Comparing Selected Physical, Physiological and Technical Characteristics of a Group of Turkish Amateur Soccer Players According to Playing Positions

Cem Sinan ASLAN[1]

Abstract

Objectives: The aim of this study was to determine differences in physical, physiological and soccer skills characteristics of a group of Turkish amateur soccer players according to their playing positions.

Methods: 23 amateur male soccer players of a team participated voluntarily to the study. Participants were divided into 3 groups according to their playing position. Participant's age, body weight and height, body fat percentage, fat free mass, aerobic capacity, anaerobic power, speed, leg strength, hand grip, vertical jump, flexibility and soccer skills capacities were measured. Obtained values were compared statistically by using SPSS (ver. 16) with the help of ANOVA and Tukey test was used to identify which groups had significant differences. Alpha level was set as 0,05 for statistical significance.

Results: ANOVA results showed that there weren't any significant differences (p>0,05) among groups at the point of physical, physiological and technical values except for right hand grip strength.

Conclusion: Physical, physiological and technical characteristics of all players who play different positions were same but only forwards were stronger than midfielders in the right hand grip strength.

Keywords: Soccer, Player Characteristics, Playing Positions

[1]Cumhuriyet University The School of Physical Education and Sports

INTRODUCTION

Soccer is characterized by lots of technical skills, movements and activities (Bachev et al, 2005). Performance in football improves depending on numerous factors such as technique, biomechanics, tactics, mental and physiological structures. Among these factors are located in the structure and rules of the game, tactical and technical skill levels of the players, playing levels of players in the league, game style, the playing positions of players, and environmental conditions (Reilly, 1996).

Effective performance in soccer, a game which requires jumping, shooting, challenges, turns, dribbles, sprints, controlling the ball under pressure, running at different speeds, and sliding tackles is dependent upon both aerobic and anaerobic metabolism (Açıkada et al., 1998; Stolen et.al., 2005). Because various movements are involved in this sport, a number of factors, such as technical ability and endurance capacity (Little and Williams, 2007) are important like positioning. Suziki and Nishijima (2005) said field positions of team mates were important in order to evaluate the overall team skill.

Soccer is a game played on a large field and includes different tasks for players. There for, playing positions should be reviewed with considering its physical and physiological needs (Marancı and Müniroğlu, 2001).

The aim of this study was determined differences in age, body weight and height, body fat percentage, fat free mass, aerobic capacity, anaerobic power, speed, leg strength, hand grip, vertical jump, flexibility and soccer skills characteristics of Turkish amateur soccer players according to their playing positions.

METHOD

23 amateur male soccer players of a team voluntarily participated in this study at the end of the preparation period. All players were notified of the research procedures, requirements, benefits, and risks before giving informed consent. Participants were divided

into 3 groups according to their playing position as defending players (n=9), midfielders (n=8) and forwards (n=6). Their selected physical, physiological and technical characteristics were measured after a 9 weeks preparation period.

For determining of participant's physical, physiological and technical qualities; age, body weight and height, body fat percentage, fat free mass, aerobic capacity, anaerobic power, speed, leg strength, hand grip, vertical jump, flexibility and soccer skills capacities were measured. Every test movement was explained to participants before application. For a 20 minutes warm-up duration was given to athletes. During warm up phase all athletes used same warm up protocol included low intensity running and some callisthenic movements. Whole measurements except for 20 m Shuttle Run Test test were repeated twice and the best one of two attempts was recorded.

For determining of players' body compositions Tanita TBF 300 (Japan) bioelectric impedance system was used. The players were weighed barefoot and only wearing the sports clothes. Bioelectrical Impedance Analysis (BIA) has a validity method to determine body fat percentage and fat mass, their reliability coefficient were respectively 0, 95 and 0,99 (Hazır and Açıkada, 2002). Body height measured by Holtain (U.K.) stadiometer according to Gordon et al. (1989).

Maximum heart rate was recorded at 1-second intervals during 20 m Shuttle Run Test and the measurement of resting heart rate was taken after a few minutes upon waking whilst still lying in bed using Polar Team[2] (Finland).

Leg strength determined by Takei (Japan) back & lift dynamometer. Players stand upright on the base of the dynamometer with their feet shoulder width apart. Arms hang straight down to hold the center of the bar with both hands; adjust the chain so that the knees are bent at approximately 110 degrees. In this position, the back should be bent slightly forward at the hips, head should be held upright, and should look straight ahead. Then without

bending back, pull as hard as possible on the chain and try to straighten legs, keeping arms straight. Muratlı, et al. (2007), Günay et al. (2006), Özer (2001) indicated that for determination of strength dynamometer was reliable.

Hand grip strenght of players determined by Takei (Japan) hand dynamometer. The players hold the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. When ready the player squeezes the dynamometer with maximum isometric effort, which is maintained for about 5 seconds. Tamer (2000) and Özer (2001) indicated that for determination of strength dynamometer was reliable.

Vertical jump was determined by Takei (Japan) jumpmeter. The player wears a waist belt attached to measuring tape that is grounded to the mat, set the tape to zero then jump as high as he can. Using the arms during a vertical jump test was free. Muratlı at al. (2007), Tamer (2000) and Sevim (1995) were indicated that vertical jump test is one of the tests to determine anaerobic power. Zorba (1999) indicated that reliability of test as 0,90-0,97.

Anaerobic power of subjects was calculated according to Lewis formula (P=$\sqrt{4.9}$ * W * $\sqrt{D}$) with using vertical jump and body weight values (Fox et al., 1988).

P=Anaerobic Power (kg/sec); $\sqrt{4.9}$=Standard Time; W=Body weight (kg); D=Jumping Distance (m)

The test involves running a single maximum sprint over a 10 m and 30 m distance, with time recorded. For determining time, photocells of Newtest 300 (Denmark) test battery were used. Three photocells were placed on 0 m, 10 m and 30 m in the linear position. Start from a stationary position, with one foot in front of the other. The reliability of this test was indicated by Fetz (1978) as 0,74-0,97.

The flexibility characteristics of players were measured by sit & reach test. This test involves sitting on the floor with legs stretched out straight ahead. When the test realized players removed their shoes.

For determining VO_{2max} the 20 m Multistage Fitness Test was used. This test involves continuous running between two lines 20 m apart in time to recorded beeps. The test started with a 8.5 km/hr running velocity and increased by 0.5 km/hr each minute. For estimating VO_{2max}, a formula was used belong Ramsbottom et al. (1988).

The technical skill test battery used by Malina et al. (2005, 2007) was utilized to calculate the players' technical skill scores. This test battery consists of six technical tests: Ball control with the body, ball control with the head, slalom dribbling with passing (focusing on speed and accuracy), slalom dribbling (focusing on speed), passing accuracy and shooting accuracy (Malina et al., 2005; 2007). After all the technical skill tests, Z scores were calculated for each test; the scores were reversed for the two timed items since lower times reflect better performance (Malina et al., 2007). The Z scores were summed to provide a composite soccer skill score for each player. The intra-class correlations for repeated measures (analysis of variance) indicated reasonable reliability: 0,72 for passing, 0,72 for ball control with the head, 0,73 for shooting, 0,88 for dribbling speed, 0,85 for ball control with the body and 0,86 for dribbling with passing.

Statistical Analysis

Values obtained from players, were compared statistically by using SPSS (ver. 16) with the help of ANOVA and Tukey test was used to identify which groups had significant differences. Before using the parametric tests, the assumption of normality was verified using the Shapiro-Wilk test. Alpha level was set as 0,05 for statistical significance. All data were reported as means and standard deviations.

RESULTS

ANOVA results showed that there weren't any significant differences (p>0,05) among groups at the point of physical, physiological and technical values except for right hand grip strength. 10 m and 30 m sprint values, anaerobic power, leg strength, jump heights, Shuttle Run Test

results and VO_{2max}, body weight and height, body fat percentage, body mass index, fat free mass and also "Total Skill Score" had shown no statistical difference (p>0,05) in terms of players' playing positions.

Table 1: Averages values and comparison results of physical characteristics of groups (ANOVA)

PARAMETERS	DEFENSE x±ss (n=9)	MIDFIELDERS x±ss (n=8)	FORWARDS x±ss (n=6)	F	p	RESULT
Age (year)	21,78±3,07	20,75±1,03	22,33±3,93	0,578	0,570	p>0,05
Height (cm)	180,33±6,69	177,25±4,37	180,00±4,56	0,769	0,477	p>0,05
Weight (kg)	75,71±14,61	74,09±12,55	70,60±6,42	0,315	0,733	p>0,05
HR$_{max}$ (beat)	198,22±5,47	199,00±12,42	200,83±8,35	0,149	0,862	p>0,05
HR$_{rest}$ (beat/min.)	63,67±9,99	61,50±7,63	60,33±9,63	0,261	0,733	p>0,05
Body Mass Index (kg/m^2)	23,10±3,15	23,49±3,36	21,78±1,90	0,600	0,558	p>0,05
Body Fat Percentage (%)	7,69±4,95	8,86±4,26	6,22±2,41	0,682	0,517	p>0,05
Body Fat Mass (kg)	6,40±5,03	7,02±4,43	4,48±2,15	0,643	0,536	p>0,05
Fat Free Mass (kg)	69,31±10,13	67,05±8,27	66,12±4,61	0,297	0,746	p>0,05

ANOVA results showed that there weren't any significant differences (p>0,05) among groups at the point of measured physical values.

Table 2: Averages values and comparison results of physiological characteristics of groups (ANOVA)

PARAMETERS	DEFENSE x±ss (n=9)	MIDFIELDERS x±ss (n=8)	FORWARDS x±ss (n=6)	F	p	RESULT
Vertical Jump (cm)	53,78±4,74	53,12±5,17	56,83±7,41	0,810	0,459	p>0,05
Leg Strenght (kg)	127,61±20,60	126,12±14,99	138,83±17,45	0,985	0,391	p>0,05
Right Hand Grip (kg)	45,63±5,56	41,09±3,72	48,57±5,87	3,900	0,037	p<0,05
Left Hand Grip (kg)	43,80±6,33	41,17±4,95	45,9+0±5,73	1,196	0,323	p>0,05
10 m Sprint (sec.)	1,87±0,09	1,88±0,08	1,85±0,09	0,213	0,810	p>0,05
30 m Sprint (sec.)	4,55±0,17	4,53±0,14	4,40±0,16	2,023	0,158	p>0,05
Anaerobic Power (kgm/sec.)	122,81±24,27	119,79±21,57	117,22±7,67	0,140	0,870	p>0,05
Flexibility (cm)	22,44±6,58	28,75±6,53	26,50±7,99	1,801	0,191	p>0,05

Shuttle Run (number)	77,22±12,10	77,87±21,52	94,17±15,34	2,199	0,137	p>0,05
VO$_{2max}$ (ml.kg-1.min-1)	45,24±4,04	45,10±6,63	50,12±4,58	1,991	0,163	p>0,05

Comparison of the measured physiological characteristics of the groups by ANOVA; there were no significant differences among groups at the point of vertical jump, leg strength, left hand grip, 10 m sprint, 30 m sprint, anaerobic power, flexibility, the number of shuttle run and also VO$_{2max}$ (p>0,05), only the right hand grip strength results had statistically significant differences between groups (p<0.05). According to the results of the Tukey test, forwards were stronger than midfielders in the right hand grip (p=0,037; p<0.05).

Table 3: Averages values and comparison results of soccer skill characteristics of groups (ANOVA)

PARAMETER	DEFENSE x±ss (n=9)	MIDFIELDERS x±ss (n=8)	FORWARDS x±ss (n=6)	*F*	*p*	RESULT
Total Skill Score (point)	-1,10±0,90	-0,81±0,64	-0,82±0,48	0,810	0,459	p>0,05

Comparison of the measured technical characteristics of the groups by ANOVA; there were no significant differences among groups at the point of total soccer skill score (p>0,05).

DISCUSSION

When the literature was reviewed; it became clear that physical, physiological and technical characteristics of players in this study it was similar to other studies' results. Kumartaşlı et al. (2011), Cerrah et al. (2011), Apti (2010), Alemdaroğlu et al. (2010) and Silva et al. (2008) found similar age and body composition characteristics with the current study. Results of HR$_{max}$ and HR$_{rest}$ in this study were similar to Alemdaroğlu (2008), Aziz et al. (2005), Arslan et al. (2006), Erkmen et al. (2005) and Saygın (2001). Mean values of strenght, anaerobic power, sprint, flexibility and VO$_{2max}$ in current study parallel with values of studies of Cerrah et al. (2011), Besler et al. (2010), Duyul Albay et al. (2008), Tokmak (2008), Ateş ve Ateşoğlu (2007), Ek ve ark. (2007), Aslan et al. (2010), Taşkın (2006),

Temoçin et al. (2004), Akın et al. (2004), Kişhalı et al. (2002), Uğraş et al. (2002) and Saygın (2001). Technical capacity of players in this study remind of capacity of players into study of Cerrah et al. (2011).

A lot of initial study showed that there were not any significant differences among players at the point of playing positions in soccer. For example, Joe Dunbar and Treasure (2005) did not find any differences as physically or physiologically among playing positions in English Premier League teams' players like studies of Cerrah et al. (2011), Akın et al. (2009), Köklü et al. (2009) and Taşkın (2006). Similar to the results of other studies, also current study has not any differences in the rest of the qualities of groups except for hand grip strength capacity which is thought to be coincidence for difference of between forwards and midfielders.

CONCLUSION

Consequently; in the light of other study results it can be claimed that although the trainings were prepared according to basic needs of soccer, it does not include the principle of training specificity in terms of playing position in amateur teams or the differences among the physical, physiological and technical characteristics of players in different positions began to eliminate in today's soccer.

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