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A Modified T-Test for Football Referees to Test Agility, Quickness and Sprint Performances

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ABSTRACT

The football referees perform many actions as jogging, running, sprinting, side steps and backward steps during a football match. Further, the football referees change match activities every 5-6 seconds. Many tests are being conducted to determine the physical levels and competences of football referees like 50 m running, 200 m running, 12 minutes Cooper test, 6 × 40 m etc. All of these tests include straight runnings dominantly. However, the football is not completely full of straight runnings. Quickness, turning skills and changing direction speed namely agility is the crucial for referees to maintain well positioning during match. For this reason, we have modified the classical T-Test for referees by addition side steps, quick turnings and backward steps to test agility skills and their speed. And we compared the T-Test scores with 10 meters and 30 meters sprint tests scores of 74 male referees (Ankara, Turkey) who regularly participating in trainings and regularly refereeing in matches. All referees performed 10 meters and 30 meters sprint tests twice and we recorded the best sprint times. The referees performed the T-Test one time. All three tests have shown normal distribution frequencies. Our results showed a significant corelation between all of three tests; 10 meters and 30 meters (r = 0,660; P < 0,01), 10 meters and T-Test (r = 0,226; P < 0,01), 30 meters and T-Test (r = 0,269; P < 0,01). These results showed that, T-Test scores will be usable to determine 10 meters and 30 meters sprint level of the referees and additionally, T-Test could also give information about levels of other crutial skills for referees as agility. In conclusion, our data showed that the modified T-Test for referees could be used for testing each of the running speed and agility skills of the soccer referees.

Keywords: agility, football referees, sprint tests, soccer, modified t-test

1. Introduction

Soccer players are constantly changing their positions in a 105-68 m area, while playing soccer. Players are running 11-14 km in the professional leagues and 9-11 km in the amateur leagues in this wide area during match. Football is a contact game and it is important to maintain optimum closeness to the positions for referees who are the deciding factor for which of these contact moments is appropriate for the football rules. Also, since the players are in constant motion, the assistant referees must be at least as close as the referees to the positions. In view of a player in the offside position is running 7 m in one second, the assistant referees must be well positioned in the offside positions and have quickness and agility at a very good level (Müniroğlu, 2007; Satman, 2017).

The football referees perform many actions as jogging, running, sprinting, side steps and back steps during a footbal match (Matthew Weston, Helsen, MacMahon, & Kirkendall, 2004). Total running distances of football referees during a match has been increased by past years. Studies showed that, while the running distance of the football referees was 9438 ±707 m during matches in 1993, the distance has been increased to 11376 ±1600 m in 2001. It is reported that the distance covered at the maximum speed by a referee is 608 m (Dottavio & Castagna, 2001).

While the most of distances covered by referees during a match by standing, walking and jogging (more than %75 of total match activity), the high-intensity running distances (running speed > 5.5 m/s) has very important role on the physical demands of a match and the development of fatigue (Bangsbo, Norregaard, & Thorso, 1991; Krustrup & Bangsbo, 2001; M. Weston, Castagna, Impellizzeri, Rampinini, & Abt, 2007). Otherwise, it has been reported that the football referees change match activities every 5-6 seconds (Krustrup & Bangsbo, 2001). Therefore, agility which means quick and accurately changing direction ability is another important skill for referees and should be trained (Sheppard & Young, 2006; Matthew Weston et al., 2012).

Many tests are being conducted to determine the physical levels and competences of football referees. In the past, the aerobic capacity was thought to the most important for referees and the tests for the selection of football referees was conducted belong this thougt. Examplary to this aerobic tests, 12-minutes Cooper running test, two 50 m and two 200 m runs had been used since 2007 (Müniroğlu, 1995; Schenk, Bizzini, & Gatterer, 2017; Matthew Weston et al., 2012). Later, many studies have indicated the importance of the anaerobic capacity in football (Needham, Morse, & Degens, 2009; Sporis, Ruzic, & Leko, 2008; Tessitore et al., 2005). After 2007, FIFA has added a standardized 6×40 m sprints and a repeated 150 m test to the referee testing and has started to the testing anaerobic capacity of the referees (Bozdoğan, Kızılet, & Biçer, 2017).

10 meters running tests, 30 meters running tests are some another methods using to determine physical level of athletes (Duthie, Pyne, Ross, Livingstone, & Hooper, 2006; Miller, Herniman, Ricard, Cheatham, & Michael, 2006). 10 meters and 30 meters running tests are especially for determine sprinting skills, explosiveness, strength and anaerobic capacities of the athletes (Gil, Gil, Ruiz, Irazusta, & Irazusta, 2007; McBride et al., 2009; Walklate, O'Brien, Paton, & Young, 2009). Parallelly, T-Test is used to determine agility, quickness and speed of the athletes (Little & Williams, 2005; Miller et al., 2006; Pauole, Madole, Garhammer, Lacourse, & Rozenek, 2000).

All of the tests using for testing the soccer referees include the straight runnings, but soccer does not consist by full of straight runnings. For this reason, T-Test will be useful for testing the agility, quickness and speed of the soccer referees. Referees are not always symmetrical, and occasionally have to choose asymmetrical runnings. Quick and speedy returns, sudden maneuvers are very important for both the referees and assistant referees in the game (Müniroğlu, 2007). For this reason, testing the agility skills of football referees become important. Thus, in this study, we have modified the classic T-Test (Semenick, 1990) by adding a quick turning back movement to the last part of the test to the testing quick turning abilities of the soccer referees and turned into a T-test that would be completed by straight running, side running, back running and then spinning at a rapid pace. We have modified the classical T-Test because, the classical T-Test has not included a turning back movement. The last part of the classical T-Test has directly backward steps 10 yards along. We added another cone to the center of this 10 meters and added there a turning checkpoint for performing an agility skill needed movement (Figure 1). This was the main difference between our modified T-Test with the classical T-Test. Another difference of our T-Test was, the classical T-Test used imperial units (Semenick, 1990) and we used the metric units as Sassi et al. was used (Sassi et al., 2009). And this is the first study to test whether the T-Test can be used to select referees.

In this study, we compared our modified T-Test scores with 10 meters and 30 meters sprint test scores. We have suggested that, the referees who have high scores from 10 meters and 30 meters tests would have better scores in T-Test. In this way, the modified T-Test will give information about agility skills of the referees, while giving succesful information about their sprinting skills. To test these hypothesises, these tests were conducted with referees who worked in Ankara (n=74), who competed every week and who signed the approval forms.

2. Methods

2.1 Participants

74 male football referees in Ankara (Turkey) participate in this study. All of participating referees are active, regularly participating in trainings and regularly refereeing in matches. All referees have signed the approval forms. Mean age of the participant referees is $25{,}84 \pm 3{,}06$. All referees participeted in all of 3 tests (10 meters, 30 meters and T-Test).

2.2 Protocols

All referees performanced twice of 10 meters and 30 meters sprint test and all referees performanced T-Test one time after a 20 minutes warm-up workout. The tests started in the evening at 7 p.m. that was the usual training time of Ankara referees. The tests performed in the Ankara 19 Mayıs Stadium training pitches, on the synthetic turf.

10 meters and 30 meters tests have similar protocols. Photocells settled in start and end point of 10 meters distance. All referees started 1-meter behind of the starting photocells. The referees performed twice in 10 meters and 30 meters tests. For all referees, best sprint time has been recorded.

2.3 T-Test Protocol

The classical T-Test was used the imperial units (5 yards and 10 yards) to measure the distances of the cones (Semenick, 1990). We used the metric units (5 meters) as the Sassi et al was used (Sassi et al., 2009).

40 cm heighted cones have been used in T-Test. The cones have been settled up like a T letter as shown in the figure 1 (Figure 1). All referees started 1-meter behind of the starting photocells. Firstly, the referee sprinted 10 meters straight and touched the cone with his left hand. After that, the referee runned by side steps 5 meters right and touched the cone with his right hand, and runned by side steps to the left 10 meters and touched the cone with his left hand. Later, the

referee runned again to the right by side steps 5 meters and touched the center cone with his right hand. And then, the referee runned by backward steps to the center cone and touched it with right hand. Then the referee turned around quickly and sprinted to the end point and passed the photocell. The referees performed the T-Test one time. Finishing times has been recorded.

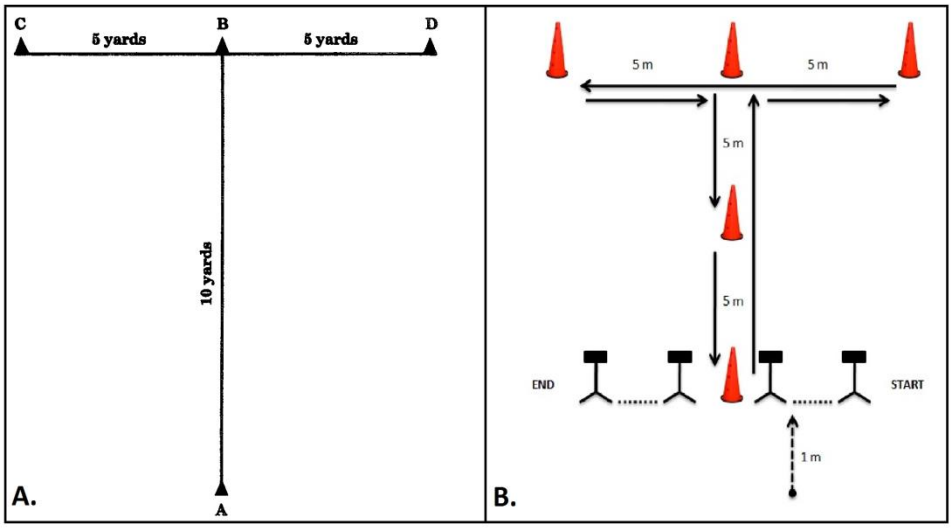

Figure 1. A. The classical T-Test (Semenick, 1990), B. Our modified T-Test for referees

2.4 Statistical Analyses

IBM SPSS Statistics 24.0 has been used to statistical analyses. All 10 meters - 30 meters, 10 meters – T-Test and 30 meters - T-Test values compared by Pearson Product Moment Correlation and linear regression analyses. Correlations between 10 meters - 30 meters, 10 meters – T-Test and 30 meters - T-Test analyzed and graphed (Figure 3). The level of significance was set at $P < 0{,}01$.

3. Results

In this study, 10 meters, 30 meters and T-Test scores of 74 male football referees have been analyzed. 10 meters test scores were between 155 and 183 split seconds (Mean: 169,81 s). 30 meters test scores were between 393 and 460 split seconds (Mean: 426,14 s). T-Test scores were between 996 and 1332 split seconds (Mean: 1152,93 s). All three groups have shown normal distribution frequencies (Figure 2).

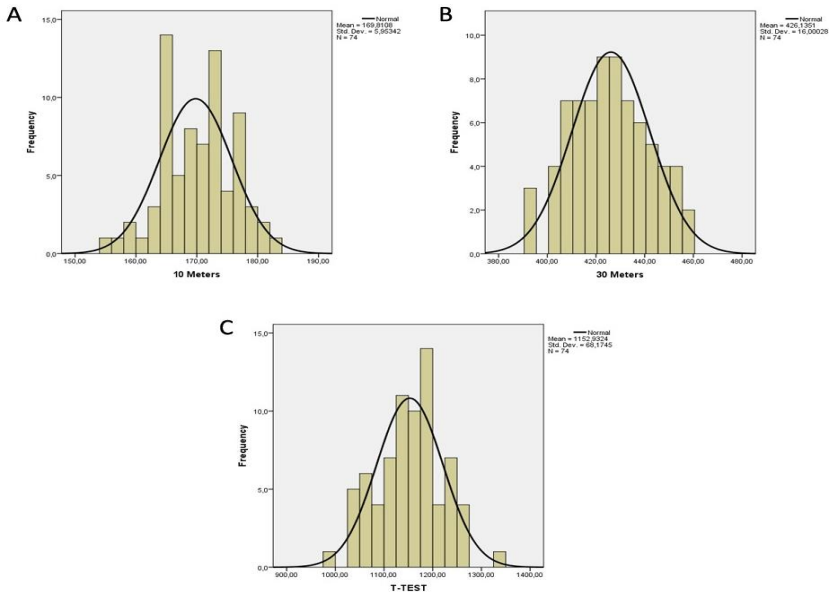

Figure 2. Frequency distributions. A. 10 meters, B. 30 meters, C. T-Test

Correlations were analyzed between each two groups (10 meters - 30 meters, 10 meters - T-Test, 30 meters - T-Test) and graphed (Figure 3). All correlations were significant at the 0,01 level. Simple scatter charts have shown the linear correlations between 10 meters and 30 meters (r = 0,660; P < 0,01), 10 meters and T-Test (r = 0,226; P < 0,01), 30 meters and T-Test (r = 0,269; P < 0,01). Linear regression analyses were significant for all groups (P < 0,01).

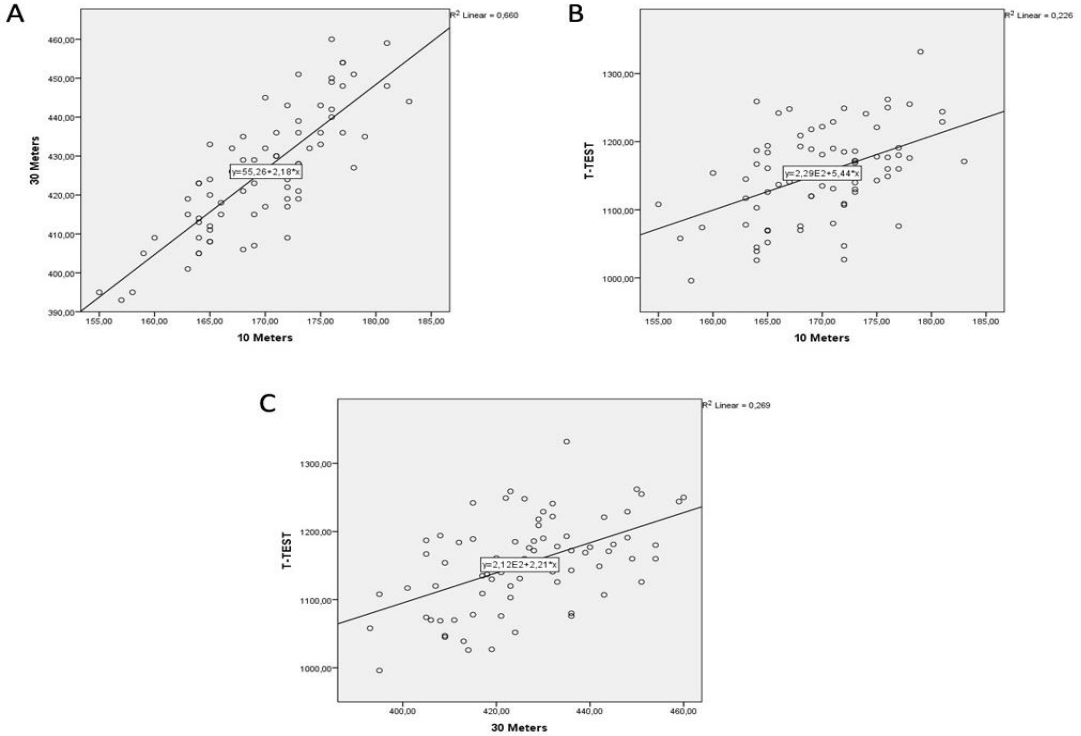

Figure 3. Simple scatter charts of correlations. A. 10 meters - 30 meters, B. 10 meters - T-Test, C. 30 meters – T-Test (P < 0,01)

4. Discussion

We have modified the classical T-Test (Sassi et al., 2009; Semenick, 1990) to test referees with addition the movement of turning back quickly to the test procedure. And we compared the modified T-Test scores with the 10 meters and 30 meters sprint scores of the 74 football referees.

Our results showed that 10 meters, 30 meters and T-Test results have a significant relation between each other. Correlation analyzes revealed that the referees who have greater scores in 10 meters test have also greater scores in 30 meters and in T-Test. Similarly, the referees who have greater scores in 30 meters test have also greater scores in T-Test. These results showed that, T-Test scores will be useable to determine 10 meters and 30 meters sprint level of the referees and additionally, T-Test can give information about levels of other skills as agility, quickness and changing direction abilities. Parallelly, a recent study has revealed that a modified T-Test for the tennis players is a reliable test for measuring the change of direction speed namely agility (Huggins, Jarvis, Brazier, Kyriacou, & Bishop, 2017; Sheppard & Young, 2006).

Köklü et al. (2015) have revealed a strong correlation between 10 meters and 30 meters sprint tests (Köklü, Alemdaroğlu, Özkan, Koz, & Ersöz, 2015). Further, Ziyagil et al., have recently showed that, 10 meters speed test has a significant relationship with 100 meters speed test (Ziyagil, Cengiz, & Aksoy, 2016). Likewise, our study has shown a significance correlation between 10 meters and 30 meters sprint tests.

Our results showed that, the modified T-Test for referees has parallel scores with 10 meters and 30 meters sprint tests significantly. Differently from the 10-meters and 30-meters tests, T-Test will provide opinions about the agility of the referees by side stepping and quickly turning back movements.

Another finding of the Köklü et al. (2015) was the 10 meters and 30 meters sprint abilities have a significant correlation with zigzag agility performance (Köklü et al., 2015). Our results similarly showed that 10 meters and 30 meters sprint test scores have shown significant correlation with T-Test that a reliable test for measuring the agility.

The aim of this study was investigating the availability of the T-Test for soccer referees to the test of their agility skills. We have compared the T-Test scores with, 10 meters and 30 meters sprint test scores to investigate whether the T-Test

give information about sprint skills of the referees. And our results showed that, sprint scores have a correlation between the modified T-Test scores and so, the modified T-Test could use to the test of agility skills while testing the sprint skills of the soccer referees. Another important point of this study was, this was the first study used the T-Test on the soccer referees and showed the test results could be useful in the stages of talent selection of referees. On the other hand, this study has some limitations. The referees performed these tests on the synthetic turf. This might have affected their results. Another one, we examined the T-Test only one time and we did all 10 meters, 30 meters and T-Tests in a row. Some referees could get better scores if we did T-Test a second repeat. And future studies needed to comparing our results with the classical T-Test scores and investigating the differences.

5. Conclusion

A recent study has indicated that in the top 5 leagues of the Europe (England, France, Spain, Italy and Germany), the number of dangerous/unfair tackles was decreased in last ten years (Sapp, Spangenburg, & Hagberg, 2017). Therefore, the referees must be more close to the positions during the match and they must able to change their positions quickly. Although the aerobic and anaerobic capacity of the soccer referees is very important, the agility is also a crucial skill that the referees must have a higher level. For this reason, we have modified the classical T-Test for the referees for testing the sprint speed, quickness and agility skills. Our results remarked that, modified T-Test has significant correlation with 10 meters and 30 meters straight running tests. Further, the modified T-Test for referees include the other movements of referees perform during the matches like side stepping and back stepping.

In conclusion, agility skill is a crucial factor for the soccer referees performances during match. Accordingly, the tests used to select football referees should also include the agility skill testing. Our data showed that, the modified T-Test for referees could be used for testing each of the speed, running and agility skills of the soccer referees. Further studies could improve the modified T-Test for referees by addition another movements, skills etc.

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