ORIGINAL ARTICLE

A COMPARATIVE STUDY OF LSVT BIG THERAPY AND BALANCE TRAINING EXERCISES ON BALANCE AND RISK OF FALL IN PARKINSON DISEASE

M. Ramaiah Pandian¹, Kannan Dhasaradharaman², Vishnupriya.R³, Anantharaj.K⁴, Thenmozhi. M. P⁵

Authors:
¹ MPT student, JKKMMRF College of Physiotherapy, The Tamilnadu Dr. M.G.R. Medical University Chennai, Tamilnadu, India
², ⁴, ⁵ Professor, JKKMMRF College of Physiotherapy, The Tamilnadu, Dr. M.G.R. Medical University Chennai, Tamilnadu, India
³ Professor and Principal, JKKMMRF College of Physiotherapy, The Tamilnadu, Dr. M.G.R. Medical University Chennai, Tamilnadu, India

Corresponding Author:
¹ JKKMMRF College of Physiotherapy, The Tamilnadu, Dr. M.G.R. Medical University Chennai, Tamilnadu, India, Email id: ramaiahpandianbpt@gmail.com

ABSTRACT

Background and purpose: Parkinsonism is a degenerative disease of the nervous system involving degeneration of dopamine generating cells. In the early stages of Parkinson's complaint, the face may show little or no expression or the arms may not swing on walking. The speech may come soft or slurred. Although Parkinson's complaint cannot be cured, symptoms get worse when it is not treated on correct time. Objective: To compare the effectiveness of LSVT big therapy and balance training exercise on the balance and risk of falls in Parkinson patients. Method: The patient was informed about the whole procedure and treatment method. A written consent was obtained from their voluntary participation in the study. There were 30 patients recruited based on inclusion criteria. They were divided to 2 groups. Each group had 15 subjects. Group A receives LSVT Big therapy, Group B receives balance training exercise. Each patient was given a physiotherapy program for 6 month duration, the pre and post treatment values were measured before and after 6 month for comparison. Result: The result showed that there was statistical significant difference between Group A and B. The Parkinson patients who were treated with LSVT big therapy had shown good improvement in balance and reduce falls. Conclusion: The study which was conducted for 6 months period of intervention showed that Group A of those who received LSVT (Lee Silver men voice treatment) big therapy resulted in improvement on balance and reduces falls than Group B who received balance training exercises.

Keywords: LSVT Big Therapy, Balance Training Exercises, Berg Balance Scale, Timed Up And Go Test.
INTRODUCTION

Parkinsonism is a degenerative disease of the nervous system involving degeneration of dopamine generating cells. In the early stages of Parkinson's complaint, the face may show little or no expression or the arms may not swing on walking. The speech may come soft or slurred. Although Parkinson's complaint cannot be cured, symptoms get worse when it is not treated on correct time. The progressive symptoms of Parkinson include that has rigidity, tremor, akinesia, bradykinesia, postural instability, which was a cardinal features of Parkinson disease.

In Parkinson's disease, certain whim-whams cells called neurons in the brain gradationally break down or die. Numerous of the symptoms of Parkinson's are due to a loss of neurons that produce a chemical transmitter in your brain called dopamine. When dopamine secretion drop, it causes irregular brain exertion, leading to problems with movement and other symptoms of Parkinson's disease. Parkinsonism is a movement disorder of the nervous system and that worsens over time. As whim-whams cells( neurons) in corridor of the brain weaken or damaged or die, people may begin to notice problems with movement, tremor, stiffness in the branches or the box of the body, or disabledbalance.

In the past 25 years, the number of people with the condition has jumped from three million to further than six million, and by 2040, it's projected to double again. Though utmost cases of idiopathic Parkinson disorder are sporadic, rather than familial, certain inheritable factors do appear to play a part in its occasion ( over all the chromosome parts 2q, 6q, 4q, and 4p). A neurodegenerative disorder that affects predominately the producing dopamine("dopaminergic ") neurons in a specific area of the brain called substantianigra.

The basal ganglia circuitry processes the signals that flow from the cortex, allowing the correct prosecution of voluntary movements. In Parkinson's complaint, the degeneration of dopaminergic neurons of the substantia nigra pars compacta triggers a carcade of functional changes affecting the whole basal ganglianetwork. Morethan1.5millionAmericanshavePD. Itgenerallyoccurs in men and women around age 60. Early- onset of Parkinson's occurs around age 40 Parkinson's disorder is an increasingly common neurodegenerative condition, which causes not only dysfunction of movement but also a broad range of non motor features, including mood disturbance, sleep dysfunction, autonomic dysfunction, cognitive deficit, dementia, and neuropsychiatric symptoms.

Progressive supranuclear paralysis (PSP) is a form of atypical Parkinsonism which is characterized by slow optical saccades, eyelid apraxia, and confined eye movements with particular impairment of downward gaze. Cases constantly witness hyperextension of the neck with early gait disturbance and falls. In later stages, speech and swallowing difficulty and demintia come apparent. Parkinson's disease doesn't directly cause people to die, but the condition leads to great strain on the body, and can make some people more vulnerable to serious and life-hanging infections.

But with advances in treatment, almost people with Parkinson's disease have a normal or near-normal life expectation. But they need
help with day-to-day living because of illness or disability. Care for someone regularly because they are ill, elderly or impaired, including family members. Tremor is the first symptom and latterly can be associated with bradykinesia and severity. Postural instability is generally seen late in the disease and can seriously impact the quality of life. Also important is the presence of autonomic symptoms that may precede the motor symptoms in some cases. The opinion in utmost cases is grounded on history and clinical presentation. SPECT scan can be performed in doubtful cases or to rule out other neurological diseases.

Because PD makes it harder to remember to use these bigger movements constantly, treatment includes a lot of reiteration and progressive challenges, as well as daily home practice and assignments for using bigger movements in everyday life. LSVT big therapy can lead to live an active and independent life.

LSVT-BIG is an innovative physical/occupational therapy program that helps to increase strength, motor function, and changes in brain function in individuals with Parkinson's Disease and other neurological conditions including stroke, multiple sclerosis, cerebral paralysis, and Down Syndrome. Each treatment focuses on the product of large movement of whole body functional movements. The system was developed following rigorous exploration funded by the National Institutes of Health. Further than 20 times worth of exploration documents showed improved the conditions on motor function tests following treatment.

**Balance Training**: Balance is defined as the capability to control their COG within BOS. Balance exercises are especially important for aged grown-ups because they can help cascade and help them keep their independence. It's a good idea to include balance training along with physical exertion and strength training in your regular exertion. Nearly any exertion that keeps you on your bases and moving, similar as walking, can help you keep good balance. But specific exercises designed to improve your balance are helpful to include in your daily routine and can help improved your stability.

**METHOD**

The study setting was conducted at J.K.K. Munirajah Medical Research Foundation College of physiotherapy; outpatient department and Maruthi medical center erode. The patient was informed about the whole procedure and treatment method. A written consent was obtained from their voluntary participation in the study. There were 30 patients recruited based on inclusion criteria. They were divided to 2 groups. Each group had 15 subjects. Group A receives LSVT Big therapy; Group B receives balance training exercise. Each patient was given a physiotherapy program for 6 month duration, the pre and post treatment values were measured before and after 6 month for comparison.

**PROCEDURE AND PROTOCOLS**

**GROUP A**

Group A was treated with LSVT Big therapy.

LSVT Big Therapy is an aggressive treatment system for people with Parkinson’s and
other neurological conditions that limit mobility and the capability to complete tone-care conditioning similar as bathing, feeding oneself, and getting dressed. Forward big step, Sideways big step, Backward big step, Forward big rock and reach, Sideway big, rock and reach, Dosage: 1 hour for 6 month.

GROUP B
Group B was treated with balance training exercise.

Tandem standing, Tandem walk, Single leg stand, Lateral weight shift, Wall leans, Side stepping, Backwards walking.

RESULT

Descriptive statistics for berg balance scale—Group A and Group B

<table>
<thead>
<tr>
<th>Group</th>
<th>BBS</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Paired t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Pre-test</td>
<td>25.47</td>
<td>2.20</td>
<td>31.7274</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>46.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>Pre-test</td>
<td>28.33</td>
<td>3.47</td>
<td>13.4666</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>41.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Descriptive statistics for berg balance scale—Group A and Group B

Descriptive statistic for berg Balance Scale scale in Group A shows that paired ‘t’ test values of pre Vs post-test values of Group A was 31.7274 at 0.05% level which was greater than tabulated ‘t’ values (2.13). Group B shows that paired ‘t’ test values of pre Vs post-test values of Group B was 13.4666 at 0.05% level which was greater than tabulated ‘t’ values (2.13). This showed a like there in significant difference between pre Vs post test results of Group A and Group B for BBS. This exposed that there was significant improvement in post – test mean values in response to BBS in Group A and Group B.

Berg Balance Scale Post Test Analysis

<table>
<thead>
<tr>
<th>BERG Balance Scale</th>
<th>Mean</th>
<th>Mean difference</th>
<th>Standard deviation</th>
<th>Paired t- test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>21.00</td>
<td>7.67</td>
<td>2.56</td>
<td>6.3581</td>
</tr>
<tr>
<td>Group B</td>
<td>13.33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Berg Balance Scale Post Test Analysis – Group A and Group B
The above table shows the post-test analysis result in BBS for Group A and B. The mean value of Group A is 21.00 which was greater than Group B value of and the unpaired ‘t’ test value was 6.3581 at 0.05% level, which was greater than tabulated ‘t’ value (2.15). It showed statistical significance difference between mean values of Group A and B.

**Descriptive statistics for Timed up and go test-Group A and Group B**

<table>
<thead>
<tr>
<th>Group</th>
<th>TUG</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Paired t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Pre-test</td>
<td>17.60</td>
<td>1.84</td>
<td>22.4247</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>10.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>Pre-test</td>
<td>18.73</td>
<td>1.39</td>
<td>22.4087</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>11.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3: Descriptive statistics for Timed up and go test-Group A and Group B**

Descriptive statistic for Timed up and go test in Group A shows that the paired ‘t’ test values of pre Vs post-test values of Group A was 22.4247 at 0.05% level which was greater than tabulated ‘t’ values (2.13). Group B shows that the paired ‘t’ test values of pre Vs post-test values of Group B was 22.4087 at 0.05% level which was greater than tabulated ‘t’ values (2.13). This showed that there was significant difference between pre Vs post test results in Group A and Group B. There was a significant improvement in post – test mean value in response Timed up and go test.

**Timed up and go test Post Test Analysis**

<table>
<thead>
<tr>
<th>TIMEDUP AND GO TEST</th>
<th>Mean</th>
<th>Mean difference</th>
<th>Standard deviation</th>
<th>Unpaired t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>6.73</td>
<td>0.80</td>
<td>1.16</td>
<td>1.7748</td>
</tr>
<tr>
<td>Group B</td>
<td>7.53</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4: Timed up and go test Post Test Analysis**

The above table shows the post-test analysis result in TUG for Group A and B. The mean value of Group B is 7.53 which was greater than Group B value of 1.3 and the unpaired ‘t’ test value was 1.7748 at 0.05% level, which was greater than tabulated ‘t’ value (2.15). It showed statistical significance difference between mean values of Group A and B.
DISCUSSION

The purpose of the study was to determine the effectiveness of lee silvermen voice treatment (LSVT) big therapy on balance and reduce fall in parkinson. The berg balance scale and timed up and go test was taken as the parameters to assess the balance and fall. The study sample comprised of 30 patients of age group 50–60 years grouped as A and B. In each group 15 subjects participated. Group A with LSVT big therapy where as Group B with balance training exercise. The result of the statistical analysis brings out the following for consideration.

The result showed that there was statistical significant difference between Group A and B. The Parkinson patients who were treated with LSVTbig therapy had shown good improvement in balance and reduce falls.

In the analysis and interpretation of berg Balance Scale in Group A and Group B for 15 patients in each group:

The unpaired t test value of BBS in Group A and B post- test analysis was 6.3581 which were greater than the tabulated t value 2.15.

In the analysis and interpretation of Timed up and go test in Group A and Group B for 15 patients in each group: The unpaired t test value of TUG in Group A and B post- test analysis was 1.7748 which was greater than the tabulated t value 2.15.

Based on the statistical analysis and interpretation the result of the study was improving balance and reduces falls on Parkinson. Therefore the present study was accepting the alternate hypothesis and rejecting the null hypothesis.

Irimia Mollinedo-Cardalda, conducted the time up and go test (TUG), is a simple, quick and widely used clinical performance to identify patients at risk of falling. Falls are common and disabling feature of Parkinson’s Disease (PD), so it’s necessary to identify the psychometric properties of the tests with the aim of old adults with PD at high risk of falls. To identify and analyse the psychometric properties of the TUG test and managed variants in older adults with PD.¹¹

Abu A. Qutubuddin Conducted To assess the criterion-related validity of the Berg Balance Scale (BBS) in subjects with Parkinson’s disease (PD). Thirty-eight men (average ± standard deviation, 71.1±10.5y) with confirmed PD. Their initial diagnosis had been made on average 5.8±3.6 years earlier. All could stand or walk unassisted and had mild to moderate disability. Patients who could not ambulate without assistive devices were excluded.

Correlation analyses between the BBS and the Unified Parkinson’s Disease Rating Scale (UPDRS) motor scale, Modified Hoehn and Yahr Staging (Hoehn and Yahr) Scale, and the Modified Schwab and England Capacity for Daily Living Scale (S&E ADL Scale). BBS score showed significant correlations with indicators of motor functioning, stage of disease, and daily living capacity. BBS score was inversely associated with the UPDRS motor score (−.58, P<.005), Hoehn and Yahr Scale staging (−.45, P<.005), and S&E ADL Scale rating (.55, P<.005). In all 3 correlations, lower scores on the BBS (indicating greater balance deficits) correlated with higher
UPDRS scores (indicating greater motoric or functional impairment).¹²

Neal’s, Patrick D march conducted The purpose of this systematic review was to complete a comprehensive search and review of the literature to determine the ability of the Berg Balance Scale (BBS) to predict falls in the elderly with and without pathology. Specifically, the cut off score that is most predictive of falls in the older adults and the sensitivity and specificity of the BBS in predicting falls.

Nine studies warranted inclusion in this systematic review after evaluation for article objectives, inclusion criteria, and scoring 5 or more out of 10 on the Physiotherapy Evidence Database scale. Five studies addressed the elderly population (65 years) without pathology.

The remaining 4 studies addressed elderly participants with neurological disorders. All 9 studies reported sensitivity and specificity of the BBS in predicting falls. Sensitivity and specificity results varied greatly depending on the cut off score and the author’s objectives. Eight of the 9 studies recommended specific cut off scores¹³.

**Ethical clearance:** Ethical clearance was obtained from the Institutional ethical committee JKKMMRF College of Physiotherapy, Komarapalayam with reference No. IRB/MPT/N-507/24, dated 03/03/2023.

**Conflicts of Interest:** There was no personal or institutional conflict of interest for this study.

**Fund for the study:** This was a self funded study.

---

**CONCLUSION**

The study which was conducted for 6 months period of intervention showed that Group A of those who received LSVT (Lee Sliver men Voice Treatment) big therapy resulted in improvement on balance and reduces falls than Group B who received balance training exercises.

The study concluded that LSVT big therapy was effective treatment for balance and reduce falls in Parkinson.

**Acknowledgement:** We are thankful close to all candidates who were given more support engaged in this study.

**REFERENCES**


M. Ramaiah Pandian, Kannan Dhasaradharaman, Vishnupriya. R, et.al. (2024). A Comparative Study Of LSVT Big Therapy And Balance Training Exercises On Balance And Risk Of Fall In Parkinson Disease, ijmaes; 10(2); 1834-1841.