Examination of Various Physical Parameters of Football Referees Officiating in Different Categories

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ABSTRACT

The objective of this study is to determine the differences in various physical parameters among football referees officiating in different categories. To this end, 30 Elite Level Referees and 30 Provincial Referees actively serving in Istanbul province were included in the study. To assess the physical characteristics of the referees, measurements of height, body weight, and body fat percentage were conducted. The referees participating in the research underwent sprint tests (20 m, 30 m), T-test for agility, and jump tests. These tests were administered over four separate days, with a minimum interval of two days between sessions. In analyzing the obtained data, the independent samples t-test method was employed to determine the differences between sprint, agility, and jump values, with the significance level set at 0.05. Through this study, the speed, agility, and jumping capabilities of Provincial Referees (PR) and Elite Level Referees (ELR) were assessed and compared. The results indicated no significant differences in the speed, agility, and jumping levels between Elite Level Referees and Provincial Referees.

Keywords: Elite level referees, provincial referees, speed, jumping, agility

INTRODUCTION

Speed can be defined as an individual's ability to move themselves from one point to another at maximum velocity (Sevim 2002). The generation of speed is highly dependent on its application within a short duration and the creation of intensity. The cognitive process, coupled with the contribution of willpower, plays a crucial role in manifesting the ability to achieve movement speed, as the muscular and nervous systems respond at maximum velocity under specific conditions. Furthermore, from a physiological perspective, speed is perceived as a characteristic related to the rapid movement of muscles, contingent upon the efficient functioning of the nervous system, and is defined as the primary kinematic property of motion (Muratlı et al. 2007).

As is well known, speed ability is extremely important for many sports, particularly team sports. In this context, the significance of speed emerges in football as team players strive to gain possession of the ball before their opponents (Bangsbo and Williams 2003). Modern football is now played at a rapid pace, with athletes expected to be increasingly faster. Speed is frequently utilized within the game and stands out as an effective biomotor characteristic in swiftly playing the ball towards the target (Bangsbo and Williams 2003; Moreno, 2019; Lockie, 2020).

The increasing pace of the football game in recent times has made the job more challenging for referees, who must constantly make decisions during play. Intense reactions from supporters, on-field tension, and media pressure are factors that complicate the referees' tasks (Aksu and Arslan, 2020). Referees work under intense pressure to enforce game rules and maintain order during matches (Erdoğan, 2021). The decisions made by referees during a match are frequently criticized and questioned by fans, players, and coaches (Işın, 2023; Koç,

2018). It is crucial for referees to keep up with the increasing tempo of modern football and to be close to the action to better control the game. Consequently, referees are expected to possess advanced speed abilities (Reilly and Williams 2003). When training conditions closely resemble match conditions, the resulting performance on the field becomes more purposeful (Türker and Kahraman, 2020).

In this context, it becomes crucial for referees to enhance their sprint abilities, as they perform multiple speed runs during matches to stay close to the action. Referees need to elevate this ability to a superior level to keep pace with modern football (Hill-Hass et al. 2007; Ozaeta et al. 2022). During a match, a referee exerts effort to adapt to the game's rhythm, utilizing both speed and long strides (D'Ottavio and Castagna 2001). For instance, referees employ their speed capabilities over distances exceeding 30 meters in 2-4 seconds during play (D'Ottavio and Castagna 2001). Reports indicate that referees demonstrate an average of 12-16 speed performances lasting between 1.7 and 1.9 seconds during high-effort matches (D'Ottavio and Castagna 2001). A study conducted on referees in the English Premier League revealed that they cover approximately 9.5 kilometers throughout a game, with 47% of this distance covered by jogging, 23% by walking, 12% by sprinting, and 18% by backward running (Bangsbo and Williams 2003).

The aim of our study is to examine the differences in various physical parameters between Elite Level Referees and Provincial Referees. Despite the variations in the number and difficulty levels of the matches they officiate, these referees exhibit similar training characteristics and participate in the same training processes.

MATERIALS AND METHODS

Data Collection

All measurements were conducted at the Istanbul Maltepe synthetic field. Considering the nature of the measurements, they were carried out in four distinct sessions. For Provincial Referees (PR), sprint tests and physical characteristic tests were administered in the first session, while the T-test for agility was conducted in the second session. Subsequently, Elite Level Referees (ELR) underwent sprint and physical tests, with the T-test for agility performed in the final session. These measurements were implemented during training sessions. All referees participating in the tests were instructed, within the framework of the test protocol rules, to refrain from engaging in any activities, to rest sufficiently, and to avoid physical exertion. A 10-minute warm-up routine was performed prior to the measurements.

Participants

In this study, 30 Elite Level Referees and 30 Provincial Referees actively officiating in Istanbul Province voluntarily participated after being informed about the research. Participants were briefed on all aspects of the study and were required to sign an informed consent form.

Table 1. Physical Characteristics of Participants

Variables	N	Elite Level Referees (M±SD)	Provincial Referees (M±SD)
Age (years)	30	32.25 ± 1.55	27.53 ± 2.11
Height (cm)	30	179.04 ± 6.36	179.95 ± 4.49
Weight (kg)	30	80.93 ± 8.62	77.32 ± 7.47
Body Fat Percentage (%)	30	12.69 ± 3.12	12.10 ± 2.78

Data Collection Instruments

For height measurements of the participants, a stadiometer (Seca 707, Germany) was used, while body weight was measured using an electronic scale (Seca 707, Germany). Body fat percentage analysis, based on the bioelectrical impedance method, was conducted using a Tanita bioelectrical impedance device (Tanita, Body Composition Analyzer, BC-418). Through bioelectrical impedance measurements, BMI and % Fat values were obtained. The sprint test was conducted over 20 and 30 m distances, with participants starting from a crouched position at the starting line, and results were recorded using photocells (Smart Speed Fusion Sport, Qld,

Australia).

Squat and Active jump heights were automatically calculated by measuring flight time (± 0.001 sec) using a mat functioning as an electronic circuit switch connected to an electronic mechanism (JTT-1000, Tümer Electronics, Istanbul).

Anthropometric Measurements

Height

Height was measured with the body and head erect, feet bare, and heels together. The movable part of the stadiometer was brought to the top of the head, compressing the hair sufficiently, and the measurement was recorded to the nearest 1 mm (Özer 1993). During measurement, subjects were asked to take a deep breath and maintain an upright position without lifting their heels from the ground.

Body Weight

Body weight was measured to the nearest 0.1 kg with participants barefoot, wearing shorts and a t-shirt (Özer 1993).

Body Weight and Body Mass Index (BMI) Measurements

At the beginning of the study, participants' body weight and body mass index (BMI) analysis based on the bioelectrical impedance method were performed using a Tanita Bioelectrical Impedance device (Tanita MC 780). After entering their information, subjects stood on the device wearing shorts, t-shirt, and barefoot. The device first determined the athletes' body weight and then their BMI values.

Determination of Sprint Characteristics

Meter Sprint Test

Photocell gates were placed at the start and 20-meter distances. In the 20 m speed test, participants performed the sprint twice from a standing start. The best time was used for evaluation.

Meter Sprint Test

Photocell gates were placed at the start and 30-meter distances. In the 30 m speed test, participants performed the sprint twice from a standing start. The best time was used for evaluation.

T-Test Agility

Four cones are placed as shown in the diagram below. The subject starts at cone A upon command, runs to touch cone B, then side-steps to cone C and touches it with their left hand. They then side-step to cone D and touch it with their right hand. After that, they touch cone B with their left hand and run backwards to cone A. The stopwatch is stopped when they cross the finish line.

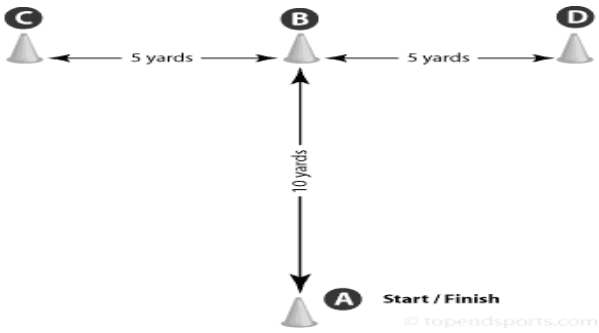

Figure 1. T Test Agility

Determination of Jumping Characteristics

Squat Jump Test

The squat jump test was performed with knees fixed at a 90-degree squat position and hands on hips, jumping upwards (Adams 2002). The test was conducted twice, and the best jump height was used for evaluation.

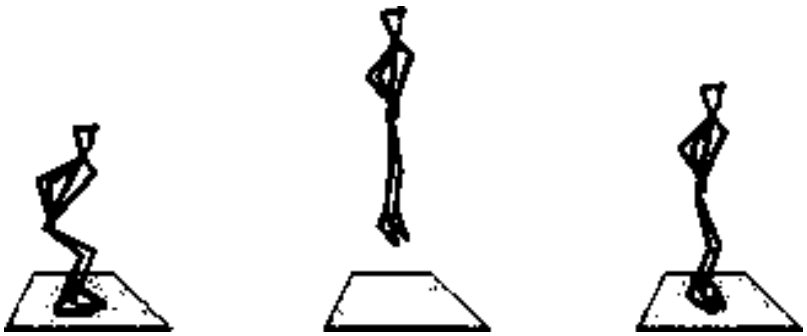

Figure 2. Squat Jump Test

Countermovement Jump Test

In the countermovement jump test, participants started in an upright position with hands on hips and knees fully extended. They then rapidly descended into a squat position before jumping upwards (Adams 2002). The test was performed twice, and the best jump height was recorded.

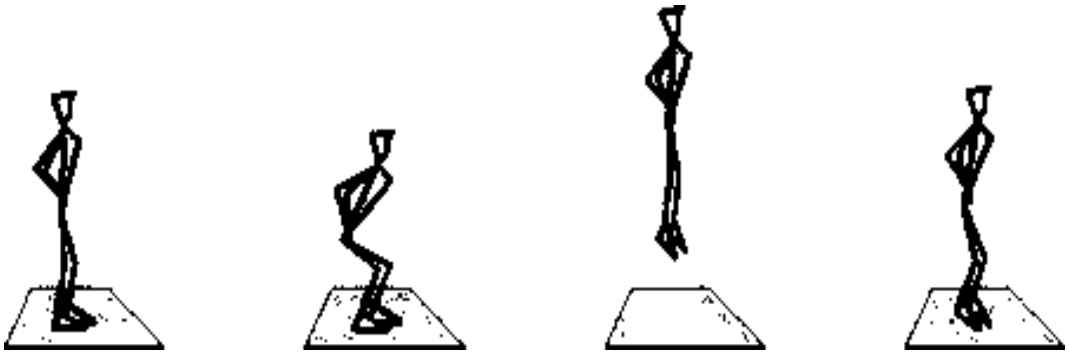

Figure 3. Countermovement Jump Test

Data Analysis

To determine the differences in characteristics such as sprint and jump performance between Elite Level Referees and Provincial Referees, an independent samples t-test was employed. Statistical analyses were performed using SPSS (version 22.0) for Windows, with the significance level set at 0.05.

RESULTS

This section of the research presents the results of the analyses conducted based on the data collected.

Table 2. Comparison of 20m and 30m Sprint Performances Between Elite Level Referees and Provincial Referees

Variables	N	Elite Level (M±SD)	Provincial (M±SD)	t-value	p
20m sprint(s)	30	3.49 ± 3.42	3.32 ± 0.13	0.709	0,482
30m sprint(s)	30	4.33 ± 0.23	4.69 ± 0.18	1.505	0,598

When Table 2 is examined, the independent samples t-test results indicate no statistically significant difference between Elite Level and Provincial referees in terms of their 20m and 30m sprint performances (p>0.05).

Table 3. Comparison of T-Test Agility Performances Between Elite Level Referees and Provincial Referees

Variables	N	Elite Level (M±SD)	Provincial (M±SD)	t-value	p
T-test agility (s)	30	3.59 ± 4.32	3.84 ± 0.19	0.696	0,359

Analysis of Table 3 reveals that the independent samples t-test results show no statistically significant difference between Elite Level and Provincial referees regarding their T-test agility performances (p>0.05). Analysis of Table 3 reveals that the independent samples t-test results show no statistically significant difference between Elite Level and Provincial referees regarding their T-test agility performances (p>0.05).

Table 4. Comparison of Squat Jump and Countermovement Jump Performances between Elite Level Referees and Provincial Referees

Variables	N	Elite Level (M±SD)	Provincial (M±SD)	t-value	p
Squat Jump (cm)	30	35,92±5,97	35,63±3,82	- 0.650	0,847
Countermovement Jump (cm)	30	28,02±4,17	28,98±3,34	- 0.352	0,673

Examination of Table 4 indicates that the independent samples t-test results demonstrate no statistically significant difference between Elite Level referees and Provincial referees in terms of their squat jump and countermovement jump performances (p>0.05).

DISCUSSION AND CONCLUSION

In this study, the speed and jumping capabilities of Elite Level Referees (ELR) and Provincial Referees (PR) were compared and evaluated within the framework of the hypothesis.

The results of this study indicate no significant difference between ELR and PR in their 20m and 30m sprint capabilities. Literature on this subject is quite limited, with most studies focusing on higher-level referees. In a study conducted in Turkey examining the speed and jumping characteristics of professional referees, Müniroğlu (2007) determined the 30m sprint performance of referees to be 4.44 ± 0.26 seconds. The 30m sprint performances of referees participating in the present study (4.46 ± 0.17s and 4.37 ± 0.18s, respectively) appear to be similar to Müniroğlu's (2007) findings. Bartha et al. (2009) found that elite Hungarian referees' 50m and 200m sprint performances did not differ from FIFA-level referees. Similarly, Castagna et al. (2005) determined that 50m and 200m sprint performances of Italian referees did not vary according to age categories, while another study found no difference in sprint runs during matches between two different categories of football referees (international and elite) (Castagna et al., 2005).

Regarding the T-test agility, analysis of the study results revealed no difference between referee categories in terms of best sprint time, total sprint time, and performance decline percentage.

The squat jump and countermovement jump capabilities of ELR and PR participating in the study were determined to be 35.92±5.97 cm and 35.63±3.82 cm, and 28.02±4.17 cm and 28.98±3.34 cm, respectively. These results show both similarities and differences compared to previous studies. In one such study, Tessitore et al. (2007) found the countermovement jump performance of 10 Italian football referees to be 32.4±5.8 cm. In a different study, Müniroğlu (2007) evaluated the jumping and sprint performances of 556 professional football referees in Turkey, reporting vertical jump values for ELR as 55.67 ± 9.08 cm. The countermovement jump performances of referees in our study appear to be better than those of Italian referees but lower than those in

Müniroğlu's (2007) study. Analysis of the study results shows no difference between ELR and PR in terms of jumping performances and anaerobic power values.

In this context, our study found no differentiation in the speed, agility, and jumping values of ELR and PR. As mentioned earlier, ELR and PR participate in joint training sessions twice a week for approximately 80 minutes. The similarity in training is thought to be the reason for the lack of differences in speed and jumping performances between ELR and PR.

RECOMMENDATIONS

1. This study included ELR and PR operating in Istanbul. Future studies could examine the effects of biomotor characteristics that directly impact professional performance, such as speed and jumping abilities, on each other among ELR and PR operating in different provinces and with a larger number of participants.

2. Future studies could also investigate other conditional characteristics of ELR and PR, such as endurance, flexibility, and strength.

3. Changes in speed and jumping performances of ELR and PR could be examined according to gender.

REFERENCES

1. Adams G. M, 2002. Exercise physiology laboratory manual. Hill Boston: Mc Graw.
2. Aksu A, Arslan C, 2020. Examination of Decision-Making Styles of Football Referees in Different Classifications. Journal of Sports Education, 4(1), 56-70.
3. Bangsbo S, Williams A.M, 2003. Physiology of Training. Science and Soccer. 1 (1), 47-58.
4. Bartha C, Petridis L, Hamar P, Puhl S, Castagna C, 2009. Fitness test results of Hungarian and international-level soccer referees and assistants. Journal of Strength and Conditioning Research. 23, 121-126.
5. Castagna C, Abt G, D'Ottavio S, 2005. Competitive level differences in YO-YO intermittent recovery and twelve minute run test performance in soccer referees. Journal of Strength and Conditioning Research. 19, 805-809.
6. D'Ottavio S, Castagna C, 2001. Analysis of Match Activities In Elite Soccer Referees During Actual Match Play. Journal of Strength and Conditioning Research. 15 (2), 167-171.
7. Erdoğan Ç. H, 2021. Footballers' Views on the Video Assistant Referee "VAR" System. Kilis 7 Aralık University Journal of Physical Education and Sport Sciences, 4(2), 113-123.
8. Hill-Hass S, Bishop D, Dawson B, Goodman C, Edge J, 2007. Effects of Rest Interval During High-Repetition Resistance Training on Strength, Aerobic Fitness, and Repeated Sprint Ability. Journal of Sports Sciences. 25 (1), 619-628.
9. Işın A, 2023. Effects of Video Assistant Referee Application on Referee Decisions: A Descriptive Study. Turkiye Klinikleri Journal of Sports Sciences, 15(2).
10. Koç K, 2018. Examination of the effect of empathic skill training applied to football referees on referees' match management. Doctoral thesis, Erciyes University, Institute of Health Sciences, Department of Physical Education and Sports Sciences, Kayseri.
11. Lockie R.G, Dawes J.J, Callaghan S.J, 2020. Lower-body power, linear speed, and change-ofdirection speed in Division I collegiate women's volleyball players. Biol Sport, 37(4):423–428.
12. Moreno M.R, Dulla J.M, Dawes, J.J, Orr R.M, Cesario K.A, Lockie R.G. 2019. Lower-body power and its relationship with body drag velocity in law enforcement recruits. Int J Exerc Sci., 12(4):847– 85.
13. Muratlı S, Kalyoncu O, Sahin G, 2007. Training and competition. Istanbul: Ladin Press.
14. Müniroğlu S, 2007. A Research on Sprint and Vertical Jump Capabilities of Professional Football League Referees In Turkey. Journal of Sports Science and Medicine. 6 (10), 213-215.
15. Ozaeta E, Fernández-Lasa U, Martínez-Aldama I, Cayero R, Castillo D, 2022. Match Physical and Physiological Response of Amateur Soccer Referees: A Comparison between Halves and Match Periods. International Journal of Environmental Research and Public Health, 19(3), 1306.
16. Özer K, 1993. Anthropometry morphological planning in sports. Istanbul: Nobel Publishing.

17. Reilly T, Williams A.M, 2003. Different Populations. Science and Soccer, Routledge. 1(1), 96-105.
18. Satman C, 2004. Examination of the Effect of Spectator Crowds on Referee Decisions in Football Matches. Unpublished Master's Thesis, Ankara University.
19. Sevim Y, 2002. Training knowledge. Ankara: Nobel Publication Distribution.
20. Tessitore A, Cortis C, Meeusen R, Carpanica L, 2007. Power performance of soccer referees before, during, and after official matches. Journal of Strength and Conditioning Research. 21,1183-1187.
21. Türker A, Kahraman M. Z, 2020. Investigation of acute effect of sparring training models on some electrolytes in elite boxers. International Journal of Applied Exercise Physiology, 9(9), 6-10.