

## **Study of some visual functions and functional variables of the respiratory and nervous systems and their relationship to the level of achievement of air rifle shooting**

**Prof. Dr. Thaer Dawood Salman<sup>(1)</sup>, Assist. Prof. Dr. Ghusoon Natiq Abdul Hameed<sup>(2)</sup>**

<sup>(1)</sup> Faculty of Physical Education and Sports Sciences/ University of Baghdad, Iraq.

<sup>(2)</sup> Faculty of Physical Education and Sports Sciences for Woman / University of Baghdad, Iraq.  
[thaer@cope.uobaghdad.edu.iq](mailto:thaer@cope.uobaghdad.edu.iq) , [ghusoon@copew.uobaghdad.edu.iq](mailto:ghusoon@copew.uobaghdad.edu.iq)

### **Abstract**

The purpose of this paper is to identify the relationship between some visual functions and the level of achievement of air rifle shooting among young Iraqi female, and identifying the relationship between some functional variables of the respiratory and nervous systems at the level of achievement of air rifle shooting among young Iraqi female. The researchers used the descriptive approach in the correlative relationships style for its suitability and the research problem. The researchers determined the research community by the intentional method represented by (10) young female shooters who represent the national team with air rifle shooting effectiveness, and who represent (100%) of the research community. One of the most important results reached by the researcher is that: There is a significant correlation between all visual function tests (visual acuity, static and moving visual field, bilateral visual efficiency, visual reaction time, color visual sensitivity variation, and visual search) with the level of achievement of air rifle shooting, there is a significant correlation between all functional tests of the respiratory system (breath-holding, vital capacity, anaerobic step test (lactic anoxic capacity), and Harvard step test) with the level of achievement of air rifle shooting, there is a significant correlation between all functional tests of the nervous system (Ashner test (eye-cardiac reaction -pre-test), Romberg test (keeping balance), and horizontal linear space sensation test) with the level of achievement of air rifle shooting. One of the most important recommendations recommended by the researchers is that: The trainers' interest in developing training programs that include visual function tests and functional tests of the respiratory and nervous systems because of their importance in the development of achievement among shooters, and re-tests all the variables that were dealt with in the current study and try to find the relationship with the level of achievement of air pistol shooting.

### **Introduction:**

Since the effectiveness of shooting is one of the types of sports activities that have witnessed a great development from a legal and technical point of view since its inception until now, it was natural that this development requires a similar development in the level of preparation of the shooting players to reach the highest forms of kinetic activity for them. And it has been proven that every sport has special physical and functional requirements that distinguish it from other games, and these requirements are reflected in the specifications that must be met by its practitioners, and the availability of these requirements can give its practitioners a greater opportunity to absorb the arts of air rifle shooting skills. Which is popular both at the international and local levels, as it is one of the beautiful and exciting sports that need high visual and functional requirements, which are reflected in the aesthetic performance during competition by correct linking between visual functions and functional variables with the skillful performance of young female players, which has its effects on achieving the best achievements, with knowing that performance in shooting air weapons requires needs and functional changes that are clearly different from the rest. For sports in its competitions and methods and methods of training as well.

The importance of the research lies in the researchers' attempt to study each of the visual functions such as the sense of sight and other visual tasks that work on regulating the incoming stimuli of the eye, which have the main role in giving the firing signal and some functional variables of the respiratory and nervous systems important to the young shooter with the effectiveness of air rifle shooting and trying to know their relationship to the level of shooting achievement. With the air rifle in order to reach the end results that serve both the shooter and the trainer alike.

### **Research problem:**

The correct preparation based on scientific foundations is the main pillar on which developed countries depend in order to achieve excellence in the field of sports, through the remarkable achievements in various forms of sports thanks to the reliance on scientific methods and methods in sports training, such as regular training based on scientific foundations, which in turn led to the development of physical, skill and physiological variables for athletes in order to reach the highest level in sports tournaments, and air rifle shooting, despite its importance and its entry into the Olympic Games, but it lacks studies and research that deal with it, which called the researchers to study it in terms of functional aspects, respiratory and nervous systems, as

well as in terms of visual functions And trying to find out whether they are related to the achievement of air rifle shooting, which is the first study in Iraq that deals with these variables, and trying to find out the type of relationship with the achievement of the effectiveness of air rifle shooting in order to reach scientific results extracted by scientific methods that serve the final results of the requirements of young female players shooting with air rifle, as well as serving the game coaches. Eating the results together with their training programs will improve the level of achievement of female shooters.

**Research objective:**

- Identifying the relationship between some visual functions and the level of achievement of air rifle shooting among young Iraqi female.
- Identifying the relationship between some functional variables of the respiratory and nervous systems at the level of achievement of air rifle shooting among young Iraqi female.

**Research fields:**

- Human field: Young female players of the Iraqi national team shooting with air rifles
- Time field: (1/10/2021) to (10/1/2022)
- Spatial field: KhawlaBint Al-Azwar Square, Baghdad Governorate

**Research methodology and field procedures:**

**Research Methodology:**

The researchers used the descriptive approach in the correlative relationships style for its suitability and the research problem.

**Community and sample research:**

The researchers determined the research community by the intentional method represented by (10) young female shooters who represent the national team with air rifle shooting effectiveness, and who represent (100%) of the research community.

**Devices and tools used in the research:**

The researchers used the following: ((Arabic sources, personal interviews, the International Information Network (Internet), an individual registration form for the results of all tests, Octopus visual field test device, visual acuity test device, Snellen chart number (1), response speed measurement device, A pressure and pulse measuring device, a spirometer to measure vital capacity, (4) electronic digital timepieces, (10) fixed paper targets, Olympic air rifles weighing (4.5 - 5) kg, a personal computer Lap top)).

**Tests used in the research:**

**First: Medical and functional tests for visual functions:**

- 1- Measuring visual acuity (Buettner.2002).
- 2- Visual field test (Shehaza.2009).
- 3- Assessment of binocular function (Zureikat.2006).
- 4- Visual reaction time test.
- 5- Contrast sensitivity of color.
- 6- Visual research test.

**Respiratory functional tests:**

- 1- Imprisonment of the soul (Abdel-Fattah and Hassanein.1997).
- 2- Vital capacity (Allawi and Abdel-Fattah.2000).
- 3- Anaerobic step test (lactic anoxigen capacity) (Abdel-Fattah and Hassanein.1997).
- 4- Harvard Step Test (Abdel-Fattah and Hassanein.1997).

**Third: Functional tests of the nervous system:**

- 1- Ashner's test (eye-cardiac reaction - pre-test) (Abdel-Fattah and Hassanein.1997).
- 2- The Romberg test (keeping balance) (Abdel-Fattah and Hassanein.1997).
- 3- The horizontal linear space sensation test (Abdel-Fattah and Hassanein.1997).

**Fourth: To test the level of achievement of air rifle shooting.**

**Exploratory experience:**

The two researchers were not satisfied with the scientific weight of the candidate tests for the application, but the scientific bases were extracted for them by conducting the exploratory experiment on a random sample from outside the limits of the main research sample, the number of its members was (4) young female shooters with air rifles, bearing in mind that the method followed is to distribute the questionnaires related to Each of the visual functions and functional variables of the respiratory and nervous systems and their tests made them enjoy (content validity) as they all agreed 100% on their validity. In order to find the coefficient of stability of the tests, the researchers used the (test and re-test) method, as all the tests were applied to the shooters on 8/10/2021, and then the same tests were re-applied to the same sample four days later on 13/10/2021, using the correlation coefficient Pearson's simple between the scores of the first and second measurements, it was concluded that all tests have high stability because all calculated values had high stability due to the fact that Sig values are smaller than the value of the approved significance level (0.05), as shown in Table (1).

In order to identify the objectivity of the tests used, the researchers calculated the value of Pearson's simple correlation coefficient between the scores of the first and second judgments, and it was concluded that they are highly objective due to the fact that the Sig values for all calculated values were smaller than the value of the approved significance level (0.05), as shown in Table (1) also.

Table (1) shows the scientific coefficients for the candidate tests for the application

	No.	Tests	stability	Sig	objectivity	Sig
Visual functions	1	Visual acuity of the right eye	0.84	0.000	0.90	0.000
	2	Visual acuity of the left eye	0.86	0.000	0.90	0.000
	3	static and moving visual field	0.90	0.000	0.90	0.000
	4	Assessment of binocular function	0.81	0.001	0.91	0.000
	5	visual reaction time	0.77	0.001	0.88	0.000
	6	Contrasting color visual sensitivity	0.74	0.000	0.86	0.000
	7	Visual research	0.74	0.003	0.91	0.000
Functional respiratory and nervous system	1	Imprisonment of the soul	0.81	0.000	0.90	0.001
	2	Vital capacity	0.80	0.000	0.89	0.000
	3	Anaerobic step	0.83	0.000	0.91	0.002
	4	Harvard Step	0.72	0.002	0.91	0.000
	5	Ashner's test (eye-cardiac reaction - pre-test)	0.76	0.001	0.89	0.000
	6	Romberg test (keeping balance)	0.74	0.000	0.91	0.000
	7	horizontal linear space sensation	0.78	0.000	0.88	0.000

**Statistical laws:**The ready program (IBM SPSS Statistics Ver 25) was used to extract the following: (percentage, arithmetic mean, standard deviation, Pearson's simple correlation coefficient).

**Results and discussion:**

**Presentation of the arithmetic means and standard deviations of the visual functions, the functional variables of the respiratory and nervous systems, and the achievement of air rifle shooting:**

The researchers extracted the arithmetic mean, standard deviation, median and the value of the torsion coefficient for all the tests used in the research in addition to the level of achievement of air rifle shooting, as shown in Table (2), and it is noted that all the values of the torsion coefficient were less than (+3), which indicates that they are located All of them are under the moderate curve, and according to what was indicated "the skewness in the moderate curve extends between (+3)" (Behi.1999), which indicates the homogeneity of all tests and their suitability to the research sample.

Table (2) shows the Arithmetic mean and standard deviation of all tests and achievement of air rifle shooting

No.	Tests	Mean	Median	Std. Deviations	Skewness
1	Visual acuity of the right eye	0.842	0.860	0.096	0.562-
2	Visual acuity of the left eye	0.885	0.890	0.011	1.363-
3	static and moving visual field	87.834	87.550	1.254	0.679
4	Assessment of binocular function	62.869	62.850	1.357	0.042
5	visual reaction time	0.013	0.011	0.003	2
6	Contrasting color visual sensitivity	22.121	22.158	0.724	0.153-
7	Visual research	32.543	32.650	0.429	0.748-

8	Imprisonment of the soul	51.814	51.800	0.618	0.067
9	Vital capacity	2095.07	2035.00	144.565	1.246
10	Anaerobic step	25.126	24.900	0.795	0.852
11	Harvard Step	55.266	55.000	1.437	0.555
12	Ashner's test (eye-cardiac reaction - pre-test)	0.201	0.200	0.091	0.032
13	Romberg test (keeping balance)	59.386	59.620	0.684	1.026-
14	horizontal linear space sensation	6.592	6.700	0.350	0.925-
15	Achievement Air rifle shooting	530	520	14.106	2.126

**Presentation and discussion of the relationship of visual functions and functional variables of the respiratory and nervous systems to the level of achievement of air rifle shooting:**

The researchers used Pearson's simple correlation coefficient to find the correlation between visual functions and functional variables of the respiratory and nervous systems with the level of achievement of air rifle shooting. Less than the value of the approved significance level (0.05), as shown in Table (3).

Table (3) shows the correlation coefficient between visual functions and functional variables of the respiratory and nervous systems with the level of achievement of air rifle shooting

No.	Functional tests	Level achievement Air rifle shooting	Level sig	Type sig
1	Visual acuity of the right eye	0.830	0.000	sig
2	Visual acuity of the left eye	0.725	0.001	sig
3	static and moving visual field	0.711	0.000	sig
4	Assessment of binocular function	0.620	0.002	sig
5	visual reaction time	0.725	0.001	sig
6	Contrasting color visual sensitivity	0.601	0.000	sig
7	Visual research	0.661	0.000	sig
8	Imprisonment of the soul	0.624	0.000	sig
9	Vital capacity	0.814	0.000	sig
10	Anaerobic step	0.862	0.000	sig
11	Harvard Step	0.881	0.000	sig
12	Ashner's test (eye-cardiac reaction - pre-test)	0.603	0.003	sig
13	Romberg test (keeping balance)	0.612	0.001	sig
14	horizontal linear space sensation	0.675	0.000	sig

It is clear from Table (3) that my tests (visual acuity for the right eye and the left eye) were significant with the level of achievement of air rifle shooting, which is a logical result because the requirements of the game depend on sight and its sharpness, and the young shooter who is good at shooting is one of the female shooters who have High visual accuracy, so it is taken into consideration that it leads to an intensification of visual neural stimuli through the development of the visual center in the brain, and this result is consistent with what was

indicated “allows the sub-cortical area in the brain By direct control of movement” (al-Fadhli.2010), the researchers also see that visual acuity depends on accuracy or what is called (central sight) because the object of the shooter follows the head, i.e. responds to what is reported from the sight, so the appropriate amount of muscular work is determined, and this also agrees With what was mentioned “the sense of sight is responsible for choosing the body by changing its position, movement, direction, speed, or sense of space and time, and that this leads to the appearance of highly skilled players in performance” (al-Fadhli.2010).

It is also noted that there is a significant correlation between the test (static and moving visual field) with the level of achievement of air rifle shooting. The visual field is the distance that an individual can see and is measured in degrees. A person with normal vision can see a field of (150°-160°) with one eye and (180°-200°) with both eyes when looking horizontally (Zureikat.2006) as The two researchers believe that the natural visual field is wider than the visual field needed by the shooter .This is consistent with what was mentioned “that the central visual field is defined by (60°) for both eyes, and the vision over parts that exceed (60°) is considered a natural field“ (Zureikat.2006).

It is also noted that there is a significant correlation between the test (bilateral vision efficiency) with the level of achievement in air rifle shooting.This agrees with what was mentioned by “The calculation of optical efficiency depends on the following equation: Binary optical efficiency = central optical efficiency x optical field efficiency” (Lennie and Susan. B .2002),Therefore, these two visual functions in the equation directly affect the bilateral visual efficiency, which means the development of the function of visual acuity and the visual field of young female air rifle shooters.The result is consistent with what was indicated “that the bilateral efficiency of sight is important for the development of performance and achievement by determining the locations of objects accurately. The eyes will lead to noise, and then poor performance for not transmitting information correctly and interpreting it as required (Mahgoub.1989).

It is also noted from the table that there is a significant correlation between the test (visual reaction time) with the level of achievement of air rifle shooting. The individual is subject to stimuli, which depends mainly on the sense of sight, as the female shooters depend on the sense of sight that is transmitted to the brain for the distances between it and the target, so it analyzes and studies the information received from the visual system and then sends the execution order through the nervous system, which in turn transmits this information to the muscular system to carry out one's duty, this result is consistent with what was “that in the sensory skill, movement is, but the decisions that are made regarding the movement test are important, and this depends on the reaction whose importance varies from one skill to another, as it develops through training and practice as well as on the ability of The senses receive stimuli (Mahgoub.1989).However, the research sample of young female shooters has reached the stage of automaticity in performance, and thus it became unnecessary to interpret the nervous commands through the central nervous system, but the instruction became executed when it reached the spinal cord and back to the executing muscles.

It is also noted that there is a significant correlation between the tests (variation of visual sensitivity to colors) with the level of achievement of air rifle shooting. Binary vision efficiency) with the level of achievement of air rifle shooting, it is an indication and indicator of the existence of a significant correlation for the variation of visual sensitivity.It is also noted that there is a significant correlation between the test (visual research) with the level of achievement of air rifle shooting, and the researchers believe that the training of female shooters is always in the real surroundings of the shooting range, which is not without stimuli that overlap with the original stimulus, which has led to the ability to focus attention on The target is isolated from other stimuli, thus it is possible to perceive kinetic issues, which helps reduce the time required for kinetic perception and then a quick response, which is the effective action from the moment the stimulus enters the brain until the start of the response, which depends on the control and ability of the target to control the tool during performance And the ability to focus to achieve the best achievement,This result is consistent with what was indicated by “the use of the focal and peripheral vision systems that work simultaneously during the pursuit and hitting of the target” (Zureikat.2006),It also agrees with what I mentioned ”requires the shooter to pick up the target and follow it in space, and then focus on the target and the optimal match between the shooter’s eye and the weapon on the target, and thus we can consider the guiding sight and the leader of the mental and physical abilities and use them in the proper way to achieve the desired goal”. (Jaafar. 2002).

Finally, the researchers believe that the moral relationship that was reached for all the tests of visual functions with the level of achievement of air rifle shooting is consistent with what was mentioned “that the improvement in the level of achievement is due to the ideal method of using the human eye in directing the weapon to the target to ensure a more accurate achievement injury” (BniKalaed 2008).While it is noted that there is a significant correlation between the breath-holding test and the level of achievement of air rifle shooting, the researchers believe that breath-holding is one of the necessary skills that must be mastered by the air rifle shooter and shooters in general.

This result is consistent with what was indicated “that breathing pure oxygen before holding the breath secures the arrival of a sufficient amount of oxygen in the blood flowing to the working muscles and to the nerve centers in the brain, which leads to the accuracy and precision of the result in the correction, as well as the

sources' stress on the importance of "The flow of concentration and of the great energies of man" (Yoga 1975). It is also noted that there is a significant correlation between the test (vital capacity) with the level of achievement of air rifle shooting. The existence of a significant correlation of vital capacity with the level of achievement is a natural and logical result.

It is also noted that there is a significant correlation between my tests (anaerobic step (lactic non-oxygen capacity), and Harvard step) with the level of achievement of air rifle shooting. ATP adenosine triphosphate and PC creatine phosphate for energy production, This result is consistent with what was indicated "The method of interval training of high intensity leads to the development of the muscles' ability to adapt to the physical exertion and delays the onset of fatigue" (Abdel-Wahhab.1983), it also agrees with "From a physiological point of view, interval training of high intensity contributes to improving the efficiency of energy production for the anaerobic system and under conditions of hypoxia" (Hammad.2001).It also agrees with what was indicated "When developing anaerobic capacity, performances must be fast and high intensity and take a short period of time not exceeding (1-2) minutes, which works to generate large amounts of lactic acid in the working muscles." Giving an appropriate rest period to restore healing (TalhaHossam El-Din .1994), and also what was mentioned by (Al-Bassiti.1994) and "The development of anaerobic (lactic) ability results in an increase in the activity of enzymes responsible for producing energy anaerobically, as they are used to destroy anaerobic conditions." (Skinner 1980) .Creatine phosphate and muscle glycogen, as strength training that requires anaerobic energy, leads to an increase in muscle stores of glycogen, and because this system is determined by most sources with a time not exceeding two minutes.

It is also noted that there is a significant correlation between the test (Ashner (eye-cardiac action -pre-test)) with the level of achievement in air rifle shooting. slow heart rate, This result is in agreement with what was mentioned "It can be said that the achievement of the mathematical form is accompanied by an increase in the level of cardiac thrust during rest, with an increase in the stroke volume and a decrease in the heart rate" (Allawi and Abdel-Fattah.2000).It is also noted that there is a significant correlation between the Romberg test (keeping balance) with the level of achievement in air rifle shooting. Thus, achieving high shooting accuracy, This result is consistent with what was indicated by "Balance is one of the important basics to achieve complete stability during the completion of the launch, and this is related to both the technical aspects and the position of the archer during the shooting, where there must be an ability of orthogonality and avoidance of muscle tension that is more than the archer's need. (Mustafa.2001).

While it is noted that there is a significant correlation between the test (sense of horizontal linear space) with the level of achievement of air rifle shooting, the researchers believe that this test is one of the most important tests in shooting in general and shooting with an air rifle in particular, as though the frequent repetition of dry shooting training The real thing about the air rifle, and for a long period of time, and not interrupting the training, all lead to the aim of reaching the stage of automaticity in performance, or what is called (physiological internalization) of the body's organs, which generates a high sense of performance, This is consistent with what was indicated "Increasing the duration of performance by increasing the number of sets ... and the number of repetitions in each set ... will stimulate the body's systems to adapt" (Al-Shishani 1994).

## **Conclusions and Recommendations:**

### **Conclusions:**

- There is a significant correlation between all visual function tests (visual acuity, static and moving visual field, bilateral visual efficiency, visual reaction time, color visual sensitivity variation, and visual search) with the level of achievement of air rifle shooting.
- There is a significant correlation between all functional tests of the respiratory system (breath-holding, vital capacity, anaerobic step test (lactic anoxygenic capacity), and Harvard step test) with the level of achievement of air rifle shooting.
- There is a significant correlation between all functional tests of the nervous system ( Ashner test (eye-cardiac reaction -pre-test), Romberg test (keeping balance), and horizontal linear space sensation test) with the level of achievement of air rifle shooting.

### **Recommendations:**

- The trainers' interest in developing training programs that include visual function tests and functional tests of the respiratory and nervous systems because of their importance in the development of achievement among shooters.
- Re-examine all the variables that were dealt with in the current study and try to find the relationship with the level of achievement of air pistol shooting.
- Conducting other studies on psychological and physical variables and physical measurements that were not addressed in the current study, and trying to find out the type of relationship with the achievement of air rifle shooting.
- Re-conducting the current study at levels of shooters that were not addressed in the current study, for both sexes.

**References:**

- Abul-Ela Abdel-Fattah and Muhammad SobhiHassanein. 1997. Mathematical physiology and morphology and methods of measurement and evaluation: (Cairo, Arab Thought House).
- Ahmed Adel Al-Shishani 1994: The stages of physical preparation for sports competitions: (King Saud University, Department of Physical Education).
- Allah's command Al-Bassiti. 1994. The rules and foundations of sports training and its
- Bnikalaed . 2008. www. com / vb / show threat .
- Farouk El-Sayed Abdel-Wahhab. 1983. Principles and Physiology of Sports: (Cairo, Dar Al-Kutub).
- Helmut Buettner. 2002. Mayo Clinic about vision and eye health: practical answers about eye diseases and the conditions that affect them, 1st Edition: (translation), Arabization and Programming Center (Arab House of Science).
- Ibrahim Abdullah FarajZureikat. 2006. Visual Disability - Basic Concepts and Educational Considerations, 1st Edition: (Amman, Dar Al Masirah for Publishing, Distribution and Printing).
- Mufti Ibrahim Hammad. 2001. Modern sports training, planning, leadership, application: (Cairo, Arab Thought House).
- Muhammad Hassan Allawi and Abul-Ela Ahmed Abdel-Fattah. 2000. Physiology of Sports Training: (Cairo, Arab Thought House).
- Mustafa Abdul-Karim Mustafa. 2001. The effect of a proposed training curriculum in developing the achievement of shooting with a precision target pistol, unpublished doctoral thesis, College of Physical Education, University of Baghdad.
- Mustafa Hossein Behi. 1999. Scientific Transactions between Theory and Practice (Reliability - Honesty - Objectivity - Standards), 1st Edition: (Cairo, Al-Kitab Center for Publishing).
- Peter Lennie and Susan. B .2002 . Visual impairments. determining eligibility for social benefits . Washington, DC: national academy press.
- Saba Muhammad Jaafar. 2002. The relationship of kinetic response time and attention concentration with the results of throwing air weapons.
- SareehAbd al-Karim al-Fadhli. 2010. Biomechanics applications in sports training and kinetic performance. 1st floor (Oman: Dar Dijla).
- Skinner, J. And McLain, T. 1980. The Transition From Aerobic To Anaerobic Metabolism, R- O- Exercise And Sports.
- Suleiman Khaled Shehaza. 2009. Lectures of the Medical Technical Institute of Sight: (Damascus University).
- TalhaHossam El-Din .1994.The kinetic and functional foundations of sports training: (Cairo, Arab Thought House).
- WajeehMahgoub. 1989. Kinesiology - kinetic learning. (House of Wisdom, Baghdad).
- Yoga. 1975. The 8 step to health & peace pichardhileman.