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# **The effect of a training curriculum for the development of some functional variables and the level of achievement in the effectiveness of air rifle shooting**

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**Abstract**---There are significant differences between the pre and post-tests in favor of the post-test in the tests) stroke volume (S.V), cardiac thrust (C.O.P), left ventricular volume, maximum oxygen consumption Vo2max), which indicates the effect of the proposed training approach. There are significant differences between the pre and post-tests in favor of the post-test in the achievement level test with air rifle shooting for young female shooters, which indicates the effect of the proposed training curriculum. There are no significant differences between the pre and post-tests in the tests (heart rate (HR) before exercise, heart rate (HR) after exercise, systolic blood pressure rate before exercise, systolic blood pressure rate after exercise, anaerobic step test (ability) Lactic Anoxa, Harvard Step Test

**Keywords**---effect training curriculum, functional variables, air rifle shooting.

**Introduction****Importance of research**

Today's world is witnessing tremendous scientific and technical development in various fields of life, and scientific development is a criterion by which countries' progress and development are measured. Training is a tool to achieve this superiority. Thanks to training, many countries have been able to achieve

tremendous progress for their societies in all sports fields, and scientific development has achieved a great renaissance in all fields, which in turn led to the development of the sports field significantly, through the wonderful achievements in Various fields of sports events, thanks to the reliance on scientific methods and methods in sports training, such as regular and codified training based on scientific foundations, which in turn led to the development of physical and functional variables that were the basis that enabled the athlete to reach the highest level in sports tournaments. Air rifle shooting is one of the activities that require specificity in its training, especially to distinguish it from other sporting activities by creating in the shooter a spirit of competition and challenge, as well as developing his ability to be patient and calm, and the ability to think quickly and choose the right decision to shoot at the target, and a sense of distance and time in order to Achieving victory, so we will not be able to develop and raise the efficiency of functional and performance devices for shooters without relying on other sciences such as the physiology of sports training, which is one of the necessary sciences for workers in the field of sports training. Sports training leads to various physiological changes that include all body systems, so the performance level of the shooters will evolve whenever these changes are positive and in order to achieve the physiological adaptation of the body's organs to perform the physical load and perform the performance efficiently with economy of effort as the representative changes in the muscles during physical training have due to their link to energy production, as it is not possible to set the level of sports training without the help of with functional tests. The importance of the research lies in preparing a training curriculum whose vocabulary has been scientifically codified to develop some functional variables and level of achievement in line with the performance requirements of the effectiveness of air rifle shooting.

### **Research Problem**

The scientific progress that sports are witnessing in our time is the result of research and investigation of everything that is new with the aim of rising to the highest levels. The various sports in general and the effectiveness of air rifle shooting, the subject of the study in particular, is the result of the combination of several interrelated and complementary factors, one complementary to the other, from realistic planning, providing scientific training cadres, and using training means to develop the physical, skill, functional and psychological aspects of it, and the development of training curricula must be commensurate with the ability of Female archers by relying on other sciences as well, in order to reach achievements that satisfy the ambitions of the coaches and female archers together. And since one of the researchers was a practitioner of the game and working in the field of teaching and training the game, I noticed some trainers neglecting the modern methods and methods of training and their lack of interest in the current and renewed development in the methods of training by air rifle shooting, as the young shooter with the air rifle will be under the influence of the racing atmosphere, so she will feel nervous And anxiety, which appears in different forms such as high pulse, increased breathing speed, in addition to poor concentration, which will affect the ability of the shooter to shoot, so the researchers decided to develop a training curriculum according to scientific

foundations to develop some functional variables and the level of achievement of young female shooters in the effectiveness of air rifle shooting.

### **Research Objectives**

1. Develop the vocabulary of a proposed training curriculum to develop some functional variables for young female shooters in the effectiveness of air rifle shooting.
2. Identifying the effect of the proposed training curriculum on some functional variables and the level of achievement of young female shooters in the effectiveness of air rifle shooting.

### **Research Hypotheses**

1. There are significant differences between the pre and post-tests, in favor of the post tests, in some functional variables among female shooters in the effectiveness of air rifle shooting.
2. There are significant differences between the pre and post-tests in favor of the post tests in the level of achievement of the young shooters in the effectiveness of air rifle shooting.

### **Research Areas**

1. The human field: the young female players in the air rifle shooting event for the 2020-2021 sports season.
2. Time range: 5/9/2021 to 12/25/2021 AD.
3. Spatial domain: the indoor hall of the College of Physical Education and Sports Sciences for Girls / University of Baghdad and Khawla Bint Al-Azwar Square / Baghdad Governorate.

### **Research methodology and field procedures**

#### **Research Methodology**

The experimental method was used for its suitability to the objectives and hypotheses of the research.

#### **Research Sample**

The research sample was represented by the 10 female shooters who participated in the sports season 2020-2021 with the effectiveness of air rifle shooting.

#### **Data collection methods**

The researchers used devices and tools (Arabic and foreign references, a medical device for measuring height and weight type (Pesa Persan) American-made, echocardiogram ultrasound device (Ecoho) type (Voluson 530 D) of Germany, a mercury sphygmomanometer, and Polar watches to measure Pulse rate (4), Tread Mill device (Marquette) type American made used to check the heart during exercise, mercury blood pressure device, spirometer to measure vital capacity,

Vo<sub>2</sub>max maximum oxygen consumption, Olympic air rifles weighing 4.5 – 5 Kg (5), (10) fixed paper targets, a video camera, IBM SPSS Statistics Ver 25 program.

### **Identification of Functional Variables**

In order to determine the most important functional variables related to the effectiveness of air rifle shooting for young female athletes, the researchers designed a questionnaire that includes the nomination of a set of functional tests needed by the emerging air rifle shooter, which were presented to a number of experts and specialists in the field of tests, measurement, physiology of sports training and shooting, and after collecting the questionnaires and unloading In its data, functional variables that obtained less than 75% of the expert opinion were excluded, and thus work was settled on the following tests:

First / Functional tests of the heart muscle using the Ecoho device:

1. Strike Size (S.V) (4: 1999: 256)
2. Cardiac Propulsion (C.O.P) (14: 1995: 448)
3. The volume of the left ventricle.

Second / Functional tests of the heart muscle using the Tread Mill:

4. Heart rate (H.R) before exercise.
5. Heart rate (H.R) after exertion
6. Pre-exercise systolic blood pressure (11: 1987: 157)
7. Post-exercise systolic blood pressure rate
8. The maximum oxygen consumption is Vo<sub>2</sub>max.

Third / Anaerobic step test (lactic anoxygen capacity) (5: 1997: 221)

Fourth / Harvard step test (5: 1997: 275)

### **Shooting achievement test**

The achievement level test includes the use of the 4.5 mm air rifle and weapons-specific targets, and each shooter is given (60) shots within a time of 1.5 hours, and the final result is calculated on the basis of the number of shots that hit the gradients of the target center, where each shot is calculated on a target from (10) and thus The final total will be (600) as an upper limit for measuring achievement.

### **Pre-tests**

The two researchers conducted the tribal tests for functional tests in the indoor hall of the College of Physical Education and Sports Sciences for Girls / University of Baghdad, and the achievement test with the effectiveness of air rifle shooting for the young players in Khawla Bint Al-Azwar Square in Baghdad Governorate, who are (10) shooters on 10/9/2021 AD. Measurements results with individual questionnaires for each shooter by the team coach and under the supervision of the researchers.

## **Main Experience**

The researchers developed a training curriculum that includes exercises to develop functional variables and the level of achievement in the effectiveness of air rifle shooting, prepared in proportion to the ages and levels of young shooters. The program, and after taking their observations, the validity of the program for implementation was acknowledged, and the training program was started from 10/9/2021 to 10/11/2021, noting that the training program lasted (8) weeks with (3) training units per week, the part takes The main component of one training unit was (60) minutes, as (24) training units were applied at a rate of (12) training units per month, with a time of (1,440) minutes.

## **Post-Tests**

The post tests were conducted after the completion of the training curriculum on 12/11/2021 AD, and the researchers followed the same method that I used in the tribal tests and with the same spatial and temporal conditions and conditions, and cooperated with the auxiliary work team.

## **Statistical Laws**

The ready program (IBM SPSS Statistics Ver25) was used to extract the following: (arithmetic mean, standard deviation, T. test for correlated non-independent samples, Kolmogorov-Smirnov test, Shapiro-Wilk test).

## **Presentation, analysis and discussion of the results**

### **Presenting and discussing the results of the (T.test) test for functional tests and the level of achievement in the effectiveness of air rifle shooting in the pre and post tests**

Before starting the statistical treatments, the researchers conducted a (normal distribution) test in (Kolmogorov-Smirnov) and (Shapiro-Wilk) tests for (stroke volume (SV), cardiac impulse (COP), left ventricular volume, heart rate (HR) before Effort, heart rate (HR) after exercise, systolic blood pressure before exercise, systolic blood pressure after exercise, VO<sub>2</sub>max, anaerobic step test (LAP), Harvard step test, achievement level test) which were Their values in the Kolmogorov-Smirnov test were respectively (0.166, 0.279, 0.365, 0.258, 0.187, 0.208, 0.167, 0.319, 0.211, 0.156, 0.197) and their significance level Sig values were respectively (0.133, 0.143, 0.172, 0.098, 0.088) , 0.147, 0.072, 0.118, 0.110, 0.084, 0.162), while their values in the (Shapiro-Wilk) test were (0.774, 0.732, 0.689, 0.757, 0.743, 0.810, 0.698, 0.762, 0.766, 0.606, 0.711) And the values of its significance level Sig were respectively (0.093, 0.066, 0.122, 0.085, 0.068, 0.169, 0.132, 0.121, 0.099, 0.216, 0.248), and given that all the Sig values for all physiological tests and the achievement level of the air rifle in my (Kolmogorov-Smirnov-Smirnov) and (Shapiro-Wilk) tests are greater than the approved significance level of . (0.05), which indicates that the data follow a normal distribution, so the researchers have the right to use parametric statistics, so the t-test was used for independent and uncorrelated samples, and thus the sample

is equivalent in all physiological tests and the level of achievement with air rifle shooting effectiveness as shown in Table (1)

Table (1) Evaluate the functional tests and the achievement test for the effectiveness of air rifle shooting in my (Kolmogorov-Smirnov) and (Shapiro-Wilk) tests.

No	Exams	Kolmogorov-Smirnov			Shapiro- Wilk		
		Statistic	Df	Sig	Statistic	Df	Sig
1	Stroke size (S.V)	0.166	10	0.133	0.774	10	0.093
2	Cardiac thrust (C.O.P)	0.279	10	0.143	0.732	10	0.066
3	left ventricular volume	0.365	10	0.172	0.689	10	0.122
4	Heart rate (H.R) before exertion	0.258	10	0.098	0.757	10	0.085
5	Heart rate (H.R) after exertion	0.187	10	0.088	0.743	10	0.068
6	Pre-exercise systolic blood pressure	0.208	10	0.147	0.810	10	0.169
7	systolic blood pressure after exertion	0.167	10	0.072	0.698	10	0.132
8	Vo2max Maximum Oxygen Consumption	0.319	10	0.118	0.762	10	0.121
9	Anaerobic Step Test (LAP)	0.211	10	0.110	0.766	10	0.099
10	Harvard step test	0.156	10	0.084	0.606	10	0.216
11	Achievement level in air rifle shooting activity	0.197	10	0.162	0.711	10	0.248

Since the sample follows a normal distribution, the researchers used the T-test for correlated, non-independent samples to find out the significant differences between the pre and post-tests in all functional tests (stroke volume (SV), cardiac thrust (COP), left ventricular volume, heart rate Heart rate (HR) before exercise, heart rate (HR) after exercise, systolic blood pressure before exercise, systolic blood pressure after exertion, maximum oxygen consumption Vo2max, anaerobic step test (LAP, Harvard step test) And the level of achievement test by air rifle shooting as well as shown in Table (2), as it is clear from Table (2) that the tests (stroke volume (SV), cardiac thrust (COP), left ventricular volume, maximum oxygen consumption Vo2max, Achievement with air rifle shooting) is significant and in favor of the post test because all the calculated (P-Value) values, denoted by the symbol (Sig), are less than the approved morale level of 0.05 (2: 2020: 109), while the tests (Blow rate) the heart (HR) before exertion, heart rate (HR) after exertion, systolic blood pressure before exertion, systolic blood pressure rate after exertion, anaerobic step test (LAC), Harvard step test) were not significant due to

the fact that All the calculated P-Values, which are denoted by the symbol (Sig), are greater than the approved significance level of 0.05.

Table (2) Arithmetic means, standard deviations, and (t) value calculated for the pre and post-tests in the functional tests and the achievement test for the effectiveness of air rifle shooting

No	Exams	pretest		post test		mcf	H2 F	T Value	Sig	Indication
		P	S	P	S					
1	Stroke size (S.V)	83.000	1.490	76.800	1.751	6.200	0.771	8.034	0.000	moral
2	Cardiac thrust (C.O.P)	5083.500	78.173	5418.900	80,283	-335.400	28.683	11,693	0.000	moral
3	left ventricular volume	143.900	2.846	166.800	2.394	-22.900	1.286	17.804	0.000	moral
4	Heart rate (H.R) before exertion	64,000	0.666	63.800	0.788	0.200	0.133	1.500	0.168	insignificant
5	Heart rate (H.R) after exertion	187.600	0.966	187,000	1.054	0.600	0.266	2.250	0.051	insignificant
6	Pre-exercise systolic blood pressure	126.300	1.159	126.600	1.173	0.300-	0.260	1.152	0.279	insignificant
7	systolic blood pressure after exertion	186.500	1.080	186.800	1.619	0.300-	0.495	0.605	0.560	insignificant
8	Vo2max Maximum Oxygen Consumption	66.600	0.966	79.400	1.0264	-12.800	0.442	28.945	0.000	moral
9	Anaerobic Step Test (LAP)	24,000	0.942	23.800	0.788	0.200	0.133	1.500	0.168	insignificant
10	Harvard step test	54.400	0.843	54.100	0.567	0.300	0.213	1.406	0.193	insignificant
11	Achievement level in air rifle shooting	494.000	19.972	536.000	11,005	-42.000	6.716	6.253	0.000	moral

activity									
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Discussing the results of the functional tests of the heart muscle using the two Echo machines and the Tread Mill:

The researchers attribute the existence of significant differences in the functional tests and the achievement level test in the effectiveness of air rifle shooting, and in favor of the post test of using the training curriculum for young female shooters by the trainer and under the supervision of the researchers. The results of the (stroke size SV) test showed that there were significant differences in favor of the post test, and the researchers attributed that to the fact that whenever the sports training was organized and based on good scientific foundations, it was met with a clear physiological adjustment to the size, as the heart adapts to the sports training, which leads to an increase in the amount of blood paid in each One of his strokes, which reflects the general condition of the stroke size, and that the stroke size depends mainly on the size of the heart cavity, as it is directly proportional to the stroke size, and the stroke volume also depends on the volume of the systole (blood paid by the heart with each stroke) in addition to the blood volume Reserve and residual, and this is consistent with what was mentioned (Nocker 1977) "The sports training has a clear impact on the stroke volume, because through training the amount of blood pumped from the heart increases in one stroke, resulting in the expansion of the heart in response to the effort exerted by the functional organs" (13: 1977: 96), and it also agrees with what was confirmed by (Reindell 1976) "The increase in the volume of blood driven in each stroke is one of the most important reasons for the rapid blood flow during sports training. The amount of energy at the expense of the work of the heart muscle" (15: 1976: 90), and it also agrees with what was indicated by (Boyer 1979) "that organized exercise improves the functional capacity of the heart and develops the sufficiency of oxygen transport and the explanation of this is that the sufficiency of oxygen transport depends on The volume of blood driven by the blow in order to reach the muscles so that they can perform their work to the fullest extent" (9: 1979: 355) The results of the COP test showed that there were significant differences in favor of the post test, and the researchers attributed this to the fact that the cardiac thrust depends on the amount of venous blood returning to the heart from all different parts of the body, meaning that the more blood returned to the heart, the greater the cardiac thrust, and this is what happens During sports training, as the amount of cardiac thrust depends on the amount of blood that the heart pushes in each beat and on the number of these beats per minute, the increase in the heart rate leads to an increase in the heart rate per minute, and this quantity decreases if the heart rate decreases when the amount of blood that it pushes The heart in each constant beat, that the conclusion reached by the researchers is consistent with what was confirmed by (Warren 1974) "The cardiac impulse rises during the exercise of sports activities to reach about (30 liters / minute) for trained people, while it reaches about (for non-trained people) about ( 20 liters/min) assuming that there is no difference in the heart rate per minute in the two cases" (16: 1974: 22), and it also agrees with what (Reindell 1976) indicated "athletes generally have the advantage that the volume of blood expelled by the heart in every precision Being larger than it in non-athletic people, and this is what we call (the athlete's heart), which is at a high level of functional efficiency so that it is able to pump a larger amount of blood in each of its beats



during a very high load effort.” (15) : 1976: 190)The results of the test (left ventricular volume) also showed that there were significant differences in favor of the post test, and the researchers attributed this to the fact that the adaptation of the heart is the result of regular exercise based on scientific grounds that gives good performance by increasing the volume and cavity of the left ventricle and increasing the volume of cardiac impulse. The effectiveness of air rifle shooting and the accompanying volume of training stresses a burden on the heart. The result that was reached is consistent with what was mentioned (Bahaa El-Din Salama 1988) “that the left ventricle bears a great burden as a result of physical exertion” (1: 1988: 94), as it agrees with what was mentioned by (Qasim Hassan 1990) “The left ventricle is one of the parts of the heart. throughout the body through the aorta, where its opening forms a space through the left ventricular orifice, and the left ventricle appears circular in the transverse sector” (3: 1990: 92), and it also agrees with what I refer to (Bello 1993) “as a result of regular training and muscle work.” Cardiac autonomic nervous system plays du It is important to influence the heart muscle during rest so that there is an increase in the relaxation of the heart muscle, which leads to an increase in the left ventricular cavity and an increase in the volume of the left ventricular volume at the end of diastole. resulting from a lot of training” (8: 1993: 65)The results of the test (Vo2 max) showed significant differences in favor of the post test, and the researchers attributed this to the fact that the maximum oxygen consumption index (Vo2 max) is one of the most important physiological indicators for female shooters to assess the functional work of their cardiovascular and respiratory systems. Because this indicator reflects in complete privacy the maximum functional efficiency of the cyclical and respiratory systems of female shooters, that the result that was reached is consistent with what was mentioned (Hara 1990) “Through sports training, we work to develop the oxygen capacity and the economical investment of it, as this requires taking oxygen with maximum energy and increasing the speed of its transfer.” And the expansion of the oxidation process in the muscle cells that take on the main load during training and competition, in addition to sports exercises in general and stretching exercises in particular, develop an It improves the functional work of the circulatory and respiratory systems, as well as increasing the mental and physical endurance of the athlete” (7: 1990: 199), and also agrees with (Erksson 1978) “that sports training improves the ability of the respiratory system by increasing the speed of oxygen delivery to the muscles.” (10: 1978: 220), and it also agrees with what was mentioned (Morehouse, Miller 1971) that “sports training increases the efficiency of the circulatory system through the work of the heart muscle to pump the largest amount of blood reaching the muscles, as the improvement increases the limit The maximum oxygen consumption is due to the improvement in the heart’s ability to pump blood and the compatibility between the work of the organs of the circulatory and respiratory system” (12: 1971: 137)As for the functional variables, the results of which showed that there were no significant differences between the pre and post tests, the researchers attributed the reason to the adaptation of the internal body organs, such as the heart, lungs, arteries and veins, to carry out their normal work, as it undertakes to push blood to all parts of the body to obtain its need for food and the rest of the materials necessary for the processes of representation. There were no significant differences in the rate of systolic pressure, as all rates were close to the normal limit in the adult person at rest for the heart rate and the systolic blood pressure rate and in the effort as well.

systolic during physical exertion. The results of the test (the level of achievement in the effectiveness of air rifle shooting) showed that there are moral differences in favor of the post test, and the researchers attribute this to the use of the proposed training curriculum, which includes the training programs that are scientifically developed correctly within the training units according to certain percentages and time, which are consistent with each training period. Also, the distribution of the training load in terms of intensity, size, repetition and positive interfacial comfort has an effect on developing the level of achievement in the effectiveness of air rifle shooting compared to the pre-test, and this result is consistent with what was indicated by (Mohamed Mahmoud Abdel-Dayem 1985) "The standardized and regular training programs according to The scientific foundations work on developing the physical and skill level of the players" (6: 1985: 136).

## **Conclusions and recommendations**

### **Conclusions**

1. There are significant differences between the pre and post-tests in favor of the post-test in the tests) stroke volume (S.V), cardiac thrust (C.O.P), left ventricular volume, maximum oxygen consumption Vo<sub>2</sub>max), which indicates the effect of the proposed training approach.
2. There are significant differences between the pre and post-tests in favor of the post-test in the achievement level test with air rifle shooting for young female shooters, which indicates the effect of the proposed training curriculum.
3. There are no significant differences between the pre and post-tests in the tests (heart rate (HR) before exercise, heart rate (HR) after exercise, systolic blood pressure rate before exercise, systolic blood pressure rate after exercise, anaerobic step test (ability) Lactic Anoxa, Harvard Step Test)

### **Recommendations**

1. The use of the functional tests that the two researchers approved at work by the trainers periodically as a reliable indicator to know the extent of the development of functional capabilities and the level of achievement in shooting with air rifles for young female shooters.
2. Re-use the proposed training curriculum with different volume and stress ratios commensurate with the studies that will be conducted in the future on female shooters of other ages and levels that were not addressed in the current study.
3. Re-use the proposed training curriculum on different types of throwing and on weapons that were not addressed in the current study.

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