

To Compare The Effect of Wobble Board Versus Frenkel's Exercise on Balance In Parkinson Patients

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Abstract- *Parkinson's is a long-term degenerative disorder of the central nervous system that mainly affects the motor system. The symptoms usually emerge slowly and, as the disease worsens, non-motor symptoms become more common. The most obvious early symptoms are tremor, rigidity, slowness of movement, and difficulty with walking. Balance control is needed to keep the body appropriately oriented while performing voluntary activity, during external perturbation, and when the support surface or environment changes. Frenkel exercises are a set of exercises developed by Professor Heinrich Sebastian Frenkel. Wobble Board is used for Balance, athletic, postural, coordination and falls prevention training. It is a circular object with uneven base, on which user attempts to balance. The aim of the present study is to find the efficacy of Frenkel's and wobble board. In this study we recruit 60 Parkinson's patients, which will be divided into two equal groups. In first group patients we use Wobble Board exercises and in second group patient we use Frenkel's exercises to improve the Balance of Parkinson patients and improvement were observed by FICSIT scale to measure out the efficacy of above giving techniques to the Parkinson patients. We provide the 6 – week exercise program to the patients. And by comparing the pre and post value we found which technique is more effective. This study reveals that the Balance can be improved with the Wobble and Frenkel's exercises both in patients with Parkinson. As per the result, it has been concluded that Wobble and Frenkel's exercises both can be used to treat the Balance in a Parkinson patients effectively.*

Parkinson's symptoms usually begin gradually and get worse over time. As the disease progresses, people may have difficulty walking and talking. They may also have mental and behavioural changes, sleep problems, depression, memory difficulties, and fatigue.

Parkinson's disease occurs when nerve cells, or neurons, in an area of the brain that controls movement become impaired and/or die. Normally, these neurons produce an important brain chemical known as dopamine. When the neurons die or become impaired, they produce less dopamine, which causes the movement problems of Parkinson's. Scientists still do not know what causes cells that produce dopamine to die. People with Parkinson's also lose the nerve endings that produce norepinephrine, the main chemical messenger of the sympathetic nervous system, which controls many automatic functions of the body, such as heart rate and blood pressure. The loss of norepinephrine might help explain some of the non-movement features of Parkinson's, such as fatigue, irregular blood pressure, decreased movement of food through the digestive tract, and sudden drop in blood pressure when a person stands up from a sitting or lying-down position.

Many brain cells of people with Parkinson's contain Lewy bodies, unusual clumps of the protein alpha-synuclein. Scientists are trying to better understand the normal and abnormal functions of alpha-synuclein and its relationship to genetic mutations that impact Parkinson's disease and Lewy body dementia.^[6]

I. INTRODUCTION

Parkinson's disease is a brain disorder that leads to shaking, stiffness, and difficulty with walking, balance, and coordination.^[1]

Parkinson's disease (PD), or simply Parkinson's ^[2] is a long-term degenerative disorder of the central nervous system that mainly affects the motor system.^[3] The symptoms usually emerge slowly and, as the disease worsens, non-motor symptoms become more common.^[4] The most obvious early symptoms are tremor, rigidity, slowness of movement, and difficulty with walking.^[5]

The term “**Balance Control**” refers to a multisystem function that strives to keep the body upright while sitting or standing and while changing posture. Balance control is needed to keep the body appropriately oriented while performing voluntary activity, during external perturbation, and when the support surface or environment changes. Faulty balance control mechanisms may contribute to fall-related injuries, restriction of gait patterns, and decreased mobility. These disabilities lead to loss of functional independence and social isolation.

Balance control is assured through dynamic control of posture, which in turn is exerted by generating postural responses to perturbations. Normally, such responses are generated by automatic mechanisms that contribute to the maintenance of upright posture and prevent the subject from falling. Postural perturbations determine the activation of the sensory systems, integration at the level of the central nervous system, and formulation of a motor response aimed at maintaining the body's centre of gravity within the base support of the subject. Theoretically, in patients with Parkinson's disease, postural instability may be the result of faulty processing in three main distinct processes:

- (i) sensory organization, in which one or more of the orientational senses (visual, vestibular, and somatosensory) are involved and integrated within the basal ganglia,
- (ii) motor adjustment process, which provides a properly scaled neuromuscular response,
- (iii) background muscle tone, known to be hypertonic in Parkinsonian patients.^[7]

Frenkel's exercises – Frenkel exercises are a set of exercises developed by Professor Heinrich Sebastian Frenkel^[8] to treat ataxia, in particular cerebellar ataxia.^[9]

It is defined as the series of gradual progressive exercises designed to increase coordination. Method of treating the ataxia & incoordination. Mechanism is based on voluntary control of movement by use of sensory mechanism i.e., sight, sound & touch to compensate for the loss of Kinesthetic sensation. The essentials being –

- (i) Concentration of attention
- (ii) Precision
- (iii) Repetition.

The ultimate aim is to establish control of movement so that the patient is able and confident in his ability to carry out those activities which are essential for independence in everyday life.^[10]

In physiotherapy a balance or **Wobble Board** is used for Balance, athletic, postural, coordination and falls prevention training. It is a circular object with uneven base, on which user attempts to balance. A 2011 study found that wobble board training is effective for elderly people to improve their standing balance^[11] Studies have also shown that the use of a balance board three times a week can reduce risk of falls in the elderly population.^[12]

II. MATERIAL AND METHODOLOGY

• SOURCE OF DATA

1. Lala Lajpat Rai Hospital, Kanpur.
2. U.H.M. Male District Hospital, Kanpur
3. Saaii College of Medical Science and Technology, Kanpur

• INCLUSION CRITERIA

1. Patients with Parkinson Disease.
2. Ability to maintain a standing position without aid for at least 5 Minute.

• EXCLUSION CRITERIA

1. Cognitive impairment,
2. Vestibular disorder,
3. Paroxysmal vertigo,
4. Visual disturbance,
5. High risk of cardiac problem,
6. Any orthopaedic disease involving lower limb.

• EQUIPMENT AND TOOLS

1. FICSIT-4 Scale,
2. Wobble board,
3. Frenkel Exercise chart.

• STUDY TYPE-Randomized control trial

• STUDY DESIGN-Comparative study

• SAMPLE SIZE -60 patients

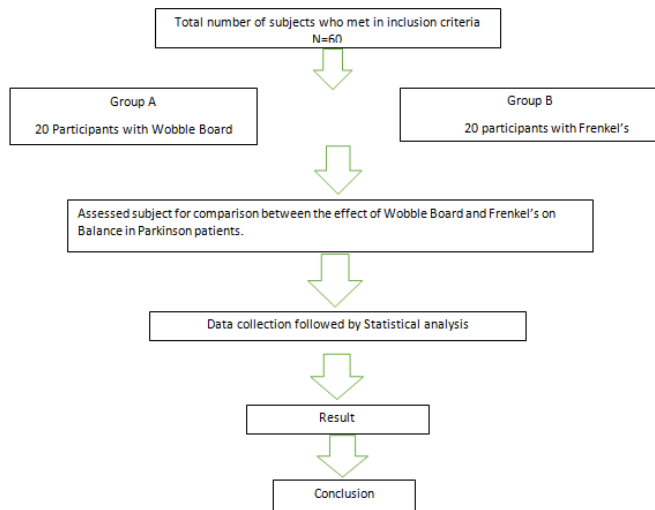
• TARGET POPULATION - Parkinson patients

• OUTCOME MEASURE - Balance in Parkinson patients

III. PROCEDURE

In this study we recruit 60 patients of Parkinson Disease. We will divide them into two groups. Initially we take assessment of all the Parkinson patients Then we test patient's static balance through FICSIT-4 scoring. For patients in first group (Group-1) we use Wobble Board; for patients in second group (Group-2) we use Frenkel Exercises to improve the balance of Parkinson patients. Then we provide Balance Training to the Parkinson patient to improve the balance in them. Improvements were observed by FICSIT-4 scale again to measure out the effects of both techniques which are applied on the Parkinson patients. We provide 3 days exercise program per week till 6 weeks to the patients to check which one is better to improve the balance on the

Parkinson patient. At the end of program and by comparing means of both scale pre and post score, we found that which technique is more effective.



Flowchart: 1 shows the follow up procedure of research article

IV. DATA ANALYSIS

Data analysis was done using IBMSPSS Statistics (software package used for statistical analysis 2019 version-26). Descriptive statistics was done to determine the demographic characteristics of the subjects recruited in this study between the groups and the comparison between the groups is done by paired samples t-test. The average age for **Group 1** participants was 55.87 years and the average weight was 65.43 Kg. The participants had an average height of 168.23 cm and correspondingly the average for Group-1 BMI was calculated to be 22. This reflects that average participant were in the Normal category in Group-1.

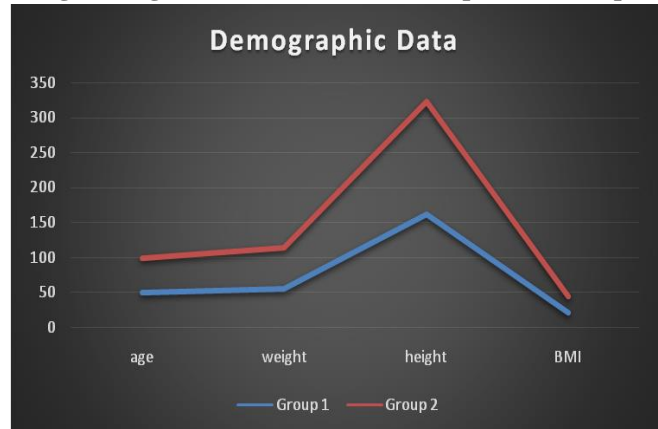
Table 1: Showing descriptive data of Group 1: WOBBLE BOARD

	N	Minimum	Maximum	Mean	Std. Deviation
Age (Years)	30	28	85	55.87	14.350
Weight (Kg)	30	49	72	65.43	6.854
Height (cm)	30	153	173	168.23	5.772
BMI	30	20	26	22.00	1.857

Table 2: Showing descriptive data for Group 2: FRENKEL's

	N	Minimum	Maximum	Mean	Std. Deviation
age	30	24	70	58.30	14.276
weight	30	49	73	65.50	6.217
height	30	154	175	169.47	6.174
body mass index	30	21	28	23.43	1.956

Graph 1: It shows the mean variance between Age, Weight, Height and BMI between Group 1 and Group 2.



The average age for Group 2 participants was 58.30 years and the average weight was 65.50 Kg. The participants had an average height of 169.47 cm and correspondingly the average for Group-2 BMI was calculated to be 23.43. This reflects that average participant were in the normal category in Group-2.

While analyzing the Group 1 data it has been found that Wobble Board was significant in improving the Balance with Mean (+SD) of 12.267 (+3.610). after calculating the t-value was 18.613 with p value of 0.000, which shows that Wobble Board was significant at the 95% confidence level.

Graph 2: Represents the comparison of data of pre and post treatment rating of FICSIT rating of Group 1



Graph 3: Represents the comparison of data of pre and post treatment rating of FICSIT rating of Group 2.

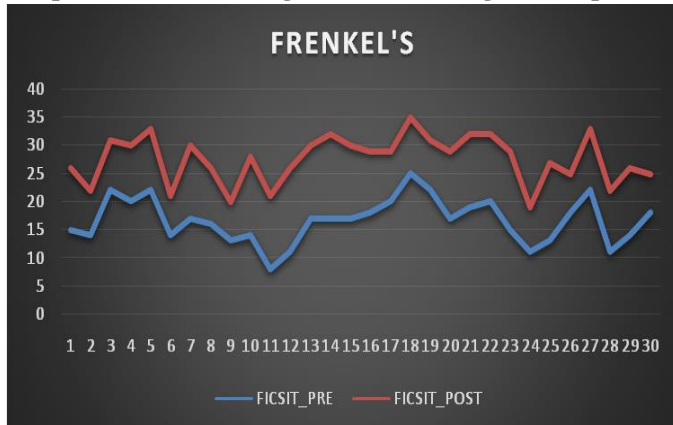


Table 3: Showing the pre (baseline) and post-treatment (after 6 weeks) scores for WOBBLE BOARD (Group- 1) and FRENKEL’s (Group-2)

	Mean	Std. Deviation	t-value	df	p value
Pre- Post (Group 1)	12.267	3.610	18.613	29	.000
Pre- Post (Group 2)	10.967	2.484	24.180	29	.000

While analyzing the Group 2 data it has been found that Frenkel’s was significant in improving the Balance with Mean (+SD) of 10.967 (+2.484). after calculating the t value was 24.180 and p value was 0.000, which shows that the Frenkel’s was significant at the 95% confidence level. The table 3 shows within the group analysis with t value and p value for the group 1 and group 2. The analysis shows that both the treatment groups i.e., WOBBLE BOARD and FRENKEL’s were found effective in improving balance in Parkinson patients.

V. RESULT

This study reveals that the Balance can be improved with the Wobble Board and Frenkel’s exercises both in patients with Parkinson’s. The significance of the difference in the mean between post-treatment for the group was checked using a paired sample t-test. For Group-1 the t-value was found to be 12.267 and was significant at the p-value of 0.000 (95% Confidence Interval). Hence the Wobble board was found to be significant in improving balance in patients with Parkinson’s. For Group-2 the t-value was found to be 10.967 and was also found to be significant at the p-value of 0.000. Hence the Frenkel’s exercise was found to be significant in improving balance in patients with Stroke.

Thus, both the treatment groups Wobble Board and Frenkel’s exercise were found to be significantly effective in treating Balance in Parkinson’s with 95% confidence interval. Whereas there was no significant difference found between Wobble Board and Frenkel’s exercises, hence the null hypothesis is rejected and alternate hypothesis is accepted.

VI. CONCLUSION

As per the result, it has been concluded that Wobble Board and Frenkel’s exercises both can be used to treat the Balance in Parkinson’s patients. While both the treatment protocols were effective, there was slight significant improvement found in group 1 treatment over group 2. Hence it has been concluded that both the treatments can be used for the treatment of balance issue in Parkinson’s patients. But statistically wobble board is shows more significantly effective in treating balance in Parkinson’s patients.

VII. DISCUSSION

The present study was done to find out the efficacy of Wobble Board and Frenkel’s exercise on Balance in Parkinson’s patients. Parkinson’s is the subject for this study. The pre and post effect of Wobble Board and Frenkel’s exercises is taken by FICSIT - 4 scale. The collected data analysis shows that null hypothesis is accepted, which means both technique Wobble Board and Frenkel’s were effective in treating balance in Parkinson’s patients. The present study also shows that the average mean of both group technique i.e., Wobble Board and Frenkel’s exercise is concluded that Wobble board is found statistically better over Frenkel’s exercise.

Santos SM *et al* suggested that Postural control in Parkinson's disease is improved when training by a directional and specific balance program than a resistance training program. Balance training is superior to resistance training in regard to improving postural control of individuals with PD. Gold standard instruments (high in cost and difficult to access) were used to assess balance, as well as scales with clinical applicability (low cost, easily acceptable, applicable and valid), which can guide the management of physiotherapists both in their decision-making and in clinical practice. Significant improvement of postural control was only reported in favour of Balance Training group for one-legged stand condition on force platform. The standardized mean difference between groups was significantly, with 36% of improvement for BT vs. 0.07% for Resistance Training on this condition. Significant improvement was also observed in favour of BT (in mean 3.2%) for balance gains in some BESTest scores, when compared to Resistance Training group (-0.98%).¹³

Wllén M *et al* suggested that training effects diminish within 6 months after balance training, implying that the program may need to be repeated regularly. Seventy-six participants were included at final follow-up. No significant ($P > .05$) between-group differences remained at either 6 or 12 months following the intervention. The mean Mini-BESTest scores of the training and control group were 19.9 (SD 4.4) and 18.6 (SD 4.3), respectively, at the 12-month follow-up. Gait speed was 1.2 (SD 0.2) m/s in both groups at 12 months. The training group showed a larger deterioration rate per month in balance performance (0.21 point) and gait velocity (0.65 cm/s) than controls ($P < .05$).¹⁴

Irene S.K *et al* suggested that the positive findings of this study provide evidence that this multi-dimensional balance training program can enhance balance and dual-task gait performance up to 12-month follow-up in people with PD. Immediately after training, EXP group showed more significant improvements than CON group in BESTest total and subsection scores, gait speed and dual-task TUG time ($p < 0.05$). At both FU_{6m} and FU_{12m}, EXP group showed significantly greater gains than CON group in BESTest total and subsection scores and dual-task TUG time ($p < 0.05$). EXP group also showed significantly greater increase in the gait speed than CON group at FU_{6m} ($p < 0.05$).¹⁵

The current study is very unique, so we can do a lot in future research. This study was conducted for a short period of time and with small sample size; future research involving long time period and larger sample size and comparing of two different intervention is also possible. The result of this study will help the physiotherapist to choose whether which intervention is best for the treatment of balance in Parkinson's patient.

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