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# THE RELATIONSHIP BETWEEN CORE EXERCISE AND BALANCE IN FOOTBALLERS

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**ABSTRACT**

This study examined the impact of an 8 week-long core exercise program on the balance performance of footballers. A total of 40 players between the ages of 13-14 were included in the study, divided into two groups of 20 players, namely the Experimental Group (EG) and the Control Group (CG). While the EG performed 30 minutes of core exercise for two days a week over a total of eight weeks in addition to their usual exercises, the CG was only asked to maintain their usual routine. Before and after the study, a dynamic balance test was undertaken on the groups. To statistically analyze the data, the Variance Analysis Technique was applied to the Repeated Measurement Trials. According to the statistical analysis in terms of Anterior/Posterior, Overall Stability and Medial Lateral Balance, (pre- and post-test) x (right and left foot) ($P = 0.039$; $P = 0.002$; $P = 0.034$) and EG and CG x right and left foot ($P = 0.000$; $P = 0.001$; $P = 0.002$) interaction impacts were significant in terms of all three states of balance. In the determination of the right and left foot balance during the pre- and post-tests for the EG and CG, Tukey's multiple comparison test showed that the right foot balance of the EG was at a significantly higher level than their left foot balance in all three states of balance before the exercise. While the footballers had better balance on their right feet in terms of anterior/posterior balance, there was no significant difference between the right and left feet of the footballers in terms of Overall Stability and Medial Lateral balances. In conclusion, it can be argued that when researching whether core exercise has an impact on the balance of footballers, it should be taken into account when the index values of the players were obtained (pre- or post-test) and from which foot (right or left).

**Keywords:** Core exercise, footballer, balance.

## 1. INTRODUCTION

Core strength exercise is a vital method of training frequently used for working a great range of muscles of the trunk that keep the spine and hip in balance (Savaş, 2003) and maintaining athletic performance (Jim et al., 2013). There are studies showing that improved core strength increases lower extremity function and supports postural stability (Alsayani et al., 2018) while other studies have demonstrated the impact of core exercises in improving balance (Dello et al., 2014; Markoviç et al., 2015; Yoon et al., 2015; Trampas et al., 2015) and other performance parameters for different branches of sport (Sharma et al., 2012; Kachanathu et al., 2014). Core exercises have been widely used in recent years because they improve performance (Saeterbakken et al., 2011; Schilling et al.,

2013). Although core exercises differ from weight-lifting exercises in practice, the focus is still on increasing muscle strength. With core exercise the control and balance of the body is improved, the strength of many large and small muscle groups is increased, the risk of injury is reduced, and efficiency of movement or switches between movements are increased due to the improvements in balance (Şatıroğlu et al., 2013). It has also been emphasized that core strength exercises prevent back pain (Calatayud et al., 2015) and reduce the frequency of injuries (Viktoria et al., 2016). Balance is an important factor in maintaining the body composition required for good performance in sport. For that reason, it forms the basis of dynamic sports with sudden changes in the pattern of motion. All branches of sport require a certain level of balance (Savaş, 2003). Balance is a complex process involving coordinated activities of various sensory, motor and biomechanical components (Jim et al., 2013).

This study intends to demonstrate the impact of core exercises which strengthen the body's core, which enables energy to be efficiently transferred from the upper extremities to the lower extremities and vice versa, and which improve control and balance of the entire body thereby improving the balance performance of footballers.

## 2. MATERIALS AND METHODS

### 2.1. Study Group and Its Type

This study examined 40 male players between the ages of 13-14 who are active footballers in the youth academies of amateur football league teams in the Nizip district of Gaziantep. With the footballers' consent, it was determined whether they suffered from any impediments either before or during the study. The players themselves and their parents were informed about the study plan and purpose, and a written consent form in line with the Ethics Committee report was obtained from them indicating that they were participating voluntarily in the study. For the purposes of the study, 20 players were randomly selected to take part in the Experimental Group (EG) and 20 were selected to take part in the Control Group (CG) from among 40 male players who regularly attend football training.

After demographic data (age, height, weight) pertaining to the players in the EG and CG were recorded, the bio-impedance method (Tanita BC418) was used to determine the percentage of body fat at the pre-test stage. The equilibrium performance was measured using the isokinetic balance system. Afterwards, in addition to their usual football exercises, the EG, consisting of 20 players, performed 45 minutes of core exercise using their own body weight for two days a week over a period of eight weeks. While the CG consisting of 20 players was only asked to maintain their usual routine of football exercises. This allowed us to study the impact of a core strength exercise regimen on the balance performance of the EG and compare the results with those of the CG. The measurements were performed twice, both before and after the study.

### 2.2. Collection of Data

#### 2.2.1. Identification of Age, Height and Bodyweight

The age of each subject was confirmed with ID cards. Height was measured using the length measurement on the scale with an accuracy of 0.01 cm while each subject was barefoot or wearing socks, and body weight was measured with an accuracy of 0.01 kg using scales, with each subject wearing suitable sportswear.

#### 2.2.2. Body Composition

Body Fat Percentage measurement using Bioelectrical Impedance Analysis: A "Tanita-BC 418 MA" device was used to conduct the Bioelectrical Impedance Analysis (BIA). While taking the measurements, the individuals were asked to stand barefoot on the metal surface of the device, while holding the handles with both hands and releasing their arms in parallel with their body. The

process lasted about 1-2 minutes for each subject, and the body fat percentage results detected using the Bioelectrical Impedance Analysis device were printed out from the device (Sarıtaş et al., 2011).

### 2.2.3. Dynamic Balance Test

The Biodex Balance System (Biodex Balance System, BBS; Biodex Inc., Shirley, NY) was used for dynamic balance performance measurements. The subjects took part in the test barefoot wearing suitable sportswear. The subjects were allowed to perform as many trials as they wished to minimize the learning effect before the tests. Three separate balance score measurements were taken for each balance test (Cachupe et al., 2001).

### 2.2.4. Statistical Analysis

Before and after the study, a dynamic balance test was performed on the groups. To statistically analyze the data, the Variance Analysis Technique was applied to the Repeated Measurement Trials while Tukey's multiple comparison test was used to determine left and right foot balance of the players in the EG and CG for both pre- and post-test purposes.

## 3. FINDINGS

**Table 1.**General Descriptive Statistics by Group in terms of the Determined Features

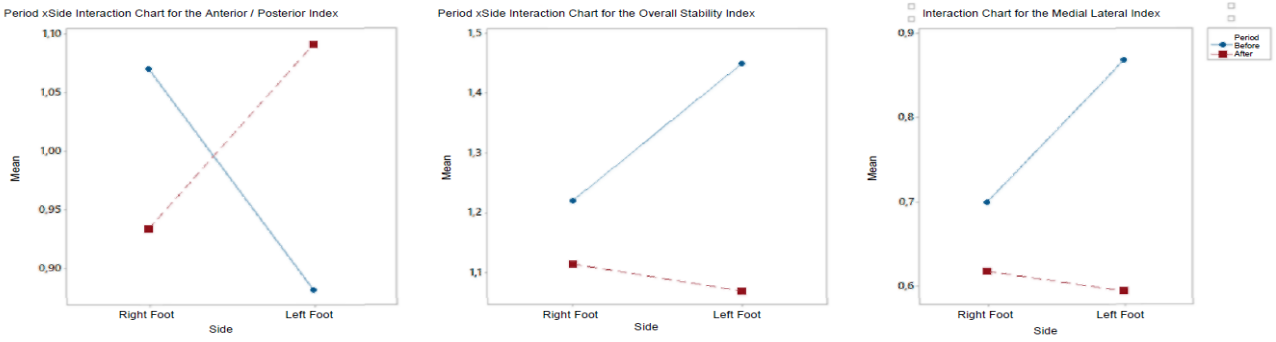
| Variables | Control Group (CG) | | Experimental Group (EG) | |
|---|---|---|---|---|
| | Mean | Standard Error | Mean | Standard Error |
| Age (year) | 13.45 | 0.11 | 13.40 | 0.11 |
| Height (cm) | 159.35 | 1.42 | 159.60 | 2.22 |
| Weight (kg) | 43.29 | 1.60 | 48.46 | 1.83 |
| Body fat percentage (kg/(heightxheight)$^2$ | 12.98 | 0.85 | 15.76 | 1.31 |

**Table 2.** Descriptive Statistics for Pre- and Post-Test Values of Balance Measurements

| Variables | | Pre-Test | | Post-Test | |
|---|---|---|---|---|---|
| | | Mean | Standard Error | Mean | Standard Error |
| **Anterior/Posterior** | Right Foot | 1.07 Aa | 0.08 | 0.94 Bb | 0.08 |
| | Left Foot | 0.88 Bb | 0.07 | 1.09 Aa | 0.09 |
| **Overall Stability** | Right Foot | 1.22 Ba | 0.09 | 1.12 Ab | 0.08 |
| | Left Foot | 1.45 Aa | 0.11 | 1.07 Ab | 0.08 |
| **Medial Lateral** | Right Foot | 0.70 Ba | 0.06 | 0.62 Ab | 0.04 |
| | Left Foot | 0.87 Aa | 0.07 | 0.60 Ab | 0.06 |

**Note 1:** Differences between the groups in the same period characterized by different capital letters are significant
**Note 2:** Differences between the periods in the same group characterized by different lowercase letters are significant

According to the statistical analysis in terms of the variables Anterior/Posterior, Overall Stability and Medial Lateral Balance, pre-test - post-test x right-left foot (P = 0.039; P = 0.002; P = 0.034) interaction impacts were significant in terms of the three variables (Table 2 and Graph 1).



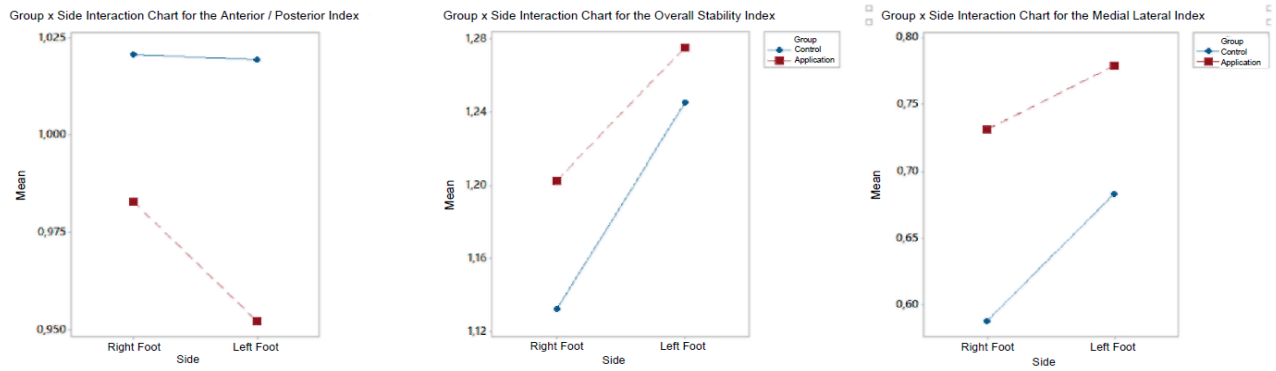

**Graph 1.** Pre-test - post-test x right and left foot interaction graphs for the anterior/posterior, overall stability and medial lateral variables

**Table 3.** Descriptive Statistics of Balance Measurements by Groups

| Variables | | Control Group (CG) | | Experimental Group (EG) | |
|---|---|---|---|---|---|
| | | Mean | Standard Error | Mean | Standard Error |
| **Anterior/Posterior** | Right Foot | 1.03 Aa | 0.09 | 0.99 Aa | 0.07 |
| | Left Foot | 1.02 Aa | 0.08 | 0.95 Aa | 0.08 |
| **Overall Stability** | Right Foot | 1.13 Bb | 0.08 | 1.21 Ba | 0.08 |
| | Left Foot | 1.25 Aa | 0.10 | 1.28 Aa | 0.09 |
| **Medial Lateral** | Right Foot | 0.59 Bb | 0.05 | 0.73 Aa | 0.04 |
| | Left Foot | 0.68 Ab | 0.06 | 0.78 Aa | 0.07 |

**Note 1:** Differences between the groups in the same period characterized by different capital letters are significant
**Note 2:** Differences between the periods in the same group characterized by different lowercase letters are significant

When the group x right-left foot (P = 0.000; P = 0.001; P = 0.002) interaction in the table was examined, it was determined that there were no significant differences between the groups in terms of right and left foot balance of the footballers with reference to the Anterior/Posterior balance; that the footballers in the EG had significantly higher levels of right foot balance in comparison to the CG in terms of Overall Stability, and that there were no significant differences between the EG and the CG in terms of left foot balance. Concerning Medial Lateral balance, the footballers in the EG had significantly higher levels of balance on both the left and right foot in comparison to the footballers in the CG.




**Graph 2.** Group (EG-CG) X right and left foot interaction graphs for the anterior/posterior, overall stability and medial lateral index values

## 4. DISCUSSION AND CONCLUSION

This study aimed to examine the impact of an 8 week-long core strength exercise regimen on balance performance of male footballers aged between 13 to 14. The applied core exercise regimen had no significant impact on right and left foot balance of footballers in the EG. On the other hand, it was determined that the footballers in the EG had significantly higher levels of right foot balance in comparison to the CG in terms of Overall Stability and that there were no significant differences between the EG and the CG in terms of left foot balance. Concerning Medial Lateral balance, the footballers in the EG had significantly higher levels of balance on both the left and right foot in comparison to the footballers in the CG. As football includes many different movements, the balance angles change as a result of continuous weight transfer between the legs. This transfer and change depends on the overall, anterior-posterior and medial-lateral balance. The significant differences in the right leg overall and medial-lateral measurements of the EG as demonstrated by the dynamic balance measurements performed in the study was ascribed to the fact that most players in that group use their right foot by default while some of them are more adept at playing with their right foot despite an equal number of exercises for and equal focus on both right and left leg. The study compared two groups, namely the Experimental Group and the Control Group, which displayed no dissimilarities in terms of age and gender. Since football quintessentially requires more dynamic balance, this study has placed emphasis on the development of balance using different strategies (Yılmaz et al., 2019). Studies have already established that balance parameters can be affected by factors such as age and gender (Condon end Cremin, 2014). In his

research, Akcınar reported a meaningful difference in dynamic balance test measurements in favor of the right foot (Akçınar, 2014). In a study exploring the impact of core lower extremity strength exercises on the dynamic balance of basketball players, it was established that the balance skills values of the experimental group showed improvements in both the right and the left foot in comparison to the control group (Yüksel et al., 2016). Similarly, it was reported that there was a significant difference between the pre- and post-test values yielded by core training exercises performed by volleyball players (Sadeghi et al., 2013). In a study of static and dynamic core exercises, it was reported that the values of players in the experimental group were significantly better (Sever, 2017). While a four-week core exercise program was found to contribute to the static and dynamic balance of the players (Lacono et al., 2014), a similar study found that an eight-week long core exercise program brought about a positive improvement in static balance scores (Stray-Pedersenet al., 2006). One study reported that a six-week long core exercise program for adolescents makes a positive contribution to balance scores (Granaclher et al., 2014). In a study comparing a five-week long core exercise program using Pilates balls to a traditional exercise routine, it was found that the core exercise group had achieved greater improvements in terms of balance on one foot (Cosio-Lima et al., 2003), while a study by Samson revealed that core exercises designed for tennis players made a positive contribution to their dynamic balance (Samson, 2005) and Ozmen (2016) found that a core exercise regimen resulted in a positive contribution to the dynamic balance of adolescent badminton players (Ozmen end Aydoğmuş, 2016). It has been reported that certain exercises aimed at strengthening the core region make a positive contribution to improvements in balance in the elderly, as it does in young people (Markoviç et al 2015). It has been emphasized that functional core exercises may have positive results in elderly women resulting in efficient extremity use and strong balance. In the literature, there are also dynamic exercises using Bosu and Pilates balls that induce improvements in static balance via core exercises (Emery et al., 2005; Yaggie et al., 2006). On the other hand, it has been emphasized that core exercises do not lead to any improvements as demonstrated by measurements using the star balance test (Sato end Mokha, 2009). There are other studies using different balance methods and techniques. In terms of dynamic and static balance measurements of female athletes, it was determined that the static balance of gymnasts and the dynamic balance parameters of footballers were better than those of basketball players (Bressel et al., 2007). Another study on football players has shown that the static and dynamic balance of professional footballers is at a higher level than that of amateur players (Paillard et al., 2006).

On the basis of available data, it is possible to argue that dynamic core exercises can have a positive impact on static balance. When compared with other studies, this study differs from them in terms of different methodologies used for evaluating core training exercises.

As a result, it is thought that exercises targeting the core region positively affect strength and thus physical performance. It can be argued that core strength exercises have positive effects on both Overall and Medial balance.

## REFERENCE

Akçınar, F., (2014). 11-12 Yaş Çocuklarda Pliometrik Antrenmanın Denge ve Futbola Özgü Beceriler Üzerine Etkileri. *İnönü University Institute of Health Sciences. Department of Physical Education and Sports,* Malatya.

Alsayani, K,Y,A,, Savkin, R., Akkaya, N., Büker, N. (2018). The relationship between transversus abdominis muscle thickness with static and dynamic balance in helthy adults. *Annals of Physical and Rehabilitation Medicine.* Volume 61, Supplement.

Bressel, E., Yonker, J.C., Kras, J., Heath, E.M. (2007). Comparison of static and dynamic balance in female collegiate soccer, basketball, and gymnastics athletes. *J Athl Train.* 42(1): 42-6.

Cachupe, W.J.C., Shifflett, B., Kahanov, L., Wughalter, E.H. (2001). Reliability of Biodex Balance System Measures. *Measurement In Physıcal Educatıon And Exercıse Science,* 5(2): 97-108.

Calatayud, J., Borreani, S., Martin, J., Martin, F., Flandez, J., Colado, J.C. (2015). Core muscle activity in a series of balance exercises with different stability conditions. *Gait Posture.* 42(2):186-92.

Condon, C., Cremin K. (2014). Static balance norms in children. *Physiother Res in.* 19(1):1-7.

Cosio-Lima, L.M., Reynolds, K.L., Winter, C., (2003). Effects of Physioball and Conventional Floor Exercises on Early Phase Adaptations in Back and Abdominal Core Stability and Balance in Women. *The Journal of Strength & Conditioning Research,* 17(4): 721-725.

Dello, I.A., Martone, D., Alfieri, A., Ayalon, M., Buono, P. (2014). Core Stability Training Program (CSTP) effects on static and dynamic balance abilities. *Gazzetta Medica Italiana Archivio per le Scienze Mediche,* 173(4): 197-206.

Emery, C.A., Cassidy, J.D., Klassen. T.P., Rosychuk. R.J., Rowe, B.H. (2005). Effectiveness of a home-based balance-training program in reducing sports-related injuries among healthy adolescents: a cluster randomized controlled trial. *Canadian Medical Association Journal*, 172(6): 749-754.

Granaclher, U., Schellbach, J., Klein, K., Prieske, O., Baeyens, J.P., Muehlbauer, T. (2014). Effects of core strength training using stable versus unstable surfaces on physical fitness in adolescents: a randomized controlled trial. *Sports Science, Medicine, and Rehabilitation*, 6:40.

Jim, F.S., Jeff C.M., John RB, Jacob L.T. (2013). Effect of core strength and endurance training on performance in collegestudents: Randomized pilot study. *Journal of Bodyworkand Movement Therapies.* Volume 17, Issue 3, 278–290.

Kachanathu, S.J., Tyagi, P., Anand, P., Hameed, U.A., Algarni, A.E. (2014). Effect of Core Stabilization Training on Dynamic Balance in Professional Soccer Players. *Phys Med Rehab Kuror*, 24(06): 299-304.

Lacono, F., Raspugli, G.F., Bruni, D., Lo Presti, M., Sharma, B., Akkawi, I., Marcacci, M. Erratum to: (2014). Arthrodesis After Infected Revision TKA: Retrospective Comparison of Intramedullary Nailing and External Fixation. *The Musculoskeletal Journal of Hospital for Special Surgery.* HSSJ. 10:197.

Markoviç, G., Nejc, S., Zrinka, G., Valerija, K. (2015). Effects of feedback-based balance and core resistance training vs. Pilates training on balance and muscle function in older women: A randomized-controlled trial. *Archives of Gerontology and Geriatrics*,117-123.

Özmen, T., Aydoğmuş, M., (2016). Effect of core strength training on dynamic balance and agility in adolescent badminton players. *Journal of Bodywork & Movement Therapies*, (20): 565-570.

Paillard, T., Noé, F., Riviére, T., Marion, V., Montoya, R., Dupui, P. (2006). Postural performance and strategy in the unipedal stance of soccer players at different levels of competition. *J Athl Train*, 41(2): 172-6.

Sadeghi, H., Shariat, A., Asadmanesh, E., Mosavat, M. (2013). The Effects of Core Stability Exercise on the Dynamic Balance of Volleyball Players. *International Journal of Applied Exercise Physiology*, 2(2):1-10.

Saeterbakken, A.H., Tillaar, R.V.D., Seiler, S. (2011). Effect of core stability training on throwing velocity in female handball players. *J. Strength Cond. Res.*, 25(3): 712-718.

Samson, K.M., (2005). The effects of a five-week core stabilization-training program on dynamic balance in tennis athletes. West Virginia University.

Sarıtaş, N., Özkarafakı, İ., Pepe, O., Büyükipekçi, S. (2011). Üniversiteli erkek öğrencilerin vücut yağ yüzdelerinin üç farklı yöntemle değerlendirilmesi. *Journal of Health Sciences*, 20(2): 107-115.

Şatıroğlu, S.. Arslan, E., Atak, M. (2013). Voleybolda Core Antrenman Uygulamalrı. *5th training science congress*. 02.-04. Beytepe/Ankara.

Sato, K., Mokha, M. (2009). Does core strength training influence running kinetics, lower-extremity stability, and 5000-M performance in runners? *Journal of Strength and Conditioning Research*, (23): 133-140.

Savaş, S. (2013). Basketbolda corestabilizasyon ve theraband uygulamalarının performansa etkisi. *5th training science congress* 02.-04 July, Beytepe/Ankara.

Schilling, J.F., Murphy, J.C., Bonney. J.R., Thich, J.L., (2013). Effect of core strength and endurance training on performance in college students: randomized pilot study *J. Bodyw. Mov. Therapi*, 17 (3): 278-290.

Sever, O. (2017). Futbolcularda statik ve dinamik core egzersizlerin stork denge testine etkisi. *Journal of Human Sciences*, 14(2): 1781-1791.

Sharma, A., Geovinson, S.G., Singh, S.J. (2012). Effects of a nine-week core strengthening exercise program on vertical jump performances and static balance in volleyball players with trunk instability. *The Journal of sports medicine and physical fitness*, 52(6): 606-615.

Stray-Pedersen, J.I., Magnussen, R., Kuffe, l.E., Seiler, S., Katch, F., (2006). Sling exercise training improves balance, kicking velocity and torso stabilization strength in elite soccer players. *Medicine Sci Sports Exerc*, 38(5): 243.

Trampas, A., Mpeneka, A., Malliou, V., Godolias, G., Vlachakis, P. (2015). Immediate Effects of Core-Stability Exercises and Clinical Massage on Dynamic-Balance Performance of Patients With Chronic Specific Low Back Pain. *J Sport Rehabil*.24(4): 373-83.

Viktoria, K.B., Brigitta, S., Gabriella, K., Eleonora, L., Pongrac, A., Andras, O., Melinda, J. (2016). Application and examination of the efficiency of a core stability training program among dancers. *European Journal of Integrative Medicine*, 8S,3-7.

Yaggie, J.A., Campbell, B.M. (2006). Effects of balance training on selected skills. *The Journal of Strength & Conditioning Research*, 20(2): 422-428.

Yılmaz, C., Özgür, S., Varol, T. (2019). Yaş Aralığı 13-15 Yıl Olan Kadın Judo ve Voleybol Sporcularında Statik Denge Parametrelerinin Karşılaştırılması. *J Sports Sci*. 11(1):1-7.

Yoon, S.D., Sung, D.H., Park, G.D. (2015). The effect of active core exercise on fitness and foot pressure in Taekwondo club students. *J Phys Ther Sci.*,27(2): 509-11.

Yüksel, O., Akkoyunlu, Y., Karavelioğlu, M.B., Harmancı, H., Kayhan, M., Koç, H. (2016). Basketbolcularda Core Alt Ekstremite Kuvveti Antrenmanlarının Dinamik Denge ve Şut İsabeti Üzerine Etkisi. *Marmara University Journal of Sport Sciences*, 1(1).