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# Balance Board vs Balance Ball: Which One is Superior in Enhancing Static and Dynamic Balance Abilities on Healthy University Students

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**Abstract**

**Aim:** The purpose of this study was to compare the effects of two different unstable surfaces balance training on static and dynamic balance abilities.

**Methods:** The 52 healthy active university students were randomly divided into three groups: the training groups exercised on the firm (balance board) or soft ground (balance ball, BOSU®) for 16 min for 3 days per week for eight weeks, involving structured balance exercises. The control group did not perform the balance exercises in this process. All of the groups were tested static and dynamic balance tests by a computerized balance system before and after the training period. Tests were carried out using a single and double-leg stance either with the eyes open or closed.

**Results:** One-way and mixed-design analyses of variance tests indicated that significantly similar improvements were observed in the exercise groups' static (ellipse area and perimeter length) and dynamic (stability index and average track error) balance ($p < 0.05$). No significant changes were observed in the control group in any of the variables tested at any point ($p > 0.05$).

**Conclusion:** Finding shows that using balance board and balance ball as balance training intervention tools have similar effectiveness for static and dynamic balance enhancement in healthy active university students.

**Keywords**
Balance training,
Bosu,
Perimeter length
Unstable surface

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## INTRODUCTION

Human postural demands and balance control during mobility and rotational motion are of primary interest for athletic performance and daily life and also for avoiding fractures and injuries caused by balance disorder in children and the elderly (Kibele, Granacher, Muehlbauer, & Behm, 2015; Ogaya, Ikezoe, Soda, & Ichihashi, 2011).

Balance is generally defined as the ability to maintain the body's center of gravity within its base of support (Hrysomallis, 2011). Postural control, on the other hand, involves controlling the body's position in space dually and is divided into two as static and dynamic control (Samuel, Solomon, & Mohan, 2015). Dynamic balance is the preservation of an upright body position throughout locomotion, whereas static balance is the process of maintaining the center of mass vertically over the base of support with minimal movement while maintaining specific poses for an extended period of time (Kilroy, Crabtree, Crosby, Parker, & Barfield, 2016). Balance is considered to be a critical component of common motor skills.

In recent years, studies on improving postural control and balance have gained gradual importance in rehabilitation and prevention of sports injuries and have focused particularly on knees and ankles. In the literature, it has been shown with strong evidence that training intended to improve balance can be performed on different grounds with different equipment; balance training on stable and unstable surfaces can develop dynamic balance ability as well as static balance ability and that it could reduce the risk of injury particularly in the lower extremity (Zech et al., 2010; Di Stefano, Clark, & Padua, 2009). Improvements occurring in proprioception and neuromuscular control are considered to be mainly responsible for this progress (Zech et al., 2010).

Since exercise on unstable surfaces requires the participants to make rapid and controlled changes in the center of pressure, it leads to difficulty in the control of the postural balance (Paillard & Noé, 2015). Studies on the unstable soft ground balance ball and unstable firm ground balance board which have maintained their popularity because of being easily portable, practical and cheap and not requiring a special setup have shown that this equipment improves balance ability; however, balance-performance differences that could come up due to the two different grounds have not been examined (Ogaya et al., 2011; Emery, Cassidy, Klassen, Rosychuk, & Rowe, 2005; Cug, Duncan, & Wikstrom, 2016; Cerrah et

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al., 2016; Balogun, Adesinasi, & Marzouk, 1992; Silva, Mrachacz-Kersting, Oliveira, & Kersting, 2018; Lubetzky-Vilnai, McCoy, Price, & Ciol, 2015).

Therefore, the aim of the present study was to compare the effect of the same balance training protocol performed on two different unstable surfaces (balance board and balance ball) on static and dynamic balance performance. We hypothesized that static and dynamic balance would improve as a result of the same exercise program with both types of equipment while no changes in the control group and that exercises on the balance board would be more effective compared to the balance ball in balance performance development as it is more difficult to preserve balance with this device.

## METHOD

### Participants

Eighty-seven university students completed a questionnaire providing information regarding their basic anthropometric data, injury history, physical activity level, and participation of balance training history. Sixty volunteers aged between 18-25 years met the inclusion criteria: not overweight or obese [body mass index (BMI) < 25], no serious injury in the lower extremity in the last six months, not participate any balance exercise program previously and not following an intense exercise program (with a weekly number of activities ≤ 3). Eight of the participants were excluded from the study because they could not attend the training program regularly.

Participants were randomly divided into three groups: the collected questionnaires were numbered sequentially, groups were formed as number 1 to group 1 (balance board group), number 2 to group 2 (balance ball group), and number 3 to group 3 (control group, CG). The exercise groups followed an 8-week training program of balance exercises on firm ground (balance board group) and soft ground (balance ball group), while the CG was not willing to participate in exercise training.

Prior to participation, all participants were fully informed of the purpose of the study, the experimental procedure, and the potential benefits and possible risks of being involved and were then asked to provide informed consent. The structure of the study was approved to be compliant with "the Declaration of Helsinki: Ethical Principles in Medical Research involving Human Subjects" by the Ege University Scientific Research Ethics Committee of the Faculty of Medicine (Approval number:18-10.2/44).

*Height and Body Weight Measurement:* They were measured using an electronic device (SECA® 767, USA) with standard methods (Lohman, Roche, & Martorell, 1991).

*Static and Dynamic Balance Measurement:* Static and dynamic balance performances of each group were evaluated using a computerized balance system (Prokin 252, Tecnobody, Bergamo-Italy); prior to and following the training program. The platform had a sensor in the center which perceived each angular movement and sent data to the computer directly. The software downloaded onto the computer makes it possible to monitor each angular movement perceived by the sensor and the loads on the platform on a computer screen and to record them into personal files. Angular movements of the system were forwards-backward (±15°) and left-right (±15°) and it has the opportunity of platform control at 50 different levels which can be controlled over the software.

### Procedures

Before the tests, the participants practiced ski simulation game with two different difficulty levels on the balance platform for 2-3 minutes, to familiarize with the testing equipment. After that they started the tests following a 20-minute rest.

The static balance test was performed on the stable platform alternately using a single and double-leg stance, with eyes open (EO) and eyes closed (EC), and arms on sides of the body and standing position with no support. An approximately 30-sec rest was taken between each of six test measurement of 20 seconds. The positions of the feet were determined so as to stand at equal distances to the origin point with reference to the lines on X and Y axes and the participant was asked to look at a fixed point in front of him/her (Aksit & Cırık, 2017; Atilgan Erkut, 2013).

Dynamic balance on bipedal stance were tested for 60 second and the difficulty level was set as "20" point. The participants' barefoot was placed on the balance platform in a standardized position. The test compromises trying to move clockwise five times in a reference circle seen on the computer screen which provides continuous visual feedback to understand the difference between what he/she was feeling on a kinesthetic level and what is actually happening at motor level. The test was repeated two times with a 10-min interval and the best result was recorded.

The tests evaluated the stability index (SI) indicating the angular distance during the test and the average track error (ATE) in the dynamic balance test. The ellipse area (EA) showing the area of the field departed away from the center and the perimeter length (P) indicating the distance taken during the test for the right and (R) left foot (L) with eyes open (EO) and closed (EC) in static balance (Aksit & Cırık, 2017; Atilgan Erkut, 2013).

The participants were warned not to change their usual physical activity levels during the study period, to be rested on measurement days and not to consume caffeine.

Training Program

Balance ball (Both Sides Up BOSU®, Fitness Quest, Canton, OH), is a piece of equipment shaped like an air-filled half-ball which is covered with a flat and firm platform at the bottom and rubber at the top. The ball, which can be used on both sides, makes it possible to do exercise intended for the development of general or branch-specific balance, proprioception and kinesthetic awareness (Yaggie & Champbell, 2006).

A balance board is a training tool that allows for a ~10º tilt in all directions with an inclined elevation of 4.5 cm at the bottom along with a hard surface of a circular platform that is 40 cm in diameter.

The program included exercises on BOSU®'s bladder side or balance board:

1) Full squats with eyes open and closed (20s -20s rest -20s) × 2 set
   20s rest
2) 2.Half squats with eyes open and closed (20s -20s rest -20s) × 2 set
   20s rest
3) 3.Swinging one leg (right) while standing on the other with eyes open and closed (20s -20s rest -20s) × 2 set
   20s rest
4) 4. Swinging one leg (left) while standing on the other with eyes open and closed (20s -20s rest -20s) × 2 set
   20s rest
5) 5.Standing in glider position (right) with eyes open and closed (20s -20s rest -20s) × 2 set
   20s rest
6) 6. Standing in glider position (left) with eyes open and closed (20s -20s rest -20s) × 2 set
   20s rest

They were repeated three times a week for eight weeks. Each exercise was maintained for 20 seconds and a 20-second rest was taken afterward on one session which lasted for a total of 16 minutes (Cerrah et al., 2016).

**Statistical analysis**

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) 25.0 (IBM Corp., Armonk, NY, USA) package program and $p \leq 0.05$ was accepted as the level of statistical significance. Descriptive statistics were reported as the mean ± SD. After the normality test (Shapiro-Wilk), descriptive characteristics of different groups were compared using a one-way variance analysis (ANOVA) test. To assess possible interaction between study groups and time, mixed-design ANOVA (3 × 2, Group × Time) for each investigated variable was used. The magnitude of performance changes (Δ) were compared using one-way ANOVA and post-hoc least significant difference (LSD) test. The effect size of the difference was evaluated using the classification of Cohen (< 0.2 trivial, $0.2 \leq d < 0.5$ small, $0.5 \leq d < 0.8$ moderate, $d \geq 0.8$ large effect size).

## RESULTS

Five out of the 40 participants as the exercise groups that performed the training program and three out of the 20 participants as the CG failed to complete the study due to their busy school schedules. None of the participants experienced injuries or diseases during the program.

The physical characteristics of the exercise groups and the control group are presented in Table 1. The mean age, height, weight and BMI measured prior to training program were similar in all groups ($p > 0.05$).

**Table 1.** Physical characteristics of exercise and control groups

| Characteristics | Balance Ball Group (n=18) | Balance Board Group (n=17) | Control Group (n=17) | p |
|---|---|---|---|---|
| Male/Female (n) | 7/11 | 10/7 | 9/8 | |
| Age (year) | 22.2±1.62 | 21.6±2.03 | 22.0±1.65 | 0.631 |
| Height (cm) | 169±7.96 | 171±11.4 | 172±8.28 | 0.677 |
| Weight (kg) | 64.0±14.1 | 71.6±16.0 | 68.4±12.0 | 0.278 |
| BMI (kg/m$^2$) | 22.2±3.61 | 24.1±3.11 | 22.9±2.95 | 0.249 |

BMI: Body mass index

The 3 × 2 ANOVA results indicated that statistically significant interaction between group and time factors was found in EC-EA ($F_{[2,51]} = 6.762$, $p = 0.002$, $\eta p^2 = 0.210$), in EC-P ($F = 3.339$, $p = 0.043$, $\eta p^2 = 0.116$), in R-EO-EA ($F = 4.153$, $p = 0.021$, $\eta p^2 = 0.140$), in R-EO-P ($F = 5.055$, $p = 0.010$, $\eta p^2 = 0.165$), in DIN-SI ($F = 3.790$, $p = 0.029$, $\eta p^2 = 0.129$). However, each group showed similar change patterns across the study from pre to post-test for the other parameters.

Descriptive statistics of static balance using double-leg stance pre- and post-test scores among groups, ANOVA test results of the percentage change between pre- and post-test scores and their post-hoc test results are shown in Table 2. Accordingly, Δ % of the static balance performance parameters (EA and P) measured with eyes open (EO) and closed (EC) separately on both legs were found statistically different between balance ball and control groups and between balance board and control groups, except EO-P ($p = 0.555$).

**Table 2.** Static balance test scores using double-leg stance of exercise and control groups

| arameters | | Balance Ball Group (1) | Balance Board Group (2) | Control Group (3) | ¥ANOVA results | ¥post-hoc p value | ¥d value |
|---|---|---|---|---|---|---|---|
| EO-EA (mm$^2$) | Pre-test | 160 ± 124 | 209 ± 143 | 190 ± 120 | p = 0.003* F = 6.37 | (1-2)=0.961 | -0.378 |
| | Post-test | 99.1 ± 41.0 | 143 ± 85.8 | 175 ± 91.1 | | (1-3)=0.003* | -0.253 |
| | Δ % | -25.6 ± 28.3 | -26.0 ± 19.5 | -1.50 ± 22.2 | | (2-3)=0.003* | 0.148 |
| EC-EA (mm$^2$) | Pre-test | 278 ± 171 | 298 ± 181 | 325 ± 164 | p < 0.001* F = 16.9 | (1-2) 0.601 | -0.117 |
| | Post-test | 182 ± 101 | 211 ± 136 | 313 ± 151 | | (1-3)<0.001* | -0.289 |
| | Δ % | -31.0 ± 18.9 | -28.1 ± 11.6 | -2.42 ± 17.2 | | (2-3)<0.001* | -0.161 |
| EO-P (mm) | Pre-test | 216 ± 55.4 | 244 ± 83.3 | 213± 42.5 | p = 0.555 F = 0.595 | (1-2)=0.492 | -0.410 |
| | Post-test | 181 ± 38.9 | 220 ± 61.9 | 204 ± 43.2 | | (1-3)=0.287 | 0.062 |
| | Δ % | -12.1 ± 24.9 | -7.00 ± 14.9 | -4.18 ± 24.8 | | (2-3)=0.702 | 0.483 |
| EC-P (mm) | Pre-test | 318 ± 125 | 319 ± 81.4 | 333± 66.9 | p = 0.051* F = 3.15 | (1-2)=0.885 | -0.010 |
| | Post-test | 266 ± 84.1 | 273± 78.5 | 328 ± 72.4 | | (1-3)=0.041* | -0.153 |
| | Δ % | -13.2 ± 22.2 | -14.0 ± 15.2 | -1.19 ± 12.8 | | (2-3)=0.029* | -0.194 |

*p≤0.05; ¥ statistical comparison for Δ % values, d: Cohen's d (<0.2 trivial; 0.2≤d<0.5 small; 0.5≤d<0.8 moderate; d≥0.8 large effect size); EO: eyes open, EC: eyes closed, EA: ellipse area, P: perimeter length, Δ %: percentage change between pre and post test scores.

Descriptive statistics of static balance using a single-leg stance pre- and post-test scores among groups, ANOVA test results of the percentage change between pre- and post-test scores and their post-hoc test results are shown in Table 3. A statistical significant difference was found in the right leg (R) EO-EA (mm$^2$), EO-P (mm), EC-P, and the left leg (L) EO-EA.

**Table 3.** Static balance test scores using single-leg stance of exercise and control groups

| Parameters | | Balance Ball Group (1) | Balance Board Group (2) | Control Group (3) | ¥ANOVA results | ¥post-hoc p value | ¥d value |
|---|---|---|---|---|---|---|---|
| R-EO-EA ($mm^2$) | Pre-test | 447 ± 169 | 542 ± 214 | 541 ± 190 | p = 0.002* F = 6.95 | (1-2) = 0.967 | -0.509 |
| | Post-test | 323 ±115 | 389 ±122 | 531 ± 180 | | (1-3) = 0.002* | -0.539 |
| | Δ % | -24.0 ± 19.0 | -24.3 ± 17.2 | 5.96 ± 41.1 | | (2-3) = 0.002* | 0.005 |
| R-EC-EA ($mm^2$) | Pre-test | 3936 ± 4544 | 4033 ± 3033 | 6316 ±12917 | p = 0.148 F = 1.98 | (1-2) = 0.979 | -0.026 |
| | Post-test | 2561 ± 1101 | 3100 ± 2283 | 5099 ± 6857 | | (1-3) = 0.093 | -0.256 |
| | Δ % | -2.04 ± 49.3 | -2.81 ± 64.5 | -47.8 ± 127.6 | | (2-3) = 0.088 | -0.251 |
| R-EO-P (mm) | Pre-test | 661 ± 215 | 764 ± 253 | 687 ± 230 | p = 0.001* F = 7.54 | (1-2) = 0.042* | -0.453 |
| | Post-test | 601 ± 147 | 597 ± 154 | 715 ± 191 | | (1-3) = 0.079 | -0.120 |
| | Δ % | -4.33 ± 25.9 | -18.5 ± 14.5 | 7.87 ± 19.2 | | (2-3) < 0.001* | 0.328 |
| R-EC-P (mm) | Pre-test | 2158 ± 1173 | 2206 ± 993 | 2148 ± 1359 | p = 0.043* F = 3.35 | (1-2) = 0.923 | -0.045 |
| | Post-test | 1609 ± 460 | 1754 ± 678 | 2149 ± 1284 | | (1-3) = 0.026* | 0.008 |
| | Δ % | -15.9 ± 26.3 | -14.8 ± 28.9 | 10.2 ± 44.6 | | (2-3) = 0.033* | 0.050 |
| L-EO-EA ($mm^2$) | Pre-test | 573 ± 390 | 504 ± 185 | 647 ± 389 | p = 0.007* F = 5.51 | (1-2) = 0.243 | 0.231 |
| | Post-test | 373 ± 168 | 408 ± 150 | 582 ± 221 | | (1-3) = 0.002* | -0.196 |
| | Δ % | -28.3 ± 22.3 | -15.9 ± 19.7 | -6.17 ± 45.8 | | (2-3) = 0.041* | -0.484 |
| L-EC-EA ($mm^2$) | Pre-test | 4809 ± 7846 | 6480 ±11714 | 3822 ± 5469 | p = 0.350 F = 1.07 | (1-2) = 0.812 | -0.174 |
| | Post-test | 2781 ± 1444 | 3680 ± 2762 | 4028 ± 4179 | | (1-3) = 0.263 | 0.150 |
| | Δ % | 12.6 ± 70.6 | 0.60 ± 75.4 | 69.1 ± 238.3 | | (2-3) = 0.177 | 0.300 |
| L-EO-P (mm) | Pre-test | 665 ± 254 | 718 ± 321 | 713 ± 344 | p = 0.409 F = 0.91 | (1-2) = 0.233 | -0.189 |
| | Post-test | 618 ± 161 | 615 ± 227 | 649 ± 205 | | (1-3) = 0.934 | -0.164 |
| | Δ % | -2.63 ± 21.6 | -11.5 ± 25.6 | -3.25 ± 18.7 | | (2-3) = 0.266 | 0.015 |
| L-EC-P (mm) | Pre-test | 2303 ± 1616 | 2309 ± 1569 | 1867 ± 1033 | p = 0.069 F = 2.82 | (1-2) = 0.712 | -0.004 |
| | Post-test | 1779 ± 732 | 1864 ± 741 | 2016 ± 867 | | (1-3) = 0.031* | 0.329 |
| | Δ % | -11.0 ± 29.8 | -6.50 ± 38.5 | 16.0 ± 40.7 | | (2-3) = 0.071 | 0.343 |

* p ≤ 0.05; ¥ statistical comparison for Δ % values, d: Cohen's d (< 0.2 trivial; 0.2 ≤ d < 0.5 small; 0.5 ≤ d < 0.8 moderate; d ≥ 0.8 large effect size); R: right leg, L: left leg, EO: eyes open, EC: eyes closed, EA: ellipse area, P: perimeter length, Δ %: percentage change between pre and post test scores.

Descriptive statistics, ANOVA test results and their post-hoc test results of the dynamic balance performance parameters of the groups are given in Table 4. No statistically significant difference was found in percentage change between pre- and post-test scores of SI (°) and ATE (%), as the dynamic balance test parameters among the groups.

**Table 4.** Dynamic balance test scores of exercise and control groups

| Parameters | | Balance Ball Group (1) | Balance Board Group (2) | Control Group (3) | ¥ANOVA results | ¥post-hoc p value | ¥d value |
|---|---|---|---|---|---|---|---|
| SI (°) | Pre-test | 1.82±0.94 | 1.78±0.57 | 1.71±0.86 | p = 0.079 F = 2.67 | (1-2) = 0.852 | 0.053 |
| | Post-test | 1.23±0.40 | 1.41±0.58 | 1.66±0.68 | | (1-3) = 0.042* | -0.800 |
| | Δ % | -19.4 ± 38.3 | -17.5 ± 29.5 | -0.83 ± 13.5 | | (2-3) = 0.063 | 0.099 |
| ATE (%) | Pre-test | 38.7±9.04 | 41.6±17.9 | 42.7±13.9 | p = 0.368 F = 1.02 | (1-2) = 0.172 | -0.213 |
| | Post-test | 33.1±7.13 | 37.0±8.90 | 40.5±12.0 | | (1-3) = 0.324 | -0.354 |
| | Δ % | -13.5 ± 10.9 | 3.30 ± 57.9 | -1.41 ± 22.5 | | (2-3) = 0.699 | -0.071 |

*p ≤ 0.05; ¥ statistical comparison for Δ % values, d: Cohen's d (< 0.2 trivial; 0.2 ≤ d < 0.5 small; 0.5 ≤ d < 0.8 moderate; d ≥ 0.8 large effect size); SI: stability index, ATE: average track error, Δ %: percentage change between pre and post test scores.

## DISCUSSION

The main findings of the present study were that balance exercise program on firm and soft unstable surfaces brings about significant improvement in healthy young participants' static balance parameters on both legs (EA and P with EO and EC) and single leg (R-EO-EA, L-EO-EA, R-EO-P, and R-EC-P); and dynamic balance parameters (SI and ATE) on both legs but no difference was found in percentage change for the dynamic balance test parameters among the groups. So balance ball and balance board have similar effects on balance improvement.

When the literature is examined, the use of different tests to evaluate the level of balance or its development and the results of these tests are evaluated with different parameters, which makes it difficult for us to discuss the results of our study. Even so, the literature includes strong evidence showing that balance training on stable and unstable surfaces can improve static as well as dynamic balance ability. While dynamic and static balance ability can potentially be improved on an unstable surface; it is reported that individuals' initial values are important in terms of static balance on a stable surface; and that the ceiling effect appears to occur in the development of static balance ability on a stable surface particularly in elite athletes (Di Stefano et al., 2009). Zech et al. (2010) reviewed randomized controlled studies and non-randomized controlled studies including healthy and physically active participants aged up to 40 years. They concluded that balance training can be effective on the development of static postural sway, dynamic balance and neuromuscular control in athletes and non-athletes. Moreover, it was suggested that the changes occurring in proprioception and neuromuscular control were predominantly responsible for these effects. Proprioception is such an important component of joint function because it provides an extensive amount of afferent information on the joints' internal environment, for example, tension in ligaments, intra-articular pressure, mechanical stress, and joint velocity. Without this information, motor patterns that are created are not as effective and may result in the ankle being placed in an unstable situation, especially since other sources of afferent information are unable to adequately compensate for this loss (Kidgell, Horvath, Jackson, & Seymour, 2007).

The fact that it requires the maintenance of static stand in comparison with moving the surface during balancing unlike stable surfaces was considered to have been effective on the improvement obtained in static and dynamic balance with two unstable multi-axis equipment used during the 8-week training period in our study. Although it was not measured in the present study, the fact that proprioceptive exercise performed on unstable surfaces increases muscle electromyographic (EMG) activity in the lower leg particularly with eyes closed (Braun Ferreira et al., 2011), the decrease in leg and body velocity and the angular speed of supportive extremity on all platforms for ankle, knee and hip joints (Silva et al., 2018), the increase in the EMG activation of core muscles (Calatayud et al., 2015), that the hip and ankle muscles are enabled to integrate on a single leg (Gribble & Hertel, 2004) and the increase in the strength of lower extremity muscles (Granacher, Gollhofer & Kriemler, 2010) which is claimed to be a protective factor against sports injuries may have supported these results.

Despite being conducted on different groups, with different training programs and using different testing protocols, studies evaluating the effects of balance training with balance board or balance ball in the literature have demonstrated positive results (Ogaya et al., 2011; Emery et al., 2005; Cug et al., 2016; Cerrah et al., 2016; Balogun et al., 1992; Silva, Mrachacz-Kersting et al., 2018; Lubetzky-Vilnai et al., 2015). In a study, it was reported that balance exercise done by 66 adolescents on balance board at home for six weeks improved timed static and dynamic balance test results and reduced the incidence of sporting injuries in the following six months (Emery et al., 2005). In another study balance exercise done on balance ball by healthy young adults for four weeks improved selected static and dynamic postural control parameters (Cug et al., 2016). However, our study was designed considering that the determination of the superiority of these two still-popular pieces of equipment over one another as a result of balance training performed using them would provide useful information to be transferred into practice. To this end, the second hypothesis of our study was that the balance board which would require the participants to make faster and more controlled changes in their pressure centers and was considered to bear difficulties would be more effective in improving balance than the balance ball which have also unstable surfaces and are also known to be challenging for the neuromuscular system (Paillard & Noé, 2015).

Similar to the two studies planned in parallel with our study purposes, our measurements showed that balance ball and balance board were not superior to each other in the static and dynamic balance performances as a result of the training period (Kidgell et al., 2007; Braun Ferreira et al., 2011). Kidgell et al. (2007) measured the effects of a training performed by 20 participants (11 males, 9 females) aged between 22-35 years with ankle instability three days a week on a dura disk and mini trampoline due to their different mechanical features and the measurements were taken with postural sway performance while standing on single leg. At the end of six weeks, although significant improvement was observed in the center of pressure (COP) of both groups compared to the first measurements, this difference was found to be similar in the comparison of the groups (Kidgell et al., 2007). Eosin et al. (2010) used the star excursion balance test (SEBT) to evaluate the effects of balance training performed by college athletes from different branches on a multiple-axis dyna disk and a single-axis swinging platform 3 times a week as they were working on different axes, which included balancing a 1kg-ball during fast catching on a single leg. At the end of four weeks, it was found that test parameters did not change significantly based on the equipment used. To reach similar results with these studies, it was thought that devices with similar mechanical properties used in these studies may have developed similar physiological mechanisms.

The sample size of the present study, not using blinding design in researchers, not designing with the increasing volume principle and the duration of the training period were the limitations of our study. Due to the methodological limitation of our study, neuromuscular mechanisms to explain the results obtained were unknown. Thus, it was not possible to explain whether physiologic adaptations or learning effects were responsible for the improved balance performance. However, depending on the findings of Taube et al. (2008), it could be asserted that spinal and supraspinal adaptations play a potential role in the improvement in postural control following balance training.

## CONCLUSION

This study has demonstrated that 8-week of balance training on either a balance ball or a balance board have similar effects in improving static and dynamic balance among young healthy active people. It is recommended that future studies should examine the effects of different types of exercise and training equipment on static and dynamic balance performance.

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