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**Original Article / Orijinal Araştırma**

# The Effects of Nintendo Wii® Balance Training on Cases with Chronic Knee Problems: A Randomised Controlled Trial

## *Nintendo Wii® Denge Eğitiminin Kronik Diz Problemli Olgularda Etkinliği: Randomize Kontrollü Çalışma*

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## ABSTRACT

**Objective:** This study aimed to examine the effects of Nintendo Wii® (NW) Balance Training on the balance and muscle strength of patients with chronic orthopedic knee problems.

**Methods:** The design of the study is a randomized controlled trial. A total of 40 volunteers with chronic orthopedic knee problems were randomly divided into NW and control groups with odd-even rule (ratio 1:1). Participants were assessed at the first session, at the end of the study (6 weeks). Balance was evaluated using the Kinesthetic Ability Trainer® (KAT) and Single Leg Stance Test (SLST), while muscle strength of hip flexor, extensor and abductor, knee flexor and extensor, and dorsiflexor were tested using a Hand-Held Dynamometer. **Results:** A total of 33 volunteers analysed. In the study group (n=15), statistically significant differences were observed in the KAT parameters ($p<0.05$, $d_{ppc2}$: 0.13-1.09), SLST results ($p<0.01$, $d_{ppc2}$: 0.78-0.99), and strength ($p<0.01$, $d_{ppc2}$: 0.41-1.35) after training compared to the baseline values and no significant change was observed ($p>0.05$) in the control group (n=18). **Conclusion:** The results indicated that balance training using NW was effective for the balance and muscle strength of patients with chronic orthopedic knee problems.

**Keywords:** Virtual reality, knee injuries, postural balance, muscle strength

## ÖZ

**Amaç:** Bu çalışmanın amacı Nintendo Wii® (NW) denge eğitiminin kronik ortopedik diz problemi olan hastalarda denge ve kuvvete olan etkisinin incelenmesidir.

**Yöntem:** Çalışmanın dizaynı bir randomize kontrollü çalışmadır. Toplamda kronik ortopedik diz problemi olan 40 gönüllü rastgele NW ve kontrol gruplarına tek-çift kuralı ile ayrılmıştır (1:1 oranında). Katılımcılar ilk seansta ve çalışma sonunda (6 hafta) değerlendirilmiştir. Denge Kinesthetic Ability Trainer® (KAT) ve Tek Ayak Üzerinde Durma Testi (TAÜDT) kullanılarak değerlendirilirken, kalça fleksör, ekstansör, abdüktör, diz fleksör, ekstansör ve dorsifleksörler Hand-Held Dinamometre kullanılarak değerlendirilmiştir.

**Bulgular:** Toplamda 33 gönüllünün analiz edildi. Çalışma grubunda (n=15) başlangıç verileri ile eğitim sonrası veriler karşılaştırıldığında KAT parametrelerinde ($p<0,05$, $d_{ppc2}$: 0,13-1,09), TAÜDT sonuçlarında ($p<0,01$, $d_{ppc2}$: 0,78-0,99) ve kuvvette ($p<0,01$, $d_{ppc2}$: 0,41-1,35) anlamlı farklılık gözlenirken kontrol grubunda (n=18) anlamlı değişiklik gözlenmedi ($p>0,05$).

**Sonuç:** Sonuçlar kronik ortopedik diz problemlerine sahip hastaların denge ve kas güçlerine NW kullanılarak verilen denge eğitiminin etkili olduğunu göstermektedir.

**Anahtar Kelimeler:** Sanal gerçeklik, diz yaralanmaları, postüral denge, kas kuvveti

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## INTRODUCTION

Different pathologies are frequently seen in the knee joint.[1] Following injury, the number of mechano-receptors in the damaged region decreases, the activity of inhibitor neurons increases, and the abnormal input reaches the central nervous system. This consequently leads to progressive degeneration and constant deficits in balance and coordination.[2-4]

Balance can be defined as the ability to maintain the centre of gravity of the body within the supporting surface. The centre of gravity localization may vary in different patient groups, according to the lower extremity injury, osteoarthritis, and total knee arthroplasty history, and this may cause weight bearing asymmetry (WBA) leading to degeneration in the joints.[5-7]

Different methods are used in balance training, and studies have reported that the feedback systems are also effective. Balance exercises can be performed as a home program, but they require more supervision than other exercises. Virtual reality (VR) devices as a feedback system are used as balance exercises.[8,9]

VR is a simulation medium consisting of real-time, interactive, and multi-sensory inputs. Complicated VR systems have the disadvantages of high-cost hardware and software, thus researchers prefer more popular and affordable technologies. Commercial game consoles such as Nintendo Wii® (NW) (Nintendo Company, Japan) are used for VR training. These systems are inexpensive, easily accessible and user-friendly. Recently, there has been a rapid increase in the number of studies using game consoles such as NW.[9-12] Although there are studies in literature that have examined the effects of VR systems on balance in neurological rehabilitation, there are a limited number of studies on orthopedic rehabilitation practice.[10,13,14] The aim of this study was to examine the effects of Table Tilt game from NW Balance Training games on the balance and muscle strength of patients with chronic orthopedic knee problems.

## METHODS

### Participants and Settings

The study included only subjects aged 19-40 years with unilateral orthopedic knee joint pathology ongoing for at least 6 months, who were capable of unassisted ambulation. Patients were excluded from the study if the knee joint pathology was in the acute phase, if they were receiving treatment for the knee problem, had a history of surgery, had any comorbidity, which would prevent full implementation of the balance training (acute musculoskeletal system, hip, or ankle injuries, lumbar pain, neurological diseases, etc.) or had any health problem that may affect balance. Any subjects with concomitant health problems affecting weight-bearing, or those in the study group who did not regularly participate in training were excluded from the study.[15]

A total of 40 cases whose diagnosed with chronic knee problems by an Orthopedics and Traumatology specialist (Author 4), these patients met the inclusion criteria and agreed to voluntary participation in the study. These patients were randomly divided (simple randomization procedure: odd-even rule, ratio 1:1) into the control (n=20) and study (n=20) groups according to the order of acceptance. enrollment order list was prepared by a researcher (Author 2). This list was used for the allocation of participants. Volunteers were numbered and odd numbers added to the control group, even numbers added group. A total of 7 cases were excluded because of irregular participation in the exercise program and assessments or because of an additional health problem (Figure 1). Therefore, the study was completed with 33 participants with a mean age of 23.85±4.62 years. The patients in the control group (n=18) did not participate in any training program and the patients in the study group (n=15) undertook a 6-week NW balance training program. The trial was stopped at the end of the balance training. This was a unicentral, randomised-controlled, parallel group study conducted in Kütahya/Turkey. The examinations and training sessions of the study participants were conducted out in the Department of Physiotherapy and Rehabilitation, School of Health Science, Dumlupınar University.

### Assessments

The assessments and training sessions were applied by the same researcher (Author 1). The assessments were applied before, at the end of the training program and after a period of 6 weeks.

The diagnostic data and sociodemographic information of the participants were obtained through face-to-face interviews. All the data were collected under the same environmental (constant illumination, temperature, etc.) and test conditions. In the balance assessments, the participants were asked to repeatedly step on and off the measurement platform with the same leading foot, and the measurements were performed with the patients barefoot and wearing casual clothes.

### Balance Assessments

**Kinesthetic Ability Trainer® (KAT) Balance Assessments:** Balance was assessed using the KAT (SportKAT LLC, Model TS650, United States), following the procedure recommended by the manufacturer. Since the platform is mobile, adaptation time was allowed for the participants.

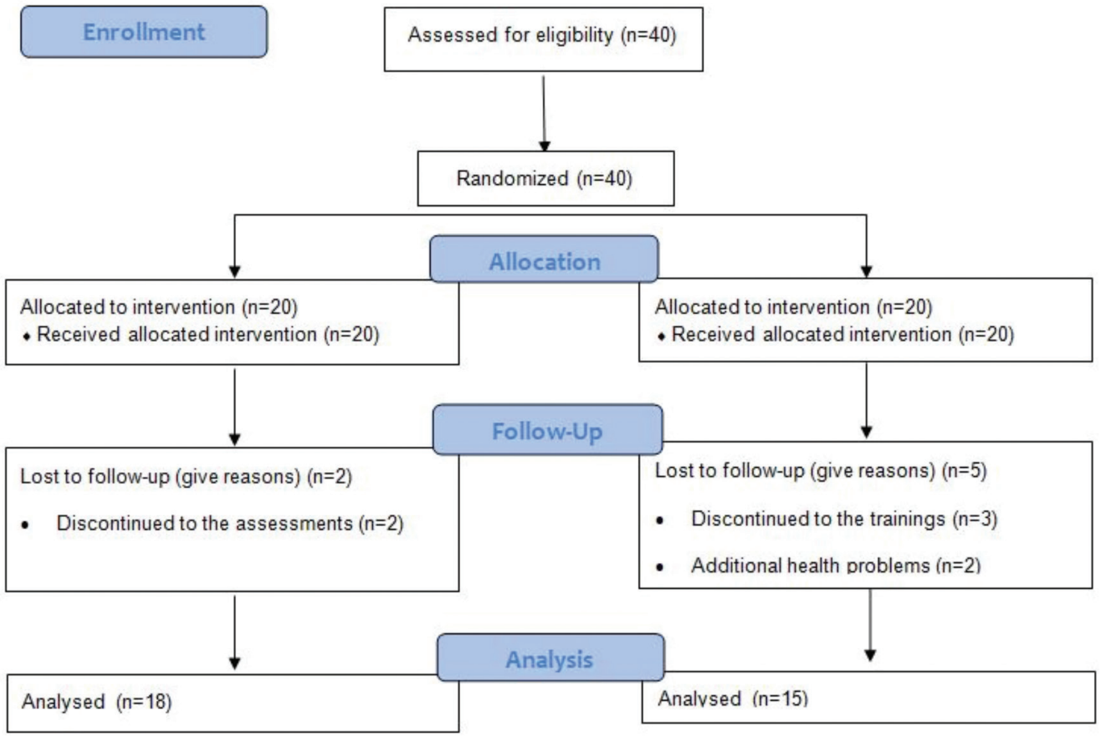


**Figure 1.** Flow diagram

Using the reference points on the platform, it was ensured that the feet were placed at the same locations. Before every measurement, the platform was calibrate. ML and AP ratios were calculated from the results of the 30-sec. measurements of left, right and both feet, and the balance result. In accordance with the manufacturer's instructions, the consistency of the balance measurements was checked, then the best of 3 consistent measurements was used.[16]

**Single Leg Stance Test (SLST):** For the static balance assessment, the SLST was applied. In this test, the participants were asked to place their hands on their shoulders transversely, to look at a 10 cm-diameter red point and to maintain a SLST for 30 seconds with the non-evaluated knee at 90° flexion. The chronometer was started at the moment when the foot was lifted from the ground and was stopped at the moment when the other leg was used as support or the lifted leg touched the ground or the location of the weight-bearing leg was changed, and the time was recorded. The test was repeated 3 times for the right and left lower extremities, respectively, and the mean values of these measurements were recorded.[17,18]

## Muscle Strength Evaluation

The muscle strength of the hip flexor (HF), hip extensor (HE), hip abductor, knee flexor (KF), knee extensor (KE) and dorsiflexor (DF) muscles was evaluated using Hand-Held Dynamometer (Lafayette Instrument Company, Model 01165, United States), and the values were expressed as Newton (N) units. The muscle strength measurements were taken using the Make Test, which involves maximal voluntary isometric contractions and has been widely reported to be reliable in the literature. The test was repeated 3 times for the right and left lower extremities, respectively, and the mean values of these measurements were recorded.[19,20]

## Nintendo Wii® Training Program

Before starting the training program, an NW user profile was created for each patient in the study group, and the basic balance tests and exercises in the Wii Fit™ software were performed. Then, the training was started at the beginner level of the 'Table Tilt' game, using both feet. When 8 sub-levels of the beginner level were completed, the subject then completed the training in a single foot at the same stage and on both feet at the advanced stage. In the single foot training, the 1$^{st}$, 3$^{rd}$, 6$^{th}$ and 8$^{th}$ sub-levels of the game were played with the affected side, while the 2$^{nd}$, 4$^{th}$ and 7$^{th}$ levels were played with the healthy side and the 5$^{th}$ level was played with both feet because of the increasing difficulty of the level. Each of the training session was continued until the active gaming duration calculated by the software reached 15 min. At the end of the training session, cooling-down exercises were performed for 5 mins. To prevent any falls due to a loss of balance during the training session, supports were placed around the training platform. When any subject experienced a loss of balance, assistance was immediately administered if needed. The balance training program was designed as 15-min sessions, 3 days a week for 6 weeks.

### Statistical Analysis

The study data were analyzed using Statistical Package for the Social Sciences 20.0 statistics software. Descriptive parameter values were stated as the frequency, percentage, mean, standard deviation, minimum and maximum. The Shapiro-Wilk test was applied to determine conformity to the normal distribution of the pre- and post-training data. To examine the differences between the study and control groups, the independent samples Mann-Whitney U test was applied. Pre- and post-training data were analyzed using the Wilcoxon rank signed test. A value of $p<0.05$ was set as statistically significant. Pretest-Posttest-Control design ($d_{ppc2}$) used for effect size estimates.[21] The sample size calculation was performed with the G Power (3.1.9, University of Kiel, Germany) based on the results of Sims et al.[15] for time to boundary test (TBT) with force plate. In the study, the mean TBT for the study and control groups were 16.72±3.44 and 12.44 ± 2.7, respectively. A confidence of 95%, statistical power of 95%, an alpha of 5%, d=1.384 effect size, and using two-way alternative hypothesis with independent two-sample t-test power analysis results were considered for the sample calculation. Because of the analysis, 15 patients per group would be required.

## RESULTS

A flow diagram of participants is shown in Figure 1 by the trial and follow-up. Of those randomly assigned, the follow-up NW training was completed for 15 of 20 participants assigned to the study group and 18 of 20 participants in the control group. No adverse effects were observed during training or assessment. The participants in the control (n=18) and study groups (n=15) were determined to be similar in terms of the pre-training physical characteristics of age, body height, body weight, and body mass index, visually analog scale ($p>0.05$). The pain levels due to the chronic knee problems and the disease duration of the participants in both groups were statistically similar ($p>0.05$) (Table 1). The data related to gender and knee joint problems are presented in Table 2.

In the control group, no significant difference was observed in the KAT balance parameters after a 6-week interval ($p>0.05$), while statistically significant differences were observed in the study group in terms of double feet balance, double feet ML ratio, and AP ratio parameters ($p<0.05$). The post-training center of pressure (COP) of participants in the study group approximated to the required level, while WBA in the ML and AP directions had statistically significantly decreased. In the analyses performed on the affected side, significant changes were observed in all the parameters ($p<0.05$). In the SLST results, statistically significant differences were determined in both the affected and healthy sides of the study group ($p<0.05$). In the control group, no change was observed in SLST parameter ($p>0.05$). The values of the balance parameters of both groups are presented in Table 3.

An increase was determined in the muscle strength of the study group in both the affected and healthy sides ($p<0.01$), but no significant difference was observed in the control group ($p>0.05$), (Table 4). According to the results, the highest level of increase was found in HE strength in the affected side of participants in the study group.

## DISCUSSION

The results of this study demonstrated an improvement in balance and increased in muscular strength of cases with chronic knee problems following a 6-week NW training program. As both the affected and healthy sides were involved in the NW training program, the significant increase in muscle strength, even in the healthy side was noticeable. The training sessions using NW are like a game, are performed in real-time, are interactive, fun, and are removed from safety issues in real life.[13,22,23]

Balance problems may cause injuries and limitations in daily life. Therefore, it is critical for clinicians and researchers to treat balance problems.[24,25] Balance exercises assigned to patients require observation, but patients with orthopedic problems generally perform these exercises unsupervised. Thus, the exercises cannot be followed up and it cannot be determined whether they are being performed correctly, and there may be a negative effect on treatment outcome. Interactive systems such as NW are useful for the follow-up of exercises as progress and exercise durations are recorded.

There is a limited number of studies in literature, which reports on balance training by using NW applied to cases with orthopedic problems. In a study by Puh et al.[3] (2014), a patient with a posterior cruciate ligament injury was given NW balance training at 12 weeks postoperatively. After 24 sessions involving 8 different games, it was observed that single-foot COP oscillation had decreased on both the operated and healthy sides. Following the training program, the WBA score of the patient also decreased, and more balanced weight-bearing was achieved.

In another study of cases with a history of arthroscopic anterior cruciate ligament surgery, 30 volunteers were randomly divided into 2 groups. The first group underwent NW training for 12 weeks, while the other group received a standard physiotherapy program. In the balance training with NW, four different games were selected. At the end

| Table 1. Characteristics of the patients | | | | | |
|---|---|---|---|---|---|
| Variable | Control group (n=18) | | Study group (n=15) | | p |
| | X±SD | Min-max | X±SD | Min-max | |
| Age (year) | 24.61±4.3 | 21-36 | 22.93±5.0 | 19-36 | 0.08 |
| Height (cm) | 175.00±6.6 | 164-190 | 172.00±9.1 | 156-190 | 0.57 |
| Weight (kg) | 73.16±17.3 | 50-110 | 70.93±16.4 | 45-110 | 0.84 |
| BMI (kg/m$^2$) | 23.64±4.1 | 17.7-30.5 | 23.50±3.3 | 18.5-30.5 | 0.98 |
| Rest pain (VAS) | 1.36±1.8 | 0-6.3 | 1.70±2.1 | 0-6.4 | 0.68 |
| Activity pain (VAS) | 2.77±1.8 | 0.8-6.9 | 2.23±1.8 | 0-6.2 | 0.61 |
| Night pain (VAS) | 1.12±1.6 | 0-5.4 | 2.89±3.7 | 0-8.5 | 0.41 |
| Disease duration (month) | 34.50±25.9 | 9-108 | 31.00±22.8 | 9-108 | 0.65 |

cm: Centimeter, kg: Kilogram, m$^2$: Square meters, max: Maximum, min: Minimum, n: Number of case, VAS: Visually analog scale, BMI: Body mass index, p: Mann-Whitney U test level of significance, SD: Standard deviation, X: Average

| Table 2. Descriptive values of the patiens | | | | |
|---|---|---|---|---|
| Variable | Control group (n=18) | | Study group (n=15) | |
| | n | % | n | % |
| **Gender** | | | | |
| Male | 12 | 66.7 | 9 | 60 |
| Female | 6 | 33.3 | 6 | 40 |
| **Diagnosis** | | | | |
| Meniscopathy | 4 | 22 | 5 | 33.3 |
| Patellar tendinitis | 4 | 22 | 2 | 13.3 |
| PPS | 8 | 44.4 | 8 | 53.3 |
| ACL injury | 2 | 11.1 | - | - |
| **Affected side** | | | | |
| Right | 9 | 50 | 8 | 53.3 |
| Left | 9 | 50 | 7 | 46.7 |

ACL: Anterior cricuate ligament, n: Number of case, PPS: Patellofemoral pain syndrome, %: Percent

of the 12$^{th}$ week, no difference was reported between the physiotherapy and NW training groups in terms of the examined parameters. In both groups, improvements were observed in the Star Excursion Balance Test, coordination, proprioception, and muscle strength.[26]

Karakoc et al.[27] (2018) enrolled patients with anterior cruciate ligament injury postoperative to the 6-week NW balance training consisting of 4 different games (Table Tilt, Soccer Heading, Penguin Slide, Ski Slalom). After 18 sessions, pain and WBA were significantly reduced. Additionally, it was reported that there was no difference in the function, COG, and balance of the participants in the control and NW groups.

In a study of cases with a history of total knee arthroplasty, 50 patients were randomly divided into 2 groups; one group was given exercises following the standard physiotherapy program, while the other group was given 15 min the balance training with NW. At the end of the study, it was emphasized that there was no difference between the groups in lower extremity functionality and balance. Besides, NW could be a useful auxiliary for physiotherapy in the program following total knee arthroplasty surgery.[28]

These studies corroborate the findings of the current study. However, there are also studies in literature with conflicting results. In a study, which compared NW and standard balance exercises, a group underwent an NW program, while the other received standard balance exercises. At the end of the study, it was reported that except for KE, the improvement in lower extremity muscle strength and the changes in balance parameters were statistically non-significant.[29] In another study, following an 8-week program of NW yoga and strengthening exercises, significant improvements were observed in HF, KF, and DF muscle strengths in the lower extremity, but no change was observed in single-foot COP oscillation values.[30] It is thought that the inconsistency of the current study results with those of these studies is caused by the selected games. In the previous studies, NW training was provided, but the exercises implemented were yoga, aerobic and strengthening exercises rather than balance exercises.

Generally, the results of the current study are consistent with the literature. VR systems such as NW create multi-sensory inputs and activate various locations of the central nervous system. Furthermore, the program is executed through weight-bearing of the body NW balance training. In the table tilt game, the weight-bearing has the characteristics of closed kinetic chain movements, which are repeated in different directions. In a session of training, agonist and antagonist muscle groups work together, and isometric, eccentric, and concentric contractions repetitively occur in all the muscles in the lower extremities. The muscle strength increase obtained at the end of the study is

**Table 3. Comparision of balance parameters**

| Variable | | | Control group (n=18) | | | Study group (n=15) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | First assessment | Second assessment | p | Before training | After training | p | Effect size ($d_{ppc2}$) |
| | | | X±SD | X±SD | | X±SD | X±SD | | |
| KAT | Double Leg | Balance Score | 505.33±136.3 | 479.05±170.9 | 0.15 | 574.00±215.7 | 437.93±132.7 | <0.01* | -0.62 |
| | | ML Ratio | 28.16±17.8 | 32.38±23.4 | 0.37 | 48.26±26.9 | 33.73±22.4 | <0.04* | -0.13 |
| | | AP Ratio | 39.26±28.1 | 34.15±29.1 | 0.65 | 49.45±32.0 | 22.92±19.2 | <0.02* | -0,7 |
| | Affected Side | Balance Score | 506.55±136.9 | 506.11±123.9 | 0.98 | 649.00±218.0 | 452±150.4 | <0.01* | -1.09 |
| | | ML Ratio | 35.61±24.6 | 35.23±23.4 | 0.86 | 56.40±34.5 | 27.77±20.6 | <0.001* | -0.89 |
| | | AP Ratio | 44.33±20.5 | 40.33±24.6 | 0.55 | 54.26±33.2 | 29.16±15.61 | <0.01* | -0.77 |
| SLST | | Affected Side | 20.47±10.1 | 21.48±9.6 | 0.14 | 18.71±9.3 | 27.38±5.3 | <0.001* | 0.78 |
| | | Healthy Side | 21.86±9.5 | 21.82±9.6 | 0.53 | 19.33±8.8 | 28.50±4.0 | <0.001* | 0.99 |

AP: anterioposterior, KAT: Kinesthetic Ability Trainer®, max: Maximum, min: Minimum, ML: Mediolateral, NW: Nintendo Wii®, n: number of case, P: Wilcoxon Rank Signed test level of significance, SD: Standard deviation, SLST: Single leg stance test X: Average

**Table 4. Comparision of muscle strength**

| Variables | | Control group (n=18) | | | Study group (n=15) | | | |
|---|---|---|---|---|---|---|---|---|
| | | First assessment | Second assessment | | Before trainings | After trainings | | Effect size ($d_{ppc2}$) |
| | | X±SD | X±SD | | X±SD | X±SD | | |
| Affected side muscle strength (N) | HF | 176.21±53.4 | 185.4±54.0 | p 0.06 5.2% | 181.77±40.5 | 227.03±57.9 | p<0.001* 24.9% | 0.75 |
| | HE | 206.65±54.9 | 221.03±61.5 | p 0.07 7.0% | 194.38±39.0 | 274.52±60.8 | p<0.001* 41.2% | 1.35 |
| | HA | 216.40±52.7 | 224.31±48.3 | p 0.17 3.7% | 202.66±41.4 | 256.44±62.4 | p<0.001* 26.5% | 0.95 |
| | KF | 130.03±42.3 | 135.83±38.7 | p 0.17 4.5% | 125.52±31.6 | 151.44±44.1 | p<0.001* 20.7% | 0.53 |
| | KE | 185.46±61.3 | 177.24±54.3 | p 0.06 -4.4% | 180.52±32.7 | 223.64±43.1 | p<0.001* 23.9% | 1.01 |
| | DF | 171.98±40.7 | 184.00±38.2 | p 0.08 7.0% | 163.31±32.4 | 225.29±34.5 | p<0.001* 38.0% | 1.33 |
| Healthy side muscle strength (N) | HF | 179.36±48.3 | 188.06±59.1 | p 0.09 4.9% | 182.32±36.9 | 225.33±57.4 | p<0.001* 23.6% | 0.78 |
| | HE | 209.26±57.4 | 224.67±69.5 | p 0.15 7.4% | 193.68±38.4 | 265.97±50.1 | p<0.001* 37.3% | 1.14 |
| | HA | 219.09±56.9 | 222.18±49.5 | p 0.71 1.4% | 203.72±39.3 | 271.96±53.5 | p<0.001* 33.5% | 1.3 |
| | KF | 133.58±46.3 | 137.35±43.4 | p 0.28 2.8% | 131.21±31.0 | 151.63±41.2 | p<0.001* 15.6% | 0.41 |
| | KE | 187.79±50.7 | 183.22±48.8 | p 0.26 -2.4% | 177.36±33.9 | 232.04±52.4 | p<0.001* 30.8% | 1.34 |
| | DF | 173.93±38.2 | 183.97±32.2 | p 0.06 5.8% | 166.94±32.1 | 217.2±34.7 | p<0.001* 30.1% | 1.12 |

HF: Hip flexor, HE: Hip extansor, HA: Hip abductor, KF: Knee flexor, KE: Knee extansor, DF: Dorsiflexor, n: Number of case, N: Newton, p: Wilcoxon rank signed test level of significance, SD: Standard deviation, X: Average, %: Percentage of muscle strenght change

believed to originate from the weight- bearing on a single foot in different directions. Moreover, sensory inputs in the extremities increase in conditions of repetitive weight-bearing and closed kinetic chain movements.[8]

When fundamental safety precautions are taken, a VR system such as NW can be reliably and efficiently used in rehabilitation. In this study, all the subjects could easily adapt to the program in a short time. However, certain adaptations such as the in-game scoring system and levels of difficulty should be applied to enable NW to be used in rehabilitation to a wider extent.

## Study Limitations

The current study had some limitations. First is the heterogeneity of the knee pathologies of the participants. Second is that the long-term results of the training are not exactly known. Finally, this study was not blinded in design.

## CONCLUSION

The results of this study indicated that balance training applied using NW to patients with chronic orthopedic knee problems is effective on balance and muscle strength. With both existing software and potential modifications, devices such as NW can be used for balance training programs to be implemented in the hospital or at home for patients with orthopedic problems. NW is easily accessible and low-cost and has many advantages over VR systems and can therefore be recommended as a treatment option to be used in the rehabilitation of patients with chronic knee pain.

## Ethics

**Ethics Committee Approval:** Approval for the study was obtained from the Clinical Research Ethics Committee of Pamukkale University (decision no: 09, date: 25.06.2013).

**Informed Consent:** Detailed information was given to all the prospective participants about the procedures and measurements to be implemented, and informed consent was obtained from each patient.

**Peer-review:** Externally peer-reviewed.

## Authorship Contributions

Concept: C.C.A, U.B.A., Design: C.C.A, U.B.A., F.T., Data Collection or Processing: C.C.A, S.İ., Analysis or Interpretation: C.C.A, U.B.A., F.T., Literature Search: C.C.A, U.B.A., S.İ., Writing: C.C.A, U.B.A., F.T.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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