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The effect of a special training program on some physiological and physical variables for players of Durrat Karbala Tennis Academy under 18 years old

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Abstract
The study aimed to know the effect of a special training program on some physiological and physical variables for players of Durrat Karbala Tennis Academy under 18 years old by identifying the level of some physiological variables (maximum oxygen consumption, pulse rate), and by identifying the level of some physical variables (speed, endurance, speed tolerance) for players of Durrat Karbala Academy under 18 years old. The researcher used the experimental method and defined the research community as players of Durrat Karbala Tennis Academy, numbering (24) players. The most important conclusions are that there was an improvement in the level of speed for the sample members due to the special training program and an improvement in the level of speed tolerance for the sample members as a result of the special training program.

Keywords: Special training program, physiological, Tennis.

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1- Introduction

1.1 Introduction and Importance of the research

Advancements in the educational and scientific aspects of the training process can only be achieved through a correct understanding of the sciences related to training, including physiology. This understanding clarifies the extent of the responses and adaptations that training induces, which occur in its various forms (physical, tactical, skill-based, and psychological) on the functional systems of the athlete and the athlete's response to these training methods.

As a coach, it is essential that you have a comprehensive understanding of how aerobic and anaerobic training affects athletes' functional systems.

Ibrahim Salama (1994) believes that reliance on biological sciences and experimental studies has contributed to understanding the various effects of different types of physical training on vital systems. This is one of the main areas that contribute to the development of sports training methods.

1.2 The research problem

The research problem lies in the scarcity of studies on the game of tennis. Scientific and field tests, such as the Cooper test, are used to determine the fitness level of young tennis players under the age of 18. These tests are based on fundamental physiological and physical qualities, which help in developing appropriate training programs that enhance players' efficiency. Additionally, this leads to the improvement of the skill level of players in the game of tennis.

Therefore, the researcher conducted this study to identify the impact of a specialized training program on certain physiological and physical variables in tennis players under the age of 18. The Cooper test is a physical fitness assessment and is one of the effective and simple tests applied by trainers.

1.3 Research Objectives

The research aims to determine the impact of a special training program on certain physiological and physical variables of the players at the Durrat Karbala Tennis Academy who are under the age of 18 by identifying:

1. The levels of some physiological variables (pulse rate, maximum oxygen consumption) for the players of the Durrat Karbala Tennis Academy under the age of 18 years.
2. The levels of some physical variables (speed tolerance, speed, and special endurance).

1.4 Research Assumptions: The researcher assumes:

1. There are statistical differences between the average pre-test and post-test measurements of some physiological variables among the players of the Durrat Karbala Tennis Academy under the age of 18 in the experimental group.
2. There are statistical differences between the average pre-test and post-test measurements in the levels of some physical variables among the players of the Durrat Karbala Tennis Academy under the age of 18 in the experimental group.

1.5 Research Areas

1.5.1 Human Field: The players of the Durrat Karbala Tennis Academy in the under-18 category.

1.5.2 Spatial Area: The tennis court of the Durrat Karbala Tennis Academy.

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1.5.3 Time Domain: From 1/7/2023 to 11/6/2024.

2. Research Methodology and Field Procedures

2.1 Research Methodology

The researcher used an experimental approach relevant to the nature of the research problem.
2.2 The Research Community and Its Sample:
The researcher identified the research community as players at the Durrat Karbala Tennis Academy under the age of 18. The research sample was selected deliberately, consisting of 24 players.

2.2.1 Homogeneity of the research sample

The homogeneity of the sample members was verified by calculating the torsion coefficient for the individuals in the research sample before applying the special training program. This indicated homogeneity among the individuals in the basic research sample, as follows:

Table (1) Homogenization of the research sample

Type of tests	Test Name	variables	Unit of measurement	Arithmetic mean	Standard deviation	mediator	Torsion coefficient
Physical	Rustameter	Chronological age	year	15.40	2.51540	15.00	0 .588
		Length	cm	147.50	4.007	150.00	0.999
		Mass	kg	60.50	3.88158	67.00	0.387
		Training age	year	4.22	1.21106	4.10	0.100
Physical variables	Cooper Test 12 minutes	Endurance	K/m	2.733	2.806	2.800	-0.3358
	Cooper Test 50 Meters	Speed	W	8.11	2.625	8.0	- 0.1903
	Cooper Test 200m	Bearing speed	W	35.78	4.011	5.5	- 0.1985
Physiological variables	Cooper test using the equation	Maximum oxygen consumption	equation	37.80	0.514	40	0.9682
	Palpation	Pulse rate	Palpation	84.1	0.210	86	0.658

Table (1) shows that the torsion coefficient in the tests was limited between ±3, indicating a close approximation to moderation in all tests (physiological, physical, and psychological), which confirms the homogeneity of the sample.

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2-3 Means tools and devices used in the research

2.3.1 Means of data collection

The researcher relied on the Cooper fitness test to collect research data because it:
- Can be implemented for different age groups, both advanced and emerging.
- Enables the measurement of various physiological and physical variables.
As the trainer is capable of performing the tests, there is no need for specialized tools or a specialist.
- Has a high degree of accuracy in estimating fitness levels.

3. Results and Discussion

3.1 Presentation and Discussion of Results

Using Table No. (2) For the tolerance variable, we can see that the arithmetic mean of the Telemetry research sample differs from the arithmetic mean of the pre-measurement research sample by a significant amount (0.01).

Table (2) The arithmetic mean, standard deviation, and value (t) of the tolerance (research sample)

Endurance	Test used	Pre-tests		Post-tests		Average difference	Percentage of progress	t-value	Significance level
	Cooper test 12 minutes	S	A	S	A	0.412	13.1%	13.7	D
		2.70	2.13	3.112	1.15				

The tabular value (t) at the level of significance (0.05) is 1.714.
It is clear from Table (2) that the arithmetic mean of the Cooper 12-minute running test is continuous in the pre-test (2.701), while the arithmetic mean of the post-test for the same test is (3.112). The average difference between the pre-test and post-test is (0.412), and these results are statistically significant, being greater than the tabular value (t) at the indicative level (0.05). This indicates that the improvement and progress in implementing the special training program have been effective, contributing to the development of physiological and physical qualities alongside the skill program to achieve the best training level.

Table (3) The standard deviation, arithmetic mean, and value (t) of the speed variable

Speed	Test used	Pre-tests		Post-tests		Average difference	Percentage of progress	t-value	Significance level
	Cooper Test 50) M	S	A	S	A	2.10	35%	5.48	D
		8.05	0.25	5.95	0.89				

The table value (t) at the significance level of 0.05 is 1.714.
Table 3 shows that the arithmetic mean in the pre-test was 8.05, while in the post-test, it was 5.95. The difference was 2.10, and the results are statistically significant since this value exceeds the tabular value (t) at the significance level of 0.05. This may be linked to the improvement brought about by the successful execution of the unique training program, which

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focuses on building physiological and physical attributes in addition to the regular skill program to achieve optimal training levels.

The exercises used in the proposed training program have contributed to the development and improvement of the 50 m variable speed, as this is one of the important qualities that tennis beginners need during a match.

Table (4) The arithmetic mean, standard deviation, and value (t) of the speed tolerance variable

Bearing speed	Test used	Pre-tests		Post-tests		Average difference	Percentage of progress	t-value	Significance level
	Cooper Test 200m	S	A	S	A	7.45	26.7%	2.44	D
		5 34.8	1.25	27.40	1.89				

The table value (t) at the significance level of 0.05 is 1.714.

Table 4 demonstrates that the arithmetic mean in the pre-test was 34.85, while the arithmetic mean in the post-test was 27.40, resulting in an average difference of 7.45. These findings were statistically significant, exceeding the tabular value (t) at a significance level of 0.05. To achieve higher levels, a training program focused on improving physiological and physical characteristics was added to the standard skill program, resulting in this increase.

The researcher attributed this improvement to the functional normalization of the respiratory and circulatory systems, which occurs as a result of the training program's multiple repetitions, particularly the speed endurance training modules. This was done while considering the gradation in size, intensity, and inter-comfort, which is determined by the heart rate per minute. The researcher ensured that the warm-up increased the heart rate to 120 beats per minute, preparing the body for training within the program. This method is endorsed by sports training professionals, who highlight the importance of consistent and structured training.

Table (5) The arithmetic mean, standard deviation, and value (t) of the maximal oxygen consumption variable

Maximum oxygen consumption	Test used	Pre-tests		Post-tests		Average difference	Percentage of progress	t-value	Significance level
	Cooper Test	S	A	S	A	1.39	43.38	13.25	D
		2.06	0.141	3.45	0.45				

The tabular value (t) at the significance level of 0.05 is 1.714.

Table 5 shows that the arithmetic mean of the Cooper maximum oxygen consumption test in the pre-test was 2.06, while the arithmetic mean of the post-test for the same test was 3.45, resulting in a difference of 1.39. The results were statistically significant because they exceeded the tabular (t) value at the significance level of 0.05, and the improvement can be attributed to the application of the special training program.

We note that the results from the previous table led to changes in the physiological measurements under study, which were applied to the research sample. The maximal oxygen consumption variable is an objective measure to determine an individual's physical efficiency and indicates the ability and suitability of the individual for training.

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Table (6) The mean, standard deviation, and value (t) for the speed variable

Rest pulse rate	Test used	Pre-tests		Post-tests		Average difference	Percentage of progress	t-value	Significance level
	Palpation at the carotid artery	S	A	S	A	5.15	7.4%	5.35	D
		69.5	2.23	64.35	3.55				

The tabular value (t) at the significance level of 0.05 is 1.714.

In Table 6, the arithmetic mean of the pulse rate at rest in the pre-test is 69.5, while the arithmetic mean in the post-test of the same test is 64.35. The difference in the averages is 5.15, and these results are statistically significant because they exceed the tabular (t) value at the 0.05 level. This development and improvement are the result of administering the unique program, as well as the players' physiological adaptation, which led to a decrease in their heart rate.

4. Conclusions and Recommendations

4.1 Conclusions

1. There was a noticeable improvement in the level of maximum oxygen consumption as a result of the application of the special training program.
2. There was an improvement in the decrease in heart rate at rest due to the application of the special training program.
3. There was an improvement in the speed level of the sample personnel as a result of the special training program.
4. There is an improvement in the level of speed tolerance of the sample personnel as a result of the special training program.
5. There is an improvement in the level of endurance of the individuals in the research sample as a result of the special training program.
6. There is an improvement in the level of physical variables of the sample, as indicated by the moral differences shown by the study between the pre- and post-tests in the Cooper tests that the research sample underwent, favoring the post-tests due to the special training program.

4.2 Recommendations

1. The basis for rationing the training load is to determine the physiological and physical variables of the body systems before and after physical exertion, as well as during the rest period for tennis players.
2. This helps raise their level of physical efficiency, leading to an improvement in their tennis game at the Dorat Karbala Tennis Academy.
3. Guidance on the importance of scientific field tests for coaches, which are significant at the level of players.

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