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## A training program with repeated sprint and its effect on the development of some physical and physiological abilities of football players

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### Abstract

The purpose of this paper is to the effect of repeated Sprint training on physical abilities, and the effect of repeated Sprint training on physiological abilities. The researcher used the experimental method to suit the nature of the research, by designing a program for one experimental group using pre-measurement and post-measurement and its effect on football players. The research sample represents football players in Wasit Governorate (Kut Sports Club), numbering 15 football players, where the researcher conducted pre-measurements and post-measurements on them, and 11 players were selected to perform the exploratory experiment. So that the total number becomes 26 football players (basic sample - exploratory sample). One of the most important results reached by the researcher is that: Capacity is developed in all its types when continuing to apply the experimental method used (repeated speed) for football players, and used program (repeated speeds) increases the agility element. One of the most important recommendations recommended by the researchers is that: necessity of developing the speed element for football players by applying the repetitive speed program, and necessity of introducing training programs that contain high speeds.

**Keywords:** Repeated sprint training, physical abilities, physiological abilities

### Introduction

Physical abilities and physiological abilities are considered a basic pillar in all different sporting events in general, but in football in particular, where a lot of work is focused on them to reach victory in the match, this is what the coach sees and the player feels inside the stadium, as the game of football consists of 90 minutes of work and effort, and some time can be added according to the general conditions of the match, so it needs a lot of physical and physiological abilities. also mentions that each sporting event has its own physical and physiological work to implement the skill and planning work for this event, so when working on training for such an activity, it is necessary to take into account the requirements of the work in the type of exercises that focus or aim to do the athlete's activity that focuses on using the muscle group for a harmonious physical performance. (Emad El-Din Abbas Abu Zeid. 2007) <sup>[3]</sup>.

As Ibrahim Hamed (2017) <sup>[4]</sup> shows, the distance covered in a football match and what it contains of repetitions and high Sprint s through circumstances that may be intentional or through a circumstance that the group passes through are considered basic indicators that the coach works on to lay the correct foundations in addition to using advanced technological devices that can be used through this work to reach physical and functional requirements that express the player's condition on the field and on which the football player depends during the match (Ibrahim Hamed 2017) <sup>[4]</sup>.

The processes of subjecting the athlete's body to perform high physical effort during periods of applying football training programs may greatly affect the physiological state and external body measurements through which it can affect the state of clear achievement and increase its efficiency by working on repeating high or near-maximum Sprint s for a short period with small rest periods.

Football training requires various physical fitness elements, the most important of which is the Sprint element in its various degrees, as the football player needs it when he possesses the ball in the attacking position and after losing it in the defense phase.

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Regarding the importance of this study, as most football coaches focus on training programs that do not have enough to fully develop the Sprint element in all stages and conditions of the game, i.e. when the team possesses the ball in the attack or loses it in the defense phase, as well as when the player changes the direction of his body during the change in the direction of the ball, and this is considered one of the most important things that a football player is exposed to. Also, the importance of the study is that Sprint is functionally linked to the football player and working to know the extent of the impact of this Sprint on the player's physiological condition.

### Research problem

One of the most prominent problems that football players suffer from is continuing to perform successive Sprints in short times and for long periods. Also, some coaches cannot address such problems that can hinder the player at a moment's notice to reach an achievement, so some football coaches do not focus on this type of training, and it is noted that there is a major defect in the defense process as well as the attack and the player's path changes at high Sprint. The functional status is unstable when performing a fast physical effort for short periods of time and is somewhat clear, so the researcher worked on a training program through which repeated Sprint can be developed in a short time, through which its physical and physiological impact on football players.

### Research objective

The research objectives to develop the physical and physiological abilities of football players through

- The effect of repeated Sprint training on physical abilities.
- The effect of repeated Sprint training on physiological abilities.

### Research hypotheses

- There are statistically significant differences between the pre- and post-measurement in physical abilities.
- There are statistically significant differences between

the pre and post-measurement in physiological abilities.

### Research fields

- **Human field:** First Division Football Players (Al-Kut Sports Club).
- **Time field:** (3/3/2024) to (8/5/2023).
- **Spatial field:** Olympic Football Stadium (Al-Kut Sports Club).

### Terms used

#### Repeated Sprint Ability

It is a method used to repeat high-intensity Sprint in several shapes (straight - zigzag - shuttle) and continues for seconds or more with rest periods in between (Buchheit, M. & Ufland, P 2011) [2].

### Research methodology and field procedures

#### Research Methodology

The researcher used the experimental method to suit the nature of the research, by designing a program for one experimental group using pre-measurement and post-measurement and its effect on football players.

### Community and sample research

The research sample represents football players in Wasit Governorate (Kut Sports Club), numbering 15 football players, where the researcher conducted pre-measurements and post-measurements on them, and 11 players were selected to perform the exploratory experiment. So that the total number becomes 26 football players (basic sample - exploratory sample)

### Sample selection conditions

- Regular training without interruption
- All players are not injured
- The training age of the players should not be less than 6 years
- Providing all the capabilities to perform the research experiment

### Homogeneity of the research sample

**Table 1:** Statistical description of the research sample for the variables (age - height - weight - training age)

Variables	Measuring unit	Mean	Std. Deviations	Median	Skewness
Age	Year	19.57	0.19	19	1.88
Length	Cm	1.72	0.05	1.73	0.78
Weight	Kg	71.32	3.74	70.30	0.84
Training Age	Year	6.54	0.64	7	-1.78

Table (1) shows that all values of the skewness coefficients for the research sample individuals ranged between (1.88 - -1.78) for the variables (age - height - weight - training age). The table indicates that the research sample is within the moderate curve, meaning that the research sample individuals are homogeneous.

### Data collection methods

- Research sample information registration form.
- Form for collecting the results of the special tests.

### Devices and tools used

- Medical scale
- Restameter

- Measuring tape
- Football field

### Research measurements

- Speed.
- Agility.
- Ability to repeat the speed.
- Pulse
- Maximum oxygen consumption.

### Special tests for research variables

1. Sprint for a distance of 30 meters.
2. Agility test.
3. Ability to repeat the speed test.

4. Pulse.

5. Maximum oxygen consumption.

**Table 2:** Descriptive Statistics of Sprint and Physical Performance Tests for Football Players

Tests	Unit of measure	Mean	Std. Deviations	Median	Skewness
30 m sprint	Second	5.47	0.08	5.12	-0.54
20 m zigzag sprint	Second	3.95	0.07	3.74	-2.41
Speed loss rate	%	7.02	1.24	7.01	-0.11
Total test distance	Meter	1080	200.54	1141	-2.01
Pulse after maximal effort	Pulse/min	184.04	4.41	184	-0.43
Maximum Oxygen Upture	Milliliter/kg/min	46.33	0.97	46.62	-0.63

It is clear from Table (2) that all values of the skewness coefficients for the research sample ranged between (-2.41 - -2.01) in physical and physiological abilities and were limited to (-3 - +3), which indicates that there is homogeneity among the individuals of the research sample in the variables (physical - physiological).

**Exploratory study**

The researcher conducted the exploratory study to ensure the safety of the devices and tools and the suitability of the tests referred to in the scientific references, as the researcher conducted the exploratory study for two days, 3/3/2024 - 6/3/2024.

**Basic research experiment**

**Preparing the rehabilitation program:** By referring to the references and scientific theses, the researcher designed a training program using the repeated speed method.

**Rehabilitation program:** A rehabilitation program was prepared with the aim of developing the physical and physiological abilities of football players.

Content of the rehabilitation program

- Duration of the rehabilitation program 8 weeks
- Number of training units 4 units per week
- Time of the training unit (20-30 minutes)
- Load levels (medium - high - maximum) during the program implementation period.

**Table 3:** show the distribution of training load levels for training weeks

No	load levels	Load degree	number of weeks	Total Size	
				Time	Percentage %
1	medium	50- 59%	3	182	32.5%
2	high	75- 85%	3	220	38.2%
3	maximum	90-100%	2	234	26.24%
Total	super high	85-95%	8	488	100%

**Pre-measurement**

The researcher conducted the pre-measurements on the research sample on 3/6/2024.

**Implementation of the rehabilitation program**

After taking the results of the pre-sample tests, the researcher conducted the experiment on the research sample of football players for a period of 8 weeks, with 4 training sessions per week, from 7/3/2024 to 6/5/2024.

**Post-measurement**

After completing the application of the basic experiment and

implementing the program, the researcher conducted the post-measurement with the same conditions as the pre-measurement on 8/5/2024.

**Statistical treatments**

1. Arithmetic mean.
2. Standard deviation.
3. Coefficient of skewness.
4. T-test.
5. Improvement rate.

**Results and Discussion**

**Table 4:** Comparison of Pre- and Post-Measurement Results for Sprint and Physical Performance Tests with Improvement Rates

Tests	Unit of measure	Pre-measurement		Post-measurement		T value	Improvement rate %
		Mean	Std. Deviations	Mean	Std. Deviations		
30 m sprint	Second	4.16	0.05	3.98	0.03	*4.441	6.39
20 m zigzag sprint	Second	3.21	0.04	3.01	0.05	*4.521	11.65
Speed loss rate	%	5.23	1.01	3.45	1.00	*3.145	41.23
Total test distance	Meter	1014	199.24	208.63	197.21	*3.232	0.99
Pulse after maximal effort	Pulse/min	179.42	3.22	174.32	4.32	*2.104	3.02
MAXIMUM OXYGEN UPTURE	Milliliter/kg/min	41.16	0.69	44.02	0.91	*5.325	7.05

Table (4) shows the percentage of improvement in the measurements of the research variables for the sample in the physical and physiological variables, where the best and largest percentage of change between the pre- and post-measurement after applying the program was in the speed variable, which reached 41.23%, then agility, where the amount of change was 11.65%, then the percentage of

change in the maximum oxygen consumption, where the improvement value reached 7.05%, then the number of heartbeats or pulse rate 3.03%.

**Discussion of the Results**

It is clear from Table (4) that there are significant differences at the 0.05 level between the pre- and post-

measurements of the speed variable, where the calculated t value reached \*4.441, which is higher than the tabular t value of 2.131. The table also showed that there is a difference in improvement between the arithmetic averages in speed, which reached 6.39%. These results are consistent with the results of Gerard's study (2011) that repeated speed training works to raise the individual's physical efficiency and the speed element in particular for football players (Gerard: p. 688). As shown in Table (4), there are statistically significant differences between the pre- and post-measurement in the agility test, as the calculated t value reached \*4.521, which is a higher value than the tabular t value, which is 2.131. Also, the percentage of improvement among football players when applying the program reached 11.65. The researcher attributes this improvement between the pre- and post-measurements to the fact that the repeated speed training program works to increase the agility element because it contains high-speed exercises of all kinds, and through them it works on the general agility of the body. It is clear from the above table (4) in the rate of speed loss (fatigue index) that there are statistically significant differences between the two pre-post measurements, as the calculated t value reached \*3.145, which is higher than the tabular t value, which is 2.131. Also, the percentage of improvement among football players in speed repetition and fatigue resistance reached 41.23%. This is consistent with what was indicated by "that the body's muscles and nervous system work to resist repetition of speed through the work of the muscles on metabolic processes, which in turn work to speed up metabolic processes to reach recovery in the shortest possible period of time while practicing large training loads for long periods (Villanueva. A. & Bishop. D. 2011) [7].

As the table above shows, the heart rate and maximum oxygen consumption with significant differences between the two pre-post measurements and the percentage of change for them was (pulse by 3.02% - and maximum oxygen consumption by 7.05%) and this clear effect is the result of repeated speed training, as the researcher indicated in this regard that there is a direct relationship between speed training that is practiced within a standardized program that contains elements including speed and the functional status of football players, as it is clear that this improvement is noticeable compared to using normal training.

## Conclusion and Recommendations

### Conclusion

Within the limits of the research sample and the used method, the following conclusions were reached:

- Capacity is developed in all its types when continuing to apply the experimental method used (repeated speed) for football players.
- The used program (repeated speeds) increases the agility element.
- The program works to develop the maximum amount of oxygen consumption as one of the aerobic capacities of football players.
- It develops the amount of fatigue loss speed as proven by the study.

**Recommendations:** The necessity of developing the speed element for football players by applying the repetitive speed program.

- The necessity of introducing training programs that contain high speeds.
- Using such programs to develop the individual's physiological capabilities to obtain better functional indicators.

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## Appendix (1)

### Research Tests

#### 30-meter sprint test

- Test objective: Measure the player's transitional speed.
- Tools: Football field - Draw the beginning and end of the 30 meters.
- Performance method: The player stands at the starting line in a high-ready position to start. When the whistle is heard, the player runs as fast as possible until he crosses the finish line. The player takes three attempts with a sufficient rest period between them.
- Recording: The best time for the three attempts is recorded. (Mohamed Sobhi Hassanein: p. 41)

#### Agility test: 20-meter zigzag run

- Test objective: Measure agility through running and changing direction
- Tools: Stopwatch - Five legs fixed to the ground - Footballs - Football field.
- Performance method: The player stands in a high-start position. When the whistle is heard, the tester runs zigzag between the five legs three times.
- Recording: The tester's performance time is recorded and the performance time is calculated from the three attempts.

#### Cooper's test to measure maximum oxygen consumption

- The purpose of the test: to measure maximum oxygen consumption

- Scientific parameters of the test.

**Maximum oxygen consumption = distance - 504.9/44.73 ml/kg/min**

#### Tools

- Stopwatch
- Pens and notebooks
- Cones
- Whistle
- Calculator

#### Test description

- The subjects are divided into groups, each group should not be less than 4 subjects

- The subjects take a ready position behind the starting line, and when the starting signal is given, the subject sets off to complete the largest number of laps around the track for 12 minutes until the end of the 12 minutes is announced.
- When the timekeeper announces the end of the (12) minutes, the recorder counts the laps and parts of a lap for each tester for (12) minutes.

**Calculating the score:** After the end of the (12) minutes, the timekeeper blows a whistle. Each tester stands and calculates the distance to the nearest meter, which is the tester's score

#### Training unit model

Content	Time	Training intensity	Training volume	Expected Pulse	comfort contrast	General comfort
Strength training and running Burpees Free squats	6 minutes	50%	3x8	110-115Pulse/min		
Circuit training station, each station lasts 3.5 minutes Pull-ups Abdominal exercises Rubber rope exercises	30 minutes	75%	3x10	165-160 Pulse/min	25 second	25 second
Cardiovascular endurance exercises	60 minutes	60%	1	120-125Pulse/min		
Stretching and cooling down	4 minutes	Stability	/	/	/	/