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Research Article

EFFECT OF TASK-BASED LEE SILVERMAN VOICE TREATMENT-BIG (LSVT-BIG) COMBINED WITH OCCUPATIONAL THERAPY ON BALANCE AND MOTOR FUNCTION IN INDIVIDUALS WITH PARKINSON'S DISEASE: A RANDOMIZED CONTROLLED TRIAL STUDY

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Abstract

Background: PD is a continuous neurodegenerative diseases associated with the impairments in balance, movement control, mobility, & activities of daily living. Rehabilitation interventions targeting movement amplitude and functional performance may help reduce these limitations.

Methods:A controlled, randomisedstudy were carried out a study on 42 people with PD who met requirements was split upto into two equal groupsat random. Group A, the experimental group, received task-based LSVT-BIG in addition to occupational treatment, whereas traditional occupational therapy was administered to Group B, the control group. Hoehn and Yahr Scale was used as screening tools. Berg Balance Scale (BBS) and SPES/SCOPA-Motor Scale was employed to measure the results.

Results: This experimental and control there was little difference between the groups in BBS ($t = -1.821$, $p = 0.079$)or SCOPA ($t = -0.159$, $p = 0.875$) according to baseline comparisons. After the intervention, participants in the BBS ($t = 3.709$, $p < 0.001$) and the SCOPA-Motor Scale ($t = -4.021$, $p < 0.001$), the experimental and control groups differed significantly from one another.

Conclusion: The study's findings demonstrate that occupational therapy and task-based LSVT-BIG greatly enhance equilibrium & movement function in people with PD. The absence of the significant baseline differences confirmed group comparability before intervention, while the highly significant post-intervention differences in BBS and SCOPA scores demonstrated the effectiveness of the combined treatment approach.

Keywords: Parkinson's disease; LSVT-BIG; balance; motor function; Berg Balance Scale; SCOPA-Motor Scale

1. Introduction

Parkinson's disease (PD) is a long-term nerve-related condition that impacts several body systems and gets worse with time. Both movements based & Non movement based symptoms are linked to it. Dopamine Basal ganglia are disrupted when the nigrostriatal pathway is depleted circuitry involved in voluntary movement, balance, posture, coordination, and motor activity. The principal motor symptoms described in the thesis comprise slowness of movement, rest tremor, dystonic hypertonia, and balance difficulty.

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Non movement based sign include cognitive impairment, dysautonomia, sleep disturbances, psychiatric manifestations, &sensory abnormalities. These symptoms can impair functional independence, everyday activities, and QOL. (1)

The worldwide impact of PD has increased substantially, with population ageing, increased life expectancy, improved survival, and greater awareness contributing to the growing disease burden. The thesis also identifies environmental exposures, genetic susceptibility, and improved case ascertainment as factors associated with the increasing occurrence of PD. The condition predominantly affects individuals over 60 years, although younger-onset cases are recognized, and men demonstrate a higher incidence than women. (2)

Current understanding recognizes PD as a progressive degenerative disease with pathological changes that can precede the classical motor

symptoms. The thesis describes non-motor signs as constipation, reducedOlfactory, RBD, depression, anxiety, fatigue, &autonomic neuropathy as features that may occur before diagnosis. (1)

The exact etiology of PD remains incompletely understood. The thesis describes a complex interaction of genetic predisposition, environmental exposures, ageing, oxidative damage, mitochondrial impairment, abnormal protein aggregation, weakened autophagy, lysosomal dysfunction,&chronic neuroinflammation. (3,4)

Motor impairment is closely associated with reduced functional independence. Difficulties in walking, balance, transfers, stair climbing, dressing, bathing, toileting, feeding, writing, and household activities can progressively increase dependence on caregivers. Rehabilitation therefore aims not only to improve motor performance but also to enhance functional mobility, participation, and well-being. (3,5)

Balance is an important part of moving and depends on combining somatosensory, vestibular, and visual information with appropriate neuromuscular responses. In PD, basal ganglia dysfunction affects postural control and contributes to impaired anticipatory and reactive postural adjustments, reduced limits of stability, axial rigidity, gait disturbance, freezing of gait, and increased fall risk. (7,8,11,13,15)

Motor function in PD includes the ability to initiate, coordinate, regulate, and execute voluntary movements. The cardinal motor trait, bradykinesia, is typified by decreased movement amplitude, slowness of movement, difficulty initiating voluntary movements, and progressive reduction in movement speed during repetitive tasks. Rigidity, resting tremor, gait disturbance, freezing of gait, and upper-extremity impairment further affect activities of daily living and occupational performance. (1,3,5,10)

The thesis describes LSVT-BIG as an intensive, amplitude-oriented intervention targeting reduced movement amplitude or hypokinesia through repetitive, high-amplitude movements and functional task practice. Its theoretical basis is described in relation to neuroplasticity and motor learning, with emphasis on task-specific training, high repetition, intensive practice, progression of task difficulty, and feedback. (9, 10,12,15)

The standard LSVT-BIG programme described in the thesis includes gait training, functional component tasks, hierarchical functional activities, maximal daily exercises, and home practice. Task-specific functional activities include sit-to-stand transfers, reaching, turning, walking, dressing, and object manipulation. The thesis further describes occupational therapists as having an important role in integrating individualized functional goals into task-specific training. (10,15)

The Investigationwere undertaken based on investigatethe effect of task-based LSVT-BIG combined with occupational therapy on equilibrium & movement function in participants.with PD, using randomized clinical trialdesign & the BBS&SCOPA-Motor Scale as outcome measures.

2.0 METHODS AND MATERIALS

2.1 Participants and research design

RCT investigationwereExamined, discussed &authorisedby Institutional Committee on Ethics at Santosh College of Occupational,Ghaziabad **(Ref No.-SCOT/JULY-25/ECNeuro-07)**.Participants included recruited from Unnati Neuro-Developmental & Rehabilitation Center, Reborn Physiotherapy and Neuro Rehab Center, and Santosh Medical College and Hospital. Participants who met the requirements were Categorizedin 2 equal groups at random: a C group (n = 21) and an E group (n = 21). Investigateage range were 35–55 years, male and female both participants were included. The thesis states that people wasselected using the inclusion and exclusion criteria standardsand screened using Hoehn and Yahr Scale.

2.2 Intervention groups

The E group Obtainedtask-based LSVT-BIG combined with OT. This thesis procedure describes five sessions per week for four consecutive weeks, with 40–50 minutes per session and a prescribed home exercise programme. The intervention included LSVT-BIG exercises, functional task practice, gait and balance training, and individualized occupational therapy activities aimed at improving activities of daily living.

The maximal daily exercises included raising the arm from floor level to overhead, lateral arm movement, advance, side-shuffling, regression, ahead&backward arm shaking, and lateral stepping combined with trunk rotation. Functional component tasks included bathing-related activities, cleaning-related activities, and bowling-related activities. Hierarchical practice progressed through activities such as holding a towel and applying soap, rinsing and drying the body, walking to pick up a towel, cleaning a desk with a towel, folding the towel and returning to the chair, and sit-walk-pick-ball, striking bowling pins, rearranging pins, and returning to the chair. BIG walking included exaggerated arm swing, long steps, and BIG-amplitude walking.

Traditional occupational therapy was administered to the control group. This thesis describes activities including standing back-extension exercises, standing trunk-rotation exercises, backward walking practice, side-stepping, tandem walking, and single-leg standing balance exercises. The treatment schedule described in the procedure was 45–50 min/session, five sessions/week, for four weeks (20 treatment sessions).

2.3 Outcome measurements

H&Y Scale: The H&Y Scale were used as the screening scale. The thesis included individuals classified at levels 1–3.

BBS: The BBS was used to measure equilibrium performance. The thesis describes it as a

standardized balance measure and note's reliability and validity of information in its review of literature.
SPES/SCOPA-Motor Scale: The SPES/SCOPA-Motor was used to evaluate motor function. The thesis describes it as a clinician-rated test with a final score between 0 to 42, with 14 items scored from 0 to 3.

4.0 DISCUSSION

Present study investigated the efficiency of task-based LSVT-BIG paired with occupational therapy in enhance equilibrium &motor operate in individuals having PD. Participants who satisfied the eligibility criteria were recruited from the selected rehabilitation centers &chosen at random to either the E or C groups.The E group obtained task-based LSVT-BIG together with occupational treatment, whereas conventional occupational therapy was administered to the control group. Balance and motor performance were evaluated before and after the intervention using the BBS and SCOPA-Motor Scale.
The study was completed by 42 participants, with 21 participants in each group. The thesis reports an overall average age of 44.79 ± 6.18 years and equal representation of males and females across the total sample. The demographic characteristics were presented as supporting group comparisons.
Prior to treatment,It's notstatistically meaningful diff btw the E and C groups on principal baseline measures. The pre-intervention BBS score showed $t = -1.821$ ($p = 0.079$), while the SCOPA-Motor score showed $t = -0.159$ ($p = 0.875$). The thesis interprets these results as indicating that the groups were comparable before intervention.
Following completion of the intervention, participants who received task-based LSVT-BIG combined with occupational therapy demonstrated significantly greater improvements than those receiving conventional occupational therapy. There was a noticeable change inBBS ($t = 3.709$; $p < 0.001$) and SCOPA-Motor ($t = -4.021$; $p < 0.001$) after intervention.
Additional statistical analyses, included thesis reported on the Levene's test, MWU test, and independent-samples t-test. The thesis states the statistically reliablepost-treatment dissimilarityobserved btw two groups suggest that the combined rehabilitation programme produced meaningful improvements in functional performance.
The thesis relates the findings to previous research demonstrating the efficacy of LSVT-BIG in enhancing equilibrium, bearing, movement amplitude, and overall movement function in individual with PD. It describes programme as emphasizing repetitive, high-amplitude, task-specific movements that promote motor learning, improve postural stability, and facilitate functional mobility. The thesis further proposes that combining LSVT-BIG with occupational therapy may enhance independence and support transfer of motor skills into everyday life.
Overall, the thesis concludes that task-based LSVT-BIG combined with occupational therapy is a more successful rehabilitation strategy than conventional occupational therapy alone for improving equilibrium and movement function in people with PD.

5.0 CONCLUSION

The study's findings demonstrate that task-based LSVT-BIG combined with occupational therapy greatly enhances movement function &balance in the individuals with PD. The absence of significant baseline differences confirmed group comparability before intervention, while the highly significant post-intervention differences in BBS and SCOPA scores demonstrated the effectiveness of the combined treatment approach. Consistent findings across parametric and non-parametric analyses further supported the reported results. The thesis therefore rejects the null hypothesis and supports the alternate hypothesis. Combining LSVT-BIG with occupational therapy is presented as a successful rehabilitation approach for improving motor performance, balance, and functional independence in individuals with PD.

6.0 DECLARATIONS:

- **Acknowledgements:**The authors thank everyone who offered assistance and helpful criticism during this study.

- **Authors' Contributions:** NB conceptualized the study, drafted the protocol, carried out Data collection, and wrote the initial manuscript draft. RKS oversaw the process and made significant revisions to the book. CK revised the manuscript&organised its submission. The final text was reviewed and approved by all authors.
- **Ethical Approval and Consent:** Ethical Approval: **(Ref. No. SCOT/JULY-25/ECNeuro-07).**Every individual participant in the study gave their consentfor both intervention participation and publication of data.

- **Financial Support Statement:**No particular grant from any funding organization was obtained for this studyin the public, private, or nonprofit domains.Statement of Conflicts of Interest: The writers affirm that they possess no conflicting noticed

- **Statement ofData Access:**Upon reasonable request, the corresponding author will provide the datasets created and analysed for this study.
- **AI Disclosure:**This study's conception, implementation, data analysis, and manuscript writing did not make use of artificial intelligence methods.

3RESULTS

3.1 Participant characteristics

Participants	**E group (n=21)**	**Cgroup (n=21)**
No. of individual	21	21
Age range	35–55 years	35–55 years
Male	9 (42.86%)	12 (57.14%)
Female	12 (57.14%)	9 (42.86%)
Mean age ± SD	39.57 ± 2.80 years	50.00 ± 3.66 years
Intervention	Task-based LSVT-BIG + Occupational Therapy	Conventional Occupational Therapy

The study included 42 participants, with 21 participants in each group. Participants in both groups were aged 35–55 yrs. The E group included 9 males& 12 females, while the control group have12 males and 9 females. The thesis reports average ageof 39.57 ± 2.80 years in the E group and 50.00 ± 3.66 years in the C group.

3.2 Between-group baseline and after the intervention findings

Outcome	**Baseline t**	**Baseline p**	**Post-intervention t**	**Post-intervention p**
BBS	−1.821	0.079	3.709	<0.001
SCOPA-Motor	−0.159	0.875	−4.021	<0.001

The groups' baseline distinctions wasNot statistically significant. according to autonomous-samples t-test. for BBS ($t = -1.821$, $p = 0.079$) or SCOPA-Motor ($t = -0.159$, $p = 0.875$). Post-intervention, statistically significant differences were reported for BBS ($t = 3.709$, $p < 0.001$) and SCOPA-Motor ($t = -4.021$, $p < 0.001$).

3.3 MWU analysis

Element	**MWU**	**Z**	**p value**
BBS Score (PRE)	158.5	−1.562	0.118
BBS Score (POST)	92.0	−3.258	0.001
BBS INT (PRE)	147.0	−2.134	0.033
BBS INT (POST)	157.5	−1.884	0.060
SCOPA Score (PRE)	154.0	−1.674	0.094
SCOPA INT (PRE)	179.0	−1.165	0.244
SCOPA Score (POST)	87.5	−3.347	<0.001
SCOPA SCORE (POST)	89.5	−3.552	<0.001

The thesis reports no significant difference at baseline for most principal variables, including BBS Score (PRE) and SCOPA Score (PRE), while post-intervention BBS Score and SCOPA Score demonstrated statistically significant differences. The thesis interprets these findings as indicating that the E group did better thanC group after treatment.

3.4 Additional independent-samples analysis

Variable	**t**	**df**	**Two-sided p**
BBS Score (PRE)	1.708	40	0.095
BBS INT (PRE)	−2.236	40	0.031
BBS Score (POST)	3.709	40	<0.001
BBS INT (POST)	−1.947	40	0.059
SCOPA Score (PRE)	−1.699	40	0.097
SCOPA INT (PRE)	−1.175	40	0.247
SCOPA Score (POST)	−4.021	40	<0.001
SCOPA SCORE (POST)	−4.123	40	<0.001

Levene's test indicated that equal variances could be assumed for most variables, with the thesis noting unequal variances for BBS INT (POST). The principal post-intervention BBS and SCOPA comparisons were shown to be statistically significant at $p < 0.001$.

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