The effect of parallel exercises of play employing a device designed to improve the accuracy and strength of the serving skill and forehand & backhand groundstrokes in tennis

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Abstract

This study aims to prepare parallel exercises employing a device designed to improve the accuracy and strength of the tennis player's skills in terms of serve and forehand and backhand groundstrokes.

The researcher used the experimental method given its suitability to the research problem. The research sample was purposefully selected, namely (12) players of Al-Jaysh Sports Club, equally divided into two groups: experimental (treatment) and control. Upon the concluding of the main experiment and tests, the SPSS program was used to process the data statistically to obtain the results, which were then presented and discussed.

The researcher reached a number of important conclusions as the results showed that there are significant differences in statistical terms in the post-tests between the two groups set up in this study: control and experimental in the development of accuracy and strength of the serving skill and forehand and backhand groundstrokes in tennis and in favor of the experimental group.

The researcher recommended the need to use modern training equipment given its positive impact on the development of skills in addition to increasing the excitement and suspense of the players.

Keywords: Parallel exercises of play, device designed, accuracy and strength of the serving skill, forehand and backhand groundstrokes in tennis.

1- An introductory overview of the research:

1-1 A general outlook of the study and its importance:

It was not a coincidence to see the rapid development in achieving athletic levels in an array of sports games. Rather, it was born out of scientifically-sound planning in terms of education and training. Teachers and coaches have become interested in the physical and mental preparation of players and teaching them the foundations of skill performance and their accurate and rapid responses in order to upgrade the level of skill as well as the physical, tactical and psychological performance to achieve the best results.

Tennis is one of the important games that began to gain great fame among the popular sports circles because of the players' high and interesting level, which emerged thanks to employing modern training means and equipment appropriate to this game and the skills it requires.

Since tennis has recently become a highly-competitive game, every player has to have high physical qualities and skills to keep pace with modern play, which has become dependent on accuracy, speed and strength at the same time.

The skill of serving and the forehand groundstrokes is one of the important basic skills in tennis, which is the most powerful offensive weapon possessed by a tennis player, while the backhand stroke is also one of the basic skills, which is no less important than the forehand one. However, it is often a source of direct errors for most players because of the difficulty of its performance and that the development of players' level depends largely on the efficiency in the performance of those skills.

Hence, the importance of research can be gleaned from the development of the main basic skills in tennis as they are the ones that make the difference between the players in addition to the use of methods and devices that contribute to raising the level of performance to make achievement in matches.

1-2 Research Problem:

Tennis depends mainly on a set of physical, skillful, mental and psychological characteristics, especially the main basic skills, such as (serving, forehand groundstroke, and backhand groundstroke).

The research problem was determined way of subjective observation and the researcher's experience in addition to the results of the professional tests conducted for the sampled athletes periodically and interviews with the club coaches. The researcher found weakness in the performance of basic skills in the players of the Al-Jaysh sports club, especially when performing those strokes carefully and forcefully together to resolve points. As a progress, the researcher sought to prepare parallel exercises to play using a device designed to develop the accuracy and strength of serve, forehand and backhand groundstrokes technique for the research sample.

1-3 Research objective: The research aims to:

1- Preparing parallel training using a device designed to develop the accuracy and strength of the serving skill and the forehand and backhand groundstrokes.
2- Determining the impact of parallel exercises of play using a device designed to develop accuracy and strength of the serving skill and the forehand and backhand groundstrokes.

1-4 Research Hypotheses

1. There exists significant differences in statistical terms between the pre-tests and post-tests of the control group in the accuracy and strength of the serving skill and forehand and backhand groundstrokes in tennis, in favor of the post tests.
2. There exists significant differences in statistical terms between the pre-tests and post-tests of the experimental group in the accuracy and strength of the serving skill and forehand and backhand groundstrokes in tennis, in favor of the post tests.
3. There exists significant differences in statistical terms between the post tests and the control & Treatment groups in the accuracy and strength of the serving skill and forehand and backhand groundstrokes in tennis and in favor of the experimental group.

1-5 Research domains

- Human Domain: Senior-level tennis players of Al-Jaysh Sports club.
- Temporal Domain: 1/12/2022 until 1/2/2023.
- Spatial Domain: International Al-Shaab courts.

1-6 Defining terminology:

Parallel exercises: "It is the performance of basic skills under conditions similar to what happens in the game where the coach uses exercises in which situations such as those that occur in the match are created" (Al-Khashab, 1999, p. 189).

2- Methods and procedures used in this study
2-1 Methodology:

To better serve this study, it was necessary to design a proper method. With this mind, the the experimental approach was employed for the current study, which is "one of the most adequate means of accessing reliable knowledge" (Van Dalen, 1985, p. 407).

The experimental approach was implemented by designing two parallel groups: control and experimental. This is in order to address the research problem as it is more appropriate to the nature of the research to obtain the results.

2.2 Research Community:

The research community included all the players of Al-Jaysh Sports Club, totalling (12) players. Two equal groups were formed accordingly: control and experimental with six players per group. This was done randomly by lottery and homogeneity and parity were conducted for the research sample as shown in Table (1), Table (2), Table (3) and Table (4).

Table (1): the homogeneity of the sample in terms of research variables

	Variable	Measuring Unit	standard deviation	Mediator	Arithmetic mean	Coefficient of skewness
1	Age	year	1.34	27.01	27.12	0.00
2	Height	CM	2.33	183.0	181.00	0.00
3	Weight	kg	2.43	80.00	78.00	0.00
4	Training Time	year	1.32	20.40	20.55	0.00

Table (2): The Mann–Whitney U test shows a significance of (0.05) for both groups (i.e. Control & experimental) in the pre-test for the accuracy and strength of the serving skill

Experimental	Control	Indication	Sig. Value	Mann-Whitney Test	Arithmetic mean For the control group	Arithmetic mean for the experimental group
55	59					
60	55					
51	59	non-Significant	0.516	14	7.17	5.83
53	54					
55	57					
59	58					

Table (3): The Mann Whitney test shows a significance of (0.05) for the experimental and control group values in the pre-test for the accuracy and strength of the forehand groundstroke

Experimental	Control	Indication	Sig. Value	Mann-Whitney Test	Arithmetic mean For the control group	Arithmetic mean for the experimental group
30	31					
33	30					
34	33	non-Significant	0.936	17,500	6.42	6.58
37	39					
37	36					
28	30					

Table (4): The Mann Whitney test shows in terms of (0.05) for the experimental and control group values in the pre-test for the accuracy and strength of the backhand groundstroke

Experimental	Control	Indication	Sig. Value	Mann-Whitney Test	Arithmetic mean For the control group	Arithmetic mean for the experimental group
22	26					
20	23					
29	30	non-Significant	0.105	8	8.17	4.83
26	23					
23	29					
22	28					

2-3 Means of data collection, tools and research equipment used:
2-3-1 Means of data collection
- Arab and Foreign studies and research.
- Personal interviews with experts and specialists.
- Skill tests.

Tools used in the research:
(Tennis court, rackets (6), basket balls (30) balls, whistle, stopwatch, stationery, signs).

2-3-3 Equipment used:
The device designed in this study.

24- Specifications of the designed device
It is a device designed by the researcher and is placed above the net from the opposite side of the court for the players with a height of (1.50 m) and a width of (10 m). It contains (20) gates in the form of panels the height and width of which are 1.46 and 50 cm respectively. These gates are controlled electrically by a remote control to close and open these gates. The purpose of it is to focus the player on shooting balls through those gates and for certain places within the court during the exercise to increase the accuracy of the blows, especially in the performance of the serving skill and the forehand and backhand groundstrokes in tennis.
2-5 Research test:
2-5-1Testing the accuracy and strength of the serve stroke skill:(International Tennis Federation: 2004, 11).

Czech
Journal of Multidisciplinary Innovations

Volume 15, March, 2023.

ISSN (E): 2788-0389

Website: www.peerianjournal.com

Email: editor@peerianjournal.com

2-5-2 Testing the accuracy and strength of forehand and backhand groundstrokes in tennis: (Tennis Federation: 2004, 11).

2.6 Piloting

The researcher conducted a pilot experiment on Thursday 1/12/2022 at 3 p.m. on 6 players from the Al-Jaysh Youth Sports Club and on the Al-Shaab International Stadium. The goal of this experiment was to identify the obstacles and difficulties that may face the researcher during the examination in the main experiment on his research sample, to determine the competence of the assistant team, their knowledge of the course of events, and the tests related to the research, in addition to determining the suitability of exercises and tests to the research sample.

2-7 Pre-tests:

The researcher conducted the pre-tests on the research sample, at exactly 3:00 pm on Friday, corresponding to 12/2/2022. To ensure that the variables were kept constant for the post-tests, the researcher took the necessary steps to control the variables as regards time, location, and the assistant team..

2-8 The main experience:

The main experiment included the implementation of the training units prepared for the experimental group * (Appendix 1) starting from Sunday 4/12/2022 and under the supervision of the researcher. As for the control group, it applies the same previous approach without any interference. The number of training units for the total duration of the research reached (24) three training units days a week (Sunday, Tuesday, Thursday) at a rate of (60) minutes per unit.

2-9 Post-tests:

On Wednesday, 1/2/2022, at precisely 3:00 pm, the post-tests were conducted on the study sample. The researcher was keen to create conditions similar to those of the pre-tests in all respects, temporal and spatial, as well as the assistant team so as to identify the extent of the improvement obtained in the skill under study by the independent variable exclusively.

2-10 Statistical Methods:

The statistical software SPSS was used by the researcher to process the test data.

3- Presentation and discussion of results:

Table (5): The Wilcoxon test showing a significance threshold of (0.05) pertaining to the pre/post test values pertaining to the experimental group shows the accuracy and strength of the serving skill.

Pre-test	Post-test	indication	sig	Arithmetic mean (post-test)	arithmetic mean (pre-test)
55	80				
60	85				
51	78	Significant	0.027	81.16	55.50
53	88				
55	75				
59	81				

Table (6): The Wilcoxon test in terms of (0.05) for the values of the pre- and post-test of the experimental group in the accuracy and strength of the forehand groundstroke skill

Pre-test	Post-test	indication	sig	Arithmetic mean (post-test)	arithmetic mean (pre-test)
30	48				
33	49				
34	47	Significant	0.027	47.33	33.16
37	47				
37	47				
28	46				

Table (7): Wilcoxon test showing a significance threshold of (0.05) pertaining to the pre/post test values of the experimental group in the accuracy and strength of the backhand groundstroke skill

Pre-test	Post-test	indication	sig	Arithmetic mean (post-test)	arithmetic mean (pre-test)
22	36				
20	38				
29	37	Significant	0.027	37.16	23.66
26	36				
23	37				
22	39				

Table (8): Wilcoxon test showing a significance threshold of (0.05) pertaining to the pre/post test values of the control group in the accuracy and strength of the serving skill

Pre-test	Post-test	indication	sig	Arithmetic mean (post-test)	arithmetic mean (pre-test)
59	75	Significant	0.028	75.50	57.00
55	73				

Czech
Journal of Multidisciplinary Innovations

Volume 15, March, 2023.

ISSN (E): 2788-0389

Website: www.peerianjournal.com

Email: editor@peerianjournal.com

59	74				
54	75				
57	76				
58	80				

Table (9): Wilcoxon test showing a significance threshold of (0.05) pertaining to the pre/post test values of the control group in the accuracy and strength of the forehand groundstroke skill

Pre-test	Post-test	indication	sig	Arithmetic mean (post-test)	arithmetic mean (pre-test)
31	40				
30	39				
33	38	Significant	0.074	37.33	33.16
39	37				
36	39				
30	31				

Table (10): Wilcoxon test showing a significance threshold of (0.05) pertaining to the pre/post test values of the control group in the accuracy and strength of the backhand groundstroke skill

Pre-test	Post-test	indication	sig	Arithmetic mean (post-test)	arithmetic mean (pre-test)
26	30				
23	29				
30	31	Significant	0.027	31.16	26.50
23	34				
29	32				
28	31				

Table (11): Mann-Whitney test showing a significance threshold of (0.05) for the values of both the control & treatment (i.e. experimental) groups in the post-test for the accuracy and strength of the serving skill

Experimental	control	indication	sig	Mann-Whitney Test	Arithmetic mean for the control group	Arithmetic mean for the experimental group
80	75					
85	73					
78	74	Significant	0.029	4.500	4.25	8.75
88	75					
75	76					
81	80					

Table (12): The Mann-Whitney test showing a significance threshold of (0.05) for the values of both the control & treatment (i.e. experimental) groups in the post-test for the accuracy and strength of the forehand groundstroke skill.

Experimental	control	indication	sig	Mann-Whitney Test	Arithmetic mean for the control group	Arithmetic mean for the experimental group
48	40					
49	39					
47	38	Significant	0.004	0.000	3.50	9.50
47	37					
47	39					
46	31					

Table (13): Mann-Whitney test with a significance of (0.05) for the values of the experimental and control group in the post-test for the accuracy and strength of the backhand groundstroke skill

Experimental	control	indication	sig	Mann-Whitney Test	Arithmetic mean for the control group	Arithmetic mean for the experimental group
36	30	Significant	0.004	0.000	3.50	9.50
38	29					
37	31					
36	34					
37	32					
39	31					

Discussion of the results

Through Table (1), the results showed us that the sample is homogeneous in the aforementioned variables. In Table (2), (3) and (4), after conducting the Mann–Whitney U test, the results of the pre-test of the control & Treatment groups showed us that the sample members are equivalent in the basic skills under study. This means that the two groups will start applying the curriculum from one starting point.

The results of Table (5), (6) and (7) showed that the results of the Wilcoxon test for the pre- and post-test of the experimental group in the studied variables have seen a significant improvement , which can be attributed to the parallel exercises similar of play accompanied by the designed device that were carried out throughout the research period. This led to a significant improvement in skills and this is confirmed by Abdelhaq (2007, p. 11) who states that parallel exercises of play lead to the development of the motor, skill and technical program for athletes as the player gets used to the correct method of implementation of each situation or a specific motor duty to suit the player and can restore that program at a later time".

The results of Table (8) and (10) showed that the results of the Wilcoxon test for both test designs pertaining to the control group has seen a significant improvement in the skill of serve and the backhand groundstroke and the researcher attributes this improvement to the training followed by the coach. The players' skills improved as a result of this. Except for Table (9), the results of the same group did not see an improvement in the skill of the forehand groundstroke and the researcher attributes this to the players' access to the level of mastery of the skill. Through routine training alone, it is challenging to increase one's degree of skill performance. Instead, there is a need to develop new training and methods accompanied by modern means of assistance and training devices that lead to raising their skill level, and this was evidenced in the experimental group.

The results in Table (11) and (12) and (13) of Mann–Whitney U test for the treatment and control groups to test the accuracy and strength of the serving skill and the forehand and backhand groundstrokes in tennis showed a great superiority in the results and in favor of the treatment group. The researcher attributes the reason for this to the exercises carried out using the designed device that helped the experimental group players in raising the skill level with great superiority over the approach followed by the control group.

Conclusions & Recommendations
In view of the results obtained in this study, the researcher can formulate several conclusions and recommendations, which run as follows:

Conclusions
1. The findings demonstrated that the experimental group's pre/post test outcomes differed significantly in statistical terms as well as the control group in developing the accuracy and strength of the serving skill and the two forehand and backhand groundstrokes, particularly in the post-tests.
2. The findings have also demonstrated significant differences in statistical values in the post-tests between both groups incorporated in the study design: treatment and control in developing the accuracy and strength of the serving skill and the two forehand and backhand groundstrokes in favour of the experimental group.

Recommendations
These were as follows:
1- The necessity of using modern training devices because of their positive impact in developing skills in addition to increasing the excitement and suspense of the players.
2- Using a device designed for the purpose of developing other basic skills.

References
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5. All material is copyright © International Tennis Federation, 2004, p 11.

Appendix (1)
Sample training session
Exercise (1):
Purpose of the exercise: Developing the accuracy and strength of the serving skill.
Used tools: 10 tennis rackets, tennis balls (120).
Performance Description:

The player stands on the baseline with the designed device setup above the net and one of the gates of the device is opened, which determines for the player a specific part of the serve box for shooting balls through it and hitting the specific part of the target area.

Exercise (2):
The purpose of the exercise : developing accuracy and strength of the forehand groundstroke skill.
Tools used: 10 tennis rackets,(120) tennis balls, 3 signs.
Description of performance :
The first sign is placed on the serve line in the middle of the field and the second sign is placed in the center of the back area between the base line and the Serve line and the third sign is placed on the baseline. The player stands next to the first sign from the right side and is fed with balls by the coach. The player shoots the balls with a forehand groundstroke and then goes to the second sign and then shoots and returns to the third sign and then returns to the beginning (for the first sign) every time he is asked to hit a forehand groundstroke through a different open gate (the designed device) until the implementation of 20 repetitions required.

Exercise (3):
The purpose of the exercise : developing the accuracy and strength of the backhand groundstroke skill.
Tools used : 10 tennis rackets, tennis balls (120).
Description of performance :
This is performed in similar fashion to Exercise 2 except that the shot is done with the skill of the backhand groundstroke.
Date & Day : Tuesday 4/12/2022
Training objective / skill development (serve, forehand groundstroke, backhand groundstroke)
Training Session Time : 60 Minutes Educational Goal / Determination and Self-Confidence

Training method: high-intensity interval training unit intensity: 80%
Number of players.

Total Exercise time	Performance time	load components		size	intensity	Exercises used	Section	T
		Rest						
		between aggregates	between iterations					
15 Min.						General warm-up exercises	preparatory 20 Min.	1
5 Min.						Special warm-up exercises		
10 Min.	1:30 min	1 Min.	30 seconds	20*5	80%	exercise(1)	the main 35 Min.	2
10 Min.	1:30 min	1 Min.	30 seconds	20*5	80%	exercise (2)		
10 Min.	1:30 min	1 Min.	30 seconds	20*5	80%	exercise (3)		
5 d						Calming and relaxation exercises	closing 5 Min.	3