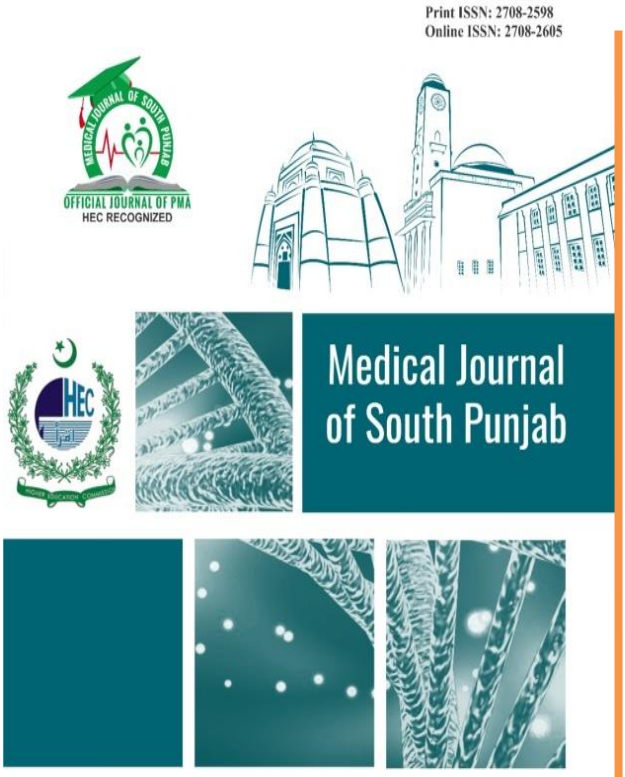
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Original Article

Effect of lee silverman voice treatment big and conventional physiotherapy on motor symptoms among patients with parkinson's disease: a randomized clinical trial

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ABSTRACT

Objective: To compare the impact of Lee Silverman Voice Treatment (LSVT) BIG with standard physiotherapy on motor symptoms in patients with Parkinson's Disease (PD).

Methods: This Randomized clinical trial was conducted at Ibn-e-Sina Hospital & Research Institute and Barki Complex, Multan, over four months from 2nd May 2026 to 31August 2026. Thirty-six patients with PD (Hoehn and Yahr stage I–III), aged 35–75 years were recruited by purposive sampling. They were randomly assigned to either Group A or Group B. The two groups were exposed to one hour sessions of sixteen supervised treatment per week during a 4 weeks period in an intensity matched condition. Motor function was measured using the MDS-UPDRS Part III at baseline and at week 4. Paired and independent t-tests were used in SPSS version 26 for data analysis.

Results: Total 33 participant analyzed (Group A n = 17, Group B n = 16) with mean age 62.56 ± 4.69 years and 88.9% male. Results showed that both groups had significant improvements in motor functioning after the treatment and participants in the LSVT BIG group had much higher improvement than their counterparts (conventional physiotherapy). The post intervention MDS-UPDRS Part III scores were lower in the LSVT BIG (28.88 ± 2.57) compared to the conventional physiotherapy group (39.88 ± 2.63; $p < 0.001$) showing that motor function improved better with LSVT BIG.

Conclusion: These results indicate that LSVT BIG compares better with standard physiotherapy as it relates to better results in improving motor functions in mild to moderate PD and its inclusion in evidence-based physiotherapy rehabilitation programs can help maximize functional outcomes and improve quality of life.

Keywords: Conventional physiotherapy, LSVT BIG, MDS-UPDRS Part III, Motor symptoms, Parkinson's disease, Rehabilitation.

1. INTRODUCTION

Parkinson's disease (PD) is a progressive chronic neurodegenerative disorder which has a broad impact on motor as well as non-motor function and impacts patients, caregivers, health systems etc[1]. It is the second most prevalent degenerative disease in the world and incidence rates have increased steadily in the last 30 years, mostly as a result of an aging population[2]. In Pakistan, incident rate is higher particularly among the male gender, which is consistent with the global trends, and limited availability of specialised neurorehabilitation services[3, 4]. Due to a progressive loss of efficacy to dopaminergic drugs over the term and to motor side effects, a pharmacologic component in the treatment of PD is now considered a part of a multidisciplinary approach, and rehabilitation treatment is recommended for PD[5].

LSVT BIG is a high-intensity amplitude-based, physical therapy programme based on the miscalibration of movement size that occurs in people with PD. The purpose of repeated high effort, large amplitude movements is to normalize this de-adaptation; and physiological evidence exists to support that proprioceptive recalibration is a part of the mechanism of action[6, 7, 8]. Systematic reviews and trials show that LSVT BIG is beneficial when compared with other interventions or no interventions in terms of motor symptoms scores on UPDRS and gait and functional mobility improvements[9, 10, 11]. Conventional physiotherapy is usually a one on one based therapy that does not have a protocol and that includes stretching, strengthening, balance, gait and functional training[12]. There are few comparative studies of the two strategies and these few studies have been done mostly in high income countries, where the disease phenotype or accessibility to services or uptake of rehabilitation services may be different from populations in South Asia.The present study had thus the purpose to evaluate whether LSVT BIG could have similar effects on PD motor symptoms when compared to the effects of conventional PP. The authors predicted that LSVT BIG would measure significantly better than standard physiotherapy for the motor function in these patients.

2. METHODOLOGY

This was a randomized clinical trial comparing LSVT BIG (Group A) with conventional physiotherapy (Group B) in patients with Parkinson's disease. The study was conducted at Ibn-e-Sina Hospital & Research Institute, Barki Complex, Multan and completed within four months after granted ethical approval (recruitment, intervention, data collection, data analysis).

The sample size was determined using G*Power version 3.1.9.4 and means and standard deviations were obtained from a reference trial of LSVT BIG. This resulted in an effect size (Cohen's d score) of 1.33. With a two-tailed test, a significance level of 0.05, power of 0.95 and a 1:1 allocation ratio, 16 participants per group (32 in total) were required. With a max attrition rate of 10% the number of participants was increased to 36, with 18 in each group.

Purposive non-probability sampling was adopted in recruiting the eligible respondents. Allocation to the two groups was done by the sealed envelope method.

Male and female patients between the age of 35-75 years, who had neurologist confirmed diagnosis of mild to moderate PD (Hoehn and Yahr stage I-III), ordered for Physiotherapy and under stable treatment for at least 4 weeks prior to the study and walking without any aids.

Hoehn and Yahr stage IV-V, severe cognitive impairment, history of stroke or multiple sclerosis, disabling musculoskeletal conditions, cardiovascular instability, and/or other structured physiotherapy program.

Patients were screened against the inclusion and exclusion criteria, informed about the study and enrolled after obtaining written

informed consent. Demographic data (age, sex, disease duration, stage and medication history) were recorded. Motor function was estimated using the clinician rated MDS-UPDRS Part III (0–132; the higher number the worse) which consisted of the following items: speech problems, facial expression, rigidity, finger movements, hand movements, foot movements, agility of the legs, rising from a chair, gait, freezing, postural instability, postural stability, and global bradykinesia and tremor. The assessments were done at the start and end of week 4[13, 14].

Group A was assigned to the LSVT BIG 16 session treatment of 60 minutes each session, 4 sessions per week, over 4 weeks – per the standard protocol. Each session consisted of seven exercises: exercises performed with maximal amplitude (floor to ceiling reach, side to side reach), and exercises requiring a step to the side, forward, or backward (forward step, side step, back step reach), and exercises to reach across the body or sideways rock the leg out and to the side (forward and side way reach, backwards and sideways rock)[15]. They were followed by functional component tasks (sit to stand, reaching, turning, stepping over obstacles, bed mobility and gait initiation) and functional activities in hierarchy (stairs, dual-task walking, turning while walking and walking in confined spaces). All sessions featured large amplitude gait practice; long stride, wide arm swing and upright gait and heel strike, therapist delivered feedback and rest breaks of 1–2 minutes as tolerated.

Group B was given conventional physio (guideline based) three times weekly for four weeks (12 sessions) for 45-60 mins per session. Sessions included Static stretching for commonly tight muscle groups (20–30 seconds, 3 reps, bilateral); strengthening of the lower limbs, upper limbs and trunk muscles (2–3 sets of 10–15 reps, progressed to tolerance level if body weight, bands or ankle weights were used); core stability and postural exercises; static and dynamic balance exercises; functional mobility exercises such as: sit to stand, transfers, bed mobility, gait[16].

Data have been analyzed by using SPSS version 26. Data of continuous variables are reported as means and ± standard deviations. Shapiro-Wilk test and Q–Q plots were performed to check normality. Within group comparison analysis was performed using a paired t-test and between group comparison using an independent t-test analysis was used because it was found that the data is normally distributed. A p value of <0.05 was deemed as significant[17].

3. RESULTS

A total of 36 patients were recruited and allocated in equal number (18 cases in each group). In Group A (LSVT BIG), 17 (94.4%) participants were male and 1 (5.6%) was female. Eighteen (15 cases, 83.3) of them belonged to males and three (16.7) to females in Group B (Conventional Physiotherapy). Overall, out of 36 participants, 32 (88.9%) were male and 4 (11.1%) were female. The mean age was 61.67 ± 4.75 years for Group A-LSVT BIG and 63.44 ± 4.58 years for Group B- Conventional Physiotherapy. The mean age was comparable for both groups and 62.56 ± 4.69 years (n = 36) for the overall mean. The age of participants ranged from 55 to 72 years, with the majority in their early 60s. In both of the MDS-UPDRS Part III scores, the two groups recorded post-intervention means were lower, meaning, they improved due to the intervention. Group A (LSVT BIG) showed marked improvements in facial expression (1.61 ± 0.698 to 0.94 ± 0.748), finger tapping—right (2.22 ± 0.943 to 1.18 ± 0.809), hand movements—left (1.94 ± 0.998 to 1.06 ± 0.899), toe tapping—right (2.22 ± 0.878 to 1.24 ± 1.251), toe tapping—left (1.94 ± 1.110 to 0.71 ± 0.849), posture (1.61 ± 0.979 to 0.53 ± 0.874), and global body bradykinesia (1.89 ± 0.832 to 1.00 ± 0.935). In comparison, Group B demonstrated smaller improvements in most components, including facial expression (1.89 ± 0.963 to 1.62 ± 1.025), finger tapping—right (2.28 ± 0.895 to 1.94 ± 1.063), toe tapping—

left (2.17 ± 0.924 to 1.75 ± 0.931), posture (1.67 ± 0.767 to 1.44 ± 0.814), and global body bradykinesia (2.11 ± 0.900 to 1.56 ± 0.814). Generally, these descriptive results indicate that bradykinesia, posture, rigidity and functional limb movements are improved with more success with LSVT BIG.

Table-1: Within-Group Comparison of Total MDS-UPDRS Part III Score for Group A

Variables	Group A (n = 17)		P-value
Total MDS-UPDRS Part III Score	**Baseline (Mean ± SD)**	**4th Week (Mean ± SD)**	**< 0.002**
	45.82 ± 2.86	**28.88 ± 2.57**	

Table-2: Within-Group Comparison of Total MDS-UPDRS Part III Score for Group B

Variables	**Group B (n = 16)**		**P-value**
Total MDS-UPDRS Part III Score	**Baseline (Mean ± SD)**	**4th Week (Mean ± SD)**	**< 0.001**
	46.50 ± 2.68	**39.88 ± 2.63**	

Table-3: Between-Group Comparison of Baseline Total MDS-UPDRS Part III Scores

Variable	Group	Mean ± SD	p-value
Baseline Total MDS-UPDRS Part III Score	Group A	45.82 ± 2.86	0.415
	Group B	46.50 ± 2.68	

Table-4: Between-Group Comparison of Post Total MDS-UPDRS Part III Scores

Variable	Group	Mean ± SD	p-value
Post-intervention MDS-UPDRS Part III	Group A	28.88 ± 2.57	<0.001
	Group B	39.88 ± 2.63	
Change Score (Baseline − Post-intervention)	Group A	16.94 ± 2.25	<0.001
	Group B	6.63 ± 3.24	

4. DISCUSSION

Participants' mean age was 62.56 ± 4.69 years and 88.9% were male. They did not have any significant difference on baseline data between LSVT BIG (45.82 ± 2.86) and conventional physiotherapy (46.50 ± 2.68; p = 0.415). This similarity at baseline provides for a level playing field in regard to treatment outcomes.The motor symptom score changed significantly from 45.82 ± 2.86 to 28.88 ± 2.57 (mean score decrease of 16.94; $p < 0.002$) in the LSVT BIG group. In line with the previous studies that after LSVT BIG treatment, patients made improvements on UPDRS Part III scores[18, 19]. Similarly, Eldemir et al. (2024) found that standard and modified LSVT BIG therapies led to improvements in motor symptoms. The results sustained the possibility of the training based on amplitude parameters to be effective in decreasing motor impairment of Parkinson's disease[19].

In conventional physiotherapy, motor symptoms had seen a significant improvement of scores from 46.50 ± 2.68 to 39.88 ± 2.63, a mean improvement of 6.63 scores ($p < 0.001$). It reinforces the importance of traditional rehabilitation, such as strengthening, stretching, postures and gait training course. Similarly, Kaya Aytutuldu et al. (2024) noted improvement as a result of a mobility training but it did not have a uniform effect across interventions[20].The scores of LSVT BIG group, which was significantly lower at post-intervention than the conventional physiotherapy group (28.88 ± 2.57 vs. 39.88 ± 2.63; $p < 0.001$), was revealed in the between-group comparison. The difference in the mean improvement was 10.31 points (in favor of LSVT BIG). This descriptive improvement was also noted at the component level assessing finger tapping, but ankle tapping, posture and global bradykinesia were also improved. In general, both interventions resulted in motor symptoms improvement, however this improved in the short term in LSVT BIG. Small sample size and 4-week follow-up preclude any conclusions about long-term effectiveness, however.

5. CONCLUSION

Patients with mild and moderate Parkinson's disease demonstrated significant differences in motor impairment after four

weeks in patients treated with LSVT BIG compared with those treated with conventional physiotherapy, in treatment that was clinically meaningful. A conventional physiotherapy approach also significantly improved, and is a viable treatment when LSVT BIG is not available.

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