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The effect of a special training program in agility on developing some skill and physical variables among players of Durrat Karbala Tennis Academy under 18 years old

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Abstract
The study aimed to determine the effect of a special agility training program on the development of various skill and physical variables among players at the Durrat Karbala Tennis Academy who are under the age of 18. The researcher employed an experimental design with pre- and post-measurements for two groups: one experimental and the other control. The research community represented the Durrat Karbala Tennis Academy's under-18 players, which numbered 50. The research sample consisted of 25 players who were purposefully selected and divided into 20 players for the main experiment and 5 players for the exploratory experiment. Considering these results, the researcher concluded that the experimental group outperformed the control group in two-dimensional measurements of physical variables (agility, transitional speed, reaction time, static balance, and coordination) and the foot movement test.

Keywords: Special training program, Tennis, under 18 years old.

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1- Introduction

1-1 Introduction and Importance of research

The game of tennis is characterized by the necessity for players to maintain continuous movement on the court in order to diversify their offensive and defensive actions. Agility is one of the important and main elements in tennis. Players must change direction and speed during play, and they do not change speed or direction randomly, but rather in response to the opponent's actions.

Many scholars agree that tennis requires rapid movements such as stopping, sprinting, starting, making direct changes in direction, stretching, and falling. Players must always be in a state of readiness and have a quick response to the opponent's movements, the ball, and their footwork. Therefore, tennis requires a range of open and diverse motor performances within strategies, executed quickly and in multiple directions, to achieve performance goals and react to the opponent's shots. This highlights the importance of the research in studying the impact of a specialized training program in agility on the development of certain skill and physical variables among players of the Dura Karbala Tennis Academy who are under 18 years old.

1-2 Research Problem

The research problem lies in the lack of training programs specifically focused on agility that help the players of the Dura Karbala Academy develop certain skills and physical variables. Therefore, the researcher decided to delve into this problem to find appropriate solutions through these specialized agility training programs, which will enhance the players' physical and skill levels in tennis.

1-3 Research Objectives

To identify the impact of a specialized agility training program on the development of certain physical and skill variables among the players of the Dura Karbala Academy for tennis under 18 years old.

1-4 Research Hypotheses

1. There are statistically significant differences between the control and experimental groups in some physical and skill variables related to foot movements, favoring the experimental group.
2. There are statistically significant differences between the pre-test and post-test in some physical and skill variables for the control group in foot movements, favoring the post-test.

1-5 Research Domains

1-5-1 Human Domain: Players of the Dura Karbala Academy for tennis under 18 years old.
1-5-2 Spatial Domain: Tennis courts at the Dura Karbala Academy for tennis.
1-5-3 Temporal Domain: 15/6/2024 – 2/11/2024.

2- Research Methodology and Field Procedures:

2-1 Research Method:

The researcher used the experimental method due to its suitability for the nature of the research and its procedures. This was accomplished using the experimental design, specifically pre-test and post-test measurements, with two groups (experimental and control).

2-2 Research Community and Sample

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The researcher defined the research community as the players of the Durrat Karbala Tennis Academy in the under-18 category, totaling 50 players.
A sample of 25 players was intentionally selected from the academy's players, divided into 20 players for the main experiment and 5 players for the exploratory experiment.

Table (1) Illustrate distribution of the research sample

Sample	Number
Main experience	20 players
Exploratory experiment	5 players
Total	25

2-2-1 Homogeneity of the Research Sample
The homogeneity of the sample individuals was verified in the basic research variables (height, weight, chronological age, training age) and physical variables, as shown in Table 2.

Table (2) Demonstrate Homogeneity of the Research Sample

Variables	**Unit of measurement**	**Average**	**Deviation**	**Mediator**	**Convolution**
Training age	year	5.17	0.45	4.98	**0.11**
Chronological age	year	18.20	2.41	17	**1.25**
Weight	kg	72.12	4.10	74	**0.85**
Length	poison	172.85	3.45	171	**0.23**

It is clear from Table 2 that the skewness coefficient for the sample in the mentioned variables of weight, height, and training age falls between ±3, indicating that the sample measurements are distributed under the normal curve, which is evidence of the homogeneity of the sample in the basic variables.

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Table (3) Show Normality in the Distribution of the Research Sample in Pre-Test Measurements of Skill Variables

Variables		Unit of measurement	Deviation	Mediator	Average	Convolution
Agility		second	3.065	16.55	24.16	1.02
Balance (Struck)		second	2.40	17.11	17.20	0.75
Reaction (reaction time)		poison	4.12	25.08	24.20	0.96
Compatibility (numbered circuits)		second	0.12	5.02	5.10	0.85
Transition speed(30m sprint)		second	0.07	6.11	6.14	1.25
Short Reciprocal Steps Tests (30) Seconds	Foot mobility tests	second	1.23	6.00	6.45	0.85
Lateral Motion Test (30) seconds		second	2.10	9.01	10.44	0.58
Test the movements of the feet and the backhand		second	3.10	7.12	7.62	1.04
Test the movement of the feet and the forehand		second	2.40	6.75	7.41	0.31

It is evident from Table 3 that the skewness coefficient for the research sample in skill and physical variables is between ±3, indicating that the sample measurements fall within the normal curve, which is evidence of the homogeneity of the sample in these variables.

2-3 Means, Tools, and Devices Used in the Research

2-3-1 Data Collection Tools

1. Electronic calculator (laptop) type (Acer) quantity: 1
2. Electronic stopwatch type (Diamond) quantity: 2
3. Plastic circles quantity: 10, with a diameter of 60 cm each
4. Tennis rackets quantity: 20
5. Whistles quantity: 2
6. Various tennis balls amounting to 1 carton
7. Ruler for measuring height
8. Measuring tape
9. Medical scale for measuring weight

2.4 field research procedures

2.4.1 Tests used in research

1. Balance Test (Strock)

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2 - Test the movement of the feet and the front blow.
3-test the movement of the feet and the backstroke.
4. Agility test.
5. 30-meter sprint test.
6-Test short (30) second reciprocating steps.
7-lateral movement test (30) seconds.

2.4.2 Exploratory Experience

The researcher conducted the exploratory experiment from June 18, 2024, to June 22, 2024. The sample for the exploratory experiment consisted of five players from the research community, who were selected from outside the main research sample. This was done to confirm and identify any problems the researcher might face during the main experiment, assess the validity of the devices and tools used, determine the time required for the main experiment, and ensure that measurements were implemented according to specific conditions.

2.4.3 Scientific Basis of Tests:

First, the Coefficient of Honesty:

The researcher calculated the honesty coefficient by using the honesty differentiation method on a sample of five players from the research sample. With measurements from a group of individuals less differentiated from beginners, consisting of five players, as shown in Table 4.

Table 4. Belief in Physical and Skill Tests

Variables		Unit of measurement	Featured Collection		Non-Premium Group		Z value
			Average ranks	Total ranks	Average ranks	Total ranks	
Agility		second	9.42	1.024	10.11	1.551	2.712*
Balance (Struck)		second	10.20	2.338	15.10	2.064	3.540*
Reaction (reaction time)		poison	13.41	2.360	26.18	3.084	2.339*
Compatibility (numbered circuits)		second	19.22	1.010	14.34	1.254	5.112*
Transition speed(30m sprint)		second	3.49	2.29	9.4	1.23	2.815*
Foot mobility tests	Short Reciprocal Steps Tests (30) Seconds	number	12.60	1.77	10.56	2.50	2.880*
	Lateral Motion Test (30) seconds	number	7.92	1.85	11.82	3.54	3.502*
	Test the movements of the feet and the backhand	second	8.41	3.65	17.30	2.54	2.409*
	Test the movement of the feet and the forehand	second	12.41	2.869	18.22	1.451	3.439*

The tabular value (Z) at the level of significance (0.05) is 1.84, with degrees of freedom equal to 4.

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It is clear from Table 4 that there are significant differences between the results of the distinguished group and the non-distinguished group, and that the calculated value of T exceeded its tabular value at a significance level of 0.05. This indicates the ability of these tests to distinguish between all levels; thus, they are valid for measuring the qualities for which they were evaluated.

Secondly, Stability Coefficient:

The test and retest were applied with an interval of three days. The stability coefficient was determined for both skill and physical tests, and the correlation coefficient was calculated by applying the test to five players from the survey experiment sample. As shown in Table 5, where the stability coefficient for skill and physical tests is presented.

Table 5 Stability of Skill and Physical Testing

Variables		**Unit of measurement**	**First application**		**Second application**		**R value**
			M	on	M	on	
Agility		second	24.19	3.085	25.18	3.23	0.804*
Balance (Struck)		second	17.22	2.42	17.10	2.52	0.779*
Reaction (reaction time)		poison	24.23	4.13	23.28	3.73	0.780*
Compatibility (numbered circuits)		second	5.11	0.11	5.12	0.10	0.985*
Transition speed(30m sprint)		second	6.13	0.04	6.15	0.06	0.872*
Foot mobility tests	Short Reciprocal Steps Tests (30) Seconds	number	6.52	1.23	6.82	1.20	0.930*
	Lateral Motion Test (30) seconds	number	10.60	2.18	11.00	2.75	0.685*
	Test the movements of the feet and the backhand	second	7.62	3.12	7.52	2.41	0.880*
	Test the movement of the feet and the forehand	second	7.43	2.42	7.42	2.48	0.915*

N=5, with a significance level of D (0.05), a tabular value of R (0.05), and a degree of freedom of 3 = 0.73.

Table 5 clearly shows that the study sample's scores have a statistically significant correlation. This is evident when comparing the initial application of the tests with the grades from the second application of the same survey group, which had a three-day delay.

The estimated R value exceeded the tabular value by a substantial margin (0.05), indicating that the test scores are stable.

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2.4.4 Training Program Parameters:

2.4.4.1 Number of Training Modules and Duration of the Program:

The duration of the program is six weeks, with three weekly units for six weeks. Thus, the total number of training units is eighteen.

2.4.4.2 Scientific Foundations of the Training Program

The researcher employed a high-intensity interval training method that is repetitive. The scientific basis of the program was to determine the intensity of the exercises at 75% to 95% of the maximum repetition for each exercise. Additionally, the maximum repetition is set at 30 seconds for each exercise. The maximum repetition is measured within 30 seconds for each exercise every three weeks to determine the load for each stage of the program. The breaks between sets are two to four minutes. The components of the training module consist of an introductory part, which includes a warm-up; the main part, which includes special preparation exercises; and the final part, which focuses on relaxation and calming.

2.4.5 Tribal Tests

The researcher conducted physical tribal tests and foot movements over two days, from June 28, 2024, to June 29, 2024.

2.4.6 Key Experience

The implementation of the fitness training program began on July 6, 2024, and lasted for approximately six weeks, encompassing 18 training units at three training units per week. The application of the fitness training program concluded on August 16, 2024.

2.4.7 Dimensional testing

After implementing the physical training program. The dimensions tests were carried out and lasted for two days immediately following the completion of the main experiment on the day 17-18 of August 2024.

2.5 Statistical Methods

The researcher utilized the following statistical methods:

- SPSS Scientific Pouch
  Test T.
- Correlation coefficient.
- Standard deviation.
- Arithmetic mean.

3. Presentation, analysis, and discussion of results

3.1 Presentation of the results of the difference between the pre-test and post-test of the control group in physical and skill variables

Table 6. The difference between the pre-test and post-test of the control group in physical and skill variables

Variables	Unit of measurement	Pre-test		Post-Test		T value	Percentage improvement
		M	± on	M	± on		
Agility	second	24.10	3.077	22.60	3.15	0.848	7.26%
Balance (Struck)	second	18.19	2.40	21.09	2.50	1.325	15.95%
Reaction (reaction time)	poison	25.23	4.12	23.40	3.80	0.874	7.10%

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Compatibility (numbered circuits)		second	5.11	0.10	4.36	0.11	1.100	15.65%
Transition speed(30m sprint)		second	6.45	0.05	5.40	0.07	*2.865	19.08%
Foot mobility tests	Short Reciprocal Steps Tests (30) Seconds	number	6.56	3.17	7.10	1.62	0.389	7.50%
	Lateral Motion Test (30) seconds	number	10.55	2.30	12.05	1.75	*3.260	14.30%
	Test the movements of the feet and the backhand	second	7.67	3.10	6.70	2.65	0.874	13.10%
	Test the movement of the feet and the forehand	second	7.40	2.45	6.10	2.48	1.109	18.69%

N = 10

* D at a significant level (0.05) Tabular t value at a significant level (0.05) = 2.14

It is clear from Table (6) that there are no significant statistical differences between the pre-test and post-test measurements of the control group in the physical variables (balance, coordination, reaction time, agility) in favor of the post-test measurement.

It is also clear from the results of the table that there are statistical differences between the pre-test and post-test measurements of the control group in the tests (lateral movement 30 seconds, transitional speed).

Table 7. The significance of the differences between the tribal and dimensional measurements of the experimental group in the skill and physical variables (N=10)

Variables		**Unit of measurement**	**Pre-test**		**Post-Test**		**T value**	**Percentage improvement**
			M	± on	M	± on		
Agility		second	25.15	3.12	17.75	3.29	*4.100	29.17%
Balance (Struck)		second	17.40	2.26	27.43	3.20	3.629*	57.43%
Reaction (reaction time)		poison	24.45	3.28	18.10	2.09	*4.208	26.04%
Compatibility (numbered circuits)		second	5.34	0.23	3.55	0.13	*2.625	32.90%
Transition speed(30m sprint)		second	6.30	0.05	4.54	0.11	3.538*	27.69%
Foot mobility tests	Short Reciprocal Steps Tests (30) Seconds	number	6.65	1.58	10.30	2.42	*2.505	54.50%
	Lateral Motion Test (30) seconds	number	11.00	1.26	15.18	1.50	*3.492	38.29%
	Test the movements of the feet and the backhand	second	7.60	3.28	5.12	1.36	*2.650	33.17%

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	Test the movement of the feet and the forehand	second	7.70	2.50	5.04	2.39	*3.860	35.45%

* D at a significant level (0.05): Tabular t value at a significant level (0.05) = 2.14.
It is clear from Table 7 that there are statistical differences between the pre- and post-measurements of the experimental group in the physical variables (agility, compatibility, transitional speed, reaction time, balance) of the footwork tests, favoring the post-measurement.

Table 8. The significance of the difference between the tribal and dimensional measurements of the control group and the experimental group in the physical and skill variables

(N=20)

Variables		**Unit of measurement**	**Pre-test**		**Post-Test**		**T value**
			M	± on	M	± on	
Agility		second	22.32	3.20	17.65	3.28	4.428*
Balance (Struck)		second	21.14	2.60	27.42	3.20	5.668*
Reaction (reaction time)		poison	23.41	3.72	18.15	2.12	3.875*
Compatibility (numbered circuits)		second	4.36	0.11	3.55	0.15	3.652*
Transition speed(30m sprint)		second	5.25	0.07	4.55	0.12	4.540*
Foot mobility tests	Short Reciprocal Steps Tests (30) Seconds	number	8.65	1.55	10.25	2.46	3.864*
	Lateral Motion Test (30) seconds	number	12.08	1.75	15.18	1.50	2.978*
	Test the movements of the feet and the backhand	second	6.60	2.72	5.12	1.40	4.672*
	Test the movement of the feet and the forehand	second	6.08	2.48	5.08	2.44	*3.775

* D at a significant level (0.05): Tabular t value at a significant level (0.05) = 2.14.
It is clear from the results of Table 8 that there are statistical differences between the two dimensional measurements of the control and experimental groups in the physical variables (agility, agreeableness, transitional speed, reaction time, balance) and tests of foot movements, favoring the experimental group.

3.4 Discussion of Results

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There are statistical differences between the control and experimental groups in some skill variables, as well as in physical variables (movements of the feet) in favor of the experimental group.

The results presented in Table 8 indicate that there is a statistical relationship between the two-dimensional parameters of the control and experimental groups in the variables of agility, compatibility, equilibrium, transition speed, and reaction time, as well as in foot movement tests, benefiting the experimental group. The researcher attributes these results to the careful planning of the program and the systematic and appropriate use of fitness exercises suitable for the research sample. This approach led to the development of physical abilities dependent on the efficiency of the nervous system, in addition to enhancing the training group's ability to perform the skill of moving the feet. Discussion of the results of the second hypothesis indicates that there are statistical differences between the tribal and dimensional measurements of the follicular group in some skill variables, as well as in physical aspects (foot movements) in favor of telemetry. As shown in the results of Table 7, there are statistical differences between the tribal and dimensional measurements of the experimental group in the physical variables (agility, compatibility, static balance, reaction time, speed). Foot movement tests have been conducted in favor of telemetry. The researcher attributes these results to the effective planning of the program, as well as the use of fitness training and load rationing for the research sample. It is important to note that the exercises were proportional to the motor performance of the sample. This led to the development of physical variables, which positively reflected on the skill performance of foot movements.

4- Conclusions and Recommendations

4-1 Conclusions

1. There are statistically significant differences between the pre-test and post-test measurements of the experimental group in the physical variables (agility, reaction time, static balance, coordination, transitional speed), with foot movement tests favoring the post-test measurement.
2. There are statistically significant differences between the post-test measurements of the control and experimental groups in the physical variables (agility, reaction time, static balance, coordination, and transitional speed) and foot movement tests, favoring the experimental group.

4-2 Recommendations

1. Conduct similar studies to identify the differences in agility between males and females.
2. Conduct tests to measure agility specialized in tennis.

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