

# A Study to Compare the Effectiveness of Balance Training Versus Balance Training along with Muscle Strengthening for Patients with Idiopathic Parkinsons Disease

K. Ashok Kumar, M. Shanmuga Priya, A. Prakash

Tagore College of Physiotherapy

**Abstract:** Background: Parkinson's disease is a neurodegenerative disorder that primarily affects movement and coordination. Idiopathic Parkinson's disease refers to cases where the cause of the condition is unknown. Balance impairment is a common and debilitating symptom in patients with Parkinson's disease. It can lead to falls, injuries, and a significant reduction in quality of life. Balance training, which focuses on improving stability and postural control, has been shown to be effective in managing balance problems in Parkinson's patients. Muscle weakness is another common issue in individuals with Parkinson's disease. It can further contribute to balance problems and functional limitations. Muscle strengthening exercises, such as resistance training, have been found to improve muscle strength and overall physical function in this population. The primary outcome measures will include balance assessments, such as the Berg Balance Scale. Secondary outcome measures may include Fall Efficiency Scale. Materials and Methodology: The study design is quasi experimental study. Grouping is done with 20 subjects with idiopathic Parkinson's disease were selected based on Inclusion and Exclusion criteria ad randomized into 2 groups. Group A will receive balance training alone, while Group B will undergo balance training alongwith muscle strengthening exercises. The study duration was 8 weeks, 4days/week with 32 sessions. All subjects underwent a pretest and posttest using Berg Balance Scale and Fall Efficiency Scale. Result: The results of this study showed that balance training combined with muscle strengthening exercises was more effective in improving balance and reducing falls in patientswith idiopathic Parkinson's disease compared to balance training alone. Pre and posttest were statistically analyzed and it was found that there is significant ( $P < 0.0001$ ) better improvement in Group B [balance training along with muscle strengthening exercise] than Group A [balance training alone]. The group A that received bothinterventions showed significant improvements in balance, gait, and functional mobility compared to the group B that only received balance training. Conclusion: This study provides evidence that incorporating muscle strengthening exercises into balance training can be more effective in improving balance and reducing falls in patients with idiopathic Parkinson's disease. The group B that received both interventions showed significant improvements in balance, gait, and functional mobility compared to the group A that only received balance training.

**Keywords:** Balance training, muscle strengthening exercises, Idiopathic Parkinson's disease, falls, balance, gait, functional mobility, quality of life.

## 1. Introduction

Parkinson's disease [PD] is the second most prevalent neurodegenerative disease worldwide that primarily affects the motor system. It is caused by the loss of dopamine-producing cells in a specific region of the brain called the substantia nigra. Dopamine is a neurotransmitter that plays a crucial role in coordinating movement, so its depletion leads to the characteristic symptoms of Parkinson's disease. It primarily occurs in middle-aged and elderly people, influencing about 1% of the population above the age of 60. The clinical manifestations associated with PD consist of motor symptoms and nonmotor symptoms. Bradykinesia,

rigidity, static tremor, and postural instability are typical motor symptoms, which in turn affectthe functional mobility, balance, and gait of patients, as well as increase the risk of falling. Anxiety, depression, and cognitive impairment are pervasive nonmotor symptoms, which subsequently have an immense impact on Quality of Life.

As a chronic progressive disease, PD is mainly treated with drugs combined with routine rehabilitation training. The main purpose of the treatment is to slow down the progression of the disease, reduce the clinical symptoms, and improve QoL in PD patients. However, long- term medication may lead to several motor complications.

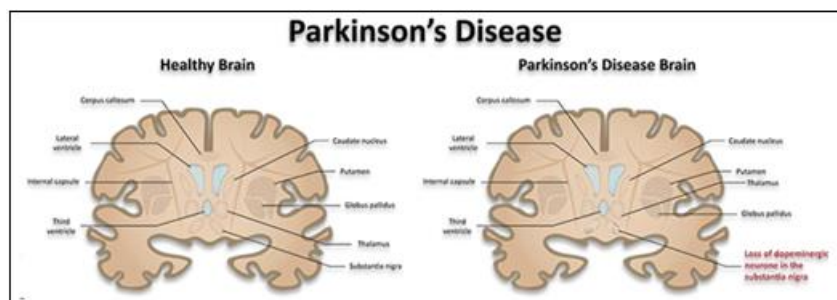


Figure 1: Normal brain Vs. Parkinson's brain

Volume 13 Issue 3, March 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

[www.ijsr.net](http://www.ijsr.net)

The incidence of idiopathic Parkinson's disease is estimated to be around 10 to 20 cases per 1,00,000 populations per year over the age of 60. Regional variations have been observed, with rates ranging from 1.7% to 2.7% in different areas of the country. More comprehensive studies are needed to accurately determine the prevalence, considering factors such as genetics, environment, and healthcare access.

Idiopathic Parkinson's disease refers to cases where the cause of the condition is unknown. It is the most common form of Parkinson's disease, accounting for about 85-90% of all cases. The term "idiopathic" means that the disease arises spontaneously or from an unknown cause.

The exact cause of idiopathic Parkinson's disease is still not fully understood, but it is believed to involve a combination of genetic and environmental factors. Some studies have identified specific genetic mutations that increase the risk of developing the disease, but these mutations are relatively rare and account for only a small percentage of cases. Other genetic variations and interactions with environmental factors, such as exposure to certain toxins or pesticides, are thought to contribute to the development of the disease in most cases. The progression of idiopathic Parkinson's disease varies from person to person. It typically starts gradually, with mild symptoms that may be overlooked or attributed to normal aging. As the disease progresses, however, the symptoms worsen and can significantly impact daily functioning. Diagnosing idiopathic Parkinson's disease involves a thorough medical history review, neurological examination, and observation of characteristic motor symptoms. There are no specific tests to definitively diagnose the disease, so doctors rely on clinical judgment and ruling out other possible causes of similar symptoms. While there is currently no cure for idiopathic Parkinson's disease, treatment options are available to manage its symptoms and improve quality of life. Medications that increase dopamine levels in the brain, such as levodopa, are commonly prescribed to alleviate motor symptoms. Other medications, such as dopamine agonists, may also be used to enhance dopamine function or manage specific symptoms.

In addition to medication, physical therapy and exercise play a crucial role in managing idiopathic Parkinson's disease. These interventions help improve muscle strength, flexibility, and balance, which can enhance mobility and reduce the risk of falls. Speech therapy and occupational therapy may also be recommended to address communication difficulties and daily living challenges associated with the disease. One of the key challenges for individuals with Parkinson's disease is maintaining balance and muscle strength, as these functions are often compromised by the disease progression.

Balance training is an important component of managing idiopathic Parkinson's disease. It involves exercises and activities that improve stability and reduce the risk of falls. Balance training typically focuses on enhancing proprioception (awareness of body position) and strengthening the core muscles, which play a crucial role in maintaining balance. One common exercise used in balance training for individuals with Parkinson's disease is the

"tandem walk." This exercise involves walking in a straight line, placing one foot directly in front of the other, as if walking on a tightrope. This challenges the individual's balance and helps improve their ability to maintain stability while walking. Other exercises that can be beneficial for balance training include heel-to-toe walking, standing on one leg, and practicing weight shifts from side to side.

Muscle strengthening exercises are also important for individuals with idiopathic Parkinson's disease. These exercises aim to improve muscle strength, flexibility, and coordination, which can help individuals maintain mobility and perform daily activities more easily. Strengthening exercises typically target the major muscle groups, including the legs, arms, and core. Resistance training using weights or resistance bands is commonly recommended for muscle strengthening in Parkinson's disease. Exercises that can help improve muscle strength and tone. It is important to start with light weights or resistance and gradually increase the intensity as tolerated.

In addition to traditional strength training exercises, functional movements that mimic daily activities can also be incorporated into a muscle strengthening program. For example, practicing sit-to-stand movements from a chair, stepping up and down onto a step, or reaching for objects at different heights can help improve strength and coordination for everyday tasks. Balance training and muscle strengthening exercises play a vital role in managing idiopathic Parkinson's disease. These exercises aim to improve stability, reduce the risk of falls, and enhance muscle strength and coordination. Working with a physical therapist or exercise specialist is important to design a personalized exercise program that suits the individual's needs and abilities. Regularity, consistency, and proper technique are key to achieving optimal benefits from these exercises. Balance training and muscle strengthening can significantly improve the quality of life for individuals living with idiopathic Parkinson's disease.

## 2. Aim of the study

The aim of the study is to compare the effectiveness of balance training alone versus balance training combined with muscle strengthening exercises for patients with idiopathic Parkinson's disease. There are different forms of treatments like manual therapy, assistive devices available for the management for idiopathic Parkinson's disease. However, balance training exercises used to one group of patients. The other group had received balance training along with muscle strengthening exercise for the management for idiopathic Parkinson's disease. This study is aimed to find out the effectiveness of these two different forms of treatment.

## 3. Need and Objectives of the Study

Parkinson's disease [PD] is the second most prevalent neurodegenerative disease worldwide. It primarily occurs in middle-aged and elderly people, influencing about 1% of the population above the age of 60. The clinical manifestations associated with PD consist of motor symptoms and nonmotor symptoms. Bradykinesia, rigidity, static tremor, and

postural instability are typical motorsymptoms, which in turn affect the functional mobility, balance, and gait of patients, as well as increase the risk of falling. Anxiety, depression, and cognitive impairment are pervasive nonmotorsymptoms, which subsequently have an immense impact on Quality of Life. The incidence of idiopathic Parkinson’s disease is estimated to be around 10 to 20 cases per 1, 00,000 populations per year over the age of 60. Regional variations have been observed, with rates ranging from 1.7% to 2.7% in different areas of the country. More comprehensive studies are needed to accurately determine the prevalence, considering factors such as genetics, environment, and healthcare access.

The purpose of this study is to investigate whether combining balance training with muscle strengthening exercises is more effective in improving outcomes for patients with idiopathic Parkinson's disease compared to balance training alone. The study aims to compare the effectiveness of these two interventions in improving balance, mobility, and overall quality of life for individuals with Parkinson's disease.

To evaluate the effectiveness of balance training in patients with Parkinson’s disease. To evaluate the effectiveness of balance training with postural stability training with patients with Parkinson’s disease. To compare the effectiveness of physiotherapy treatment on balance training versus postural stability training with balance training in Parkinson’s patient.

**4. Procedure**

This study included 20 participants [10 males and 10 females] with idiopathic Parkinson’s disease. The subjects were divided into 2 experimental group [balance training and balance training along with muscle strengthening]. The subjects were randomly assigned to one of the two group. The subjects in the present study signed a written agreement related to the experiment and volunteered to participate in the study. Subjects were informed about the procedure, merits, and demerits of the treatment. Consent is obtained from each subject for voluntary participation.

Total [n=20]

**Group A** [n=10] Consists of participants those who receive only balance training.

**Group B** [n=10] Consist of participants those who receive balance training along with muscle strengthening exercise.

Both the groups receive treatment session for 8 weeks with alternative days of treatment protocol with 4 days in a week which includes 32 sessions and 40 – 45 minutes which excludes 15 minutes of break time.

**Parameters of the study**

The outcome is measured in different ways to make sure that there is increase muscle strength and improved gait, balance and posture, these are measured from first sitting as before [pre-test] and after [post-test] treatment on both groups.

The measures include,

- Berg Balance Scale
- Fall Efficiency Scale

**5. Methodology**

**Study Design:** This study is based on quasi experimental study. Quasi-experiments are studies that aim to evaluate interventions but do not use randomization. Like randomized trials, quasi-experiments aim to demonstrate causality between an intervention and an outcome.

**Study Setting:** Tagore Medical College and Hospital, Physiotherapy Department, Rathinamangalam.

**Study Type:** Comparative type of study

- Comparative studies are investigations to analyse and evaluate, with quantitative and qualitative methods, a phenomenon and/or facts among different areas, subjects, and/or objects to detect similarities and/or differences.
- Comparative method is about looking at an object of study in relation to another. The object of study is normally compared across space and/or time.
- Comparative studies are based on research techniques and strategies for drawing inferences about causation and/or association of factors that are similar or different between two or more subjects/objects.

**Berg Balance Scale**

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Location: \_\_\_\_\_ Rater: \_\_\_\_\_

Item Description	Score [0-4]
1 Sitting to standing	-----
2 Standing unsupported	-----
3 Sitting unsupported	-----
4 Standing to sitting	-----
5 Transfers	-----
6 Standing with eyes closed	-----
7 Standing with feet together	-----
8 Reaching forward with outstretched arm	-----
9 Retrieving object from floor	-----
10 Turning to look behind	-----
11 Turning 360 degrees	-----
12 Placing alternate foot on stool	-----
13 Standing with one foot in front	-----
14 Standing on one foot	-----
Total [maximum = 56]	-----

**Falls Efficacy Scale**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

On a scale from 1 to 10, with 1 being very confident and 10 being not confident at all, how confident are you that you do the following activities without falling?

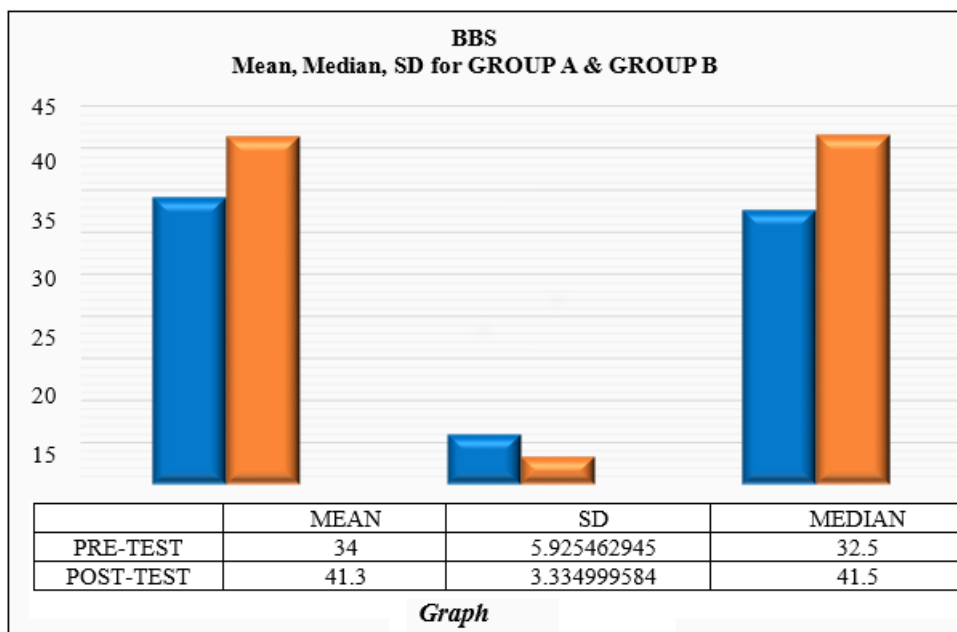
S. No	Activity	SCORE: 1 = Very confident 10 = not confident at all
1	Take a bath or shower	
2	Reach into cabinets or closets	
3	Walk around the house	
4	Prepare meals not requiring carrying heavy or hot objects	
5	Get in and out of bed	
6	Answer the door or telephone	
7	Get in and out of a chair	
8	Getting dressed and undressed	
9	Personal grooming (i.e. washing your face)	
10	Getting on and off of the toilet	
	TOTAL SCORE	

A total score of greater than 70 indicates that the person has a fear of falling

## 6. Data Analysis

**Table 1:** Comparison Group A and Group B values of Berg Balance Scale.

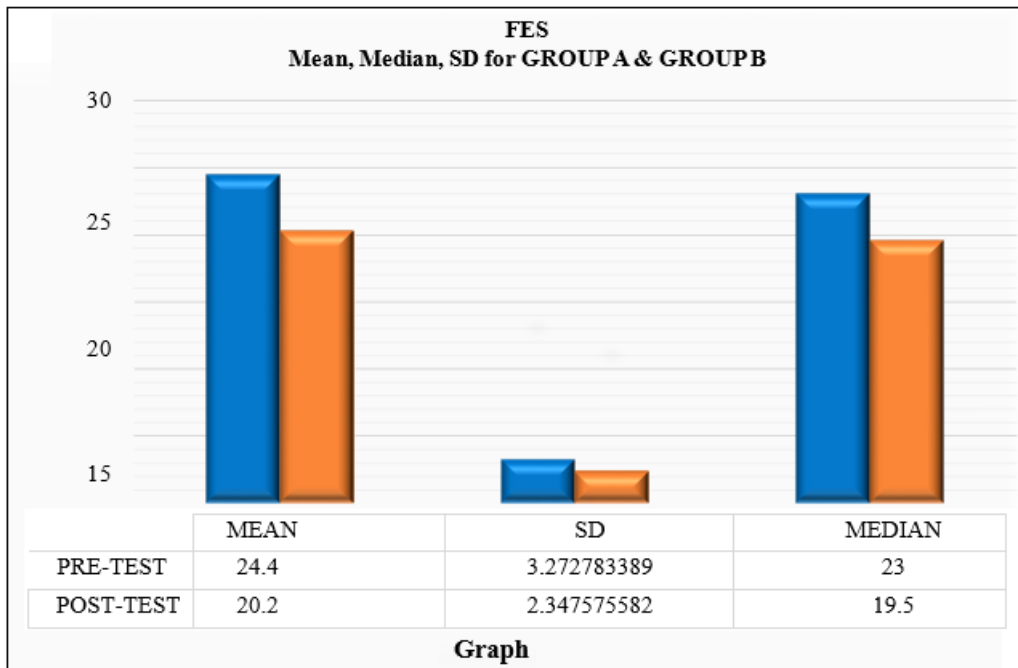
BBS	Mean	Median	SD
GROUP A	34	32.5	5.9254
GROUP B	41.3	41.5	3.3349



Shows the comparison of posttest values of BBS of Group A and Group B.

**Table 2:** Comparison Group A and Group B values of Fall Efficiency Scale.

FES	Mean	Median	SD
Group A	24.4	23	3.2727
Group B	20.2	19.5	2.3474



Shows the comparison of post-test values of FES of Group A and Group B.

## 7. Result

From the statistical analysis it was clear that Group B should significantly increase score than Group A then the result showed that the addition of balance exercise with stretching exercises in patient with idiopathic Parkinson's with an effective intervention has improved balance function and postural stability.

The statistical analysis made with the quantitative data revealed statistically difference between the Group A & Group B and also within group. The posttest mean value of Berg Balance Scale in Group A is 34 and, in the Group, B is 41.3. In Berg Balance Scale Group B were comparatively more than Group A.  $P < 0.0001$ .

The posttest mean value of Fall Efficiency Scale in Group A is 24.4 and Group B is 20.2. In Fall Efficiency Scale Group B were comparatively more than Group A.  $P < 0.0001$ . Statistical analysis of posttest for BBS and FES revealed that there is high statistically difference between Group A & Group B.

## 8. Discussion

The principle finding of this study is that the balance and stretching intervention was significantly more effective in improvement of balance dysfunction and postural instability in patients with idiopathic Parkinson disease. The study aimed to compare the effectiveness of two interventions, balance training alone and balance training combined with muscle strengthening exercises, in patients with idiopathic Parkinson's disease. The researchers hypothesized that the combined intervention yield better results in improving balance and overall functional abilities.

To conduct the study, a [20] sample of patients with Parkinson's disease was recruited and randomly assigned to either the balance training group A [10] or the balance training with muscle strengthening group B [10]. Both groups underwent their respective interventions for a specific duration. Throughout the study period, BBS and FES outcome measures were used to assess the participants' balance, mobility, and overall functional abilities. These measures could include questionnaires, and objective assessments.

## References

- [1] Morris ME. Movement disorders in people with Parkinson disease: a model for physical therapy. *Phys Ther*. 2000; 80(6):578–97.
- [2] Jankovic J. Parkinson's disease: clinical features and diagnosis. *J Neurol Neurosurg Psychiatry*. 2008; 79(4):368–76.
- [3] Rao SS, Hofmann LA, Shakil A. Parkinson's disease: diagnosis and treatment. *Am Fam Physician*. 2006; 74(12):2046–54.
- [4] Paul SS, Sherrington C, Fung VS, Canning CG. Motor and cognitive impairments in Parkinson disease relationships with specific balance and mobility tasks. *Neurorehabil Neural Repair*. 2013;27(1):63–71.
- [5] Brod M, Mendelsohn GA, Roberts B. Patients' experiences of Parkinson's disease. *J Gerontology B Psychology Sci Soc Sci*. 1998; 53(4):2