ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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Comparison of the Dynamic Balance and Speed Performance of Soccer Players Playing in Different Positions

Farklı Pozisyonlarda Oynayan Futbolcuların Dinamik Denge ve Sürat Performanslarının Karşılaştırılması

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ABSTRACT Objective: The aim of this study was to compare the dynamic balance and speed-dribbling performance of healthy adolescent soccer players (age:16.87±1.22 years, body height:176.72±6.8 cm, body weight: 67.12±6.53 kg and active soccer lifetime was: 4.91±1.79 years) playing in defence (D), midfield (M) and forward (F) positions. **Material and Methods:** The study included a total of 47 male soccer players (D:16, M:12, F:19). The sociodemographic data of the athletes were recorded. The Star Excursion Balance Test was used to evaluate dynamic balance. Measurements were taken in eight directions (anterior, anterolateral, lateral, posterolateral, posterior, posteromedial, medial and anteromedial) for right and left sides. The Speed Dribbling test was used to evaluate performance. The data were evaluated with SPSS 22.0 software using ANOVA and Kruskal Wallis tests. **Results:** The performance data of the athletes in D, M and F positions were found to be 19.42±1.01 sec, 19.23±1.24 sec and 19.50±1.09 sec respectively. There was no difference between the groups in terms of dynamic balance and speed-dribbling performance (p>0.05). **Conclusion:** According to the results of this study, there was no difference between adolescent soccer players playing in different positions in terms of dynamic balance and speed-dribbling performance. This could be due to the interchanging of positions, different from their main position, and the similar training of soccer players at the substructure level may have contributed to the similarity between the positions. As this study was conducted on U-16, U-17, U-19 and U-21 teams, it can be recommended that future studies be conducted with elite soccer players.

Keywords: Soccer; speed; dynamic balance

ÖZET Amaç: Bu çalışmanın amacı, savunma (S), orta saha (OS) ve hücum (H) pozisyonlarında oynayan sağlıklı adölesan futbolcuların (yaş: 16,87±1,22 yıl, boy: 176,72±6,28 cm, vücut ağırlığı: 67,12±6,53 kg ve aktif futbol ömrü 4,91±1,79 yıl) dinamik dengelerini ve sürat-dribling performanslarını karşılaştırmaktı. **Gereç ve Yöntemler:** Çalışmaya toplam 47 erkek futbolcu (S: 16, OS: 12, H: 19) katıldı. Sporcuların sosyodemografik verileri kaydedildi. Dinamik dengeyi değerlendirmek için Yıldız Denge Testi kullanıldı. Ölçümler sağ ve sol taraf için sekiz yönde (ön, ön dış, dış, arka dış, arka, arka iç, iç, ön iç) alındı. Performansı değerlendirmek için Sürat Dribling testi kullanıldı. Veriler SPSS 22,0 yazılımı ile ANOVA ve Kruskal Wallis testleri kullanılarak değerlendirildi. **Bulgular:** S, OS ve H pozisyonlarında oynayan sporcuların performans verileri sırasıyla 19,42±1,01 sn, 19,23±1,24 sn ve 19,50±1,09 sn olarak bulundu. Gruplar arasında dinamik denge ve sürat-dribling performansı açısından fark yoktu (p>0,05). **Sonuç:** Bu çalışmanın sonuçlarına göre, dinamik denge ve sürat-dribling performansı açısından farklı pozisyonda oynayan adölesan futbolcular arasında fark yoktur. Bunun nedeni, sporcuların bazen asıl yerlerinden farklı pozisyonlarda oynaması olabilir. Ayrıca, futbolcuların altyapı seviyesinde benzer şekilde antrene edilmesi pozisyonlar arasındaki benzerliğe katkı sağlamış olabilir. Bu çalışma U-16, U-17, U-19 ve U-21 takımlarında yapıldığı için gelecekteki çalışmaların elit futbolcularla yapılmasını tavsiye ediyoruz.

Anahtar Kelimeler: Futbol; sürat; dinamik denge

Soccer is one of the most popular sports in the world, with more than 265 million athletes.[1] Many children, adolescents, and adults play soccer for pleasure or as a profession. It has a high risk of injury compared to many other sports, and these injuries cause major economic losses.[2] Therefore, there is a need for the assessment of soccer players, especially in terms of balance and performance, because better

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balance is positively correlated with increased athletic performance and strongly correlated with injuries.[3,4] Although soccer is a team game, each player undertakes different tasks, so balance and performance should be examined according to the playing position.

Balance and performance have often been examined by researchers.[5-7] Balance is an important component for many different motor skills, such as maintaining posture and conducting complex sports skills.[8] Poor balance in athletes causes an increased risk of injury.[9,10] In terms of performance, factors such as muscle strength, vertical jump, speed and agility affect athletes' playing time in competitions.[11] This is important for the athletes' career and the team for which they play. Evaluation of balance and performance according to the playing position can contribute to a player's career. In addition, it can guide clinicians in decision-making about the return to sport and coaches in terms of training and tactics.

The activity and their frequency vary according to the positions played by the athletes. For example, defence players often make jump activities, but they sprint less than players in other positions, while forward players move more towards the ball.[12] Taking into consideration the difference between the physical and physiological needs of the different game positions, there can also be seen to be differences in physical characteristics, body composition and jumping activities of athletes.[13,14-16] In addition, those playing in the midfield position run much greater distances during a match than defence and offence players.[17]

Such differences are also seen in injuries, which is an important topic in sport.[18] For example, players who play in forward positions have a higher incidence of groin injuries than defensive players, while those playing on the outside of the midfield are injured more during matches and those playing in the middle of the defence are injured more in training.[19] These differences may occur due to different loading and movement patterns in different playing positions.[20] These situations may cause athletes to have different balance and performance.

Considering the differences mentioned by previous researchers, the aim of this study was to compare and evaluate the balance and performance of soccer players playing in different positions. In this context, the hypotheses of this study were:

H_0: There is no difference between the players in different positions in terms of dynamic balance and speed-dribbling performance.

H_1: There is a difference between the players in different positions in terms of dynamic balance and speed-dribbling performance.

MATERIAL AND METHODS

This case-control study was planned to compare the dynamic balance and speed-dribbling performance of young athletes according to their playing position. The measurements were taken from athletes in four different teams: Under 16 (U-16) (n=11), U-17 (n=6), U-19 (n=21) and U-21 (n=9). The players were separated according to their positions and the measurements were evaluated. All the measurements were taken in the afternoon with the athletes wearing sports shoes. During the measurement tests and procedures, only water was permitted to be consumed.

This study included 47 male athletes who played in defence (n=16, age: 16.93±1.34 years, body height: 180.00±7.19 cm, body weight: 69.62±8.56 kg, active soccer lifetime: 5.43±2.36 years), midfield (n=12, age: 17.08±1.24 years, body height: 175.91±5.41 cm, body weight: 66.75±4.69 kg, active soccer lifetime: 5.25±1.65 years) and forward (n=19, age: 16.68±1.15 years, body height: 174.47±4.95 cm, body weight: 65.26±5.02 kg, active soccer lifetime: 4.26±1.04 years) positions. Individuals with orthopedic, neurological or congenital problems and those with injuries affecting balance and performance during the recent 6 months were excluded from the study. If the athlete had been out of the sport for at least two weeks of the last three months, he was not included. Ethics committee approval was obtained for the study (08.11.2017/48- Trabzon, Turkey), which was carried out in accordance with the Declaration of Helsinki. Participants, and if necessary their parents, were informed about the study, and they gave written informed consent.

Before the tests, all the athletes ran for five minutes and performed 3x5-second active stretches of the lower extremity muscle groups (quadriceps, hamstring, adductor, calf). Dynamic balance measurements were taken first, followed immediately by the speed dribbling performance measurements.

The Star Excursion Balance Test was used to evaluate dynamic balance. This is a multidimensional test that includes maximum extension in eight different directions while remaining stable on a lower extremity.[21] The test includes neuromuscular parameters such as balance, coordination, flexibility, proprioception and strength of the lower extremity.[22,23] In the current study, 8 bars were placed on the ground spaced at 45^0 intervals. Measurements were taken first on the left foot, starting from the anterior direction and proceeding clockwise. Measurements were taken in the anterior (A), anterolateral (AL), lateral (L), posterolateral (PL), posterior (P), posteromedial (PM), medial (M) and anteromedial (AM) directions. The athletes rested for 2 minutes between two consecutive directions. During the test, the subjects were instructed to keep the hands on the iliac crest and not to lift the heel off the ground. Three measurements were made correctly for each direction. The raw data of the obtained dynamic balance values were normalized using the formula [(reach distance x 100) / lower extremity length].[24] Before the balance measurements were taken, all the subjects performed the extensions 6 times in each direction on each side.

Speed Dribbling, which measures speed and time versus coordination, was used to evaluate performance.[25] In this test, each subject completed a 50-meter track following the correct route. This test, which is normally carried out with a ball, was revised in consideration of the activities performed without a ball in soccer. In this study, the athletes completed the first 30 meters without a ball and the last 20 meters with a ball. The time between the start and the finish point was recorded as seconds using a chronometer. Three measurements were taken at 3-minute intervals. Before the speed-dribbling performance measurements, all athletes made a trial at a light pace to learn the correct route (Figure 1).

The test-retest reliability coefficient of the dynamic balance data was 0.57-0.95 and of the speed-dribbling performance data, 0.92.

The data were evaluated with SPSS 22.0 software (Statistical Package for Social Sciences Inc. Chicago, IL, USA). Histogram, variation coefficient, kurtosis value, skewness value, de-trended plot graph and the Shapiro-Wilks test were used to assess conformity of the obtained data to normal distribution. A balanced distribution of the histogram graph and the coefficient of variation <30%, double the standard deviation> kurtosis and skewness values was accepted as normal distribution. In addition, a regular pattern of the de-trended plot graph and a Shapiro-Wilks test value >0.05 indicated normal distribution. One-way analysis of variance (ANOVA) was applied to the data of all 3 groups showing normal distribution. Bonferroni correction was applied if there was a difference. The Kruskal Wallis test was used for data not showing normal distribution. The confidence interval was 0.95. A value of $p < 0.05$ was considered statistically significant.

RESULTS

When the sociodemographic characteristics of the athletes were compared according to their positions, there was no difference between the groups in terms of age, body weight, body mass index (BMI) and active soccer lifetime ($p > 0.05$). There was a significant difference between the groups in terms of height

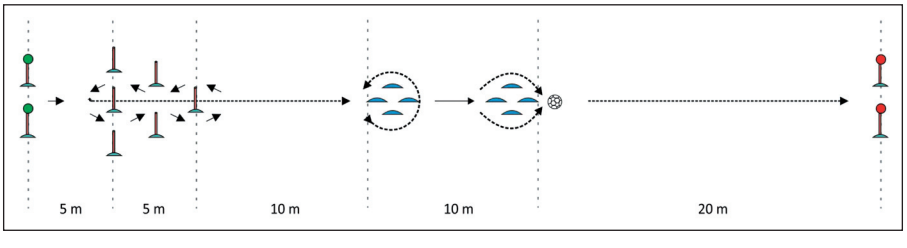

FIGURE 1: Speed dribbling test.

(p=0.02). It was found that this difference was between the athletes who played in defence and forward positions (p=0.02).

When the balance data of the left and right sides of the athletes were compared according to the playing position, no significant difference was found in respect of either side or any direction (p>0.05) (Table 1).

When the speed-dribbling performances of the athletes were compared according to the playing positions, no statistically significant difference was found between the groups (p=0.79) (Table 1).

DISCUSSION

In this study, dynamic balance and speed-dribbling performance data were compared according to the positions of soccer players. When the findings were examined, there was no difference between the groups.

Many studies in literature have compared the balance and performance of soccer players according to their playing position, but no consensus has been reached according to the results of those studies. Erdem et al. compared balance according to the playing positions of soccer players, and found no difference between the groups.[26] This was stated to be due to the lack of balance training in the training of amateur soccer players, and it was recommended that the addition of this to training programs could increase the skills of players in forward positions. Although the findings of the current study support that research, it can also be said that if dynamic balance exercises are included in training programs, not only the balance of forward positions players but also that of midfield and defence players will improve. The similarity between the groups in the current study can be considered to be due to the participation of athletes in the same training program.

Another study that compared some motor characteristics according to playing position found that in amateur soccer club teams, there was no significant difference between the balance values of defence, midfield and forward players.[27] The researchers stated that the athletes playing in different positions should have similar characteristics in order to resist each other. Accordingly, it can be said that differences between individuals have gradually decreased in cur-

TABLE 1: Comparison of balance and speed performance data between groups.

	Measurement	Defence (n=16)	Midfield (n=12)	Forward (n=19)	p
Left Balance (cm)	**A**	69.39±6.06	70.97±7.51	68.85±6.08	0.67
	AL	74.28±7.35	74.99±6.65	74.81±5.83	0.82
	L	77.78±7.99	80.02±6.74	80.89±6.56	0.43
	PL	87.15±10.60	89.97±14.16	88.32±14.56	0.85
	P	71.08±9.56	69.71±11.94	74.38±10.32	0.44
	PM	85.78±13.94	86.00±16.43	79.82±17.90	0.46
	M	56.01±4.90	56.20±5.11	55.89±5.37	0.98
	AM	62.38±5.94	65.89±5.85	65.82±8.23	0.36
Right Balance (cm)	**A**	69.50±7.03	69.26±6.34	67.21±5.72	0.51
	AL	75.71±6.66	75.79±6.79	78.97±9.21	0.39
	L	79.41±8.18	79.50±8.45	81.74±7.60	0.63
	PL	90.54±14.34	91.57±15.97	87.38±15.01	0.71
	P	68.55±9.94	68.92±9.44	71.73±12.45	0.64
	PM	79.78±13.39	82.78±14.13	79.70±16.90	0.83
	M	56.55±7.26	59.12±6.22	55.33±4.67	0.24
	AM	61.48±6.94	64.34±6.84	61.28±6.42	0.51
Speed Performance (sec)		19.42±1.01	19.23±1.24	19.50±1.09	0.79

Statistically significant differences (p<0.05). Values are reported as cm or sec and mean±standard deviation. (A: Anterior; AL: Anterolateral; L: Lateral; PL: Posterolateral; P: Posterior; PM: Posteromedial; M: Medial; AM: Anteromedial).

rent-day soccer. In addition, the soccer players evaluated in the current study comprised adolescents at the substructure level, which may have prevented them from having the full physical, motor, technical and tactical characteristics related to the position in which they play. Factors such as the needs of the team, the wish of individuals to find the most suitable position, and being tasked with different positions by the coach may cause the athletes to take on positions with characteristics other than those of their normal playing position. All these situations can be considered to have contributed to the similarity of the balance values of the players in all positions in the current study.

The differences arising from individual and position characteristics in soccer players has also provided a basis for investigating the relationship between position and performance in addition to balance.[14,28] In a study of young soccer players by Köklü et al., there were reported to be no significant differences in the measurements of anaerobic power, vertical jump, 10 and 30 meter speed tests applied to athletes playing in defence, midfield and forward positions.[29] This was attributed to the athletes not being trained specifically for the position in which they played. The results obtained in that study support the findings of the current study and as the research was conducted on athletes at the substructure level of a professional soccer team, it demonstrated similar characteristics to those of the current study. When the sporting facilities are considered and that the athletes in this study were at the infrastructure level, it was seen that the training program was applied as team training rather than individual training programs. This could also have contributed to the lack of difference between the groups, as special training programs are often implemented with the transition to professionalism.

In the literature, it can be seen that although researchers have used similar measurement methods, they have obtained different results. For example, Yapıcı et al. used two identical tests to those applied by Köklü et al. to compare motor characteristics in young soccer players.[29,30] That study was similar to the current study in terms of player profile, but the age range of 18-22 years was higher. There was reported to be no difference between the positions in the 10 m velocity test but there was a significant difference between the midfielders and the forwards in favor of the midfield players in the 30 m speed test. This was attributed to the benefits gained from position tasks. In contrast to Yapıcı et al., Gil et al. showed that there was no statistically significant difference between young soccer players playing in midfield and forward positions in respect of 30 m speed test times.[15,30] However, there was found to be a difference in favor of forwards compared to defence positions. The fact that the forward players are better at performance parameters such as endurance, speed, agility and power was considered to be the reason for this situation. Looking at these results in the literature, it can be said that the performance may change according to the athletes themselves and their teams, not primarily the playing position. In terms of speed dribbling performance, the technical skills and training content of the athlete should be taken into consideration.[31]

As different results have been shown with the use of the same tests in the same age groups, different parameters should be examined in the position-performance evaluation. In previous studies, it has been stated that there is no significant difference between the positions of soccer players in terms of max VO_2, visual and auditory reaction times as well as reactive and pre-planned agility.[32-34] These parameters may affect performance, which could explain why athletes perform similarly.

Although soccer players have specialized positions, researchers and coaches have recommended that athletes help in different positions in the game.[27] This occurs due to the double play of the game, where for example, a defensive player moves forward to contribute to an attacking movement.[32] This could also be a reason for the similar balance and performance of the athletes in this study. In addition, this similarity may also occur related to the athlete playing in different positions. Soccer players may play in different positions due to injury or team changes. Coaches may make tactical changes during training or matches, resulting in players playing in different positions, all of which can prevent athletes from specializing in a single position, and thereby contributing to the similar performance shown by all playing positions.

When examining the dynamic balance and speed-dribbling performance of athletes according to their playing positions, the level at which the athlete is playing is also important. In previous studies, mostly young and amateur athletes have been evaluated. However, professional level training is more systematic and task-oriented. When speed-dribbling performances are compared, professional soccer players are better than lower league athletes.[35] Therefore, it would not be correct to generalize the results obtained in this study to professional soccer players.

CONCLUSION

The results of this study demonstrated that the balance and performance of athletes playing soccer at the infrastructure level did not change according to the playing position such as defence, midfield and forward.

The method of the current study was different from other studies and the balance findings can be considered to be more valuable because of the high reliability and injury associated with the balance test in this research.[36,37] Moreover, the performance test in this study was different from the tests used in the other studies. The test used was original because it included soccer-specific movements and co-ordination with and without the ball.

Due to the inconsistency of the results of the previous studies on performance, since there is no consensus in the literature, the results of our study can give clinicians and academicians a new perspective.

It can be suggested that researchers compare the balance and performance of individuals who play professional-level soccer and are trained according to their game position.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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