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THE EFFECT OF USING CIRCUIT TRAINING ON DEVELOPING SOME PHYSICAL ATTRIBUTES AND BASIC SKILLS IN TENNIS

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Abstract

This research aims to prepare skillful physical exercises using the circuit training method to develop some physical attributes and basic skills in tennis. The researcher followed the experimental design due to its suitability with the problem in question; research sample was chosen in the intentional way (purposefully). They are 12 players of Al- Sayd Sports Club who were divided into two equal, experimental and control groups. As soon as the main experiment was performed and tests were conducted, SPSS was used to process the data statistically. Results showed that in the post-tests, the experimental groups scored higher in some physical attributes and basic skills under study than the control group. It is recommended that all coaches should use physical and skill exercises in a circular training manner because of their great and rapid role in developing some physical characteristics and basic skills in tennis due to the diversity of exercises within the training unit and their pairing (physical, skillful) and controlling the players in terms of number and times, performance and rest during group training.

Keywords: Basic tennis skills, circular training technique, skillful physical exercises, physical characteristic.

Introduction

The quick development occurred in all sports has not been a one day progress nor did it happen by chance. Rather, it is the results of effective planning which is based on scientific rule in learning and training.

Teachers, trainers pay more attention in preparing player both physically and mentally. They also focus on teaching them the fundamental of skill performance and the quick, and precise response for their future participating in uplifting the physical and performance skills as well as planning and psychological skills to achieve the best results.

Tennis is one of the important games that began to take on great fame among the circles of popular sports due to the high and interesting level the players presented. Such efforts came as a result of the use of modern training or educational techniques that are appropriate to the skills of this game.

Circuit training is one of the newly known training methods in the world, and it appeared in the late 50s of this century in England. The credit for introducing circuit training to the field of sports and training goes to both Morgan and Adamson from the University of Leeds in southern England (Othman, 1987).

This type is called circuit training, in which the performance takes place in the form of a circle, that is, the arrangement of the exercises is in fixed stations, then the transition takes place from one exercise to another (Sabri & Al-Katib, 1980). Since tennis has recently required a high level of competition among players, every player has to possess some physical attributes and high skills to keep pace with modern play, which relies on accuracy, speed and strength at the same time.

Accordingly, the importance of this research stems in developing some important physical attributes and basic skills that differentiate between tennis players, in addition to using appropriate techniques and methods to raise the level of their performance in matches. Furthermore, tennis depends mainly on a set of physical attributes like, speed, endurance, and strength), and the main basic skills like serving, fronthand ground strike, backhand ground stroke.

The research problem was determined through self-observation and the researcher's experience, in addition to personal interviews with the club's coaches. He concluded that the players of the Al-Sayd Sports Club need to develop some physical skills like speed response (transitional movement), strength endurance (for the two legs), flexibility of (trunk) and basic skills like serving, front ground strike, back ground strike to raise their physical and skill level to achieve better results.

Hence, the researcher sought to prepare skillful physical exercises in a circular training manner to develop some physical attributes and basic skills in tennis for the members of the research sample.

Research Objectives

It aims at:

1. Preparing skillful physical exercises in a circular training manner to develop some physical attributes and basic skills in tennis.
2. Identifying the effect of physical and skill exercises using circular training method in developing some physical attributes and basic skills in tennis

Research Hypotheses

1. Statistical significant differences are noticeable between the pre and post-test in some physical attributes of the control group to the post.
2. Statistical significant differences are noticeable between the pre and post-tests of the control group in some basic skills attributed to posttest.
3. Statistical significant differences are noticeable for the post-test in some physical attributes between pre and post-test of the experimental group.
4. Statistical significant differences are noticeable between pre and post-tests of the experimental group in some basic skills attributed to posttest.
5. Statistical significant differences are noticeable between the pre and post-test in the control group and experimental in physical attributes attributed to the intervention.
6. Statistical significant differences are noticeable between the pre and post-test in the control group and experimental in some basic skills attributed to the intervention.

Circuit training

Circuit training is an organizational method for performing exercises with or without a tool in which certain conditions are taken into account for selecting exercises, the number of repetitions and intensity, and inter-rest times. Circuit training can be formed using the foundations and principles of any of the different training methods in order to develop physical and skill traits (Hara, 1990).

Methods

Research design

Based on the research problem, the research design will be selected. In this study, the research obtains the experimental design which is considered as one of the high efficient approach for researching reliable finding (Van Dalen, 1973). Likewise, the research obtained experimental research by designing two homogenous control and experimental groups in tackling the research problem and reached the hoped results. This study was pertained on Al-Said club players from Oct 1, 2022 into Dec 1, 2022 on Al-Said Club playgrounds.

Sample

The research community includes all the 12 Al-Said club players; they were divided into two equal and homogeneous group each with 6 players. They were divided randomly by lot. The research sample homogeneousity was calculated as shown in Tables 1-7.

Table 1 Sample homogeneousity with research variables

Variables	Measurement unit	Mean score	Median	Standard deviation	Skewness
Age	Year	25.33	26.50	0.547	0.00
Length	Centimeter	178.00	179.00	1.41	0.00
Weight	Kilogram	70.00	171.50	1.36	0.00
Training age	Year	22.00	23.50	1.70	0.00

Table 2 The Mann-Whitney test of the experimental and control groups results in motor response.

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
2.5	2.2	Second	6.50	6.50	18	1.000	Not significant
2.9	2.4						
1.9	2.6						
2.1	2.2						
2.8	2.0						
2.14	2.7						

Table 3 The Mann-Whitney test of the experimental and control groups results in endurance of legs

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
22	26	Number	6.17	6.83	16	0.744	Not significant
25	22						
28	28						
28	25						
26	24						
25	27						

Table 4 The Mann-Whitney test of the experimental and control groups results in endurance of legs

Control group	**Experimental group**	**Measurement unit**	**Ordinal median Experimental group**	**Ordinal median control group**	**Mann-Whitney Test**	**Sig**	**Value**
57	55	Centimeter	**6.00**	**7.00**	**15**	**0.627**	**Not significant**
59	57						
54	60						
58	55						
59	59						
63	58						

Table 5 The Mann-Whitney test of the experimental and control groups results in strength and preciseness of the skill

Control group	**Experimental group**	**Measurement unit**	**Ordinal median Experimental group**	**Ordinal median control group**	**Mann-Whitney Test**	**Sig**	**Value**
83	83	Degree	**6.67**	**6.33**	**17**	**0.872**	**Not significant**
80	80						
75	75						
73	73						
72	72						
84	84						

Table 6 The Mann-Whitney test of the experimental and control groups results in strength and preciseness of front ground strike

Control group	**Experimental group**	**Measurement unit**	**Ordinal median Experimental group**	**Ordinal median control group**	**Mann-Whitney Test**	**Sig**	**Value**
34	33	Degree	**6.67**	**6.33**	**17**	**0.870**	**Not significant**
33	36						
36	35						
37	33						
30	32						
33	37						

Table 7 The Mann-Whitney test of the experimental and control groups results in strength and preciseness of back ground strike

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
28	27	Degree	**6.83**	**6.17**	**16**	**0.746**	**Not significant**
24	25						
23	25						
23	22						
24	20						
24	27						

Data collection

Previous studies and resources
Interviews with specialists and professions
Physical and skill tests

Research tools used

Tennis court, 6 rackets, 30 basketballs, 8 sensors for developing response speed, whistle, stopwatch, stationery, 2 dumbbells, 6 floor mats, signs, medical ball.

Equipment used

(DELL laptop.

Tests

Nelson's test for the transitional motor response (Allawi & Radwan, 1988).
Endurance test for the two legs: (Al-Shamaa, 1998).
Test of bending the trunk forward from sitting (Hassanein, 1995).
Testing the accuracy and strength of the serve stroke skill: (International Tennis Federation, 2004).
Testing the accuracy and strength of the fronthand and backhand ground strikes in tennis:(International Tennis Federation: 2004).

Exploratory experiment

The exploratory experiment was conducted on Saturday corresponding to 1/10/2022 at 2:00 pm on 6 players from the Al- Sayd Sports Club in the youth category and on the club playgrounds. The exploratory trial aimed to identify the obstacles and difficulties that may face the researcher during the test in the main experiment is on players. It aimed also at knowing the efficiency of the assistant work team and the research tests, Still it aimed at checking the appropriateness of the exercises and testing for the participants.

Pre-tests

The pre-tests were conducted on the tennis player, at 2:00 pm on Feb 10, 2022. The tired as much as possible to control the variables in terms of time, place, and the assistant team hoping them in the post-tests to remain the same.

The Main Experiment

The main experiment included the implementation of the training units design for the experimental group (Appendix 2) starting from Monday 10/3/2022 and under the supervision of the researcher. As for the control group players, they apply the same previous training without any interference. The number of training units for the entire research period amounted 24 training units, three days a week (Sunday, Tuesday, Thursday) at a rate of 60 minutes per training unit.

Post-tests

The post-tests were conducted on the players at 2:00 pm on December 1, 2022. The researcher was keen to provide similar conditions to those occurring at the pre-tests in all respects, temporal and spatial, and the assistant team in order to identify the extent of the improvement that occurred on the skills under study exclusively on the independent variable.

Data analysis

The SPSS was used to process the results of the tests. Both descriptive and inferential statistical tests were performed including mean score, and Mann-Whitney Test to check the effect across pre/posttests, and control/experimental groups.

Results and Discussion

Table 8 Results of the Mann-Whitney test of experimental group the pre and posttest in motor response

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
1.2	2.2	2.35	1.21	0.027	Significant
1.0	2.4				
1.1	2.6				
1.7	2.2				
1.1	2.0				
1.2	2.7				

Table 9 Results of the Mann-Whitney test of experimental group the pre and posttest in strength endurance of the two legs

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
26	36	25.33	33.00	0.027	Significant
22	33				
28	32				
25	34				
24	33				
27	30				

Table 10 Results of the Mann-Whitney test of experimental group the pre and posttest in trunk flexibility

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
55	65	57.33	67.50	0.027	Significant
57	66				
60	68				
55	69				
59	68				
58	69				

Table 11 Results of the Mann-Whitney test of experimental group the pre and posttest in the strength and preciseness of serving skill

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
76	96	78.16	92.66	0.028	Significant
77	91				
80	92				
82	90				
75	92				
79	95				

Table 12 Results of the Mann-Whitney test of experimental group the pre and posttest in the strength and preciseness of fronthand ground strike

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
33	43	34.33	42.66	0.028	Significant
36	44				
35	42				
33	44				
32	41				
37	42				

Table 13 Results of the Mann-Whitney test of experimental group the pre and posttest in the strength and preciseness of backhand ground strike

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
27	37	24.33	37.66	0.028	Significant
25	38				
25	37				
22	39				
20	39				
27	36				

Table 14 Results of the Mann-Whitney test of control group the pre and posttest in motor response

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
2.5	1.8	2.39	1.7	0.046	Significant
2.9	1.7				
1.9	1.6				
2.1	1.5				
2.8	1.7				
2.14	2.4				

Table 15 Results of the Mann-Whitney test of control group the pre and posttest in strength endurance of the two legs

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
22	30	25.66	29.83	0.027	Significant
25	29				
28	30				
28	31				
26	29				
25	30				

Table 16 Results of the Mann-Whitney test of control group the pre and posttest in trunk flexibility

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
57	61	58.33	63.00	0.027	Significant
59	63				
54	60				
58	64				
59	64				
63	66				

Table 17 Results of the Mann-Whitney test of control group the pre and posttest in the strength and preciseness of serving skill

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
83	88	77.83	84.83	0.027	Significant
80	83				
75	84				
73	82				
72	85				
84	87				

Table 18 Results of the Mann-Whitney test of control group the pre and posttest in the strength and preciseness of fronthand ground strike

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
34	36	33.83	37.16	0.027	Significant
33	38				
36	37				
37	39				
30	36				
33	37				

Table 19 Results of the Mann-Whitney test of control group the pre and posttest in the strength and preciseness of backhand ground strike

Pretest	Posttest	Mean Pre-test	Mean posttest	Sig	Value
28	32	24.33	30.16	0.027	Significant
24	30				
23	29				
23	30				
24	29				
24	31				

Table 20 The Mann-Whitney values of the experimental and control groups posttests results in motor response

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
1.8	1.2	Second	4.00	9.00	3	0.015	Significant
1.7	1.0						
1.6	1.1						
1.5	1.7						
1.7	1.1						
2.4	1.2						

Table 21 The Mann-Whitney values of the experimental and control groups posttests results in endurance of legs

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
30	36	Number	9.08	3.92	2.500	0.011	Significant
29	33						
30	32						
31	34						
29	33						
30	30						

Table 22 The Mann-Whitney values of the experimental and control groups posttests results in flexibility of the trunk

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
61	65	Centimeter	9.25	3.75	1.500	0.008	Significant
63	66						
60	68						
64	69						
64	68						
66	69						

Table 23 The Mann-Whitney values of the experimental and control groups posttests results in the preciseness and strength of the serving skill

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
88	96	Degree	9.50	3.50	0.000	0.004	Significant
83	91						
84	92						
82	90						
85	92						
87	95						

Table 24 The Mann-Whitney values of the experimental and control groups posttests results in the preciseness and strength of the fronthand ground strike

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
88	96	Degree	9.50	3.50	0.000	0.004	Significant
83	91						
84	92						
82	90						
85	92						
87	95						

Table 25 The Mann-Whitney values of the experimental and control groups posttests results in the preciseness and strength of the backthand ground strike

Control group	Experimental group	Measurement unit	Ordinal median Experimental group	Ordinal median control group	Mann-Whitney Test	Sig	Value
32	37	**Degree**	**9.50**	**3.50**	**0.000**	**0.004**	**Significant**
30	38						
29	37						
30	39						
29	39						
31	36						

Discussion

Results showed us that the sample is homogeneous in the aforementioned variables (Table 1). Furthermore, the Mann-Whitney test as shown in Tables (2-7), the results of the pre-tests indicated that and the control and experimental groups members are homogenous in physical attributes and basic skills under study. This means that the two groups will start applying the curriculum from one starting point.

The results in Tables (8-13) showed that the results of the Wilcoxon test for the pre and posttests of the experimental group for the physical attributes (motor response speed, strength endurance of the legs, flexibility of the trunk), as well as the results of the main basic skills (serving, the fronthand ground strike, the backhand ground strike) have witnessed a great improvement. The researcher attributes the beyond this enhancement to the physical and skill exercises the researcher prepared and they were carried out throughout the intervention and led to a significant improvement in the two skills. This findings agreed with the findings of (Nassif & Hussein, 1988) who reported level of achievement rises quickly during the use of new exercises that the athlete is not used to.

Similarly, the Wilcoxon test in Tables (14-19), display the results of the pre and posttest of the control group in physical attributes (speed of motor response, endurance of strength for the legs, flexibility of the trunk) as well as the main basic skills (serving, the fronthand ground strike, the backhand ground strike). The results witnessed a noticeable improvement which the researcher attributed the reason for this to the practice and repetition during the training process, which was followed in a good way by the coach, which led to the development of the players' performance. This finding is confirmed by Al-Bakri (2010) that exercise is a group of postures and movements, whether physical or skillful, that aim to shape and build the body, and that its repetition leads to the development of its motor and skill capabilities, which contributes to the individual's access to the highest level of athletic performance.

The Mann Whitney test as Tables (20-25) displayed show a significant superiority in favor of the experimental group over the control in the study variables. Yet the researcher attributes it to the carried out physical and skill exercises that performed in circuit techniques, which helped the players of the experimental group to develop their level in some physical and skillful traits and its superiority over the approach followed by the control group. Sence these exercises focused precisely on the weakness in the physical and skillful aspect of the players of the

experimental group, in addition to using a method that helps the experimental group player to properly ration training loads following the rules and laws, and all of this led to raising the training status and improving the level of physical fitness and skills. Othman (1990) affirmed that circuit training represents a specific system and techniques in training based on rules and laws derived from the study and analysis of the training load used, as well as from the adaptation processes related to it.

Conclusion

Through the results of the research, the researcher reached the most important conclusions and recommendations, which are:

1. The results showed statistically significant differences in some physical attributes and basic skills in the pre and posttests of the experimental group in, in favor of the post tests.
2. The results showed statistically significant differences in some physical attributes and basic skills between the two groups in the posttests, in favor of the experimental group.

Recommendations

1. The necessity to use physical and skill exercises in a circuit training manner by all coaches because of their great and rapid role in developing some physical attributes and basic skills in tennis, in addition to the diversity of exercises within the training unit and their combination (physical, skillful) and controlling the players in terms of number and working and rest times during group training.
2. Using the circuit training method for the purpose of developing physical attributes and other basic skills.

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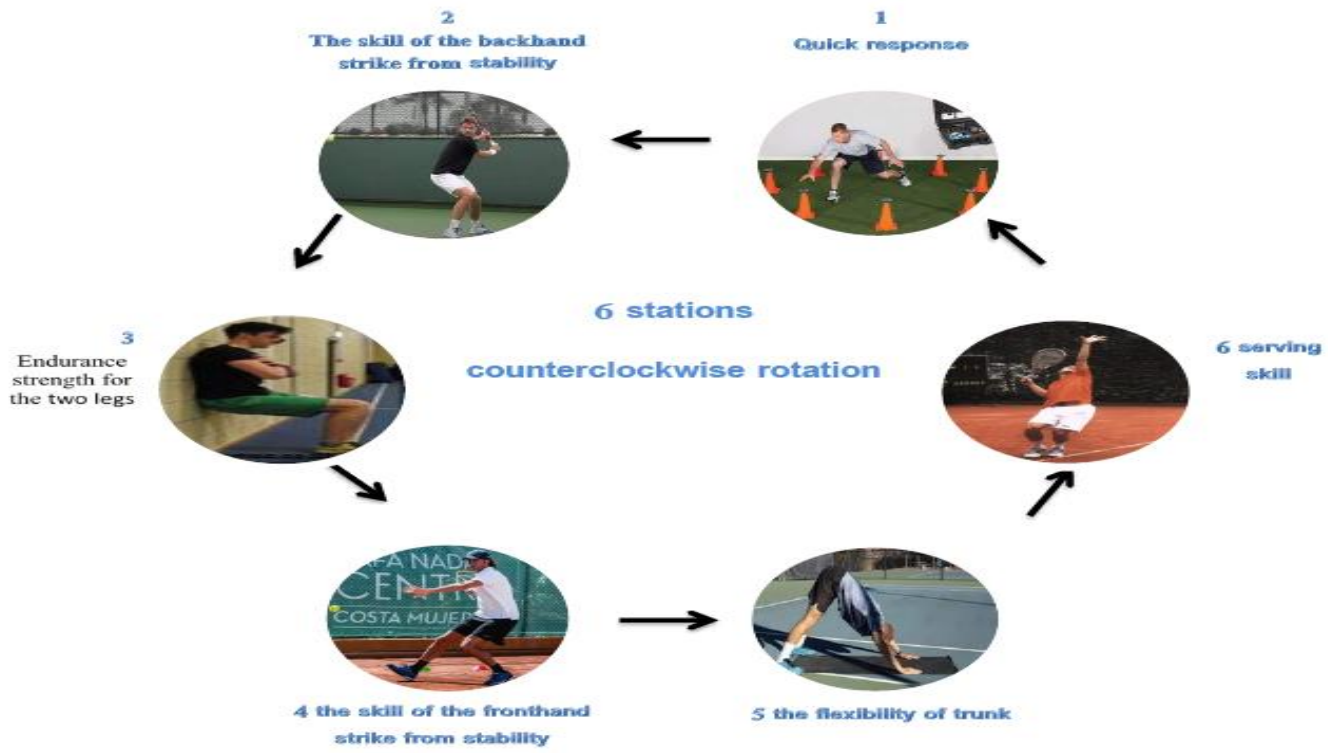
Appendix 1

A model for training circuit training on skillful physical



Appendix 2
A model of training unit no (1)

Day and date: Tuesday 4/10/2022
The training objective / developing (speed of response, strength endurance, flexibility) (serving, fronthand ground strike, backhand ground strike)
Training unit time: 60 minutes Educational objective / persistence and self-confidence
Training method: high-intensity interval training unit intensity: 80%
Number of players: 6
Note /The rest time between stations is the period of movement of the player from one station to another, since the exercise differs in each station in terms of targeting the fine muscle groups.

no	Section	Applied exercises	load components				Performance time inside station	Total training time
			Strength	Size	Relaxing			
					Between stations	Between cycles		
1	Preparatory 20 m	General warming up exercises						15 minutes
		Specific warming up exercises						5 minutes
2	Main 35 m	Exercise 1	80%	5 cycles	Transmission time from one station into another.	5 minutes	30 seconds	30 seconds
		Exercise 2						30 seconds
		Exercise 3						30 seconds
		Exercise 4						30 seconds
		Exercise 5						30 seconds
		Exercise 6						30 seconds
3	Final 5 m	Calming and relaxation exercises						5 minutes