International Journal of Sport Culture and Science
December 2019 : 7(4)
ISSN : 2148-1148
Doi : 10.14486/ IntJSCS.2019.582

Investigation of the Relationship between Functional Movement Screening Test Scores and Athletic Performance of Professional Football Players

Hasan AKA[1], Zait Burak AKTUĞ[1], Emre ALTUNDAĞ[2], Levent ŞAHİN[2]
[1]Niğde Ömer Halisdemir University, School of Physical Education and Sports, Niğde, Turkey
[2] Football Coach
E-Mail: zaitburak@gmail.com

Type: *Research Article (**Received:** 21.11.2019 – **Corrected:** ---- – **Accepted:** 28.12.2019)*

Abstract

The aim of this study is to investigate the relationship between Functional Movement Screening (FMS) test scores and athletic performances of professional football players. Twenty professional male football players participated in the study voluntarily. Functional movement patterns of the players were determined by FMS test kit and athletic performances were determined by Yoyo test, T drill test, vertical and horizontal jump test, 10 m and 20 m speed test. Spearman Correlation Analysis was used to determine the relationship between FMS test scores and athletic performances of football players. As a result of the study, no statistically significant relationship was found between FMS test scores and athletic performances of football players ($p<0.05$). In addition, the FMS test total score of the players (14.2 points) was found to be above the limit of injury (14 points). In conclusion, although FMS test scores provide important information about the quality of functional movements and the likelihood of injury, it is not a determinant of athletic performance. This may be due to the combination of several motoric characteristics of athletic performance, although FMS test scores are assessed individually.

Keywords: Football, functional movement screening, athletic performance.

Introductıon

Functional movement skills are the basic skills that are essential for each sports branch and must be developed by the age of 10 (Balyi et al., 2013). The use of multiple joints and optimal body dynamics in these movements increase the efficiency and efficiency of movement patterns. The FMS test is a biomechanical screening and evaluation system based on 7 basic movement patterns (Abraham et al., 2015). This system reveals the kinetic chain interaction between mobility and stability required for basic performance (Chorba, 2010). Muscle strength, flexibility, range of motion, coordination, balance and proprioceptive mechanism are evaluated with FMS test (Cook et al., 2010). The determination of limitation and asymmetry in as a result of the FMS test, which assesses the mobility of athletes, depends on the effectiveness and quality of the movement pattern, not the number of repetitions or the weight lifted. Furthermore, the fact that FMS test is fast, noninvasive, inexpensive and easily applicable (Perry and Koehle, 2013) allows for more frequent evaluation of athletes in all branches.

Athletes' athletic performances are also influenced by their physical structure such as height, body weight, body mass index, and motor properties such as endurance, strength, speed and flexibility and agility (Kalyon, 1990; Mohammad & Tareq, 2016; Michailidis, 2018). The quality of movement in athletes and the success of complex movements affect athletic performances of athletes and also play a role in preventing possible injuries (O'connor et al., 2011; Frost et al., 2012). In addition, muscle strength and imbalance in motor control or weak muscle strength are other factors that cause injury (Chorba et al., 2010). Therefore, by improving the functional movements of athletes, while improving the basic movement quality, it can also eliminate the possibility of injury (Aktuğ et al., 2019; Bagherian et al., 2018).

When the literature is examined, studies about FMS test are frequently seen in recent years. The majority of these studies are related to determining the probability of injury to athletes. However, there are a limited number of studies examining the relationship between functional movements and athletic performance. It is seen that these studies are mostly aimed at infrastructure athletes and women athletes. In the football branch, a study for a team at the Super League level was not found in the literature review. Therefore, the aim of this study is to investigate the relationship between the functional movements and athletic performances of the senior football players.

Materıals And Methods

The study from the Turkey Football Federation joined a football team in the Super League as players, 20 male volunteers. It was taken into consideration that the players involved in the study consist of those who did not experience any sporting injuries in the last 6 months. The tests were conducted on the off days of the players and the players were asked not to participate in any sporting activities in the last 24 hours before the tests.

Data Collection Tools

Length and Body Weight Measurements

Football players' height and body weight were measured using a height-scales (Seca 700; Seca GmbH & Co. KG, Hamburg, Germany) with bare feet and only shorts and T-shirts on them.

Functional Movement Screening Test

The functional movements of the players were determined through the Functional Motion Screening test kit (Cook et al., 2006; Güzel & Kafa, 2017). Measurements were made by a certified specialist. The test consists of 7 movements (deep squat, hurdle step, in line lunge, shoulder mobility, active leg raise, trunk stability push up, rotary stability). The measurements of the players were made considering the basal condition of their bodies without heating. The players were informed about the test before the measurements started and the movements were shown. Each movement was repeated three times during the test. The players were asked to report any pain or discomfort to the measuring specialist during the exercise of the movements.

In the test, firstly unilateral movements (deep squat, trunk stability push-up) were measured. In two-sided tests; (hurdle step, in line lunge, shoulder mobility, active leg raise, rotary stability). During the scoring, the scores of the participants from both sides of their bodies were recorded. However, the lowest score from the movement was accepted as the result of the test. This procedure was applied for bilateral movements. Each test is scored between 0 and 3. The highest FMS test score was 21 (Cook et al., 2010). It is known that individuals with a total FMS test score less than 14 points have a greater risk of injury than individuals with a score higher than 14 points (Kiesel et al., 2007).

Athletic Performance Tests

The players were given a 15-minute warm-up protocol before the athletic performance tests. Before starting the tests, the athletes were given detailed information about the tests to be applied both verbally and in practice.

Yoyo Test: The Yoyo test was determined by Intermitten Recovery Test Level 2 in a field drawn with cones at a distance of 20 m in hybrid grass. The test was repeated 1 time.

T Drill Test: The T Drill test was carried out on hybrid turf by means of a New Test Powertimer instrument with cones arranged in T-shaped intervals of five meters each. The test was performed 3 times and the best value was included in the study.

Horizontal Jump Test: The horizontal jump test was determined with the Vert Jump instrument. The test was applied to athletes 3 times and the best result was included in the study.

Vertical Jump Test: The vertical jump test was determined with the Vert Jump instrument. The test was applied to athletes 3 times and the best result was included in the study.

10 and 30 Meters Speed Test: Speeds of athletes were determined on hybrid turf ground by New Test Powertimer**.** The tests were performed 3 times and the best value was included in the study.

Data Analysis

SPSS 24.0 package program was used in the statistical analysis of the data obtained in the study. To determine the relationship between FMS test scores and athletic performances of the participants, Spearman Correlation Analysis, one of the nonparametric tests, was used. In the study, the significance level was accepted as $p < 0.05$.

Fındıngs

Table 1. Descriptive statistics of players

	N	$\overline{x}$ ± Sd
Age (year)	20	26,80 ± 4,75
Height (cm)	20	180,10 ± 8,14
Weight (kg)	20	78,20 ± 8,14
BFP (%)	20	8,35 ± 1,77

Table 2. Mean and standard deviations of FMS test scores and athletic performance test results of football players

	N	$\overline{x}$ ± Sd
Speed 10 m (sec)	20	1,80 ± ,085
Speed 30 m (sec)	20	4,15 ± ,137
T drill test (sec)	20	8,76 ± ,246
Vertical jump (cm)	20	60,4 ± 5,46
Horizantal jump (cm)	20	236,3 ± 13,3
Yoyo (m)	20	1766 ± 474,5
Deep Squat	20	1,85 ± ,587
Hurdle Step	20	1,45 ± ,510
In line Lunge	20	1,95 ± ,686
Shoulder Mobility	20	2,50 ± ,606
Active Leg Raise	20	2,05 ± ,759
Trunk Stability Push up	20	2,85 ± ,366
Rotary Stability	20	1,85 ± ,366
FMS Total Score	20	14,2 ± 2,19

Table 3. The relationship between FMS test scores and athletic performances of football players

		FMS total score	Deep squat	Hurdle step	In line lunge	Shoulder mobility	Active leg raise	Trunk stability push up	Rotary stability
	R	,180	-,074	-,009	,153	-,225	,067	-,061	,195
Speed 10 m	p	,446	,757	,971	,520	,341	,777	,799	,411
	N	20	20	20	20	20	20	20	20
	R	,087	-,174	-,052	,137	-,292	-,104	,097	,049
Speed 30 m	p	,715	,463	,827	,565	,211	,662	,683	,839

	N	20	20	20	20	20	20	20	20
T drill test	R	-,273	-,273	-,297	-,329	-,217	-,164	-,061	-,182
	p	,245	,244	,204	,156	,359	,490	,799	,442
	N	20	20	20	20	20	20	20	20
Vertical jump	R	,243	,112	,227	,439	-,149	,287	-,206	,498*
	p	,302	,637	,337	,053	,531	,220	,382	,025
	N	20	20	20	20	20	20	20	20
Horizantal jump	R	-,031	,021	-,026	-,231	-,033	,100	,097	-,207
	p	,897	,928	,913	,328	,891	,675	,683	,381
	N	20	20	20	20	20	20	20	20
Yoyo test	R	,435	,292	,305	,376	-,336	-,100	,231	,231
	p	,055	,212	,191	,102	,147	,676	,327	,327
	N	20	20	20	20	20	20	20	20

*p<0.05

When Table 3 was examined, no statistically significant relationship was found between FMS test scores and athletic performances (p<0.05).

Dıscussıon

This study was conducted to investigate the relationship between FMS test scores of professional football players and athletic performance tests (speed, endurance, jump and agility). According to the findings of the research, there was no statistically significant relationship between FMS total score and FMS subtests and athletic performance (p<0.05).

When the literature is examined, it is seen that there are studies examining the relationship between FMS test scores and athletic performance. In a similar study, no significant relationship was found between FMS test scores and athletic performances (balance, flexibility, agility, speed and vertical jump) of female volleyball players (Altundağ, 2018). In another study, the relationship between FMS test scores and athletic performances (jump, speed) of golf athletes was investigated and as a result no significant relationship was determined between these parameters. (Parchmann and Mcbride, 2011). Şahin et al. (2018) examined the relationship between FMS test scores and athletic performances (endurance, speed, agility, long jump) of athletes in their study on football players aged 14-16 years. As a result, a significant correlation was found between agility and active leg raise only from the FMS subtests (Şahin et al., 2018). In a study conducted on college footballers, no significant relationship was found between FMS test scores and strength and strength of players (Bradberry et al., 2010).

The above-mentioned studies support the results of the current study and show that there is no relationship between FMS test scores and athletic performance. This may be due to different reasons. The FMS test is a test battery that evaluates the limitation and asymmetry of movements step by step. Therefore, in the FMS test, while the individual movements are evaluated, different motor components are used together in athletic performance parameters of the athletes (such as strength, speed, endurance). Therefore, it may not be enough to explain athletic performance only with functional movements.

The FMS total score is a parameter that indicates the probability of injury to athletes. Although the FMS test average score of professional football players (14.2 points) is above the limit of injury (14 points), it may be in favor of the athletes to develop functional movements because they are very close to the critical limit. Aktuğ et al. (2019) reported that corrective exercises improve FMS test scores and reduce the likelihood of injury.

As a result, the movements of the FMS test battery are either stable or slow. As for athletic performance, it is considered that there is no relationship between functional movements and athletic performance because the movements are performed in the shortest time and with the highest performance. In addition, when evaluating individual FMS test scores, the combination of several motoric characteristics of athletic performance factors may result in a limiting factor in determining a relationship between these parameters.

REFERENCE

Abraham A, Sannasi R, Nair R. (2015). Normative values for the functional movement screentm in adolescent school aged children. International Journal of Sports Physical Therapy, 10(1): 29-36.

Aktuğ ZB, Aka H, Akarçeşme C, Çelebi MM, Altundağ E. (2019). Elit kadın voleybolcularda düzeltici egzersizlerin fonksiyonel hareket taraması test sonuçlarına etkisinin incelenmesi. Spor Hekimliği Dergisi, [Epub ahead of print].

Altundağ E. (2018). Elit bayan voleybolcularda fonksiyonel hareket taraması test skorları ile atletik performans arasındaki ilişkinin araştırılması. Yüksek Lisans Tezi, Bolu Abant İzzet Baysal Üniversitesi, Sağlık Bilimleri Enstitüsü, Bolu.

Balyi I, Way R, Higgs C. (2013). Long-Term Athlete Development: Human Kinetics: Champaign, IL.

Bagherian S, Ghasempoor K, Rahnama N, Wikstrom EA. (2018). The effect of core stability training on functional movement patterns in collegiate athletes. Journal of Sport Rehabilitation, 28(5): 444-449.

Bradberry DR. (2010). Strength, flexibility, functional movement and injury in collegiate men football players. Georgia College and State University, University of Georgia.

Chorba RS, Chorba DJ, Bouillon LE, Overmyer CA, Landis JA. (2010). Use of a functional movement screening tool to determine injury risk in female collegiate athletes. North American Journal of Sports Physical Therapy, 5(2): 47-54.

Cook G, Burton L, Hoogenboom B. (2006). Pre-participation screening: the use of fundamental movements as an assessment of function–part 1. North American Journal of Sports Physical Therapy, 1(2): 62-72.

Cook G, Burton L, Kiesel K, Rose G, Bryant MF. (2010). Movement: functional movement systems: screening, assessment, and corrective strategies. On Target Publications; USA, Aptos, CA.

Frost DM, Beach TA, Callaghan JP, McGill SM. (2012). Using the functional movement screen™ to evaluate the effectiveness of training. The Journal of Strength & Conditioning Research, 26(6): 1620-1630.

Güzel N, Kafa N. (2017). Sporcu Sağlığı. Sözkesen Matbaacılık, Ankara: 71-73.

Kalyon TA. (1990). Spor Hekimliği, Sporcu Sağlığı Ve Spor Sakatlıkları. GATA Basımevi: Ankara.

Kiesel K, Plisky PJ, Voight ML. (2007). Can serious injury in professional football be predicted by a preseason functional movement screen? North American Journal of Sports Physical Therapy, 2(3): 147-58.

Michailidis Y. (2018). Physical condition differences between semi-professional and amateur soccer players. Journal of Science Culture and Sport, 6(2): 191-202.

Mohammad A, Tareq A. (2016). The relationship between body fat percentage with speed, agility and reaction time of male football players of Bangladesh. International Journal of Science Culture and Sport, 4(4): 453-460.

O'connor FG, Deuster PA, Davis J, Pappas CG. Knapik JJ. (2011). Functional movement screening: predicting injuries in officer candidates. Medicine and Science in Sports and Exercise, 43(12): 2224-2230.

Parchmann CJ, Mcbride JM. (2011). Relationship between functional movement screen and athletic performance. The Journal of Strength and Conditioning Research, 25(12): 3378-3384.

Perry FT, Koehle MS. (2013). Normative data for the functional movement screen in middle-aged adults. The Journal of Strength & Conditioning Research, 27(2): 458-462.

Şahin M, Doğanay O, Bayraktar B. (2018). Relationship between functional movement screen and athletic performance in young soccer players, International Refereed Academic Journal of Sports, Health and Medical Sciences, 26: 1-12.