

# Effect of Wobble Board Balance Training Program among Athletes with Functionally Unstable Ankle Joint

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## ABSTRAK

Objektif kajian ialah untuk menentukan kesan program latihan papan Wobble ke atas daya keseimbangan para atlet yang mengalami ketakstabilan fungsi pergelangan kaki (FAI). Sebanyak 30 subjek (n=30) yang mengalami FAI direkrut berdasarkan kriteria rangkuman dan eksklusi. Kesemua subjek dinilai daya keseimbangan menggunakan ujian dirian anggota tunggal (single limb stance) dan ujian jangkauan fungsi dan didedahkan kepada program latihan papan Wobble sebanyak lima sesi seminggu selama empat minggu. Ujian t berpasangan digunakan untuk membandingkan min data pra dan post-ujian dan aras signifikan ditetapkan pada nilai 0.05. Pada ujian dirian anggota tunggal, para atlet mendapat min skor post-latihan yang tinggi [26.4] berbanding pra-latihan. Perbezaan disahkan dengan nilai 't' yang diperolehi [16.00]. Bagi ujian jangkauan fungsi, para atlet memperolehi min skor post-latihan yang tinggi [15.88] berbanding pra-latihan [1.26]. Perbezaan disahkan dengan nilai 't' yang diperolehi [12.54]. Ini menunjukkan bahawa latihan papan Wobble meningkatkan keseimbangan dinamik dan statik para atlet yang mengalami FAI. Secara kesimpulannya, latihan papan Wobble mungkin efektif dalam meningkatkan keseimbangan para atlet yang mengalami FAI.

Kata kunci: Ketidakkstabilan fungsi pergelangan kaki, keseimbangan, bersenam

## ABSTRACT

The objective of the study was to find out the effect of wobble board training program on balance in athletes with Functional Ankle Instability (FAI). A total of 30 subjects (n=30) with FAI were recruited based on the set inclusion and exclusion

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criteria. All the subjects were evaluated for balance using single limb stance test and functional reach test and they were subjected to wobble board training program for five sessions in a week for four weeks. Paired sample t test was used to compare the mean between the pre and post-test data's and the level of significance was set at level of 0.05. In single limb stance test, the athletes scored high post-training score mean value [26.4] than pre training score [9.73]. Thus the difference is statistically confirmed by the obtained 't' value [16.00]. In functional reach test, the athletes scored high post-training score mean value [15.88] than pre training score (14.26). Thus the difference was statistically confirmed by the obtained 't' value [12.54]. This indicated that wobble board training promoted the static and dynamic balance in athletes with functionally unstable ankle. Hence, it can be concluded that wobble board training might be effective in improving balance among athletes with functionally unstable ankle.

Keywords: functional ankle instability, balance, exercises

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## INTRODUCTION

Ankle injuries are one of the most common injuries which are sustained during sports activity (Waterman et al. 2010; Doherty et al. 2014). The frequently encountered complication following ankle injury is Functional Ankle Instability (FAI), which are necessitated to be examined and intervened as it may build up to residual ankle instability and disability (Lee et al. 2006). FAI will cause the tissue to be damaged with proprioceptive deficits and decrease in proprioceptive feedback. Clinically it is important to regain full function and sufficient functional stability to prevent recurrent injuries and to improve the performance of an individual. Intense proprioceptive training redevelops or enhances the proprioceptive sense and feedback mechanism in athlete with FAI (Bernier & Perrin 1998). The advanced equipments such as Biodex stability system, Nintendo Wii Fit and Vibrosphere TM are utilized to treat

the proprioceptive deficit and balance impairment. In the absence of expensive and sophisticated equipments, the balance training can be delivered by means of utilizing simple device like wobble board. The wobble board training improves the proprioception and balance through stimulation of mechanoreceptors which are available in the muscle, tendon, ligament and joint through loading mechanism (Hubscher et al. 2010). An earlier literature also described the significant effect of wobble board training in FAI (Freeman et al. 1965). On the other hand another evidence suggests that wobble training is not promoting balance following FAI. However, the evidence is scarce on the impact of wobble board training in improving balance among function ankle instability subjects (Azeem et al. 2010). The inconsistency of the results on the effect of wobble board training on balance promoted to carry out a study on the effect of wobble board training program on static and dynamic

balance. Thus, the present study investigated the effect of wobble board training on balancing skills among athletes with FAI.

## **MATERIALS AND METHODS**

A quasi-experimental, pre-post design was used in this research. Thirty athletes with a self-reported FAI were selected from the department of physical education and sports science of a University. FAI is a term in which patient experiences recurrent sprain or feeling of “giving way” and it is a subjective and symptomatic feeling. The study protocol was approved by institutional ethics committee and written informed consent was taken from all subjects before inclusion. All the subjects were examined to meet the selection criteria as set by the study protocol. The athletes aged between 18 to 25 years old, with the history of significant episode of unilateral ankle injuries within the past twelve months were recruited for the study. The subjects were also free of existing symptoms of pain, swelling and restricted range of motion of the ankle, history of fracture, surgeries and none of them had any form of rehabilitation program while recruitment.

### **BALANCE ASSESSMENT**

The static balance was measured by single limb stance test and the dynamic balance was assessed by functional reach test.

### **SINGLE LIMB STANCE TEST [SLST]**

The test was developed for testing static balance. The subjects were instructed

to stand on one leg with eye closed, placing arms across the chest with hands touching the shoulders. The command was given such that both legs should not touch each other. The trial was conducted with shoes off and was about three feet from the wall. The criteria to terminate the test were the legs should not touch each other, the feet/arms moved or the feet touches down, eyes opened while performing eye closed test. The test was in accordance with the protocol proposed by (Bohannon et al. 1984).

### **FUNCTIONAL REACH TEST [FRT]**

The test was developed for testing dynamic standing balance. The individuals were subjected to stand in a relaxed standing position by making a fist and raising their dominant arm until shoulder flexion was parallel with yard stick [approximately 90 degrees of flexion]. The third metacarpal was recorded along the yardstick as position 1. Then the individuals were asked to reach as forward as they can without touching the wall and taking a step. The position of the third metacarpal along the yard stick was again recorded as position 2. The differences between the two positions were noted and this was in accordance with a proposed protocol (Duncan et al. 1990).

### **WOBBLE BOARD TRAINING**

The wobble board used was circular, made of wood with 430 mm diameter and height of 65 mm, which allowed 360 tilt. The training protocol was adapted and modified from a previous study (McGuine & Keene 2006). The

Table 1: Exercise protocol

Surface	Eyes	Exercise
Board	Open	Single limb stance.
Board	Open	Single leg stance while swinging the raised leg.
Board	Open	Single leg squat [30 -45 ].
Board	Open	Double leg stance, while rotating the board.
Board	Closed	Single leg stance.
Board	Open	Single leg stance while swinging the raised leg.
Board	Open	Single leg squat [30 - 45 ].
Board	Open	Single leg stance while rotating the board clock wise and counter clock wise.
Board	Closed	Single leg stance.
Board	Open	Single leg squat[30 -45 ]
Board	Open	Single leg stance, while rotating the board clockwise and counter clockwise.
Board	Open	Single leg stance while performing functional activities [dribbling, catching, kicking]

Table 2: Pre and Post training values of Single limb stance test using paired sample t-test

Group	N	Mean	SD	SEM	t-value	p-value
Pre training	30	9.73	2.40	0.62	16.00	P ≤ 0.05
Post training	30	26.4	3.77	0.97		

athletes were asked to perform 10 min warm up which includes stretching drills and jogging. Training protocol includes five sessions in a week for four weeks; each exercise was performed for 30 sec with 30 sec rest interspersed between each exercise (Table 1). In order to acquire the skill and experience the exercise regimen, the first week of training were assisted by the physiotherapist and the athletes were instructed to perform the activity without the edge of board touching the floor.

### STATISTICAL ANALYSIS

Data was analyzed using SPSS version 17. The pre-training value and post-training value data were analyzed by using descriptive statistics of mean and standard deviation and paired t test

was used to compare the difference between pre and post-treatment session with in the group. Level of significance for all tests was set at  $p < 0.005$ .

### RESULTS

A total of fifteen subjects participated in this study with a mean age of  $21 \pm 1.266$  years old. The height and weight of the participants ranged with mean of (168.90, 59.40) and standard deviation of (8.89, 7.84). The results for single limb stance test showed that the athlete in post-training attained a high mean value (26.4), when compared to pre-training single limb stance score (9.73). Thus, the difference was statistically confirmed by the obtained t value (16.00), which was significant at 0.05 level (Table 2). The results for functional reach test showed that the

Table 3: Pre and Post training values of Functional reach test

Group	N	Mean	SD	SEM	t-value	p-value
Pre training	30	14.26	1.06	0.27	12.54	P ≤ 0.05
Post training	30	15.88	1.21	0.31		

athletes in post-training attained a high mean value (15.88) when compared to pre-training functional reach test score (14.26). Thus, the difference was statistically confirmed by the obtained t value (12.54) which was significant at 0.05 levels (Table 3)

## DISCUSSION

Balance training is believed to be one of the principal constituent of rehabilitating an athlete with functional ankle instability. Among the various training techniques, wobble board training is one of the cost-effective, easily administrable and challenging methods for training balance among functional ankle instability as against expensive techniques.

The present study findings suggested that wobble board training promoted both static and dynamic balance among athletes who are ailing from functional ankle instability. While comparing the improvement between static and dynamic balance, static balance values significantly improved comparatively as against dynamic balance. The reason could be the demanding task constraints imposed on the dynamic task when compared to static balance. The results of the study was also in line with an earlier study in which the authors concluded that wobble board training improved balance significantly when compared to subjects who underwent electrical

stimulation and no treatment (Bernier et al. 1998). Similarly, few other studies also established that wobble board training is effective which is in line with the present study (Clark & Burdern 2005; Ross & Guskiewicz 2004; Hoffman & Payne 1995; Mattacola & Lloyd 1997).

However, the present study adapted different methodological perspective in terms of training as against the protocol which was used in those studies. The protocol was modified and adapted from an earlier study (Mcguine & Keene 2006). The training protocol increased the intensity and reduced the duration in-order to accomplish former benefit. The predesigned methodological perspective which was adapted also proved to be an effective protocol for training functional ankle instability among athletes. The training protocol was supported by a previous work in which they adapted four weeks of wobble board training which brought significant improvement. Hence, it can be comprehended that it promoted different perception of the subjects' functional stability and reduces further sprains in individuals with functionally unstable ankle (Clark & Burdern 2005). The probable reason behind the changes in the amount of balance could be due to destabilization of load at the limb which would have induced a specific neuromuscular response. The response would also have focused on the athletes awareness of peripheral

sensation and process these signals into more coordinated manner. The reason behind selecting the outcome measures such as single limb stance test and functional reach test in the present study were proved to be a simple, valid and commonly used in the evaluation and training of balance (Freeman et al. 1965). Also, it was found that all of the subjects completed each component of exercises and none of them had exhaustion effect over repeated trails.

The results of the present study demonstrates the importance of wobble board training on these special populations. Health care professionals who are working on these special populations should consider using wobble board as an additional treatment along with routine management for ankle instability to promote stability. The limitations of this study were the lack of information on the mechanism of injuries, severity of the reported ankle injuries and unavailability of control group. Therefore, it can be ordered that controlling these confounding factors would have produced suitable results. Hence, future studies need to be carried out by increasing the sample size and controlling these confounding factors to acquire appropriate results.

## CONCLUSION

Wobble board training might be effective in improving balance among athletes with functionally unstable ankle.

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