EFFECT OF A WEIGHT TRAINING PROGRAM TO IMPROVE PHYSICAL AND PHYSIOLOGICAL EFFICIENCY OF FENCING PLAYERS

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ABSTRACT

Background. Technically, preparation of fencers is linked to working on their physical structure in addition to the functional skills required to perform certain tasks, such as athletic stability, flexibility, agility, reaction speed, and focus to evade or attack an opponent's weapon. Therefore, it requires a great deal of physical ability to help the athlete achieve their goal and secure victory during a match. **Objectives.** Goal was identifying effect of weight training program on physical efficiency of fencing players. **Method**. Functional competence of fencers And from Research hypotheses there are statistically significant differences between the pre- and post-test measurements between the experimental and control groups in the physical variables, in favor of the experimental group, there are statistically significant differences between the pre- and post-test measurements between the experimental and control groups in the functional variables, favoring the experimental group. The research sample was selected purposively from fencers registered with the federation affiliated with the clubs (Wasit, Al-Kut, and Al-Hay), totaling (20) fencers. They were divided into two groups: the first, a control group consisting of (10) fencers, and the second, an experimental group consisting of (10) fencers, in addition to two fencers on whom the pilot study was conducted, bringing the total number of fencers in the sample to (22). **Results.** Results proved that the physical program with weights has a positive effect on the functional state of the fencing players, which is both systolic and diastolic blood pressure maximum oxygen consumption resting pulse. **Conclusion.** Physical program with weights does not develop the element of speed to the required extent, physical program with weights has a positive effect on the elements of agility and speed-strength, as proven by the results of this study.

Keywords; weight training, physical efficiency, physiological efficiency, fencing players.

A. INTRODUCTION

Individual and team sports have become a hallmark of a nation's progress, reflecting the extent of public interest in sports. Furthermore, modern game rules are governed by international federations, aiming to protect athletes from risks and enhance the overall enjoyment of the sport. For sports of all kinds (Harianto et al., 2023; Islam et al., 2024; Suniga et al., 2025). The focus on physical programs and working to develop the athlete's capabilities has become a science that the athlete or coach learns through scientific studies and applications to reach the best condition and accelerate the athlete's development in various aspects, including physical or functional ones, and this only comes through scientific studies and observing the effect on those systems (Da'i et al., 2024; Hardinata, Ahwan, et al., 2023).

Fencing is considered an individual sport and is one of the oldest sports practiced by humans in ancient times before it entered its modern system, federations, or the Olympics with its long history and rules that do not Modern man can accept that this sport is dangerous because laws protecting the individual from harm are not taken into account, until it became a sport that is characterized by its appeal among peoples. The numbers for fencers from a technical standpoint it is related to working on the physical structure in addition to the functional work of performing skills, including the athlete's stability, flexibility of movement, agility, speed of reaction, and focus to escape from the opponent's weapon or attempt to attack the opponent. Therefore, it requires many physical abilities that help the athlete reach his goal and achieve victory during the fight.

There are many methods and techniques for athletic training in various situations, each with its own effect on the athlete's efficiency. For example, incorporating resistance during training and increasing training loads through weight training exercises aims to enhance the athlete's muscular capacity to exert effort for extended periods, thus positively impacting their physical condition (Al-Kilani 1992: 67). Physical exertion contributes to the functional development of the athlete, as reflected in training methods. The greater the individual's physical performance, the better the impact on the functional systems. This has a direct effect on the athlete's heart, increasing its size and the amount of blood flowing to it, as well as affecting blood pressure, thus increasing athletic activity. It also increases lung capacity, expands the rib cage, and slows breathing, which in turn affects the muscular system and increases physical endurance (Melhem 1999:48).

The researcher believes that weight training programs are one of the modern training methods that a fencer can acquire to increase his physical capabilities as a result of training loads with resistance weights, which affect the muscular system and increase physical endurance for longer periods of performance. This effect is reflected in the functional system of the fencer, as it is a continuous process between training and developing the athlete in mastering performance during exertions.

One of the most important aspects of this research is the diversity in the use of training programs for fencers, where there is no It is limited to traditional training methods, but also includes the use of weights or resistances and incorporates them into standardized training programs to determine the impact on the individual's physical and functional abilities. As a former fencer in Iraqi clubs, the researcher, through observations he made of training

sessions and matches, noticed many weaknesses in training programs and the physical and functional limitations of the players, such as breathing, blood pressure, and vital capacity. He concluded that these weaknesses were a result of flaws in traditional training programs for fencers (Hardinata, B, et al., 2023; Hardinata, Yosika, et al., 2023; Okilanda et al., 2023; Rahmadi et al., 2023). Therefore, the researcher found diversity in training methods through effects that enhance the training's effectiveness, impacting the player's physical and functional abilities. Through this effect, the player's technical capabilities are increased. Identifying the effect of a weight training program on physical fitness of fencing players. Functional competence of fencing players.

There are statistically significant differences between the pre- and post-test measurements between the experimental and control groups in the physical variables, in favor of the experimental group. There are statistically significant differences between the pre- and post-test measurements between the experimental and control groups in functional variables. For the benefit of the experimental group.

B. METHOD

The researcher used experimental method with two groups, experimental and control, to suit for occasion of the research. Sample was selected purposively from fencers registered with federation and affiliated with clubs. (Wasit, Al-Kut, Al-Hay) and their number is (20) fencing players, and they were divided into two groups, the first is a control group consisting of (10) fencing players, and the second is an experimental group consisting of (10) fencing players, in addition to two players on whom exploratory experiment is applied, so that total number of sample becomes (22) fencing players.

Table 1. Shows distribution of the research sample across clubs

Club name	Wasit	Al-Kut	Al-Hay
Players number	7	7	6

Table 2. Equivalence between individuals of two groups experimental and control on pre-measurement of physical and functional variables of fencing players (n=10)

Variables	Measurement unit	Experimental group		Control group		Calculated (t) value	Sig. level
		Mean	St.d	Mean	St.d		
Age	Year	22.46	0.88	23.01	0.87	1.05	0.26
Weight	Kg.	65.63	7.71	64.98	7.92	0.73	0.42
Speed	Sec.	5.12	0.38	5.41	0.40	0.061	0.93
Agility	Sec.	6.65	0.79	6.11	0.53	0.89	0.38

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Hands explosive power	Rep.	17.42	4.23	18.31	4.11	1.13	0.88
Systolic blood pressure	Mm/mercury	115.30	7.92	113.27	6.01	1.72	0.07
Diastolic blood pressure	Mm/mercury	72.16	9.81	68.48	8.69	1.96	0.09
Max. oxygen consumption	Ml/kg/min	28.81	2.63	29.31	3.16	0.718	0.32
Pulse	Rep.	77.52	8.68	71.22	7.93	0.47	0.64

n=20 tabular t = 2.04

Table No. (2) shows that all t values for the experimental and control groups are less than the tabulated t value (2.04), meaning that there are no differences in all physical and functional variables between the individuals of the two groups. This indicates that there is equivalence before starting to implement the program.

Study tools

First: Devices and Tools: data collection form for the tests. A fencing field. A mercury device for measuring pressure. Measuring tape. Markers and cones. Treadmill.

Second: Physical Program: After consulting scientific references, previous studies, and the experiences of trainers in the field of fencing training, a physical weight training program was prepared, and its effect on physical and functional efficiency was observed. The program lasted 8 weeks, with 3 training sessions per week.

Thirdly: Physical tests: Speed: Sprint 30 meters to measure maximum speed. Agility: Shuttle running to measure agility. The explosive power of the arms.

Fourth: Functional tests: Systolic blood pressure: Cefogo Manometer after exertion. Diastolic blood pressure: Cefogo Manometer device after exertion. Maximum oxygen consumption: Cooper's run test 12 minutes. Pulse at rest: The traditional method - from the veins of the neck and hand.

Study variables

Independent variable: Physical weight training program.
Dependent variable: Physical and functional variables.

Pilot experiment

Pilot study was conducted on fencing players from outside the research sample from November 28th to November 30th, 2024. purpose of this study was:

1- Understanding the nature of the test and measurement.
2- Ensuring that the team assisting in conducting the tests understands.
3- Identifying the difficulties faced by the players and the support team.
4- Knowing how much time is needed to conduct the tests.

A. RESULTS

The researcher conducted the post-test after the completion of the rehabilitation program for both the experimental and control research groups, where the results were as follows: Day 1 / Physical tests. Day 2 / Functional Tests.

Table 3. Results of t-test for pairs to determine significance of differences between pre- and post-measurements for control sample n=10

Variables	Measurement unit	Pre measurement		Post measurement		Calculated (t) value	Sig. level	Change %
		Mean	St.d	Mean	St.d			
Speed	Sec.	4.94	0.51	4.56	0.39	6.79	0.0001	-7.82%
Agility	Sec.	6.71	0.91	6.42	0.83	5.51	0.0001	-6.84%
Hands explosive power	Rep.	17.32	4.23	19.56	3.92	3.61	0.0001	10.25%
Systolic blood pressure	Mm/mercury	115.43	8.11	107.14	7.02	5.76	0.0001	9.40%
Diastolic blood pressure	Mm/mercury	72.16	10.52	70.34	9.84	8.21	0.0001	13.51%
Max. oxygen consumption	Ml/kg/min	39.42	5.61	42.53	5.01	6.64	0.0001	9.62%
Pulse	Rep.	77.09	8.21	70.92	6.45	6.82	0.0001	-10.32

At level of (0.05), the tabulated t = 2.04

Table No. (3) shows the results of the tests for the control research sample and shows the percentage of change between pre and post-measurements in favor of post-measurement after applying the traditional program, where the percentage of change was -7.82% for speed, -6.84% for agility , -10.25% for explosive hand power, -9.40% for systolic blood pressure, -13.51% for diastolic blood pressure, -9.62% for maximum oxygen consumption, and -10.32 for resting pulse.

Table 4. Results of tests for significance of differences between pre- and post-measurements for experimental group (n=10)

Variables	Measurement unit	Pre measurement		Post measurement		Calculated (t) value	Sig. level	Change %
		Mean	St.d	Mean	St.d			
Speed	Sec.	4.81	0.48	4.76	0.35	3.33	0.002	-2.14%
Agility	Sec.	5.95	0.45	4.12	0.23	6.41	0.0001	-21.45%
Hands explosive power	Rep.	17.92	4.83	23.01	0.21	5.42	0.001	24.32%
Systolic blood pressure	Mm/mercury	116.04	8.32	98.42	0.18	4.93	0.0001	26.12%
Diastolic blood pressure	Mm/mercury	72.48	9.54	64.18	20.17	5.01	0.0001	26.12%
Max. oxygen consumption	Ml/kg/min	37.72	6.18	47.09	4.93	9.09	0.0001	23.98%
Pulse	Rep.	78.11	7.23	65.01	5.12	12.24	0.0001	-19.22%

At a level of 0.05, the tabulated value is 2.04.

Table (4) shows that the training program has a positive effect on all physical and functional variables except for speed, as the percentage of change witnessed for each of: Speed -2.14%, Agility -21.45%, Explosive Power 24.32%, Systolic Blood Pressure 26.12 % , Diastolic Blood Pressure 26.12%, Maximum Oxygen Consumption 23.98%, Resting Pulse -19.22%.

Table 5. Results of t-test for two groups experimental and control in post-test measurement of study variables (n=20)

Variables	Measurement unit	Experimental group		Control group		Difference between averages	Calculated (t) value	Sig. level
		Mean	St.d	Mean	St.d			
Speed	Sec.	4.76	0.35	4.56	0.39	0.30	4.29	*0.0001
Agility	Sec.	4.12	0.23	6.42	0.83	-2.28	4.31	*0.0001
Hands explosive power	Rep.	23.01	0.21	19.56	3.92	3.45	5.12	*0.0001
Systolic blood pressure	Mm/mercury	98.42	0.18	107.14	7.02	-8.72	5.63	*0.0001

Diastolic blood pressure	Mm/mercury	64.18	20.17	70.34	9.84	-6.16	5.45	*0.0001
Max. oxygen consumption	Ml/kg/min	47.09	4.93	42.53	5.01	4.56	10.75	*0.0001
Pulse	Rep.	65.01	5.12	70.92	6.45	-5.91	12.01	*0.0001

At the 0.05 level, the tabulated t-value is 2.04.

Table No. (5) shows that there are statistically significant differences at the significance level of (0.05) in all study variables between the training and control groups, in favor of the experimental group.

Discussion

The study aimed to investigate the effect of the weight training program on the physical and functional condition of 10 fencing players who underwent the weight training program. Tests were conducted on speed, agility, explosive power, systolic and diastolic blood pressure, maximum oxygen consumption, and resting pulse. The percentages varied for long-term measurement between the experimental and control groups, except for the speed component, where sufficient development was not achieved.

In general, this study was reinforced by the study of (Mahmoud Ali 2007), which indicated that weight training has a positive effect on the player's physical and functional condition. (Mahmoud: 97)

The researcher believes that with regard to the physical variables of agility and strength characterized by speed and explosive power, weight training increases the body’s strength to perform during physical activity, meaning that it targets specific muscles that can be developed through physical exertion. In other words, high-intensity muscle work exercises and training with resistance increase the muscle’s ability to function in an anaerobic system, and it also affects the element of agility within the limits of skillful physical work with high speed of performance and repetitions.

Regarding the effect of the weight training program on systolic or diastolic blood pressure and maximum oxygen consumption or resting pulse, it was positive as a result of the weight training program.

The researcher believes that the percentage decrease in resting pulse or systolic or diastolic blood pressure is an indicator of the good health and physical condition achieved by the fencer, and this is what the study concluded. (Mahmoud Hussein 2013) The weight

training system works to activate the nerves during the time, as they are responsible for increasing or decreasing the pulse at rest, and thus work to raise or lower blood pressure.

Regarding the maximum oxygen consumption during 12 minutes of exertion, an increase in oxygen consumption was observed, which is a positive indicator of improved respiratory system efficiency.

B. CONCLUSION AND RECOMMENDATIONS

Conclusion

Physical program with weights does not develop the element of speed to the required extent. Physical program with weights has a positive effect on the elements of agility and speed-strength, as proven by the results of this study. Results proved that the physical program with weights has a positive effect on the functional state of the fencing players, which is both systolic and diastolic blood pressure, maximum oxygen consumption, resting pulse.

Recommendations

Disseminating the research results to fencing coaches for their benefit. Working on studies similar to such programs to develop the physical and functional efficiency of fencing players

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D. AUTHOR CONTRIBUTION STATEMENT

All authors are responsible for the completed manuscript.

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Physical tests

1- 30-meter sprint speed test: The purpose of the test : to measure maximum speed. Performance description The player stands behind the starting line, and upon hearing the starting signal, the player sprints to the finish line at maximum speed. Recording : The time taken by the player to cover 30 meters is recorded. (Abu Al-Ala, Nasr Al-Din 2003: 67)
2- Agility test: Test name: Shuttle Run. The purpose of the test: to measure agility. Performance description: Four cones are fixed on the ground, with the first post 3.60 m from the starting line and the distance between each cone and the next 2.50 m. The player passes between the cones while avoiding touching them. Recording: The time is calculated from the time the lab signal is given until the student returns to the starting line. (Al-Basati: 34)
3- Explosive strength test of the arms: The purpose of the test is to measure the explosive power of the arms. Performance description: The throwing area is marked with parallel lines, with a distance of 5 cm between each line, or a measuring tape is fixed on the starting line from zero to a few meters towards the throwing area. The player technician sits on the chair holding the medicine ball with both hands above his head, and his torso should be close to the edge of the chair. Recording / The lab is given three attempts and the best attempt of them is recorded. (Abu Al-Ala, Nasr Al-Din 2003: 67)

Maximum oxygen consumption test

Cooper's test was used: (Abu Al-Ala, Nasr Al-Din 2003: 67) Test objective: To measure maximum oxygen consumption. Equipment: Running track, Whistle, Stopwatch. Performance method: The participant stands at the starting line and upon hearing the starting whistle, runs continuously for 12 minutes. Each participant tries to cover the greatest distance possible. Recording: Upon hearing the signal to end the test, the player stands in place, and the distance between him and the starting line is calculated using following equation:

Maximum oxygen consumption = 22.351 x distance traveled - 11.289

Training Session Model

First week, First day

Exercise	Load	Set	Rep.	Rest
Lifting a 3 kg. weight and holding the position	50%	1	3	1 Min.
Throwing a weight upwards	40%	1	3	15 Rep.
Running a distance of 200 meters	50%	1	3	1 Rep.
Hold a medicine ball with hands straight	30%	1	3	30 Sec.
Zigzag run	30%	1	3	1 Rep.
Performing a wrestling match while holding weights with both hands	30%	1	3	1 Min.