

Effect of Cardiac Respiratory Fitness Exercises (CRF) According to Some Biomechanical Laws in P02 and Lung Efficiency of Female Students

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Abstract--- *The research focused on the impact of cardio-respiratory fitness exercises according to some biomechanical laws in PO₂ and lung efficiency (VC, FEV₁/ FVC) for female students. And try to reach the best development of the variables, as the use of different aids such as ropes, terraces and ladders to help students to perform the required exercises. The experimental group was trained in cardio-respiratory fitness exercises. These exercises were organized according to some biomechanical laws during a semester period for the fourth preparatory students and for 25 weeks at the rate of two training units per week. The control group, where the statistical results showed the superiority of the experimental group over the control group.*

Keywords--- *Cardiac Respiratory, Fitness and Exercises.*

I. INTRODUCTION

There has been a great development in recent years on the concept of women's sports and exercise exercises by them, because of its role in achieving multiple goals, including raising the level of sports achievement and development of the health of individuals, so it became a need and even necessary for their multiple benefits. The School of Physical Education is not limited to teaching physical education, but also to achieve the objectives of physical education in the school, among those goals is to improve the health level of students, and that the exercise of appropriate physical activity regularly improve physical fitness and improve health, and with continuing to perform cardio-respiratory fitness exercises (CRF) and gradually increase its intensity, the body adapts to these exercises and improves its performance in them. The body always adapts to human activities and these exercises increase the body's ability to consume oxygen and breathing, lung strength and ability to receive and distribute oxygen to the body. In addition to improving these exercises to perform muscles and their ability to produce energy in addition to their strength and flexibility, although these sports may cause fatigue while doing it, but increasing the strength of the heart, lungs and muscles leads to reduce of fatigue during daily activities.⁽¹⁾

The importance of research in the preparation and application of a set of cardio-respiratory exercises designed according to some of the laws of biomechanics in determining the intensity of pregnancy according to time, speed, distance, energy discharged, and work, and these laws contributed to the preparation of exercises based on the science supporting training science such as biomechanics and physiology, These exercises aim to improve the cardiac respiratory fitness of students in secondary schools, because these devices are very important as a criterion

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for the health, safety and prevention of students from diseases and access to students with high physical efficiency, and these inferences were made through the identification of the most important analyzes Blood related with the recognition of the efficiency of the lungs by the use of many advanced devices in the examination and measurement.⁽²⁾

The Study Objectives

1. Prepare CRF exercises in accordance with some biomechanical laws.
2. Identify the effect of cardiac respiratory fitness exercises (CRF) according to some biomechanical laws in PO₂ and lung efficiency (VC, FEV₁ / FVC) for female students.

II. PRACTICAL PART

Field Research Procedures

The researchers used the experimental method in order to be consistent with the methodology of the two groups (experimental and control) with pre and posttests to suit the requirements of the research. The researchers chose the sample area Radwa (secondary bright girls) to be the population of the study as the fourth grade students were identified and aged Between (15-17) years and the number (75) students for the academic year 2018-2019 and a sample of (30) students from the original community was chosen randomly (lottery), then were distributed to two groups (experimental, control) by (15) students For each group in the random manner The simple (lottery) also.

Measurements

1. Measuring PO₂ with EDAN (Blood Gass)
2. Measurement of lung efficiency variables (VC, FEV₁ / FVC) with III (spirolab)

Main Experiment Procedures

Pretests

Pre-tests were conducted on the research sample of the two groups (experimental and control) for the study variables (blood variables and lung efficiency) for three days according to the following sequence:

First day (Sunday, 7/10/2018): Test of lung efficiency indicators for the two groups (experimental and control) of the number (30) students, the second day (Monday, 8/10/2018): Test the blood variables for the (experimental) group (15) student, the third day (Tuesday, 9/10/2018): test blood variables for the group (control) number (15) students.

Application of Cardiac Respiratory Fitness Exercises (CRF)

Selected a group of exercises aimed at the large muscles in the body mainly such as some of the muscles deployed in the trunk and limbs, these types of exercises include jogging, and some types of jumping, and a set of aerobics, and was determined in the identification and organization of use on a set of mechanical laws such as speed, Acceleration, Distance, Time, Work piece, Ability, Energy, Zoya Body. The exercises were applied to the experimental group on Sunday 14/10/2018 and until Tuesday 30/4/2019, taking into account (intensity, rest periods) and the selected exercises were codified according to the pneumatic power system.

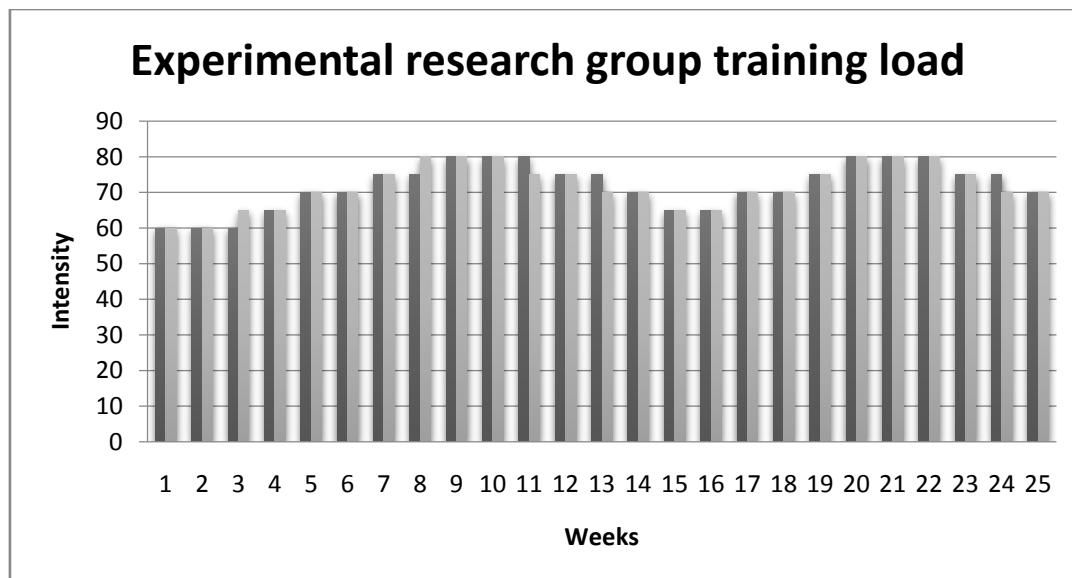


Figure 1: Experimental Research Group Training Load

Posttest Tests

The tests were conducted after the completion of the application of cardiac respiratory fitness exercises (CRF), and that was in the days (Sunday, Monday, Tuesday) on (5-6-7 / 5/2019) and the same sequence of pretests.

III. RESULTS AND DISCUSSED

After the researchers unloaded the results of pre and posttests and statistically processed and for the purpose of knowing the results of the development of the research variables, the data was analyzed using statistical bag (SPSS).

Table 1: The Calculated Value of (t) for the Independent Samples and the Level of the Significance of the Test and the Significance of the Differences between the Test Results (Posttests) for the Experimental and Control Groups of the Dependent Variables

Variables	Units	Experimental group		Control group		Calculated (t) value	Test level indication	Type of significance
		Mean	SD	Mean	SD			
VC	L	4.27	0.37	3.98	0.19	2.76	0.010	Sig.
FEV1/FVC	%	87.66	1.95	86.03	2.10	2.20	0.036	Sig.
PO ₂	mm Hg	24.53	1.72	23.06	1.98	2.162	0.039	Sig.

Discussion of the Results of Tests (Posttests) for the Experimental and Control

Groups of Lung Efficiency Variables (FEV1 / FVC, VC)

From Table (1), there are significant differences in the index of both variables (FEV1 / FVC, VC) between the results of the post-test tests of the experimental and control groups and for the benefit of the experimental group. The diaphragm muscle, which is the main breathing muscle, which led to an increase in the expansion of the chest

and bronchi and bronchi and thus increased the vital capacity and this that "regular exercise sports leads to positive functional changes in the respiratory system, And these changes The growth of the chest muscles leads to an increase in the widening of the rib cage, which improves and increases breathing movements due to increased vital capacity and then increases the body's ability to ventilate the maximum pulmonary resulting from the large volume of breathing air at a time and increase the rate of breathing⁽³⁾. That physical exercise "leads to the expansion of respiratory passages such as bronchi and bronchi.⁴Exercise has the effect of strengthening the breathing muscles. The greater the strength of the breathing muscles. The vital capacity of the lungs which affects the increase in the volume of breathing air due to a relationship Between the vital capacity of the lungs and the maximum breathing air⁽⁴⁾, which is confirmed by that regularity in the practice of sports training, especially aerobic exercise to increase the volume of vital capacity of the lungs VC as well as the maximum pulmonary ventilation due to a number of physiological changes in the functions of the lungs and respiratory organs, as associated This increases the size of the inspiratory air reserve than the exhaled air reserve of the trained athletes.⁽⁵⁾

As a result of the improvement in the efficiency and elasticity of the lungs, pulmonary volumes generally increase, including the volume of forced exhalation in the first second and thus increase the percentage of forced expiratory volume, which is indicated that there is an increase in lung volumes in general in trained people as a result The efficiency of the lungs and respiratory functions and their adaptation to regular and continuous sports training is also increasing. One of the health benefits that can be gained from exercise is to increase the vital capacity of the lungs, increase the effective oxygen exchange and increase the number of red blood cells and blood volume⁽⁶⁾.

While we found control group members relied on the vocabulary of physical education lesson originally prepared from the school of material, which did not rely on mechanical laws in the organization and did not use diversity in tools and methods of application, which gave an improvement when compared with the pretest test but showed less benefit compared to members of the experimental group⁽⁷⁾.

Discussion of the Results of the Tests (Posttests) for the Experimental and Control Groups of the PO2 Variable

From Table (1) it is found that there are significant differences between PO2 variable between the results of the experimental and control groups for the experimental group. The reduction of CO2 in the research sample was better and this was reflected in the adaptation to reduce the CO2 pressure coming from the tissues in the blood and raise the pressure of O2, which pointed out that Physical exercise increases blood volume As a result of muscle contraction and increased respiratory rate,⁽⁸⁾ the rate of blood pushed from the heart increases as the blood vessels of the working muscles expand and the vessels of the non-functioning organs such as the digestive system are stretched to drive the largest amount of blood to the working muscles so that the blood circulation and the respiratory system can increase its capacity. Rhythmic and repetitive exercises such as walking, jogging, cycling and swimming increase the speed of blood flow in the working muscles, which benefits the general circulation very⁽⁹⁾.

With the increased breathing of the experimental sample that practiced the proposed exercises, oxygen increases and diffuses from the pulmonary vesicles to the pulmonary capillaries. Ashraf Mahmoud said that the result of sports training increased pulmonary ventilation in order to deliver oxygen to the working muscles and as a result of

increased breathing increases the chance of gas exchange with blood, and that from the physiological adaptations of sports training on blood is to increase the volume of Blood and red blood cells, as well as high blood efficiency to carry larger amounts of oxygen as a result of physiological adaptation works to deliver more oxygen to the muscles through low blood quantities. Exercise activity increases the ability of the bone marrow to Production of erythrocytes and haemoglobin, leading to increased oxygen capacity of the blood⁽¹⁰⁾.

The reasons for the significant differences that appeared to the experimental sample that the nature of the proposed exercises was organized in the lesson plan, and relied on various sciences such as biomechanics, physiology, and sports training. This has created a state of development in the level of performance of the sample scientifically through the harmony of exercises with the capabilities and capabilities of members of the research sample.

IV. CONCLUSIONS

1. The preparation of cardio-respiratory fitness exercises in accordance with biomechanical laws has increased the effectiveness of these exercises and their positive effects.
2. The period of application of the exercise (25) weeks was long enough to cause physiological changes of the variables studied.

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