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Investigation of Balance Performance in Soccer in Terms of Positional Differences

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Ethical Statement: It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited.

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Abstract

The aim of this study was to investigate balance performance in soccer in terms of positional differences. For this purpose, 18 healthy male soccer players participated in the study. The mean age of the participants was 21,06 ± 0,87 years, mean height 175,2 ± 6,98 cm, mean body weight 67,70 ± 5,96 kg. The study protocol was approved by the ethics committee of Selcuk University, Faculty of Sport Sciences. Dynamic balance tests with eyes open and eyes closed were used to evaluate the balance performances of the athletes. One-way Anova test and Paired Sample T test were used to evaluate the data obtained. As a result of the statistical tests, there was no significant difference between the positions in terms of balance performances (P>0,05). In addition, no significant differences were found in all other parameters except the eyes open Medial Lateral Stability Index(MLSI) parameter of midfielders (P>0,05). As a result, it can be concluded that the balance performances of soccer players competing as amateurs at different levels in soccer do not show positional differences as a result of our study.

Keywords: Balance, dominant, non-dominant, soccer.

INTRODUCTION

Balance is expressed as a state that includes the coordinated activities of motor, biomechanical and sensory factors, and on the other hand, it represents dynamism as an integrated state of many neurological factors, which appears to be a static state (10). In addition, balance is specific to the movement in which the performance is applied and differs according to each sport branch (21). In soccer, which is one of these branches, balance performance has an important place for the continuity of lower extremity functions (7).

Soccer is a sport branch that involves long times, fast directional running and emphasizes physical parameters such as strength, agility and endurance in addition to tactical and technical skills (1,17). While soccer players control their posture during their movements, on the other hand, they follow the movements of their teammates and opposing team players thanks to their visual information skills (18). At the same time, since soccer is played in a wide area and the tasks undertaken by athletes are different, it is necessary to evaluate soccer players in terms of their positions (15). In a study conducted in this context, Gil et al (6)

reported that anthropometric and physiologic differences were found between soccer players playing in different positions and that they showed different physical and motor characteristics according to their positions and that these differences were compatible with the workload they performed on the field in order to create anthropometric and physiologic profiles of non-elite young soccer players according to their playing positions and to determine their relationship with the selection process. In addition, in today's soccer, it is known that players who play in every position in a team should have many motoric characteristics, and even players who work in the offensive zone should help the defense, and players who work in the defensive line should help the offensive line in the same way (13). This information in the literature clearly shows how important balance performance is in the physical development of the player and in specific tasks related to the game when we examine the players in terms of position (8).

In the light of this information, it is important to determine the balance performance, which directly affects the training and competition performance of soccer players and provides their development, by considering positional differences. In this context, in this study, it was aimed to examine the dominant and non-dominant leg data of soccer players on a positional basis.

MATERIAL AND METHOD

Participants

This study was carried out with 18 male soccer players aged between 20-23 years who played soccer for at least 3 years in the 1st Amateur League, Super Amateur League and Regional Amateur League teams in Konya province. The criterion was that the participants did not have any health problems and sportive injuries.

Table 1. Descriptive statistics of the participants

Variable	N	Mean	SD	Minimum	Maximum
Height (cm)	18	175.17	6,98	162,00	184,00
Body weight (kg)		67,70	5,96	57,20	76,40
Age (years)		21,06	0,87	20,00	23,00

Measurement Methods

Height and Body Weight Measurement

In the study, the height of each subject was measured with a stadiometer with an accuracy of 0.01 meters (m) and body weight (BW) was measured with an electronic scale (SECA, Germany) with an accuracy of 0.1 kilogram (kg). During the height measurements, the volunteers were standing with bare feet, heels together, knees stretched, body and head erect, and eyes facing forward. When the sliding caliper bar touched the head of the volunteers, it was stopped and the closest value was recorded as the height value in centimeters (cm). During weight measurements, subjects participated with bare feet and wearing shorts that would not affect their weight. The value obtained on the scale screen was recorded in kg.

Identification of the Dominant Foot

The leg with which the participants kicked (kicked) the ball was defined as dominant. The dominant leg of the participants was determined according to their answer to the question "Which leg do you primarily use when kicking a ball".

Dynamic Balance Measurement

Dynamic balance tests with eyes open (EO) and eyes closed (EC) were used to evaluate the balance performances of the athletes. The EO and EC balance tests were performed on both dominant and nondominant leg and the difficulty level of the measurement tool was set as "level 6" in the EO balance test and "level 10" in the EC balance test. For the tests, the athletes were allowed to move the platform freely by looking at the screen to determine the coordinates of the foot position and to determine the ideal foot position. They were instructed to adjust the position of the support leg until they reached a stable position. Once the appropriate position was found, the platform was locked according to the athletes' foot position and the coordinates of this position were recorded by the device. The tests were performed with reference to the

recorded foot position. In order to eliminate the effect of the arms during the tests, the athletes were asked to place their hands diagonally on their right and left shoulders. The athletes were allowed to participate in all tests barefoot and wearing comfortable sportswear, and they were allowed to practice sufficiently before the measurement to get used to the measurement tool.

The duration of the EO and EC balance tests was 20 seconds. During the tests, the test was started after the participant adjusted the center of gravity using visual information from the screen of the measurement tool. For the EO condition, the screen of the measurement tool was turned off during the test and the participants were asked to look at a point approximately 1 meter away at the participant's eye level. For the EC condition, the eyes of the participants were closed during the test. Participants were asked to maintain the test posture for 20 seconds. At the end of the test, the EO and EC balance scores of the participants were recorded separately.

Ethics Committee Decision

This study was approved by the Non-Interventional Ethics Committee of Selçuk University Faculty of Sport Sciences (Approval number: E. 543913)

Data Analysis

Statistical evaluation was performed using SPSS 29.0 package program. The data obtained in the study were presented as mean and standard deviation. Shapiro-Wilk test was applied to determine the distribution of the data and the data showed normal distribution. According to the result of the normality distribution, One-way ANOVA test was applied to determine the difference in the balance performances of soccer players by position. In addition, Paired Sample T test was applied to determine the difference between dominant and non-dominant foot balance parameters and eyes open and eyes closed balance performance within the group (positional). The results were evaluated at 95% confidence interval and $p<0.05$ was considered significant.

RESULTS

As a result of the tests, the data regarding the comparison of dominant and non-dominant values of the soccer players' eyes open (EO) dominant and non-dominant values by position are presented in Table 2.

Table 2. Positional comparison of dominant and non-dominant data of soccer players with eyes open (EO)

Parameters	Defense players (Mean ± SD)	Midfielders (Mean± SD)	Offense players (Mean ± SD)	f	p
EO-D-OSI	3.63 ± 1.02	3.07 ± 1.26	3.45 ± 1.33	0.34	0.72
EO-D-APSI	2.53 ± 1.09	2.05 ± 0.98	2.68 ± 1.11	0.58	0.57
EO-D-MLSI	2.10 ± 0.76	2.00 ± 0.90	1.72 ± 0.93	0.32	0.73
EO-ND-OSI	3.68 ± 1.06	3.45 ± 0.92	4.40 ± 1.45	1.09	0.36
EO-ND-APSI	2.58 ± 1.00	1.88 ± 1.43	3.38 ± 1.27	2.17	0.15
EO-ND-MLSI	2.17 ± 1.03	2.92 ± 0.97	2.17 ± 0.80	1.28	0.31

EO: Eyes Open, **D:** dominant, **ND:** Non-dominant, **OSI:** Overall Stability Index, **APSI;** Anterior Posterior Stability Index, **MLSI:** Medial Lateral Stability Index. (P<0,05).

As a result of the findings, no significant positional difference was found in dominant and non-dominant balance performance in all findings measured with eyes open.

Table 3 shows the data on the positional comparison of dominant and non-dominant data of soccer players with eyes closed (EC).

Table 3. Positional comparison of dominant and non-dominant data of soccer players with eyes closed (EC)

Parameters	Defense players (Mean ± SD)	Midfielders (Mean± SD)	Offense players (Mean ± SD)	f	p
EC-D-OSI	7.52 ± 1.58	7.05 ± 2.10	6.67 ± 0.92	0.42	0.67
EC-D-APSI	5.98 ± 2.12	5.23 ± 1.97	5.22 ± 0.98	0.37	0.70
EC-D-MLSI	4.71 ± 2.07	3.53 ± 0.73	2.90 ± 1.24	2.41	0.12
EC-ND-OSI	7.25 ± 1.59	6.40 ± 1.60	6.00 ± 1.11	1.16	0.34
EC-ND-APSI	5.22 ± 1.56	4.62 ± 1.39	4.58 ± 1.16	0.40	0.68
EC-ND-MLSI	3.87 ± 0.50	3.43 ± 0.83	3.05 ± 0.75	1.99	0.17

EC: Eyes Closed, **D:** dominant, **ND:** Non-dominant, **OSI:** Overall Stability Index, **APSI;** Anterior Posterior Stability Index, **MLSI:** Medial Lateral Stability Index.

Although there were differences in all findings measured with eyes closed, these differences did not create a significant difference in dominant and non-dominant balance performances.

Table 4 presents the findings of dominant and non-dominant balance performance according to the positions played by the players (defense players, midfielders and offense players).

Table 4. Balance differences for positional dominant and non-dominant data

Variable	Leg	Position	Mean	SD	p
EO-OSI	Dominant	Defense	3.63	1.02	0.93
	N.Dominant		3.68	1.06	
EO- APSI	Dominant	Defense	2.53	1.09	0.60
	N.Dominant		2.58	1.00	
EO- MLSI	Dominant	Defense	2.1	0.76	0.93
	N.Dominant		2.17	1.03	
EC- OSI	Dominant	Defense	7.52	1.58	0.66
	N.Dominant		7.25	1.59	
EC- APSI	Dominant	Defense	5.98	2.12	0.31
	N.Dominant		5.22	1.56	
EC- MLSI	Dominant	Defense	4.72	2.07	0.41
	N.Dominant		3.87	0.50	
EO-OSI	Dominant	Midfielders	3.07	1.26	0.35
	N.Dominant		3.45	0.92	
EO- APSI	Dominant	Midfielders	2.05	0.98	0.76
	N.Dominant		1.88	1.43	
EO- MLSI	***Dominant***	***Midfielders***	***2***	***0.90***	**0.01***
	N.Dominant		***2.92***	***0.97***	
EC-OSI	Dominant	Midfielders	7.05	2.10	0.32
	N.Dominant		6.40	1.60	
EC-APSI	Dominant	Midfielders	5.23	1.97	0.39
	N.Dominant		4.62	1.39	
EC-MLSI	Dominant	Midfielders	3.53	0.73	0.60
	N.Dominant		3.43	0.83	
EO-OSI	Dominant	Offense players	3.45	1.33	0.12
	N.Dominant		4.40	1.45	
EO-APSI	Dominant	Offense players	2.68	1.11	0.17
	N.Dominant		3.38	1.27	
EO-MLSI	Dominant	Offense players	1.72	0.93	0.12
	N.Dominant		2.17	0.80	
EC-OSI	Dominant	Offense players	6.67	0.92	0.36
	N.Dominant		6	1.11	
EC-APSI	Dominant	Offense players	5.22	0.98	0.45
	N.Dominant		4.81	1.33	
EC-MLSI	Dominant	Offense players	2.90	1.24	0.77
	N.Dominant		3.45	0.75	

*: P<0,05

In the EO-MLSI data of midfielders, a significant difference was found between the balance performance of the dominant leg and the performance of the non-dominant leg. In all other parameters, no significant difference was found for all three positions.

DISCUSSION

In the study, it was revealed that there was no positional difference in all values of dominant and non-dominant leg. In addition, in the dynamic balance tests applied with eyes open and eyes closed, there was a significant difference in the data of midfielders in the EO-MLSI parameter, while no significant differences were detected in all other parameters.

In team sports, it has been observed that athletes generally use their dominant legs to perform various tasks such as passing, shooting, intermediate, ball control and also to perform technical movements (14). Considering this fact, it is seen that athletes use their dominant legs more intensively than their non-dominant legs and as a result, asymmetries in the lower extremities are observed (2). In addition, Kocaoglu and Girgin (12) found that the postural control performance of the dominant leg was higher than the postural control performance of the non-dominant leg in the comparison of the postural control performances of the dominant and non-dominant leg. In the present study, unlike these findings, no significant differences were observed when we compared the dominant and non-dominant leg performances of the athletes. Similarly, no significant differences were observed when dominant and non-dominant leg balance performances were compared in some studies that were in parallel with the findings of the present study (4, 9, 16, 22).

One of the aims of this study was to compare the balance performances of soccer players playing in different positions. In this study, no significant differences were found in the balance performances of soccer players playing in different positions. In contrast to this finding, Jadczak et al (11) reported that static balance performance and dynamic balance performance differed significantly between soccer players playing in different positions. Positionally, the demands of the game differ from the soccer players on the field. The distances traveled by athletes and the related fatigue levels may affect their balance performance. (19) mentioned that there is a close relationship between fatigue threshold and balance performance. In the present study, it was observed that the dominant and non-dominant leg performances of soccer players made a significant difference only in the EO-MLSI parameter of midfield players. In the data obtained in high-level organizations such as the Champions League, it has been observed that midfield players cover more distance than other positions during a competition when the ball is in possession (3, 5, 20). This is thought to be due to the fact that midfielders are more likely to pass and control the ball, possibly leading them to develop superior single limb balance skills (20).

As a result, the importance of balance performance, which directly affects the training and competition performance of soccer players and provides their development, has been revealed with our study. In addition, it was also observed that the balance performances of soccer players playing amateur level soccer did not differ in terms of position.

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