

The effect of the maximum physical effort on some physiological variables, body components and achievement level in the effectiveness of air rifle shooting

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Abstract:

*The job that confronts players with the effectiveness of shooting with an air rifle is high, so it requires necessary functional adaptations that differ in their degrees from other sports. Regular training in air rifle shooting leads to physiological changes in most of the body's internal systems, and changes and responses can be identified. The functional accompanying physical activity through the presence of body components that reflect these physiological changes in the form of changes in some components, and the importance of research lies in studying the physiological changes accompanying the maximum physical effort and the consequent development of the level of achievement in the effectiveness of shooting with air rifle and body components during rest and after performance. Maximum physical effort, and the **research objectives** were as follows:*

- 1. Identify the changes that occur in the level of some physiological variables before and after performing the maximum physical exertion.*
- 2. Identify the changes that occur in the components of the body before and after performing the maximum physical exertion.*
- 3. Identify the changes that occur in the level of achievement in the effectiveness of shooting with an air rifle before and after performing the maximum physical effort.*

As for the research hypotheses, they are:

- 1. There are significant differences in the level of some physiological variables before and after the performance of the maximum physical exertion and in favor of post-measurement.*

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2. *The presence of significant differences in the components of the body before and after the performance of the maximum physical exertion and in favor of dimensional measurement.*

3. *There are significant differences in the level of achievement in the effectiveness of shooting with an air rifle before and after performing the maximum physical effort and in favor of telemetry.*

The researchers used the descriptive method, and the research sample consisted of (10) female players emerging with air rifle shooting, and (8) physiological tests and (5) body components and a level of achievement in the air rifle were used.

Keywords: *rifle shooting, physiological changes, body components*

I. Introduction:

The job that confronts players with the effectiveness of shooting with an air rifle is high, so it requires necessary functional adaptations that differ in their degrees from other sports. Regular training in air rifle shooting leads to physiological changes in most of the body's internal systems, and changes and responses can be identified. The functional activity that accompanies physical activity through the presence of body components that reflects these physiological changes in the form of changes in some components, as physical activity accompanies the occurrence of laceration in some of the muscle fibers that the practitioner feels in the form of muscle pain and this damage is accompanied by an increase in some components of the body, and therefore He will notice that there are clear differences in the activity of the components of the body in terms of the increase or decrease of its activity as the level of performance during training progresses.

The importance of the research lies in studying the changes that occur in the level of achievement in the effectiveness of shooting with an air rifle, as well as some physiological variables and body components during rest and after performing the maximum physical exertion, which will have a significant impact on the interpretation of performance through the numerous data that will be easily explained and then judged by Through its classification into positive and negative aspects of investing and developing what is positive, as well as limiting the impact of negative variables in order to reach the best performance by the level of achievement with the air rifle.

Research problem:

The research problem lies in trying to identify the resulting changes in the level of achievement in the effectiveness of shooting with the air and physiological rifle and body components before and after the performance of the maximum physical effort because our Iraqi library lacks studies and research in the effectiveness of shooting with air rifle.

Research aims:

1. Identify the changes that occur in the level of some physiological variables before and after performing the maximum physical exertion.

2. Identify the changes that occur in the components of the body before and after performing the maximum physical exertion.

3. Identify the changes that occur in the level of achievement in the effectiveness of shooting with an air rifle before and after performing the maximum physical effort.

Research hypotheses:

1. There are significant differences in the level of some physiological variables before and after the performance of the maximum physical exertion and in favor of post-measurement.

2. The presence of significant differences in the components of the body before and after the performance of the maximum physical exertion and in favor of dimensional measurement.

3. There are significant differences in the level of achievement in the effectiveness of shooting with an air rifle before and after performing the maximum physical effort and in favor of telemetry.

Research fields:

1. The human field: Young players in the air rifle shooting event for the 2018-2019 sports season.

2. Time domain: 7/15/2019 to 27/9/2019.

3. Spatial domain: the internal hall for shooting in the College of Physical Education and Sports Science for Girls / University of Baghdad.

II. Research Methodology:

The two researchers used the descriptive method in the comparison method, as it suits the research objectives.

The research sample:

The research sample was used in an intentional way, and it consisted of (10) young women shooting players in the effectiveness of air rifle shooting and participants in the sports season 2018-2019.

Data collection methods:

The researchers used the following tools and devices (Arab and foreign sources and references, a pyrometer for measuring vital capacity, Polar watches to measure the pulse rate number (4), Olympic air rifles weighing 4.5 - 5 Kg, count (5), stationary paper targets number (10), a device for measuring Mercurial blood pressure, 5Beurer BF100 to calculate body components, belt conveyor to measure maximum oxygen consumption (Vo₂max).

Main experience:

Before performing any effort (at rest), body components were measured, physiological tests were recorded, in addition to recording the level of achievement in the air rifle shooting event for each emerging shooter, after

which the maximum physical effort represented by running 100m at the maximum speed for each pitcher was applied, and after completion From running, body components were measured, physiological tests were recorded, in addition to recording the level of achievement in the effectiveness of air rifle shooting for each emerging shooter player (after physical effort), knowing that all procedures were taken while the archers were in the training camp established for them, which included a spirit of friendly competition Between the throws while applying all the tests.

III. Results, analyzed and discussed:

Analysis and discussion of the results of physiological tests, body components and achievement level in the effectiveness of air rifle shooting:

| Table (1) values of all tests in (Kolmogorov-Smirnov) and (Shapiro-Wilk) | | | | | | | |
|--|----|-----------|--------------------|----|-----------|--|---|
| Shapiro-Wilk | | | Kolmogorov-Smirnov | | | The tests | N |
| Sig | Df | Statistic | Sig | Df | Statistic | | |
| 0.077 | 10 | 0.860 | 0.122 | 10 | 0.236 | Pulse rate at rest | 1 |
| 0.565 | 10 | 0.941 | 0.124 | 10 | 0.235 | Pulse rate after voltage | 2 |
| 0.854 | 10 | 0.966 | 0.200 | 10 | 0.180 | Systolic blood pressure at rest | 3 |
| 0.948 | 10 | 0.977 | 0.200 | 10 | 0.123 | Systolic blood pressure after the voltage | 4 |
| 0.230 | 10 | 0.902 | 0.200 | 10 | 0.176 | Blood diastolic pressure at rest | 5 |
| 0.124 | 10 | 0.878 | 0.079 | 10 | 0.280 | Blood diastolic pressure after the voltage | 6 |
| 0.876 | 10 | 0.968 | 0.200 | 10 | 0.134 | Vital capacity | 7 |
| 0.487 | 10 | 0.934 | 0.200 | 10 | 0.143 | The maximum oxygen consumption is Vo2max | 8 |
| 0.647 | 10 | 0.839 | 0.270 | 10 | 0.215 | BMI | 9 |

| | | | | | | | |
|-------|----|-------|-------|----|-------|--|-----------|
| 0.712 | 10 | 0.879 | 0.239 | 10 | 0.162 | Fat ratio | 10 |
| 0.841 | 10 | 0.911 | 0.244 | 10 | 0.133 | The proportion of bone in the body | 11 |
| 0.692 | 10 | 0.882 | 0.261 | 10 | 0.171 | The proportion of water in the body | 12 |
| 0.882 | 10 | 0.839 | 0.244 | 10 | 0.238 | Muscle ratio in the body | 13 |
| 0.094 | 10 | 0.842 | 0.085 | 10 | 0.252 | The level of achievement in the effectiveness of the air rifle shooting | 14 |

Table (2) arithmetic mean, standard deviations, and the calculated value (T) for pre -and post- tests, physiological tests, body components, and level of achievement in the effectiveness of air rifle shooting

| Significance | Sig | Value of T | Post- test | | Pre-test | | The tests | N |
|--------------|-------|------------|------------|---------|----------|---------|--|----------|
| | | | Std | A | Std | A | | |
| Non-Sign | 0.223 | 1.309 | 0.699 | 72.600 | 0.788 | 72.200 | Pulse rate at rest | 1 |
| Sign | 0.002 | 2.844 | 4.989 | 132.300 | 5.279 | 135.900 | Pulse rate after voltage | 2 |
| Non-Sign | 0.068 | 1.769 | 1.398 | 122.800 | 1.449 | 122.100 | Systolic blood pressure at rest | 3 |
| Non-Sign | 0.007 | 1.464 | 0.942 | 124.000 | 1.269 | 123.500 | Systolic blood pressure after the voltage | 4 |

| | | | | | | | | |
|-----------------|-------|-------|--------|---------|--------|---------|--|-----------|
| Non-Sign | 0.053 | 1.500 | 1.100 | 80.100 | 1.080 | 79.500 | Blood diastolic pressure at rest | 5 |
| Sign | 0.002 | 2.167 | 1.251 | 81.700 | 1.080 | 80.500 | Blood diastolic pressure after the voltage | 6 |
| Sign | 0.003 | 2.765 | 24.776 | 1394.50 | 31.149 | 1297.60 | Vital capacity | 7 |
| Sign | 0.001 | 4.100 | 5.034 | 74.700 | 1.398 | 67.800 | The maximum oxygen consumption is Vo2max | 8 |
| Sign | 0.000 | 4.311 | 2.806 | 28.100 | 2.067 | 23.300 | BMI | 9 |
| Sign | 0.000 | 3.601 | 1.766 | 12.300 | 1.715 | 14.500 | Fat ratio | 10 |
| Sign | 0.002 | 2.964 | 0.632 | 11.200 | 0.875 | 10.900 | The proportion of bone in the body | 11 |
| Sign | 0.000 | 4.031 | 3.464 | 36.00 | 1.032 | 31.200 | The proportion of water in the body | 12 |
| Sign | 0.001 | 1.922 | 0.918 | 42.800 | 1.154 | 42.000 | Muscle ratio in the body | 13 |
| Sign | 0.001 | 5.152 | 28.872 | 491.500 | 18.104 | 550.00 | The level of achievement in the effectiveness of the air rifle shooting | 14 |

From Table (2), the variables (pulse rate after effort, diastolic blood pressure after effort, vital amplitude, maximum oxygen consumption Vo2max, body mass index, fat percentage, bone percentage in the body, water ratio in the body, muscle percentage in the body) It is characterized by its having significant differences and in favor of the post -test due to the fact that the level of significance (Sig) is smaller than the approved level (0.05), with the exception of the level of achievement in the effectiveness of shooting with an air rifle, it is characterized by having significant differences in favor of the pre-test, while the tests (average Pulsation at rest, systolic blood pressure at rest, systolic blood pressure after effort, and diastolic blood pressure at rest) are not significant, given that the level of significance (Sig) is greater than the approved level (0.05).

The researchers attribute the existence of these moral differences and in favor of the post-test the effect of the maximum physical effort used, which is represented by running (100 m) at the maximum speed, and the researchers believe that the heartbeat is one of the important indicators to measure the training status of the player and the ability of the heart and blood circulation, and this is consistent with what he mentioned (Mowaffaq Majeed: 1999: 24) "The training works on adapting the heart and blood circulation and the player becomes able to increase the heart rate whenever his athletic level improves," he also said (Abu Al-Ella Abdel-Fattah and Muhammad Sobhi: 1997: 58) that "the pulse is one of the very important indicators for the coach And an athlete who can be easily measured in the field, as it gives an indication of the training status of the player, the effort exerted, and his response to sports activity to perform physical pregnancy. "

Also, blood pressure is one of the important indicators of the functional condition of the periodic system to ensure the safety of players and this is consistent with what he indicated (Qasim Hassan: 1990: 109) that "blood pressure reflects the state of parts", as stresses (Abu Al-Ella Abdel-Fattah and Mohamed Sobhi: 1997 64: "The amount of blood pressure is determined by its construction on several factors, the most important of which is the relationship between pushing the heart's blood into the arteries and the resistance that faces blood flow in these arteries. In the event that this relationship is unsafe, the blood pressure level is not normal in the sense of either pressure Blood is high or low. "

The researchers also see that as a result of the maximum physical exertion exerted, the shooting target may need to increase the number of calories to face training and the effort exerted by compensating the lost calories when using the anaerobic and air energy to effectively train with the air rifle, and this result is consistent with what he indicated (Muhammad Al-Sayyid and Ahmad Ali: 2009: 277-278) "The metabolic rate is of particular importance due to its association with energy production during athletic activity, whether this energy is aerobic or anaerobic, and the sports activities in which the athlete exerts a strenuous muscle effort in a short period of time depends On speed and strength, so players need a high calorie count to replace the body with food. "

The researchers also see that the large muscles are the ones that cover the bones, therefore the percentage of bone and its density have improved due to its close association with the level of athletic achievement in general and the emerging throws in the effectiveness of shooting with air rifle in particular because the greater the bone density, this helps in bearing the strength of the muscle contractions significantly and the high level The athlete, especially since the weight of the used air rifle (5) kg, in addition to the weight of the clothes of each archer with the air rifle (6) kg, and that the exercise of sports activity helps increase the bone density, and this result reached by the researchers is consistent with his mention (Hussein Ali and others: 2009: 119) "that Regular exercise for physical and athletic activity stimulates blood circulation in the bone tissue, which improves its supply of the mineral elements it needs and then affects the bone density by increasing the deposition of calcium within healthy limits. In addition, it helps to slow the rate of demolition of the bone structure, and the bone density increases with the increase in the intensity of sports training. "

The researchers also see that increasing the percentage of water in the body in the post-test helps the player in maintaining the water level in the body from dehydration during training or a lack of fluids during competitions,

whether through natural drinking water or sports drinks to compensate for the loss of the body through sweat and a balance of fluids in the body So that the fuel supply does not decrease with the muscles and consequently it will negatively affect the level of achievement of the player, as well as the lack of water and fluids from inside the body leading to a decrease in the size of the plasma which leads to a decrease or reduction in (the size of the stroke, cardiac thrust, and low blood pressure), that the result that The researchers reached it consistent with what he indicated (Muhammad al-Sayyid and Ahmad Ali: 2009: 381) "The athlete's need for water must be met because of its importance in regulating body temperature, as the heat from a workout for a few minutes is sufficient to damage the muscle protein if the water does not exist from During disposal by sweating, as the amount of water lost is estimated at (2 - 8%) of the body weight and that the lack of water and fluids from inside the body leads to a decrease in the size of the plasma, which leads to a decrease or decrease (the size of the stroke, heart attack, and low blood pressure)) Which leads to a deterioration in the level of performance of the athlete. "

Also, the vital capacity indicates the level of respiratory integrity and consequently the physical burden that the various body systems are subject to while the players are exposed to a maximum physical effort, which indicates the positive impact of training on the player, and this is consistent with what he mentioned (Ashraf Hussein: 2010: 93) "that the vital capacity has Positive impact on contributing to the level of digital achievement. "

The short anaerobic capacity and the functional efficiency of the heart and the circulatory system are among the indicators that show the functional interrelation between training and the safety of its equipment to know the ability, adaptation and safety of the player during the exercise of air force throwing effectiveness, and this is consistent with what he mentioned (Qasim Hassan: 1990: 134) "that practicing training The athlete regularly leads to positive functional changes in the respiratory system and these changes achieve additional flexibility in the muscles of the chest cage, which increases their ability to stretch and expand, which leads to an increase in the volume of air inhaled and thus helps to increase the amount of oxygen in the process of gas exchange between the blood and the alveoli and economic In breathing movements due to increased vital capacity. " It also agrees with what Talha Hossam El Din 1994 indicated, "When developing anaerobic capacity, the performance should be fast and very high and take a short period of time not exceeding (1-2) minutes, which works to generate large quantities of lactic acid in the working muscles. With an appropriate rest period given to restore healing (7: 162), as well as what he mentioned (God's Ordinary Command 1998) (1: 75) and (Skinner 1980) (18: 236) "The development of anaerobic ability (non-tactical) results in an increase in The activity of the enzymes responsible for producing anaerobic energy being used to demolish creatine phosphate and muscle glycogen, since strength training that needs anaerobic energy leads to an increase in muscle stock of Cyclogen, and because this system is determined by most sources with a time not exceeding two minutes. The researchers agree with what he indicated (Ahmad Walid: 2013: 150) "to the importance of respiratory functions to improve the level of athletic achievement, and that sports training creates a small change in the size and capacity of the lungs, as the vital capacity after training increases through the improvement of the organ's functions Respiratory as well Improving the level of physical efficiency whenever the circulatory system increases the ability to supply the body with a greater amount of oxygen while increasing the ability of muscles to consume oxygen to supply the body with energy through metabolism in high training intensities, and the increase in the amount of aerobic

and anaerobic systems for energy production will lead to the development of the level of efficiency Physical. And with this, my first and second research hypotheses were achieved.

As for the level of achievement in the effectiveness of shooting with an air rifle, which was in favor of tribal measurement, it is a natural and logical result, being one of the most important requirements for shooting in the effectiveness of shooting with an air rifle. The availability of focus and self-suppression, so the researchers see that the close link between the skill of self-concealment and the accuracy of shooting in general Aerobics in particular should not be subjected to any physical effort before competition, so we note that the maximum physical effort to which the research sample was subjected has negatively affected the accuracy, focus and self-suppression of the throws, which led to the achievement of their level of comfort is the best compared to the level of their achievement After the maximum physical effort, which was weak, this corresponds to what was followed by the archery coaches in their training programs by giving the archers relaxation exercises and stretches before the competition, and they are also given breathing exercises because the energy is exhausted from them because of the weight of the weapon and clothes, that the result reached by the researchers She agrees with what he indicated (Yoga: 1975: 91-107) "that the process of pure oxygen breathing before the breath is suppressed provides a sufficient amount of oxygen in particular, as the breathing of the first As a pure prisoner before self-suppression, it secures the supply of sufficient oxygen in the blood flowing to the working muscles and the nerve centers in the brain, which leads to the accuracy of tightening the result in correction, as well as emphasizing the sources of the importance of flow to focus and enormous human energies.

The researchers also see that the effectiveness of archery in general and shooting with an air rifle in particular need to be highly tolerated, especially since the time period of the competition is about (1.5) hours and during this period you need to aim at a high susceptibility to resisting muscular nervous fatigue, as the muscle work that continues for a long time leads The fatigue of the central nervous system, so the archer needs to rest before the competition and not to the extreme physical effort, which was reflected on the skillful performance and consequently led to the poor level of their achievement after the effort. Thus, the third research goal and its third hypothesis were also achieved.

IV. Conclusions and recommendations

Conclusions:

After processing and discussing the data, the researchers reached the following conclusions:

1. There were no significant differences between the pre and post measurements of emerging throws in the effectiveness of air rifle shooting in (pulse rate at rest, systolic blood pressure at rest, systolic blood pressure after effort, and diastolic blood pressure at rest).
2. There are significant differences between the pre and post measurements of the emerging throws in the effectiveness of air rifle shooting in the physiological variables (pulse rate after voltage, diastolic blood pressure after voltage, vital capacity, and maximum oxygen consumption Vo_{2max}).

3. There are significant differences between the pre and post measurements of the emerging throws in the effectiveness of air rifle shooting in the body components (body mass index, fat percentage, bone percentage in the body, water percentage in the body, and muscle ratio in the body).

4. There are significant differences between the pre and post measurements and in favor of the pre-measurement of the emerging shooters in the level of achievement in the effectiveness of the air rifle shooting.

Recommendations:

1. Carrying out similar studies using different intensity physical loads, which the researchers did not address.
2. Benefit from learning about some physiological indicators and body components in planning, following up and developing training programs.
3. Conducting similar studies on males at all levels that the researchers did not address in the study.
4. Conducting similar studies on other weapons with archery that the researchers did not address.

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