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A study of the mechanical and electrical activities of the heart and their relationship to the phosphagenic and lactic energy systems of young basketball players

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***Abstract*---**It was found that there was a significant correlation between all tests of the mechanical and electrical activity of the heart (systolic force FC, stroke volume SV, end-diastolic volume, EF volume, and left ventricular volume during diastole LVDD) with the test of the oxygen-phosphating energy system (Markaria). - As safe (Margaria-Kalamen)It was found that there is a significant correlation between all tests of the mechanical and electrical activity of the heart (myocardial systolic force FC, stroke volume SV, end-diastolic volume EDV, and the percentage of heart pumpingEF blood, and left ventricular volume during diastole (LVDD) with the Lactational Oxygen Energy System Test (Wingate Test 30 Second)

***Keywords*---**Scientific development achieved, scientific foundations, phosphagenic.

Introduction

Introduction and importance of research

The scientific development achieved by developed countries in the field of sports opened new horizons in most developing countries to invest scientific discoveries in many areas of life, and physical education took a prominent position among these sciences that serve the individual and society and contribute to its building and happiness. It developed its philosophy and became based on sound scientific foundations, as measurement and testing have begun to be taken care of by

trainers due to its importance in decision-making and building training curricula, as well as all determinants of high achievement from physical, psychological, skill and functional, as the practice of sports training leads to functional changes There are many body systems, and the practice of training for long periods and on a regular basis leads to functional adaptations in the body's systems in general and the heart system in particular. within the cardiovascular system and affect the ability and ability of the heart muscle to obtain blood and pump it in order to provide blood with oxygen to the working muscles, that the occurrence of physiological adaptations The function of the heart is commensurate with the requirements of the vital organs of the body, as well as with the extent of the work of the heart according to the energy system and the type of sports training. Basketball is one of the team games that requires privacy in its training, especially after recent modifications in its performance system This game requires quick performance by the players in carrying out the attacks and returning faster for the purpose of defense. It also requires quick movement by the players from one place to another over four periods of ten minutes each, and given that each energy system has functional requirements that differ from The other energy system, so the importance of the research lies in recognizing the type of relationship that occurs for each of the mechanical and electrical activities of the heart of young basketball players with each of the phosphagine and lactic energy systems.

Research Problem

Due to the interest of the studies that are currently being conducted to know the importance of the functional response that occurs in sports events and the extent of the positive and negative of this response and activation in the sports field to reach the best achievement and a full understanding of these variables, as it is not possible to reach a specific performance level unless the physiological functions of the athlete are consistent with this The level of performance, as the performance of a specific sports activity affects the parts of the body used and changes its shape resulting from continuous sports training, and given that each physical activity has its own energy system that meets the requirements of muscular work, as well as the type of activity practiced by the player is what determines what the heart needs from A functional ability commensurate with work and with the requirements of different body systems, and given the lack of knowledge of young basketball players and their coaches to determine the functional capacity of each of the energy systems, despite the occurrence of variation in the functional adaptation of the heart and cardiac muscle when performing and in a manner that corresponds to the effort that leads to each system of energy. Energy systems, in addition to the absence of a previous study that dealt with research and interpretation, to identify the type of relationship for each of the mechanical and electrical activities of the heart with L. Play basketball with both the phosphagenic and lactic energy systems.Therefore, the researchers decided to address the issue by conducting a study to identify the relationship of each of the mechanical and electrical activities of the heart of young basketball players with the phosphagenic and lactic energy systems.

Research Objectives

1. Identifying the mechanical and electrical activities of the heart according to the phosphagic and lactic energy systems of young basketball players.

2. Identifying the relationship of each of the mechanical and electrical activities of the heart with the anoxygen phosphagine energy system for young basketball players.

3. To identify the relationship of each of the mechanical and electrical activities of the heart with the lactic acid energy system of young basketball players.

Research Areas

- The human field: the youth basketball players.

- Time range: 1/15/2022 to 3/10/2022.

- Spatial domain: Echo Department and Cardiology Department / Medical City Hospital, People's Inner Hall.

Research methodology and field procedures

Research Methodology

The descriptive approach was used in the correlative relationships style to suit the research objectives.

Research Sample

The research sample consisted of 12 youth basketball players who participated in the 2021-2022 sports season, in addition to (6) young players representing the pilot experiment sample from the Police Sports Club and from outside the sample limits.

Methods of collecting information

The researchers used the following devices and tools: (Arab and foreign sources, Pulse Oxymeters, Nonie Model 8600), and Echocardiograph. y) type (Vousen530D), electrocardiogram device (electrocardioghraphy), individual registration form for test results, (4) electronic stopwatch.

Research Procedures

First / Cardiac functional tests according to energy systems:

- The Margaria-Kalamen-Test to measure the system (anoxic-phosphatic) (3: 1998: 132)

- Wingate Test 30 Second to measure the Lactic Anoxygen System (8: 2000: 184-185)

- Measuring the force of contraction of the heart muscle: Force of Contraction (4: 2000: 144)

Second / Variables of the mechanical and electrical activity of the heart

1. Stroke Volume (SV)

2. End Diastolic Volume (EDV)

3. Ejection fraction, symbolized by (EF) (2: 2000: 45)

4. Left ventricular volume during diastole.

Experimental Experiment:

The two researchers conducted an exploratory experiment on 18/1/2022 on (6) players representing the Police Club and from outside the limits of the sample in order to conduct medical physiological tests (echo and electrocardiograms) in the Medical City Hospital, while the functional tests were conducted in the club's hall. Sports Police, to avoid errors that may accompany the work while conducting tests on the main work sample.

Main Experience

The main experiment was conducted on 1/22/2022 over a period of three days, where firstly, physiological tests (electrocardiography and electrocardiography) were conducted at the Medical City Hospital (Echo Department and Electrocardiogram Department) at rest time, and secondly, functional tests were conducted in the People's Sports Hall. After the PHOS test (Markaria test - as safe) was divided on the second day, and the LAC test (Winkett test 30 seconds) on the third day.

Statistical means

The ready program (IBM SPSS Statistics Vr26) was used to extract the following statistical treatments (arithmetic mean, standard deviation, Pearson's simplified correlation coefficient)

Presentation, analysis and discussion of the results

Presenting the results of the mechanical and electrical activities of the heart according to the energy systems:The two researchers extracted the values of the arithmetic means and the standard deviations of all the variables of the mechanical and electrical activity of the heart for the phosphatic and lactic systems of the young basketball players as shown in the tables (1)

Table (1)Arithmetic averages and standard deviations of the electrical and mechanical activity tests of the heart

For both phosphagenic and lactic energy systems for young basketball players

The n system Lactic		the system Phosphagenic		lonliness measurement	the exams
± _	Q-	± _	Q-		
		10,578	1395.54	Kg.m/sec ^{2}	Markaria - as safe
18.491	2.549.3			Kg.m.sec	Winket 30 seconds
0.125	1.973	0.132	1.884	ml.v	Energy systolic muscle hearty FC
1.450	116.77	1.416	108.14	Ml	size the hit SV
2.431	167.25	2.341	152.74	Ml	size End extroversion EDV
0.006	73.30	0.007	73.20	%	The ratio Centennial to pump the blood EF
1.010	52.341	0.004	51.074	Mlm	size ventricle left During extroversion LVDD

Presenting the results of the correlation relationship between the mechanical and electrical activities of the heart with the phosphagenic and lactic energy systems:In order to achieve the objectives of the second and third research, the researchers extracted the relationship between the mechanical and electrical activities of the heart with the phosphagic and lactic energy systems through the use of Pearson's simple correlation coefficient law. R) computed (Sig), which is smaller than the approved value of (0.05), which indicates that they all have significance and the existence of a significant correlation between them as shown in Table (2)

Table (2) Inter-correlation coefficients values of each of the mechanical and electrical activities of the heart with the phosphagenic and lactic energy systems of young basketball players

indication	Sig	Winket 30 seconds	indication	Sig	Markaria - as safe	the exams
Moral	0.000	0.81	moral	0.000	0.88	Energy systolic muscle hearty FC
Moral	0.002	0.83	moral	0.000	0.68	size the hit SV
Moral	0.000	0.72	moral	0.001	0.71	size End extroversion EDV
Moral	0.000	0.77	moral	0.000	0.84	The ratio Centennial to pump the blood EF
Moral	0.000	0.86	moral	0.000	0.79	size ventricle left During extroversion LVDD

Discuss the results

It has been clear through the results of the interrelationships of the interactions of each of the mechanical and electrical activities of the heart with the phosphagenic and lactic energy systems of the young basketball players in all the variables of the research, and the researchers confirm that it is a logical result, which is logical because the two systems depend on the anoxic system, although the phosphagen group depends on the energy elements. Phosphagenic only, while the lactic group depends on the "phosphagenic and lactic" elements, and all the research variables depend on the (Starling–Frank) law of the heart, which states that "the volume of the paid blood increases by the effect of the increase in the volume of blood that fills the ventricle during diastole, and that the increase in The volume of this blood that fills the ventricle leads to a compressive effect on the muscle fibers in the heart, which is reflected on the strength of the heart muscle contraction, and as a result, the heart pushes a large amount of blood during one beat" (6: 1985: 248)The result that was reached indicates the efficiency of the ability of the circulatory system, which is due to the efficiency of blood transfusion from inactive tissues to active tissues, and thus the ability of these activities to consume oxygen. This result is consistent with what was indicated by (Abu Ela Ahmed 1982) (1: 1982: 64-65) "There are some physiological functions that affect the efficiency of the function of the heart, lungs and blood vessels in delivering oxygen from the inspiratory air from the lungs to the blood and the efficiency of oxygen delivery processes to tissues, which means the functional safety of the heart or the efficiency of the muscles in using oxygen for metabolism".As Guyton & Hall 1996 (7: 1996: 131) states, "When the heart contracts severely, the end-systole volume can drop to as low as (10-20) milliliters, and also when large amounts of blood flow into the ventricles during The diastolic volume can become as large as (150-180) milliliters in the heart, and the end-stroke volume sometimes increases to about twice when the end-diastolic volume increases and the end-systole volume decreases, and the systolic test (FC) indicates that the maximum The ability to contract the ventricular fibers can be achieved during the contraction of the heart muscle, and this can be achieved through the ability of the heart to push the largest amount of blood during each contraction of the heart muscle, as the increase in the force of the stroke is accompanied by a decrease in the heart rate, and this result is consistent with what was mentioned (Guyton & Hall 1996) (7: 1996: 278) "The heart muscle contracts and relaxes in a rhythmic manner due to changes in electrical activity. When excess amounts of blood flow to the heart, it stretches the walls of the heart's chambers, and the heart muscle contracts more strongly as a result of this expansion, and its chambers are emptied of their contents.

The researchers also see that the size of the stroke is the result of ventricular contraction to push an amount of blood from the left ventricle to all parts of the body in one stroke. The percentage of blood pumping (EF) indicates that there is a portion of blood remaining between each contraction and relaxation of the heart muscle by the difference in value or the difference in the ejection part of the ventricle. -70%) at rest time, and it increases when the ventricles contract in case of physical exertion.While the test (percentage of blood pumping EF) indicates that the variables of the electrical activity of the heart are the influencing factor in determining the functional ability of the heart of the players, while the variables of

the mechanical activity of the heart are the influential and important factor in determining the functional ability of the heart of the players.The researchers also see that the increase in the size of the heart is accompanied by an increase in the size and diameter of the blood vessels and arteries with an increase in the diameter of the openings of the heart valves in order to accommodate this resulting increase in the volume and quantity of blood flow through it. And blood vessels to meet the needs of muscles and other body tissues during exercise, and this result is consistent with what was indicated by (Muhammad Hassan and Abul-Ela Ahmed 2000) (5: 2000: 320-322) "that the heart adapts to the exercise of sports training as a result of the increase in the volume of blood paid in Each beat of the heart during physical load, when muscular work increases the blood pressure inside the heart cavity and this leads to an increase in the relaxation of the heart muscle and increases the size of the ventricular cavity and the diastolic capacity of the ventricle increases in its size during muscle work more than during rest, and the difference between them in this case is called (extra reserve volume), and sports training leads to a decrease in diastolic muscle tone in connection with a change in the balance of the influence of the autonomic nervous system on the heart muscle during rest, and accordingly it notes an increase in cardiac muscle relaxation and Then the diastolic ventricular volume increases by no more than (5-10%) and based on the training regimen, the length of the muscle fibers of the heart increases as a result of the anatomical changes associated with the activity of building protein, and thus a functional expansion of the heart occurs.

Conclusions and recommendations

Conclusions

1. It was found that there was a significant correlation between all tests of the mechanical and electrical activity of the heart (systolic force FC, stroke volume SV, end-diastolic volume, EF volume, and left ventricular volume during diastole LVDD) with the test of the oxygen-phosphating energy system (Markaria). - As safe (Margaria-Kalamen)

2. It was found that there is a significant correlation between all tests of the mechanical and electrical activity of the heart (myocardial systolic force FC, stroke volume SV, end-diastolic volume EDV, and the percentage of heart pumpingEF blood, and left ventricular volume during diastole (LVDD) with the Lactational Oxygen Energy System Test (Wingate Test 30 Second)

Recommendations

1. The trainers' use of indicators of the mechanical and electrical activities of the heart to know the functional ability of the players in each of the energy systems in the training of young basketball players.
2. Conducting similar studies to measure the mechanical and electrical indicators of the heart according to energy systems on sports activities that were not covered in the current study.

3. Conducting similar studies to measure the mechanical and electrical indicators of the heart according to the energy systems on advanced basketball players and women basketball players.

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