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The effect of high-intensity interval training (HiiT) on developing speed types among first-class referees in the Iraqi football league

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Abstract

Speed is a key element in football referees' performance. It enables them to respond effectively to challenges and pressures in matches, increasing their chances of success. Therefore, football referees must work hard to develop this crucial trait to achieve outstanding performance on the field. Numerous studies and field reports indicate that there is a disparity in the speed level of first-class referees in the Iraqi Football League, which may affect the quality of their refereeing performance. Traditional training methods may not be sufficient to develop this vital skill, hence this problem emerged. One of the most important reasons may be the lack of exercises that develop speed types among first-class referees. The purpose of this paper is to identify the effect of high-intensity (HIIT) exercises on developing speed types (kinetic response speed, transition speed, and rapid power) on (9) first-class referees in the Iraqi Football League. The researcher conducted the main experiment for (7) weeks. High-intensity (HIIT) exercises were applied, and post-tests were conducted. He concluded that the use of high-intensity (HIIT) exercises develops speed. recommended the necessity of implementing these exercises.

Keywords: High-intensity (HIIT) exercises, speed types, football referees

Introduction

Refereeing is essential in football, as referees are responsible for maintaining the game and leading it to safety. Football referees have a distinct role to play during times of high pressure or decisive moments in matches. The importance of the referee's role in football cannot be overlooked. It is the safety valve of matches, and physical fitness is a crucial factor in the performance of football referees, as the refereeing role requires high stamina and quick response to changing movements on the field. Football is one of the most dynamic and fast-paced sports, requiring referees to be able to keep up with player movements and make accurate decisions at crucial moments. With the increasing pace of matches and the rising level of competition, developing referees' physical capabilities has become essential to ensure their effective performance. "A match referee covers an average distance of 12 kilometers during a 90-minute match, of which 5-6 kilometers is sprinting for distances ranging from 120-150 meters at near-maximum speed or at maximum speed for 30-60 meters, which is equivalent to 2-1 kilometers. The remaining distance ranges from jogging to walking at other times (Alaa Abdul Qader, 2011) ^[1] (Radhi & Obaid, 2020) ^[7]. Among these abilities, speed stands out as a crucial factor that enables the referee to be in the correct positions on the field, which helps him make accurate and fair decisions. As the game evolves and its pace increases, it has become necessary to improve the physical capabilities of referees to ensure they are able to make the right decisions at crucial moments. Speed in its various forms such as transition speed, quick strength, and quick response is essential for referees to stay in the right positions to monitor the course of play effectively. Many referees work to develop it. Short bursts of high-intensity exercise are interspersed with rest or lower-intensity activity in the training technique known as high-intensity interval training (HIIT). This technique is used to boost anaerobic capacity, enhance cardiorespiratory fitness, and efficiently burn calories in a brief amount of time (Shaker, Tuama, & Radhi, 2022) ^[9]. It is a modern method that has proven effective in improving physical abilities, as it relies on short periods of intense exercise interspersed with active rest periods, which contributes to

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developing cardiorespiratory endurance, muscular strength, and rapid response. Given the importance of these variables in refereeing performance, the importance of this study is highlighted by its exploration of the effect of HIIT exercises on developing speed types among first-class referees in the Iraqi Football League, which contributes to raising their level of performance in officiating matches. Football referees and physical trainers can benefit from the results of this study in designing more effective training programs that contribute to improving referees' physical performance, which positively impacts their performance during matches. This study will also enrich knowledge about the impact of high-intensity interval training (HIIT) on referees' physical abilities, particularly in the area of speed development, providing a reliable scientific basis for referee physical preparation programs (Shalan, Aboode, & Radhi, 2022) [8].

Research Problem

Speed, in its various forms, is a crucial factor in improving the performance of football referees. It directly impacts their ability to monitor the flow of play and make correct decisions. This is one of the most important qualities football referees must possess. With the significant development of modern football and the increased pace of matches, referees are now required to maintain a high level of physical fitness. Improving referees' speed, in its various forms, helps them position themselves in the appropriate positions on the field, contributing to more accurate decisions and reducing refereeing errors. Despite the importance of speed in referees' performance, numerous studies and field reports indicate variations in the speed levels of first-division referees in the Iraqi Football League, which may affect the quality of their refereeing performance. Furthermore, traditional training methods may not be sufficient to develop this vital skill, calling for the search for more effective training methods. Hence, the following are the root causes of the research problem main question:

What is High-intensity interval training's (HIIT) impact on growing speed types among first-division referees in the Iraqi Football League? This study aims to provide scientific and practical solutions to develop the speed of football referees using HIIT exercises, which may contribute to improving the quality of refereeing in the Iraqi Football League.

Research Objectives

- To identify high-intensity interval training (HIIT) exercises and speed types (kinetic response speed, transition speed, and rapid power).
- To identify the impact of activities involving high-intensity interval training (HIIT) on developing speed types (kinetic response speed, transition speed, and rapid power) among first-class referees in the Iraqi Football League.

Research Theories

- Between the pre- and post-tests, there are hypotheses with statistical significance regarding kinetic response speed, transition speed, and rapid power among first-class referees in the Iraqi Football League.

Research fields

- **Human field:** (9) first-class referees in the Iraqi Football League.
- **Time field:** (3/1/2025) to (13/2/2025)
- **Spatial field:** Ministry of Youth, Ali Hussein Stadium

Methods of Research and Field Operations

Research Techniques

Because the experimental approach was appropriate for the problem's nature, the researcher employed to be solved.

Research sample community

The research sample was deliberately selected using a single-sample method, and consisted of (9) first-class referees in the Iraqi Football League.

Table 1: The research sample's homogeneity as determined by the skewness coefficient in the examined tests.

No.	Variable	Unit of measurement	Arithmetic mean	±standard deviation	The mediator	Twisting
1	Right response speed	Second and its parts	1.726	0.073	1.720	0.256-
2	Left response speed	Second and its parts	1.812	0.077	1.79	0.291-
3	Transitional speed	Second and its parts	4.518	0.067	4.50	0.579
4	Speed force	Number	11.444	0.527	11.0	0.271

Data Collection Methods: Research Tools and Equipment Used

Data Collection Methods

- Arabic and foreign sources and references.
- Tests and Measurements
- Observation and Experimentation.

Tools and Devices Employed:

- Electronic Calculator
- Indicators
- Barriers of Different Heights
- Jumping Boxes
- Weights
- Electronic Time Clocks

Research Procedures:

Tests Used in the Research:

Leg Kinetic Response Speed Test (Muhammad Subhi

Hassanein, 2000) [2]

- **The test's objective** is to assess the legs' kinetic response speed.
- **The tools** utilized were a stopwatch and a tape measure.
- **Specifications for the test:** The center line is 1 m, and two side lines are drawn 6.4 m apart. The coach stands in front of the goalie, who is positioned on the center line. He lifts the stopwatch-wielding hand. He runs in the direction the coach indicates when he is signaled to one side, and vice versa for both directions.
- **Recording:** It is computed how long it takes from the signal till the goalie crosses the side line entirely. With a 20-second break in between each try, each goalie gets 10 chances in both directions. The best effort is noted.

30m Running Test from a Moving Start (Abdul Rahman Nasser, 2004) [1].

- **Test objective:** To measure transitional speed.

- **Equipment:** Stopwatch - Three parallel lines. The first represents the start line, the second represents the speed measurement line, 10m from the first line, and the third represents the finish line, 30m from the second line.
- **Test description:** The subject stands behind the first starting line from a standing position. At the start signal, the subject runs, attempting to reach maximum speed at the second starting line. They continue running at maximum speed until they cross the third line.
- **Recording:** The time in seconds is recorded from the start of the second line until the moment they cross the third line.

Rapid Strength Test (Sit-Up-Jump Test) (Kadhim Al-Rubaie, Muwaffaq Al-Mawla) [4]

- **Test objective:** To measure the rapid strength of the leg muscles.
- **Test description:** From a long sitting position, the player rises from this position to jump up in the air, extending his knees, then returning to the initial position for (30) seconds.
- **Recording:** The number of jumps is counted for (30) seconds.

Exploratory experiment

The researcher conducted a pilot experiment on January 3, 2025, on a sample of (3) judges prior to implementing the program. They had not benefited from the main experiment. The purpose of the pilot was to:

- Ensure the ease of preparing and implementing the tests.
- Identify the time required to complete the tests.
- Observe the extent of the examinees' response to the test.
- Observe the suitability of the support staff.

Pre-tests

Pre-tests were performed on the research sample by the investigator, which consisted of (9) referees, on January 5, 2025, at 3:00 PM, at the Ministry of Youth Stadium (the late Ali Hussein). The researcher explained how to conduct the tests and their order, and the (10)-minute rest period between tests.

Training Methodology

The researcher conducted the main experiment on Tuesday, January 7, 2025, and concluded it on Tuesday, February 18, 2025. For a period of (6) weeks, HIIT, or high-intensity interval training, was used. Short bursts of high-intensity exercise are interspersed with rest or low-intensity activity in this integrated, supplemental training regimen. This technique is used to boost anaerobic capacity, enhance cardiorespiratory fitness, and efficiently burn calories in a brief amount of time. - Work intervals: These ranged in duration from 20-60 seconds at maximum effort. They included exercises such as sprinting, jumping, weighted resistance exercises, or bodyweight exercises such as squats and push-ups.

- **Rest intervals:** These were short, ranging from 10-60 seconds, and could be passive (complete rest) or active (such as light walking or slow jogging).
- **Repetitions:** These could range from 4-10 repetitions depending on the individual's goal and fitness.
- Groups were set to consist of 2-6 sets for each exercise.
- These exercises were performed over two sessions per week.
- The primary experiment's training session count was 13.
- Every exercise was done at 90% to 95% intensity.
- Appendix (1) shows a sample of the exercises.

Post-tests

On Thursday, February 20, 2025, the researcher and the support staff administered the post-tests to the research sample in the same manner as the pre-tests.

Statistical Methods

The researcher used statistical methods through the Statistical Package for Social Systems (SPSS) and the relevant statistical laws, namely:

- Arithmetic mean
- Median
- Skewness coefficient
- Normal deviation
- To ascertain the significance of mean differences for related samples, use the T-test.

Presentation, Analysis, and Discussion of Results

The differences between the pre- and post-tests are presented, analyzed, and discussed:

Table 2: Demonstrates how the arithmetic means, standard deviation, computed t-value, and significance of the variations between the two test results differ: Tests before and after:

Test	Mean	Standard deviation	Mean	Standard deviation	Arithmetic mean of difference	Standard deviation of differences	Calculated t value	level sig	Type sig
Right response speed	1.726	0.073	1.658	0.05	0.067	0.038	5.350	0,001	Sig
Left response speed	1.812	0.077	1.736	0.064	0.074	0.034	6.605	0,000	Sig
Transitional speed	4.518	0.067	4.443	0.074	0.075	0.051	4.380	0,002	Sig
Speed force	11.444	0.527	12.33	0.50	0.888	0.60	4.438	0,002	Sig

Analysis of the findings about the variations between the pre- and post-tests

There are notable disparities between the pre- and post-tests, favoring the post-test group, according to an analysis of the study group's data in Table (2). The effectiveness of high-intensity interval training (HIIT) is credited by the researcher for this outcome. exercises, which is an integrated, complementary training system that effectively

improves the physical and skill capabilities of referees through the quality of these exercises. (High-intensity interval training (HIIT) contributes to the development of transition speed, response speed, rapid strength, explosive power, and agility, which enhances the overall performance of athletes. In addition, HIIT improves the body's metabolic capacity, making it more efficient in utilizing energy.) (Muhammad Shabram Alwan. 2021) [5]. Since these

exercises help raise the level of kinetic abilities capable of achieving excellence and positive results, they can improve speed and physical performance. HIIT exercises have also contributed to improving endurance and cardiorespiratory fitness, which may lead to increased speed in athletes. “We find clear differences between the speeds of the referees, and speed is linked to all other elements of physical fitness in an effective way” (Alaa Abdul Qader, 2011) ^[1] as it combines more than one element in a single exercise, namely (speed, agility, and sprint speed), which are the most important components of the kinetic abilities of these exercises, which is to improve anaerobic abilities. Since high-intensity (HIIT) exercises are the primary means used during the training program and influence the functional levels of the human body’s systems and organs to achieve progress in them, which resulted in the referees having a physiological adaptation similar to the conditions of the tests in terms of distance and rest, which caused the process of functional imprinting of the cyclic and respiratory readiness through the many repetitions of the exercises, which is necessary to raise the athletic level. This is consistent with what (Haider Nima) ^[6] indicated that “choosing the appropriate training method to develop any physical or skill characteristic is one of the most important factors in the development of the athlete and the advancement of his level.” (Haider Abdul Qader Nima, 2014) ^[1] Training on the situations that he may encounter while leading the match is extremely necessary to become one of his behaviors for development and improving his level of performance, through the process of retrieving the situations This was reflected in the post-test results, which were logical.

Conclusion and Recommendations

Conclusion

- The study results showed that high-intensity interval training (HIIT) had a positive impact on developing the speed characteristics of first-class referees in the Iraqi Football League.
- The speed of kinetic response among referees was significantly improved, enhancing their ability to react quickly to events in matches.
- An improvement in transitional speed was observed, contributing to the referees' ability to move quickly between different positions on the field.
- The implementation of HIIT exercises increased the referees' speed strength, enabling them to execute powerful and rapid movements during matches.
- The study confirmed that the regular use of HIIT exercises enhances the physical performance of referees and helps them cope with the physical and mental pressures of matches.

Recommendations and Suggestions

- It is recommended that high-intensity interval training (HIIT) exercises be implemented as part of the regular training program for first-class referees in the Iraqi Football League to improve their speed characteristics.
- It is preferable to designate special training programs for football referees that focus on developing various types of speed, such as kinetic and transitional response speed, and quick power.
- Periodic tests should be conducted to measure and analyze the development of speed in referees using

precise scientific methods to determine the effectiveness of the training programs.

- The results of the study on high-intensity interval training (HIIT) should be disseminated to the Football Referees Development Committee.
- The need to develop and implement exercises based on new ideas for first-class football referees.
- Conduct similar studies on basketball referees.

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Appendix (1)

Some Models of High-Intensity Interval Training (HIIT)

- Using short-term sprinting (20 m, 30 m, 50 m, and 60 m)
- Using agility exercises (sprinting between posts)
- Using agility exercises (sprinting with a change of direction)
- Using jumping, rotating, and then launching exercises
- Using forward, backward, and sideways bounce jumping exercises
- Using forward and sideways jumping over a barrier and then launching exercises
- Using ground ladder exercises

- Using take-off, knee-raising, and jumping and then launching exercises
- Using different-distance launches to develop linear speed