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The study aimed to identify the level of troponin enzyme and the level of some motor abilities of the research sample, as well as to compare between young and advanced players in the level of troponin enzyme and some motor abilities. While the research problem came through the researchers' knowledge of the sport of basketball and the importance of motor abilities, which is one of the important abilities in this sport as a result of the difficulty of its skills and its reliance on a set of motor abilities. It is known that the practice of sports training leads to physiological changes that include almost all internal systems of the body, and that the process of physiological adaptation and the response of the body's systems to perform physical load is carried out through a group of systems and organs in the body, the most important of which are enzymes and enzymatic action. The most prominent changes and functional responses of tissues that accompany physical activity can be identified in direct and indirect ways through the presence of changes in some of these enzymes. Due to the importance of the enzyme troponin and its role in contraction and diastole, the problem lies in knowing the extent to which the level of this enzyme changes and some of the motor abilities of young and advanced basketball players.The researchers also concluded that all the values of functional indicators are within the normal limits. There are differences in troponin levels and motor abilities in favor of advanced players.

Introduction to the research

1-1 Introduction and importance of the research:

Physiological studies in the field of training physiology or sports physiology are one of the main topics for those working in the field of physical education and sports training, and in this way, it is possible to know the effect of physical training methods on the vital systems of the athlete's body as a result of participating in competitions or training and in accordance with the requirements of the target sport. Therefore, the physiology of sports training is one of the most important basic sciences for workers in the field of sports training. The general physiology was concerned with the study of all the functions of the body, so the physiology of training means that it is the science that gives a description and explanation of the physiological indicators resulting from the performance of training once or the repetition of the training several times in order to improve the responses of the body organs. If we combine all the abilities together, we will notice that some of them are related to the physiological state and others are related to the ability to control movement and depend on motor control that is directly related to the central and peripheral nervous system. Mobility Collar has called on scientists to add other components that are important in fitness, such as agility, balance, and flexibility, while Ahmed and Khalil define it as "a natural or acquired readiness to perform a special performance for large muscle groups without excessive fatigue, as well as muscle strength, flexibility, muscular ability, muscular skin, agility, cyclical skin, physiological speed and work, standard, physical or motor work." Ahmed Odeh and Khalil Al-Khalili, 2000, p. 45).

It is a common assumption that practicing sports activity with effort generates an external load, which in turn turns into an internal load that affects the functional and biochemical systems of the athlete, which in turn leads to the appearance of muscle pain in athletes, due to insufficient blood flow that causes a lack of oxygen to the muscles, or as a result of the accumulation of muscular work residues resulting from physical training, increased osmotic pressure of the muscle cell, and lack of calcium ions. Muscle tissue damage. These residues lead to an increase in the concentration of some biochemical variables in the blood, such as the enzyme troponin for the working muscles that participated in physical performance, which in turn may contribute to reducing the sensation of muscle pain resulting from physical and motor abilities training in special exercises according to maximum intensity.

Tulloh L ; 2010,P.159))

Troponin (C) plays a role in muscle contraction and regulates contraction and diastole. Troponin (T) is more effective in various diseases that affect the heart muscle. Troponin (I) inhibits the enzymatic degradation of adenosine triphosphate (ATP), which causes muscle contraction.

From the above, it is clear that the level of troponin enzyme and because it has a role in contraction, diastole, stress and muscle pain in all athletes in general and in basketball players in particular, so the importance of research lies in a comparative study in the level of troponin enzyme and some motor abilities of young and advanced basketball players. Thus, we reduce the stress of the various muscles and functional systems as a result of the increase in the physical stress obtained by the various muscles, ligaments and the heart, which allows to increase the opportunity to reach high training grades and at the same time reduce the appearance of muscle pain and the occurrence of myocardial infarction.

1-2 Research Problem:

Through the researchers' acquaintance with the sport of basketball and the importance of motor abilities, which are considered one of the important abilities in this sport as a result of the difficulty of its skills and its reliance on a number of motor abilities, as well as the researcher's knowledge of some enzymes related to muscular work and their impact on the theory of slippage, which is of great importance and should be taken into account during the development of training curricula and the selection of various training methods, and after reviewing many references and sources related to the sport of basketball. It is one of the important sports through which medals can be won in local and

international championships. The researcher noted that there have been few studies that investigate the effect of troponin enzymes and its role in the development of some motor abilities.
It is known that the practice of sports training leads to physiological changes that include almost all internal systems of the body, and that the process of physiological adaptation and the response of the body's systems to the performance of physical load is carried out through a group of systems and organs in the body, the most important of which are enzymes and enzymatic action. The most prominent changes and functional responses of the tissues that accompany physical activity can be identified in direct and indirect ways through the presence of changes in some of these enzymes. Due to the importance of the enzyme troponin and its role In contraction and diastole, the problem is to know how much the level of this enzyme and some of the motor abilities of young and advanced basketball players are altered.

1-3 Research Objectives:

1- Identify the level of Troponin in the research sample.
2- Identify the level of some motor abilities of the research sample.
3- Comparison between young and advanced players in the level of troponin enzyme and some motor abilities.

1-4 Research Hypotheses:

1- There are statistically significant differences in the level of the enzyme troponin in young and advanced basketball players.
2- There are statistically significant differences in the level of some motor abilities in young and advanced basketball players.

1-5 Research Areas:

1- Human Field: Young and advanced basketball players in Maysan Governorate.
2- Temporal Domain: From 1/2/2025 to 1/4/2025.
3- Spatial Domain: - Closed Hall and Physiology Laboratory at the Faculty of Physical Education and Sport Sciences, Maysan University - and the City Laboratory for Pathological Analysis.

3. Research methodology and field procedures

3-1 Research Methodology:

The researchers used a descriptive approach to fit the nature of the problem.

3-2 Research Population and Sample:

Determining the research population and selecting the sample is one of the important procedures in scientific research, and the researcherTan determined the research population by the deliberate method, which are the (14) young basketball players, and the (14) applicants, and the research sample was selected by the deliberate method, where (12) players were selected from each category, where their percentage of representation of the original community was (85%) for the two categories.

3-3 Means of collecting information, devices and tools used in the research:

1- Arab and foreign references and sources.
2. The International Information Network (Internet).
3- Registration forms for the results of the tests.
4. The assistant medical team.
5. TREAD MILL TYPE (EC-T220). CATEYE) is made in Japanese.
6- CENTRIFUGE (80-2) Chinese-made centrifuge.
7- Laboratory device for measuring the enzyme troponin (Mindray BS 200).
8- DIAMOND.

9- Tubes to save blood samples.
10- A medical case to store blood sample test tubes.
11- A box for transporting blood serum samples.
12- Plastic injections to draw blood.
13- Medical cotton, sterile and wound adhesive.
14- Tape measure.
15- Indicators.
16- Tennis balls.
17- Balance beam.

3.4 Field Research Procedures:

3.4.1 Measurement of Troponin Enzyme:

To perform enzyme analyses in any government or private laboratory, the following steps must be followed strictly:

First: Blood drawing method: We draw blood from the clearest available vein of (5) ml, and the hand can be tied to the turrica to increase the clarity of the vein, as the drawing process must be quick and organized to avoid the breakage of red blood cells and their spread in the serum (serum), which leads to errors in the results.

Second: After drawing blood, we put the blood in a special tube to separate the blood serum from the rest of its components, and this tube is better to be of the gel-containing type (Gel) called (Gel Tube), as this gel works on the speed of blood clotting as well as acts as a barrier between the blood serum and the rest of the components after separating it.

Third: Separation Process: We place the Gel Tube in the centrifuge and place the device at a speed of (3000-4000) cycles per minute for a period of (5-10) minutes to ensure the good separation of the blood components from the serum.

Fourth: After the blood was drawn by a specialized medical staff, (5 mm liters) of blood was drawn, noting that the measurement method according to the device used, which is the Mindray Bs 200 device, is a self-examination device for clinical chemistry, and the drawn blood was placed in special tubes to be analyzed in the laboratory to obtain a measurement of (troponin enzyme).

3.4.2 Anaerobic Ability Test and Motor Ability Tests:

I. Cunningham and Faulkins anaerobic ability test. (Abul Ela Ahmed Abdel Fattah and Muhammad Sobhi Hassanein, 1997, p. 229).

Second- Agility test (T-test) running in the shape of a letter (T)). (Kamal Abdul Hamid Ismail: 2016, pp. 310-312)

Third: Moving balance test. (Ali Salman Abdul Tarfi: 2013, p. 185)

Fourth: Eye-to-eye compatibility test. (Ali Salman Abdul-Tarfi, 2013, p. 184)

Fifth: Testing the compatibility between the eyes and the legs. (Ali Salman Abdel Tarfi: 2013, p. 182)

3.5 Exploratory Experiment:

The researchers conducted the exploratory experiment on (2/2/2025) on Sunday to verify the accuracy of the tests, to know the time it takes to conduct the tests, and to know the obstacles that the researcher may face in order to avoid them during the implementation of the main tests, and to ensure the location of the test and its suitability for the implementation of the test. This experiment was conducted on a sample of (4) players, as it included (2) from each category for young people and applicants who were randomly selected.

3.6 Main Experience:

The two researchers, after completing all the procedures for the implementation of the field procedures, conducted the main experiment on (26-27/2/2024) on Wednesday and Thursday for a set of codified tests for some motor abilities and measurement of the troponin enzyme, andthe aim of these tests is to use them as an indicator and measure for some of themotor and functional abilities of the player, and the researcherTan relied on In the use of these tests on scientific references and sources.

3–7 Statistical Treatments: The researchers used the statistical package (SPSS).

4. Present, analyze and discuss the results

4.1 Presentation, analysis and discussion of pre-exertion and post-exertion troponin results for young and advanced basketball players:

Table (1)

Shows the unit of measurement, mean of arithmetic, standard deviation, calculated (T-test) value and significant differences for pre-exertion and post-exertion troponin enzyme indices for young and advanced basketball players

Significance of differences	Calculated T test value	Effort Dimension		Before Effort		Unit of Measurement	Statistical Treatments Collection	t
		±	Going to	±	Going to			
Moral	4,30	0.016	0,15	0,025	0,12	NG/ML	Youth	1
Moral	4,62	0,026	0,18	0,023	0,13		Applicants	2

Table (1) of the troponin enzyme shows us that the young players obtained a mean of (**0.12**) and its standard deviation was (**0.025**), while after the effort it obtained an arithmetic mean of (**0.15**) and a standard deviation of (**0.016**), and the calculated value of (T test) was (4.30).

It shows us that the advanced players before the effort obtained an arithmetic mean of (**0.13**) with a standard deviation of (**0.023**), while after the effort, they obtained an arithmetic mean of (**0.18**) and a standard deviation of (**0.026**), while the calculated value of (T test) was (4.62).

It is clear from Table (1) that there are significant differences in the results of the measurements of troponin for the advanced samples , as well as the results of the measurements between the young and the advanced, and in favor of the applicants, and the researchers attribute these significant differences to the successive muscle contractions of the advanced sample members, due to higher physical abilities as well as physical growth, and because of the active role of troponin in these contractions, and this is consistent with what was indicated (Gresslien 2016).He stated that "troponin plays a crucial role in regulating contraction and high diastole during athletic training, hence its elevation is observed after training." Gresslien, T. & Agewall: (2016, p.609-621).

The increase in muscular responses also contributed to the increase in troponin levels, which can be considered a physiological and healthy condition for the research sample, especially the advanced players, "The increase in the troponin enzyme is a response to physical exertion, which is an expected increase, and it is considered a health condition, which is evidence of the absence of a pathological condition."(P.169 – 176, 2010, : Shave. R. Baggish & (others)

As Gresslien (2016) confirmed, "We conclude from our studies that light and heavy exercise is what causes the troponin level to rise, which should be taken into account that there are several factors that affect post-exercise troponin levels, but all of these factors are physiological." ,p609-621,2016: Gresslien. T. & Agewall.))

Richardson (2018) noted that "regular and prolonged training contributes to increased troponin levels after training due to the occurrence of stimulation in the heart muscle and consequently an increase in muscle contractions and an increase in troponin levels" Richardson. A. g. &(others):2018 p.77-78.

The researchers can infer from the results of the study that the increase in the enzyme troponin in advanced players resulting from the increase in calcium concentration due to regular training and high effort "regular training contributes to an increase in calcium concentration" and that this increase leads to an increase in muscle contractions and thus an increase in the enzyme troponin, which is consistent with what was indicated (Guezennc 1999)."The increase in calcium concentration after high physical exertion leads to an increase in muscle contraction as it is released from the cytoplasm to help the enzyme troponin release the enzyme (ATP), which contributes to increasing the functioning of the heart muscle, an increase in the number of heart beats, and the release of the enzyme troponin into the blood."(Guezennc. T, D, & Horder: p24, 1999)

4.2 Presentation, analysis and discussion of the results of the motor abilities of young and advanced basketball players:

4.2.1 Presentation and analysis of the agility test for young and advanced basketball players:

Table (2)

Shows the unit of measurement, arithmetic mean, standard deviation, calculated (T-test) value, and significant differences for the agility test for young and advanced basketball players.

Significance of differences	Calculated T test value	±	Going to	Unit of Measurement	Statistical Treatments Collection	t
Moral	2,24	2,20	15,90	second	Youth	1
	3,10	2,1	16,20		Applicants	2

Table (2) shows us that the agility test for young players obtained an arithmetic mean of (15.90) **with a standard deviation of (**2.20**), while the calculated value of (**T test) was (2.24**),** and the advanced players obtained an arithmetic mean of (**16.20**) with a standard deviation of (**2.1**), while the calculated value of (T test) was (**3,10**).

4.2.2 Presentation and analysis of the hand-eye compatibility test for young and advanced basketball players:

Table (3)

Shows the unit of measurement, arithmetic mean, standard deviation, calculated (T-test) value, and significant differences for the hand-eye compatibility test for young and advanced basketball players.

Significance of differences	Calculated T test value	±	Going to	Unit of Measurement	Statistical Treatments Collection	t

Moral	4,80	1,30	5,14	degree	Youth	1
	4,10	1,40	5,27		Applicants	2

Table (3) shows us that the hand-eye compatibility test for young players obtained an arithmetic mean of (**5.14**) with a standard deviation of (**1.30**), while the calculated value of (T test) was (**4.80**), and the advanced players obtained an arithmetic mean of (**5.27**) with a standard deviation of (**1.40**), while the value of (T test) was (1.40).) calculated (**4,10**).

4.2.3 Presentation and analysis of the Eye-Man Compatibility Test for Young and Advanced Basketball Players:

Table (4)

Shows the unit of measurement, arithmetic mean, standard deviation, calculated (T-test) value and significant differences for eye-to-man compatibility testfor young and advanced basketball players

Significance of differences	Calculated T test value	±	Going to	Unit of Measurement	Statistical Treatments Collection	t
Moral	3,60	1,20	8,90	second	Youth	1
	7,30	0,90	7,20		Applicants	2

Table (4) shows us that the compatibility test between the eye and the man for the young players obtained an arithmetic mean of (**8.90**) with a standard deviation of (**1.20**) while the calculated value of the (T test) was (**3.60**), and the advanced players obtained an arithmetic mean of (**7.20**) with a standard deviation of (**0.90**), while the value of (T test) was (0.90).) calculated (**7,30**).

4.2.4 Presentation and analysis of the balance test for young and advanced basketball players:

Table (5)

Shows the unit of measurement, arithmetic mean, standard deviation, calculated (T-test) value, and significant differences for the balance test for young and advanced basketball players

Significance of differences	Calculated T test value	±	Going to	Unit of Measurement	Statistical Treatments Collection	t
Moral	2,30	1,15	9,30	second	Youth	1
	5,40	1.89	6,90		Applicants	2

Table (5) shows us that the balance test for the young players obtained an arithmetic mean of (9.30) **with a standard deviation of (**1.15**) while the calculated value of (**T test) was (2.30**),** and the value of the (**T-test**) was (6.90**) with a standard deviation of (**1.89), while the calculated value of (**5,40**).

4.2.5 Discussion of the results of motor abilities:

It is clear from what was presented in the tables (2-3-4-5), which show the results of the tests showing the motor abilities of the young and advanced basketball players, which showed significant differences for both groups.

The researchers attribute these significant differences to the continuation of training, and the researchers believe that skill training can develop physical and motor abilities, on which the levels of skill performance depend according to the requirements of each specialized sport. The researchers also attribute the significant differences that appeared in the advanced players in motor abilities represented by (agility, hand-eye compatibility, eye-leg compatibility, balance) at the expense of young players in tests to the special exercises used by coaches for each age stage according to scientific foundations based on sports training literature, in which the level and individual differences between players are taken into accountAhmed Al-Hadi also stressed that "many specialists agree on the need to link physical and motor preparation and artistic performance on a continuous basis, as appropriate technical preparation includes an economical and ideal use of physical capabilities. Special exercises should occupy a large share of the total size of training to create a broad base of physical and motor abilities" (Ahmed Al-Hadi Youssef: 2016, p. 188), and this is also confirmed by (Lanb) "The principle of privacy in training means that training includes movements similar to the nature of performance in the practiced activity."(Lanb . D:p29, 1984) and"Training that contains a sufficient level of intensity and volume, in addition to the variety between them in stimulating the muscular system, is considered a successful method" (Mukhlad Muhammad Jassim, 2010, p. 115)

The researchers also attribute these differences to the training methods used in the training programs, which have an effective role in developing these motor abilities under study, as Abdel Moneim Suleiman mentions that "the process of repeating the correct responses to the same educational situation leads to and reaches the individual to a great degree of mastery, as through the method of repetition of the educational situation and its correct response, the mistakes associated with it are eliminated and the correct aspects are maintained and persistent."Abdel Moneim Suleiman Barham: 1995, p. 419). As Kamal Al-Rabadi confirms, "Diversity in sports performance is one of the basic factors for the process of balance in physical and motor integration, and it works to increase the desire to train."(Kamal Jamil Al-Rabadi: 2001, pp. 126-127) and this is supported by (Hanafi Mahmoud) that "working and focusing on one quality during training does not bring the required quick effect" (Hanafi Mahmoud Mukhtar: 1997, p. 54) and (Qasim Hassan) confirms that "training on skills requires a multiplicity of physical and motor qualities in preparation for raising the skill level" (Qasim Hassan Hussain: 1985, p. 67). This is confirmed by (Hussain Al-Ali and Amer Shaghati) "In order to ensure the achievement of the goals of sports training, the coach must organize and plan it well, so the planning process in training represents the planned and organized scientific procedures in a very precise way, which helps the athlete to achieve high indicators in training."(Hussain Ali Al-Ali and Amer Fakher Shaghati: 2006, pp. 59-60) (Muwaffaq Asaad) confirms: "The design of the program depends on several things that must be achieved in the training units on which the program is built, and the basis of this is the overlapping relationships between all the training units, their time, their number per week, the total number of units in the program, the time range of the program, in addition to the type and nature of the exercises, the training methods used, the devices and tools necessary to accomplish the training tasks, and the repetition of the training units is an important basis for the success of the training units. The training program, as regular and prolonged repetition leads to a change in the general training condition of the player and the growth of his functional efficiency, and also adds that "it requires the player to carry more than he is working on, i.e. (above the load) that he was working on, until the performance is stabilized in relation to the level achieved by the player,

and thus the state of adaptation that occurs in the internal devices as a result of the training units installed in the program."(Muwaffaq Asaad Mahmoud: 2010, pp. 227-237).

5. Conclusions and Recommendations:

5.1 Conclusions:

1- The troponin index was within normal limits.
2- There are differences in troponin levels and motor abilities in favor of advanced players.

5.2 Recommendations:

1- Conducting similar studies on sports or on other age groups.
2- Perform other functional and hormonal measurements in order to standardize training according to these or other indicators in order to keep pace with the development in global sports.
3- Emphasizing the use of special exercises for each age stage according to scientific foundations based on the sports training literature, which takes into account the level and individual differences between the players.

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