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Comparison of Athletic Performances of Male Soccer Players with Respect to Their Respective Positions in Game

C. Berkan Alpay

Nigde University, School of Physical Education and Sports, Nigde, Turkey
Telephone: +90 546 437 51 51, E-mail: berkanalpay@hotmail.com,

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ABSTRACT The aim of this study is to compare the athletic performances of post-preparation soccer players in terms of their positions in game. The soccer players (n=30) competing for Pazarcik Spor in the 3rd Males Regional Amateur League of Turkey participated in the relevant study. The athletic performances (aerobic and anaerobic power) as well as pulmonary function tests of the athletes participated in the study were measured accordingly. The normality testing of the obtained data was performed using the Shapiro-Wilk test. The Kruskal-Wallis H test from the non-parametric tests was used to compare the data not showing normal distribution. The "Pairwise Multiple Comparisons Test" was, on the other hand, used for fixing the differences between groups. Though some differences were found in some respiratory levels of post-preparation athletes in relations to their positions in play, no statistically significant difference was observed for their athletic performances.

INTRODUCTION

Soccer is the world's most popular sport played by men, women, children and adults at different levels of expertise (Stølen et al. 2005). There are too many studies in the literature on soccer and soccer players (Janjic et al. 2010; Vigne et al. 2010; Rebelo et al. 2013; Ardern et al. 2015). Demonstrating, in particular, the needs of the players in the game can be capable of providing information in relation to the performance they will put forward during football matches. The soccer performance depends mainly upon numerous factors such as the factors that are technical/biomechanical, tactical, mental, and physiological. One of the causes for the soccer being the most popular game in the world is that it does not require the players to have an extraordinary capacity in any of these performance areas, but they still need to have been at a reasonable level in all areas (Stølen 2005).

Though the playing fields of soccer, requiring large areas for playing, were divided into outer defense, central defense, outside midfield, central midfield, and forward (Lago-Peñas et al. 2011), it is divided, as a universal game position, into three positions as defender, midfielder, and forward (Mohr et al. 2008). The quantitative analyses performed by means of personal observations may ensure some feedback, beyond making comments on their performance and activities, to the players and coaches for improving themselves accordingly (Vilar et al. 2013). Soccer players fulfill different activities such as averagely 17.01 percent standing, 40.4 percent walking, 35.1 percent running at lower pace, 8.1 percent running at higher pace, 0.7 percent running at sprint like race, late challenge, head and leg shots, dribbling, jumping, and turns during a match. 87.2 percent of the distance traveled during a football match accounts for the aerobic exercise. That the VO2max levels of the soccer players being very close to the levels of long-distance cross-runners with an average level of 55-65 mL/min/kg, emphasizes the importance of aerobic energy production for soccer. Meanwhile, movements associated with anaerobic energy occurring in a short time and at high-intensity such as short-distance sprints, changing direction, sudden stops, head shots, jumping, drawing shots, occur frequently in soccer (Günay and Yüce 1996: 33-34).

Each soccer player may cover different running distances according to his/her location in the game. The aim of this study accomplished taking into consideration that each location should have its own different physical and physiological properties is to make a comparison between the respiratory parameters and athletic

Address for correspondence:
C. Berkan Alpay
School of Physical Education and Sports, Nigde University, Nigde, Turkey 51700
Phone: +90 546 437 51 51
Fax: +90 (388) 313 00 14
E-mail: berkanalpay@hotmail.com

performances according to playing positions of post-preparation period soccer players.

MATERIAL AND METHODS

Subjects

The soccer players (n=30) competing for Pazarcik Spor in the 3rd League of Turkey took their part in the relevant study (age: 22. 43±3.01 years, age of training, 10.57±1.50 years, height: 178. 10±6.41 cm, weight: 72.75±6.72 kg, body mass index: 22.89±0.95kg/m2). The subjects were given necessary information stating the aim and method of the study, and they signed relevant consent forms prior to the study. The athletes participated in the study did not reveal any disease.

Applied Tests

All measurements were taken at the Pazarcik Indoor Sports Hall located at Pazarcik district, Kahramanmaras. The levels of relative humidity, temperature, and music volume for the yo-yo testing prevailing in the sports hall where the measurements were taken, were measured by means of the DT8820 digital multifunctional environment meter. The levels of relative humidity were fifty percent, temperature 26 °C, and volume 75 decibels in the sports hall.

Measurement of Height and Body Weight: The heights and weights of the study group were measured with bare feet and shorts with an accuracy level of 0.01 using brand Seca stadiometer.

Pulmonary Function Tests: The spirometric analyses of the subjects were accomplished by means of Chestograph HU-105 spirometer. Athletes remained in sitting position throughout the test. Test measurements were taken thrice for each parameter in terms of relevant protocol. The best value for each parameter was recorded.

Yo-Yo Intermittent Recovery Test 1/Aerobic Power: This is a test that the speed is increased at a regular rate. The test consists of a racecourse having 20-meter round trips, and there is a recovery area of 5+5 meters at the end of each round trip on where the athletes take a rest actively.

If any athlete cannot reach twice to the finish line on time, the test is considered finished, and the distance traveled by the athlete is recorded accordingly (Krustrup et al. 2006). Yo-Yo intermittent recovery test was performed in compliance with all test protocols. The distance recorded was acquired with VO2max levels using the formula below:

Yo-Yo IRT1: [IR1 distance (m) X 0.0084] + 36.4

Vertical Jump/Anaerobic Power: The measurements were taken by means of electronics jump meter, Newtest 3000. The measurement was made in a position legs opened at a width of shoulder, body bent 90 degrees from knees and tilted forwards, and arms hanged down. This process was repeated three times, the best value was recorded in cm, and the values of anaerobic power (kg-m/sec.) were calculated applying the Lewis formula on the distance jump.

P=[d4.9x(Weight)dD(m.)]

Where,

P= Power

D = Vertical jump distance (m.)

Statistical Analyses

The normality testing of the data acquired was performed using the Shapiro-Wilk test. The Kruskal-Wallis H test from the non-parametric tests was used to compare the data not showing a normal distribution. The “Pairwise Multiple Comparisons Test” was used, on the other hand, for fixing the differences between groups. All of the analyses were applied on the SPSS 21. The confidence interval was selected as ninety-five percent, and the levels below $p<0.05$ considered as being significant.

RESULTS AND DISCUSSION

The coaches have recently been applying various tests on the athletes in order to acquire information about their training performances and the physical capacities, and these tests, therefore, should be appropriate to the relevant sports branches. Since the field tests such as shuttle run or Cooper contain nonstop exercises, these tests do not provide any valid assessment about the performance status of athletes who struggle for half-speed sports such as football, basketball or handball. In contrast to that, there is widespread consensus about Yo-Yo IR tests, which has shorter recovery period and expressed as spaced, being more valid and reliable one for evaluating the performances in half-speed sports (Saltin and Astrand 1967; Aziz et al. 2005; Sirotic and Coutts 2007; Ingebrigtsen et al. 2012).

The soccer players competing for Pazarcik Spor in the 3rd Males Regional Amateur League of Turkey were participated in the relevant study. In the study, pulmonary function tests and athletic performance measurements of the subjects were applied, and the purpose of this study, meanwhile, was to bring to light the differences between the soccer players competing in different positions.

The players surveyed were classified according to their universal positions. It has been found that there was no significant difference between the demographic characteristics relating to playing positions in the game ($p>0.05$) (Table 1). This result makes one think that the study group has a homogeneous structure and even that the results obtained have not been sourced from their physiological properties, but from the physical properties of them.

The physiological features, in addition to the tactical and technical skills, increase the level of sporting skills. All the efforts laid for success while fulfilling a sporting skill is called as the athletic performance (Bayraktar and Kurtoglu 2004). Soccer is a sports branch in which both aerobic and anaerobic efforts have been applied sequentially and required appropriate fitness in terms of muscular and cardio-respiratory (Akgün 1994).

That the levels of MVV and VC being high are an advantage for long-term efforts of 90 minutes long for the economic operation of the pulmonary system. When the pulmonary function tests of the soccer players were examined in relation with their positions in a game during this study, which has been scheduled taking into account that each would have specific physiological functions according to the positions reserved for them, a difference was detected for the levels of FVC (Forward $\boldsymbol{q_2}$: 4.37, Midfielder $\boldsymbol{q_2}$ 3.90, Defender $\boldsymbol{q_2}$ 3.53), FEV_1 (Forward $\boldsymbol{q_2}$: 4.00, Midfielder $\boldsymbol{q_2}$: 3.57, Defender $\boldsymbol{q_2}$: 3.18), MVV (Forward $\boldsymbol{q_2}$: 150.00. Midfielder $\boldsymbol{q_2}$: 134.00, Defender $\boldsymbol{q_2}$:119.50), and VC (Forward $\boldsymbol{q_2}$: 4.50. Midfielder $\boldsymbol{q_2}$: 3.72 Defender $\boldsymbol{q_2}$:3.63) ($p<0.05$), but no difference was found between PEF values (Forward $\boldsymbol{q_2}$: 458.00, Midfielder $\boldsymbol{q_2}$: 415.00, Defender $\boldsymbol{q_2}$:357.00) ($p>0.05$) (Table 2). The levels of FVC, FEV_1, MVV, and VC of the forwards have the largest median accordingly (Fig. 1).

In this study, whereas it was observed, when the FVC levels between groups were examined, that the defenders have lower levels than both the forwards and the midfielders and there was a significant difference between them ($p<0.05$), no difference was detected between forwards and midfielders ($p>0.05$). When the FEV_1 levels were examined, on the other hand, there was a difference only between forwards and defenders ($p<0.05$), but no difference was observed between the midfielders and both the forwards and defenders ($p>0.05$) (Fig. 2).

The large amount of oxygen, which is carried to the tissues during a 90 minutes competition, is associated with the MVV levels. Meanwhile, when the MVV levels were checked, there was a

Table 1: Comparison of demographic variables of soccer players in terms of football positions

Demographic variables	*Football positions*	*N*	q_2	q_1	q_3	*p*
Age (years)	Forward	10	24.00	20.00	25.00	.694
	Midfielder	10	21.50	19.50	24.50	
	Defender	10	22.00	19.75	25.25	
Age of Training (years)	Forward	10	10.00	8.75	12.25	.960
	Midfielder	10	10.00	10.00	11.25	
	Defender	10	10.00	9.75	12.25	
Body Height (m)	Forward	10	1.79	1.75	1.83	.649
	Midfielder	10	1.76	1.73	1.80	
	Defender	10	1.79	1.70	1.86	
Body Weight (kg)	Forward	10	73.75	68.00	78.50	.542
	Midfielder	10	70.75	66.86	74.63	
	Defender	10	75.75	67.63	80.63	
BMI (kg/m^2)	Forward	10	22.52	22.10	23.62	.187
	Midfielder	10	22.60	22.60	23.42	
	Defender	10	23.47	23.02	23.75	

q_1: 25 percent quartile. q_2: 50 percent quartile (Median). q_3: 75 percent quartile. BMI: Body mass index

Table 2: Comparison of pulmonary function tests of soccer players in terms of football positions

Pulmonary parameters	*Football positions*	*N*	q_2	q_1	q_3	*p*
FVC(L/sec)	Forward	10	4.37[a]	3.88	4.65	.001**
	Midfielder	10	3.90[a]	3.60	4.28	
	Defender	10	3.53[b]	3.23	3.64	
FEV_1(L/sec)	Forward	10	4.00[a]	3.78	4.20	.001**
	Midfielder	10	3.57[ab]	3.32	4.02	
	Defender	10	3.18[b]	2.66	3.33	
PEF(L/min)	Forward	10	458.00	369.25	488.75	.330
	Midfielder	10	415.00	339.00	481.25	
	Defender	10	357.00	315.25	453.00	
MVV(L/min)	Forward	10	150.00[a]	141.75	157.25	.001**
	Midfielder	10	134.00[a]	124.50	150.75	
	Defender	10	119.50[b]	99.75	124.75	
VC(L)	Forward	10	4.50[a]	3.71	4.64	.021*
	Midfielder	10	3.72[ab]	3.53	4.19	
	Defender	10	3.63[b]	3.34	3.69	

*$p<0.05$. **$p<0.01$. q_1: 25 percent quartile. q_2: 50 percent quartile (Median). q_3: 75 percent quartile. ab: the differences between groups are represented by different letters. FVC: Forced vital capacity. FEV_1: Forced expired volume in one second. PEF: Peak expiratory flow. MVV: Maximal voluntary ventilation. VC: Vital capacity. L: Liter. min: Minute. sec: Second.

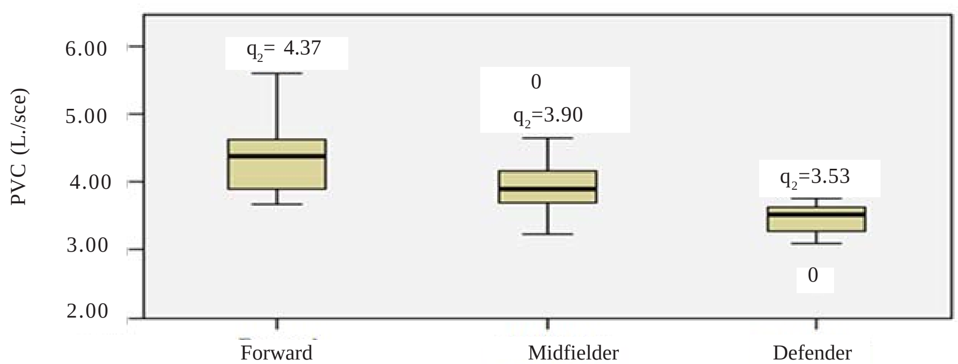

Fig.1. Comparison graph for FVC levels of soccer players
Source: Author

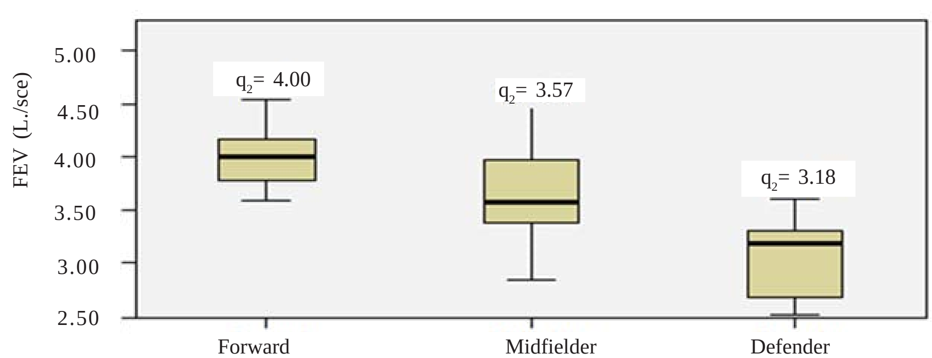

Fig. 2. Comparison graph for FEV_1 levels of soccer players
Source: Author

difference between the defenders and midfielders ($p<0.05$), but no difference was detected between the forwards and midfielders ($p>0.05$) (Fig. 3).

Finally, there was a difference in VC levels of the forwards and defenders ($p<0.05$), but no difference was determined between midfielders and both the forwards and defenders ($p>0.05$) (Table 2) (Fig. 4).

Soccer, though it has been accepted as an aerobic game in terms of time, is a game with too many anaerobic aspects since, in substance, it contains mostly intense interval sprints within. Therefore, in the literature, the levels of respiratory function tests are not considered as a factor, which limits maximal aerobic performance (Reilly et al. 1990). Though there was no statistically significant difference in demographic variables of the players participating in the study, still some numerical differences have been detected ($p>0.05$) (Table 1). If the researchers take into consideration that the respiratory functions vary according to the various factors and in particular to the structural components of body, it is thought that the differences revealed in breath tests have been resulted from the differences of the physical and physiological components of the players.

It was determined in this research that there was no statistically significant difference between aerobic (Forward $q_{2:}$ 53.37. Midfielder $q_{2:}$54.88. Defender q_2:52.53) and anaerobic power (Forward $q_{2:}$114.25. Midfielder $q_{2:}$101.55. Defender q_2:101.68) levels of the soccer players in compliance with their positions in game ($p>0.05$; Table 3). Previous studies, on the other hand,

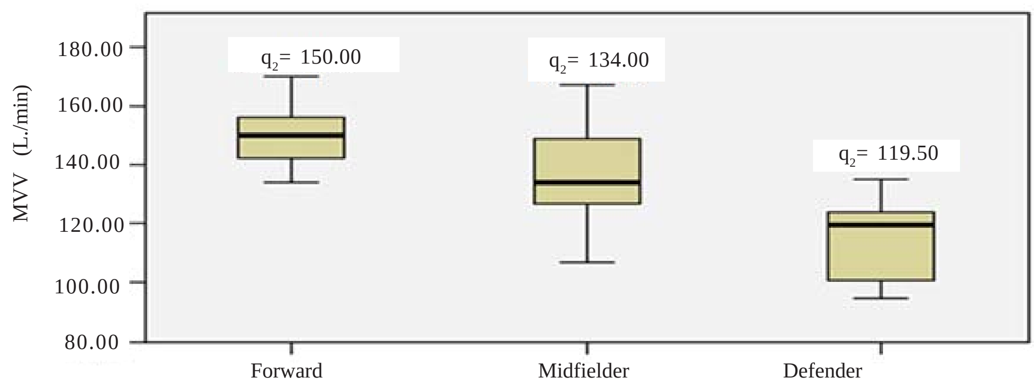

Fig. 3. Comparison graph for MVV levels of soccer players
Source: Author

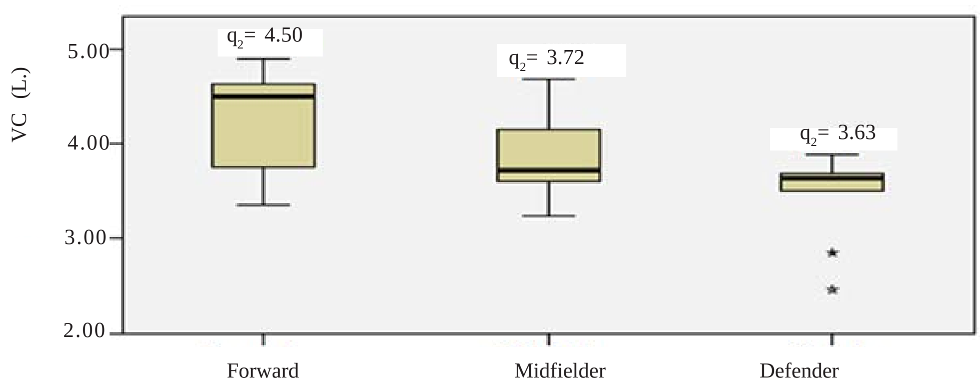

Fig. 4. Comparison graph for VC levels of soccer players
Source: Author

Table 3: Comparison of power tests of soccer players in terms of football positions

Power tests	*Football positions*	*N*	q_2	q_1	q_3	*p*
Aerobic Power (ml/min/kg)	Forward	10	53.37	50.68	56.22	.782
	Midfielder	10	54.88	52.19	56.22	
	Defender	10	52.53	50.68	56.48	
Anaerobic Power (kgm/sec)	Forward	10	114.25	105.17	120.94	.072
	Midfielder	10	101.55	89.37	111.41	
	Defender	10	101.68	90.90	113.33	

q_1: 25 percent quartile. q_2: 50 percent quartile (Median). q_3: 75 percent quartile. ml/min/kg: milliliter/minute/kilogram. kgm/sec: kilogram-meter/second

have shown some differences in the athletic performance between soccer players according to their positions (Wisløff et al. 1998; Reilly et al. 2000). The studies, however, accomplished recently according to the positions of players in game have revealed that there was no difference between their athletic performances (Cerrah et al. 2011; Koç and Aslan 2015).

Rampinini et al. (2007) have reported in their studies that the forwards have performed more sprints than the defenders and midfielders, and in contrast to that, midfielders traveled long distances than the other players. It has been taken into consideration that such a situation was resulted from team's formation and positions of the players in game. Strauss et al. (2014) determined, therefore, that there was no difference between the values of Max VO2 in terms of playing positions of soccer players. Nilsson and Cardinale (2015) reported again that there was no difference between aerobic and anaerobic capacities of the players according to their playing positions.

CONCLUSION

As a result, though the athletes have been thought to have different physical and physiological characteristics as playing positions in football, it is considered for today's football game that aforesaid differences have been gradually disappearing. It has directed one to think that some expectations such as the defenders' joining the attacks, forwards' helping the defense, have caused the running distances traveled during a match to disappear without applying any distinction for relevant positions of players, thus suggesting that the players need to have skills close to each other. This fact should be considered a normal phenomenon because soccer is a team game.

RECOMMENDATIONS

The results obtained in this research show that there has been no athletic performance difference between the playing positions of the players. In this context, it has been thought that since soccer is a team game, the training practices aiming athletic performance-enhancing should be performed taking into consideration individual differences of players, and their performance levels be synchronized with the highest level possible. Such an application will encourage soccer players to play team games more than regional games.

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