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ORIGINAL RESEARCH

Effects of foot preference on postural control in soccer players

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Abstract

A soccer player often uses the dominant leg during activities and the non-dominant leg is used to support body weight. This may have different effects on the postural control between the dominant and non-dominant legs in soccer players. Detection of a possible asymmetry in postural control is important because a bilateral difference may be a contributing factor to injury. This study aimed to compare the postural control performances of right- and left-footed amateur soccer players; secondly, it aimed to address the postural control differences between the dominant and non-dominant legs of soccer players. Twenty-four healthy male soccer players were divided into two different groups (right foot dominant = 12, left foot dominant = 12). Dynamic postural control scores of soccer players in dominant and non-dominant single-stances were measured under two sensory conditions (eyes open and eyes closed) using the Biodex Balance System. In the comparison of two independent groups according to the normality distribution, the t-test and Mann-Whitney U test were used for independent samples. The t-test for dependent samples and the Wilcoxon test were used to compare dependent groups. The results of the study; whether the players are right-footed or left-footed in both eye-open and eye-closed conditions does not affect their postural control performance; showed that the postural control performance of the dominant leg was higher than the non-dominant leg in the eye-open condition of all soccer players regardless of right and left legs. Therefore, it was determined that leg dominance exhibited a symmetrical performance in terms of postural control.

Keywords: Dominant, foot, non-dominant, postural control, soccer.

Introduction

The onset of limb use preferences and their shift towards one limb (causes of right-handedness and left-handedness) have been studied in many studies due to genetic factors that have been researched by the scientific community for more than a century and environmental conditions during the postnatal development process (Belmont & Birch, 1963; Gabbard & Bonfigli, 1987; Gabbard, 1993; Tan, 1985). As it has been stated that the neurophysiological mechanism of right or left limbs (hand and foot) usage preference has not been elucidated (Karadağ et al., 2010), along with the views that try to explain right-handedness and left-handedness (predominantly used hand and foot preference) with the location and hormonal effects in the mother's womb, it is widely accepted that it is a genetically determined feature (Gabbard, 1993; Tan, 1985). The advantages and disadvantages of cerebral lateralization, which is under the influence of these reasons, have been the subject of curiosity of scientists who study lateralization (Bale & Scholes, 1986; İmamoğlu & Kılcıgil, 2007; Teixeira et al., 2010; Yanci & Camara, 2016). Yazıcı et al. (2020) said a matter of curiosity by adding different dimensions to the

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"Sports and Lateralization" relationship, which states that both hand and foot preferences play a decisive role in success and skill alone and that the non-dominant side can achieve a more effective performance even if it does not gain an advantageous position through exercise. They emphasized that it continues its feature (quality).

It is generally accepted that hand and foot preference is related to cerebral dominance (Tan, 1985, Öztaşan & Kutlu, 2014), and the concept of cerebral lateralization is defined as the anatomical and functional differentiation between the right and left hemispheres of the brain (Pençe, 2000; Tan, 1985; Öztaşan & Kutlu, 2014; Soysal et al., 2007). This concept causes performance differences in human motor and movement skills (Akça, 2015). In other words; the right hand is ruled by the left brain, and the left hand by the right brain, and accordingly, the left brain in right-handed people; Left-handed people are right-brain dominant. For this reason, in left-handed people, the superior skill of the left hand compared to the right hand is to the right brain; it can be said that the superior skill of the right hand compared to the left hand is dependent on the left brain (Pençe, 2000). A similar situation has been reported in hand use, where foot and eye dominance is preferred (Dane & Balcı, 2007). The use of both hands (ambidexterity) and left hand is thought to provide significant advantages, especially in basketball, handball, boxing, and wrestling athletes, surgeons, sculptors, and musical instrument players, as this type of dominance is thought to provide significant advantages (Tat, 1999) it has been stated that if a player's unilateral limb use is high, his ability to play decreases (Bale & Scholes, 1986).

Postural control requirements for athletes depend on the nature and type of sport played. Each sport has different postural control requirements that are necessary to maintain branch-specific movements safely and effectively without losing postural control (Knight et al., 2016). In this sense, postural control has an important role in many sportive activities, and proficiency in postural control can determine successful performance (Adlerton et al., 2003).

Maintaining postural control requires the individual to keep the center of gravity within the base of support (Shumway-Cook & Woollacott, 1995). Postural control requires correct afferent inputs and efferent outputs (information) from the involved joints and muscles (Gurfinkel et al., 1995) and refers to the combination of visual, sensory, vestibular systems and motor responses (Shumway-Cook & Woollacott, 1995). The central nervous system combines peripheral inputs from these systems and selects the most appropriate muscle responses to control body position and posture on the base of support (Nashner et al., 1982; Shumway-Cook & Horak, 1986). Postural control is achieved by combining vestibular, visual, and somatosensory information in the central nervous system (Fransson et al., 2004; Vuillerme et al., 2005).

Maintaining static and dynamic postural control is a basic requirement for success in sports such as football, basketball, and gymnastics (Gerbino et al., 2007). In the literature, dominant and non-dominant expressions are defined depending on the role played by the limb (for example, a preference for the use of the lower leg). Accordingly, while the dominant limb is a mobilizing limb, the limb responsible for maintaining body posture during the activity of the dominant limb is defined as non-dominant (Iwańska et al., 2015).

It is suggested that the stability of the stance leg is very important in the realization of successful movements related to football (Chew-Bullock et al., 2012; Paillard et al., 2006). Football players often support their body weight with one leg when hitting the ball (Kellis et al., 2001), and most football players prefer to use the dominant leg to hit the ball more accurately and the non-dominant leg to support their body weight. Most exercises (shooting, passing, and stopping) are performed within a few seconds while standing on one leg, which is not normally the dominant leg (Barone et al., 2011). Therefore, it is likely that football players have better one-leg stance stability (balance) and differ in postural control values between the dominant and non-dominant legs.

Performing different technical movements in football (e.g. shot, pass) requires a one-leg stance, and the stability of the supporting leg is critical for correct hitting. For this reason, it is emphasized that the postural control of football players should be evaluated in a single-leg stance (Paillard et al., 2006). Many studies have discussed whether postural control performance differs between dominant and non-dominant legs in different sports branches, but a common conclusion could not be reached (Booysen et al., 2015; Promsri et al., 2020; Bigoni et al., 2017; Gstottner et al., 2009; Rein et al., 2011; Jadczak et al., 2018; Knight et al., 2016; Muehlbauer et al., 2014; Schorderet et al., 2021). However, in a meta-analysis that included forty-six studies to determine whether the postural sway performance of healthy adults is affected by the dominance of the leg, no significant difference was found between the dominant and non-dominant legs in any category accordingly, it was stated that it remains unclear whether unilateral postural control performance differs between dominant and non-dominant legs (Schorderet et al., 2021). For these reasons, it is aimed to further clarify the effect of the dominant and non-dominant legs of the athletes on the postural swing performance by evaluating whether leg dominance affects the postural control performance. The research is important in terms of better explaining the potential effect on postural control with the data to be obtained by comparing the postural sway performances of both legs. The primary aim of this study is; to compare the postural control performances of right-legged and left-legged amateur football players. The second aim of the study is to address the postural control differences between the dominant and non-dominant legs of football players.

Methods

Participants and Procedure

Twenty-four male amateur soccer players between the ages of 18 and 30 voluntarily participated in the study (age = 21.21 ± 2.26 years; height = 176.71 ± 5.73 cm, body weight 69.84 ± 8.99 kg). The right foot (Right-Footed, righty) of 12 of the football players was the dominant leg, and the left foot (Left-Footed, lefty) of 12 was the dominant leg. Participants were selected on the condition that they had no history of lower extremity injury and lower extremity surgery, concussion, or visual, vestibular disorders in the past 6 months. The research was approved by the Non-Interventional Ethics Committee of the Faculty of Sports Sciences of Selcuk University (Decision Date: 09.05.2022, Number: 56). It was carried out by the Code of Ethics of the World Medical Association also known as a declaration of Helsinki. Participants were informed before the study and each participant signed an informed consent form. Measurements were carried out in the Performance Laboratory of the Faculty of Sports Sciences of Selcuk University.

Body Weight and Height Measurement

The body weights and heights of the participants were measured with a stadiometer. Body weight measurement in kg and height measurement in cm were taken with the body upright, arms hanging freely to the sides, that is, when the participant was in anatomical posture, wearing sports clothes and without shoes.

Postural Control

Biodex Balance System (BBS-Biodex Balance System, Biodex Medical Systems Inc, Shirley, NY) was used to determine the postural control performances of the participants. This system is a device that measures and records the ability of participants to maintain their postures under dynamic stress. High scores obtained from the measuring device indicate impaired postural control performance. Studies are showing that the BBS is a reliable tool in the evaluation of dynamic postural performance (Cachupe et al., 2001; Hinman, 2000).

A postural control test was performed with both dominant and non-dominant legs, with the difficulty level of the measurement tool being "6" in the eyes open (EO) condition and "10" in the eyes closed (EC) condition, a total of 4 times for each athlete. The dominant legs of the participants were determined according to their answers to the question "Which leg do you use first when hitting the ball". Participants were asked to stand on the platform of the measuring instrument with a one-leg stance (dominant or non-dominant). The test involves the participant holding the test position for 20 seconds. In the standing position with one leg, the other leg should not touch the ground and both legs should not touch each other. In the application of the test, the participants were allowed to move the platform freely by looking at the screen in order to determine the coordinates of the foot position and determine the ideal foot position. It was instructed to adjust the position of the support leg until a stable position was reached. After the appropriate position was found, the platform was locked according to the foot position of the participants, and the test was applied after the coordinates of this position were recorded by the device. During the test in EO condition, the screen of the measuring tool was turned off and the participant was asked to look at the point located approximately 2 m ahead and at eye level, and in the EC condition, the participant was asked to complete the test with eyes closed. In order to eliminate the effect of the arms during the tests, the participants were asked to put their hands on their right and left shoulders diagonally, and they were allowed to participate in all of the tests barefoot and wearing comfortable sportswear. Participants were allowed to practice sufficiently before the measurement so that they became accustomed to the measurement tool. The overall balance score for each participant after the test, expressed as the "Overall Stability Index-OSI", anterior-posterior (AP) sway, and medio-lateral (ML) sway scores were calculated and recorded by the measurement tool.

Data Analysis

Research data were presented as mean and standard deviation (SD). Normality analysis was performed with the Shapiro-Wilk test. T-test and Mann Whitney U test were used for independent samples to compare two independent groups according to normality distribution. The t-test for dependent samples and the Wilcoxon test were used to compare dependent groups. The statistical significance level was accepted as 0.05. All statistical calculations were done with SPSS 22.0 package program.

Results

Table 1 presents the participants' demographic characteristics. As shown in Table 2, there was no significance in OSI (U=64.500; p=0.663), AP sway (t=0.875; p=0.391), and ML sway (U=72,000; p=1,000) between right-footed and left-footed soccer players for EO condition of the dominant leg. In a comparison of the measurements performed with the non-dominant leg in the EO condition, similarly, OSI (t=-0.119; p=0.906), AP (t=0.431; p=0.671), and ML (U=61.500) ; p = 0.543), it was determined that there was no significant difference between being right-footed and left-footed.

Table 1

Participants' demographic characteristics (n=12).

Variables		Mean	SD
Age (year)	Right-footed	20.50	2.11
	Left-footed	21.92	2.27
Height (cm)	Right-footed	177.50	7.75
	Left-footed	175.92	2.68
Body weight (kg)	Right-footed	69.55	9.40
	Left-footed	70.13	8.96
Experience (year)	Right-footed	5.17	2.21
	Left-footed	6.75	2.73

Table 2

Postural control scores in EO condition.

		Right-Footed		Left-Footed	
Variables		Mean	SD	Mean	SD
Dominant Leg	OSI in EO	2.81	1.11	2.68	1.08
	AP in EO	2.02	0.89	1.76	0.51
	ML in EO	1.54	0.81	1.62	1.04
Non-Dominant Leg	OSI in EO	3.30	1.12	3.36	1.27
	AP in EO	2.26	0.73	2.13	0.69
	ML in EO	1.93	0.90	2.03	1.41

EO: Eyes Open; OSI: Overall Stability Index; AP: Anterior-Posterior; ML: Medio-Lateral.

Table 3

Postural control scores measured in EC condition.

		Right-footed		Left-footed	
Variables		Mean	SD	Mean	SD
Dominant Leg	OSI in EC	4.59	1.20	4.63	1.19
	AP in EC	3.24	0.98	3.31	0.88
	ML in EC	2.53	0.86	2.50	0.93
Non-Dominant Leg	OSI in EC	4.66	1.03	5.49	1.28
	AP in EC	3.54	0.75	4.09	1.00
	ML in EC	2.33	0.82	2.74	0.97

EC: Eyes Close; OSI: Overall Stability Index; AP: Anterior-Posterior; ML: Medio-Lateral.

Table 4
Dominant and non-dominant leg postural control scores (n=24).

Variables		Dominant Leg		Non-Dominant Leg	
		Mean	SD	Mean	SD
EO Condition	OSI	2.74	1.07	3.33*	1.17
	AP	1.89	0.72	2.20*	0.70
	ML	1.58	0.91	1.98	1.16
EC Condition	OSI	4.61	1.17	5.08	1.22
	AP	3.28	0.91	3.82	0.91
	ML	2.51	0.88	2.53	0.91

** Significantly different from the dominant leg (p<0.05).*
EO: Eyes Closed; EC: Eyes Closed; OSI: Overall Stability Index; AP: Anterior-Posterior; ML: Medio-Lateral.

When the EC condition postural control scores of the participants were examined (Table 3), the OSI (t=-0.085; p=0.933), AP (t=-0.175; p=0.863), and ML scores (t=0.068; p=0.946) of the dominant leg were not significantly different between right and left-footed groups.

When the postural scores of the non-dominant leg of the participants were examined in the EC condition (Table 3); OSI (t=-1.753; p=0.093), AP (t=-1.526; p=0.141) and ML (U=50,000; p=0.203) scores were not statistically different between right and left-footed groups.

As a result of the comparison of the postural control performances of all football players included in the study in the EO condition (Table 4); it was determined that the OSI scores of the dominant leg (Z=-2.688; p=0.007) and AP sway scores (Z=-2.130; p=0.033) were lower than the scores measured with the non-dominant leg (p<0.05). In the EO condition, the ML sway scores were not statistically significantly different between the dominant and non-dominant legs (Z=-1.057; p=0.057).

When the postural control scores of all soccer players measured in the dominant and non-dominant leg EC condition were compared (Table 4), OSI (t=-1.550; p=0.135), AP sway (Z=-1.844; p=0.065) and ML sway (Z=-0.289; p=0.772) scores did not differ significantly.

Discussion

The primary purpose of this study was to compare the postural control performances of right-footed and left-footed amateur soccer players. The second aim of the study was to address the postural control differences between the dominant and non-dominant legs of soccer players. The general results of the study showed that the right-footed or left-footed of the players in both EO and EC conditions did not affect their postural control performance (OSI, AP, ML). Another result of the study; the postural control performance of the dominant leg was found to be higher than the non-dominant leg in the EO condition, regardless of the right and left feet of all soccer players.

Unlike the upper limbs, the lower limbs play a role in natural functions such as supporting body weight and movement that requires effective coordination between the legs (Promsri et al., 2020). Several studies have reported that the dominant leg differs between dynamic tasks, such as hitting the ball, and static tasks, such as balancing on one leg (Promsri et al., 2018; Velotta et al., 2011). Leg dominance appears to function as the type of activity (task) a person has to perform, and when the task is inherently manipulative (dominant), most participants use their right leg (most people prefer the right side), when the task included stabilization such as standing on one leg, it was stated that more than 50% of the participants in the study used their left leg to perform the task (Velotta et al., 2011). Spry et al. (1993) determined that the dominant leg was not stronger than the other in right or left-leg dominant participants as determined by a series of manipulative and weight-bearing performance tests. Previous studies support the idea that people are usually right-leged for mobilization tasks but left-leged for tasks requiring postural stabilization (Gentry & Gabbard, 1995; Spry et al., 1993; Whittington & Richards, 1987). The results of our study do not confirm the results of previous studies. The difference (novelty) of this study from previous studies is that it compared the dominant and non-dominant legs by examining the right and left-footed. In the study, it was expected that the non-dominant leg would show better stability since soccer players had to balance their stance legs in different positions to hit the ball, so faster and more balanced control would be achieved, but this expectation was not met with the results of this study. Therefore, it can be said that right-footed and left-footed players show symmetrical performance in terms of postural control.

In the study in which the balance abilities of the preferred (dominant) and non-dominant (non-dominant) leg of amateur soccer players were evaluated, one of the twenty-one soccer players reported the dominant leg as left-footed, while twenty of them stated it as right. No significant difference could be found between the dominant and non-dominant leg, but a certain trend towards better balance performance was observed in the non-dominant leg (Gstöttner et al., 2009). Another study; analyzed the differences in stance balance during dominant and non-dominant single-leg stances between different types of sports and sedentary participants and athletes. No other significant differences were observed within and between the four right-footed dominant groups (football, basketball, windsurfing, and sedentary). Football players showed better balance performance during the non-dominant one-leg stance (left leg) compared to the sedentary group. This situation is explained by the fact that soccer players have a better stance balance on the non-dominant leg due to soccer activity (Barone et al., 2011).

In the comparison of the postural control performances of the dominant and non-dominant leg, regardless of the right-footed and left-footed of all soccer players, the postural control performance of the dominant leg (in the EO condition) was found to be higher than the postural control performance of the non-dominant leg, which is the remarkable results of the present study. The postural control performance of the dominant leg was found to be higher than the non-dominant leg in the EO condition, regardless of the right and left legs of the soccer players. However, no significant difference was found in the EC condition. Generally; results in both (EO and EC) conditions show that the dominant leg has lower postural control scores. It can be said that these results of our study partially support the results of the study (only for EC condition) of Schorderet et al. (2021). Erkmen et al. (2007) pointed out that the dominant leg balance (344.00 ± 201.44) scores of soccer players were better than the non-dominant leg balance (397.39 ± 162.88). The results of our study were similar to their results. The findings of the meta-analysis by Schderet et al. (2021), in which many studies were examined, showed that balance performance was not affected by the dominance of the leg. These results are interpreted as the performance of both legs can be used as a reference.

Przybyla et al. (2013) showed that removing visual feedback during movement to achieve the desired goal improves the performance of the non-dominant arm. In the study where the balance performances of the dominant and non-dominant legs were evaluated; compared to the Biodex balance system, the difference between the legs was greater when pillows were used in Tetrax measurements. It has been reported that this may be due to the higher demand on the proprioceptive system in an unstable (unstable) state created by the soft pillow, so the difference between the dominant and non-dominant leg is more pronounced in a test that is more difficult for the locomotor system (Gstöttner et al., 2009). When the studies are evaluated, it is pointed out that the removal of a moving floor and visual feedback creates a more challenging performance on the proprioceptive system in terms of the non-dominant leg, but this was not the case in our study. This result can be attributed to the fact that the proprioceptive capacity of soccer players to control the ball while maintaining balance may have developed. It has been reported that soccer creates a strong visual dependence on the ball, the opponent, and teammates, and the necessity of controlling the ball with the feet requires the players to look towards the ground in a way that contradicts the necessity of watching the displacement of the other players. Therefore, the ability of top soccer players to look away from the ball has developed to increase the time to observe the match. It has been emphasized that lower dependence on the vision for postural control in professional soccer players, controlling the ball without watching it can be an example of gaining this ability (Paillard & Noe, 2005).

Some authors, however, could not reveal significant differences in the balance ability of the dominant and non-dominant leg in amateur soccer players in unilateral stance (Bigoni et al., 2017; Gstottner et al., 2009; Rein et al., 2011). The results of McCurdy & Langford's (2006) study showed that static balance performance differences between legs cannot be determined by leg dominance. Huurnink et al. (2014) stated that for field hockey players, there is an equivalent performance between the legs in the control of a fixed stance on one leg (postural stability).

Another study that differs from the results of the current study; compared static balance performance and muscle activity while standing on one leg on the dominant and non-dominant leg under various sensory conditions with increasing levels of task difficulty. The increase in sensory task difficulty caused a deterioration of balance performance and increased muscle activity for all muscles except two. However, standing on one dominant leg compared to the non-dominant leg did not produce statistically significant differences in various balance and electromyographic measurements, regardless of sensory condition. The authors stated that these results show that the dominant and non-dominant leg can be used interchangeably during the static single-leg balance test in healthy young adults (Muehlbauer et al., 2014). Therefore, it can be said that the results of these studies are consistent in showing symmetrical performance between the dominant and non-dominant leg for postural control in athletes.

Considering the complexity of movements during the game, it requires soccer players to have the ability to balance on one leg under both static and dynamic conditions and accordingly have better stabilization in the single-leg stance (Matsuda et al., 2008; Ramirez-Campillo et al., 2015). The results of several studies in the literature support this information. In the study in which body balance control strategies in both dominant and non-dominant legs of professional soccer players representing different sports levels in static and dynamic conditions were compared; In the dynamic test, the soccer players had statistically significantly better results in the non-dominant leg, no significant difference was noted in the static test. This was attributed to the highly dynamic nature of the soccer game (Jadczak et al., 2018). In their study, Booysen et al. (2015) revealed that there is a moderate relationship between the dynamic balance performance in which the non-dominant leg is used for stance and the eccentric strength of the knee extensors of the non-dominant leg in male soccer players. Strong muscle contractions can help provide an adequate extensor moment and help players return to a more stable position while trying to unilaterally maintain balance.

The results of the study investigating the effects of leg dominance in a single leg position on a multi-axis movable balance board and the interactions between gender and leg dominance; supported the idea that leg dominance influences motor behavior and showed that the movement of the non-dominant leg was better controlled (higher N3) than the nervous control system of the dominant leg (lower N3). It has been suggested that leg dominance effects should be considered when evaluating lower extremity neuromuscular control or during training, and special attention should be paid to diagonal plane movements (Promsri et al., 2020). In another study, a significant difference was found in the mean displacement ratio in the medial/lateral direction between the dominant and non-dominant legs in both EO and EC conditions, and it was observed that the non-dominant leg was displaced more than the dominant leg. It has been noted that this outcome may increase the risk of injury for the non-dominant leg, as previous research has shown that declines in balance performance may be an indicator of future injury. If a decrease in balance performance is detected, it has been suggested to prescribe a training program to improve the athlete's balance and reduce the risk of injury (Knight et al., 2016).

In the study, which was to examine the pressure center sway characteristics of both dominant and non-dominant legs during single-leg static stance in soccer players; Anteroposterior and horizontal oscillations of soccer players were found at the lowest level. It was stated that soccer players compared to swimmers, basketball players, and non-athletes had a more balanced single-leg stance than these three branches. It has been concluded that since soccer players show higher frequency sway, they reduce the front-back and horizontal oscillations by correcting the body sway more frequently while maintaining the oscillation speed. In addition, the authors deduced that the difference in balance ability between the legs arising from soccer training may have been minimized since soccer players have the opportunity to use both legs equally in daily life (Matsuda et al., 2008).

In this study; In comparison with the dominant and non-dominant legs of right-footed and left-footed players in EO and EC conditions, foot dominance did not show a statistically significant difference in postural control. These results were found to be in line with the results of a previous study, which emphasized that the dominant and non-dominant legs did not show a significant performance difference during maintaining postural control, even under normal (EO) and more difficult (EC) conditions (Bigoni et al., 2017; Gstöttner et al., 2009; Rein et al., 2011; Muehlbauer et al., 2014). When the relevant literature was examined, we could not find any research that compared the postural control performances of athletes from different sports branches by distinguishing right and left-footed. In this respect, the current study was limited to discussing the postural control performances of soccer players who use their right and left legs dominantly and non-dominantly.

Conclusion

In summary, this study, based on the thought that hemisphere differences, which have an effect on cerebral lateralization, would affect the postural control performance of right-footed and left-footed soccer players and cause postural control differences between dominant and non-dominant legs; it has been seen that whether the players are right or left-footed in both EO and EC conditions is not a factor on their postural control performances (OSI, AP, ML). The hypothesis that being right-footed and left-footed makes a difference between the dominant and non-dominant limb on postural control remains controversial. More research is needed to confirm our results in terms of the effect of being right-footed and left-footed on postural control. In future studies, it will be interesting to plan and investigate the effects of this distinction (right-footed and left-footed, dominant and non-dominant distinction) in different sports branches.

In the comparison of postural control performances of the dominant and non-dominant leg, regardless of being right and left-footed, there was a significant difference in favor of dominant leg balance performance (higher). It is understood that the use of non-dominant and non-dominant legs in soccer players can only be effective in postural control in the dominant leg and EO conditions and postural control performance may be affected by leg raid.

Authors' Contribution

Study Design: YK, YG; MMI; Data Collection: YK, YG; Statistical Analysis: YK; Manuscript Preparation: YK; Funds Collection: YG.

Ethical Approval

The research was approved by the Non-Interventional Ethics Committee of the Faculty of Sports Sciences of Selcuk University (Decision Date: 09.05.2022, Number: 56). It was carried out in accordance with the Code of Ethics of the World Medical Association also known as a declaration of Helsinki.

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Conflict of Interest

The authors hereby declare that there was no conflict of interest in conducting this research.

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