

Effect of Physical Therapy with Music Therapy on Gait, Balance and Quality of Life In Parkinson's Disease

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Abstract

Background: Parkinson's disease is a chronic, progressive and neurodegenerative disorder. A range of motor and non-motor symptoms may cause postural instability and impaired functional mobility often leading to falls and decrease quality of life. Physical therapy with Music therapy may be promising intervention to improve gait and related activities in Parkinson's disease. **Methodology:** Permission was taken from institutional ethical committee. An experimental study was conducted on 30 individual selected on the basis of inclusion and exclusion criteria. Randomized allocation of the participants was done into experimental (Physical therapy with music therapy) and control (Conventional physical therapy) groups. Participants were evaluated pre and post intervention for gait using Dynamic gait index (DGI), balance using Time up and go (TUG) and quality of Life using Parkinson's disease quality of life 39 (PDQ 39) questionnaire. A six weeks intervention program was given to the patients for four times per week. **Result:** Data was analyzed using Shapiro-wilk test accordingly parametric or non-parametric test were performed. Between groups comparisons showed extremely significant ($p < 0.001$) improvement on DGI (4 ± 1.363), TUG test (2 ± 0.92) and PDQ 39 questionnaire (45.07 ± 10.62) in experimental group as compare to DGI (2.33 ± 1.496), TUG test (0.933 ± 0.70) and PDQ 39 questionnaire (42.53 ± 10.56) in control group. **Conclusion:** The study concluded that physical therapy with Music therapy is effective in improving gait, balance and quality of Life in patients with Parkinson's disease

Keywords: Parkinson's disease (PD), Physical therapy with music therapy, Quality of life (QOL), balance, Gait.

Introduction

Parkinson's disease has been known since biblical times but the symptoms was formally described by James Parkinson and termed 'the shaking palsy'.¹ Parkinson's disease is chronic, progressive and degenerative disorder of nervous system characterized by large number of motor and non-motor features. It is characterized by the cardinal features of rigidity, bradykinesia, tremor and postural instability.² Parkinson's disease is a second most common neuro degenerative disorder; that affects

more than 1.5% of the population above the age group of 60 years and 5% above the age group of 80 years. Based on this in India, approximately 0.32 million individual suffering from PD.^{3,4}

The causes of the Parkinson's disease are either genetic or environmental or may be both factors influence the disease.² The potential risk factors are age, gender, head injury, area of residence, occupation, pesticide exposure, exposure to metals and genetic predisposition. The term parkinsonism is used to describe a group of disorder with primary disturbance in dopamine system of basal ganglia (BG).^{2,5}

Primary motor symptoms of Parkinson's disease are rigidity, bradykinesia, tremor and postural instability. Non motor symptoms include mood disorder, orthostatic hypertension, bowel and bladder problems, integumentary changes, difficulty in speaking & swallowing and

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cognitive problems etc.² A range of motor and non-motor symptoms have severe consequences may cause postural instability and impaired functional mobility often leading to falls and decrease quality of life.⁶

Modern management of Parkinson's disease aims to obtain symptoms control, to reduce clinical disability and to improve quality of life. Music acts as a specific stimulus to obtain motor and emotional responses by combining movement and stimulation of different sensory pathways.⁷ According to research study Music therapy improves the cognitive function, reduce psychological and behavioral disturbances related to neurological disorder that promote functional recovery and quality of life of patients.³ So we explored Music therapy as a method for inclusion in Parkinson's disease rehabilitation programs and studying their effect on gait, balance and quality of life.

Method

An Experimental study was carried out on 30 Parkinson's disease patients taken from various neuro rehabilitation centers. Patients were selected according to the inclusion and exclusion criteria. Inclusion criteria's were patients diagnosed with idiopathic Parkinson's disease, both male and female, have to be responsive to levodopa therapy or other dopaminergic treatment, Age limit: 40 to 80 years, Modified Hoehn and Yahr stage 2, 2.5 and 3, Berg Balance score

>20. Patient were excluded based on the following criteria such as patient having secondary parkinsonism, severe sensory deficits, disease affecting movement (other than Parkinson's disease), patients having any mental health issue due to which assessment of patient becomes difficult, any recent history of musculoskeletal or cardiac disorder, any recent surgical history. The participants were assessed using DGI, TUG test and PDQ 39 questioner for gait, balance and QOL respectively before the intervention program and were divided into Experimental and Control Group by random allocation using envelope method.

Procedure

Ethical clearance was taken from Institutional Ethical Committee and Participants were selected according to inclusion and exclusion criteria. the aims, objectives and method of study was explained to the participants and written consent was filled. Both of the groups received treatment for duration of 60 minutes with appropriate rest period as required. Number of treatment sessions was 4 times/week for 6 weeks.

Experimental group: Physical therapy with Music therapy.

Each session consist of warm up period, workout session and cool down period. Warm period were included choral singing and bilateral upper extremity movement in sitting. Workout session were included passive stretching of major muscle group and strength training; while these exercises melodic instrumental music was played. Marching music was played during standing and marching activity. During gait training Waltz rhythmic music was played. Modify tap dance music was played during balance training. Cool down period was included breathing exercise with om music and fine motor movement on rocking chair. Exercises were given according to the need of patients. Rest period were also given to the patient if they required.

Control group: Conventional Physical therapy.

Each Session consist of warm up period, workout session and cool down period. Warm period were included active free movements in sitting, and bilateral upper extremity pattern to facilitate trunk rotation in sitting. Workout session were included passive stretching of major muscle group, strength training, active range of motion exercises, and wand exercises. Standing and marching activity, balance and gait training. Cool down period was included breathing exercise and fine motor movement on rocking chair. Exercises were given according to the requirement of patients. Rest period were also given to the patient if they require.

Result

Table 1: Baseline Demographic Data

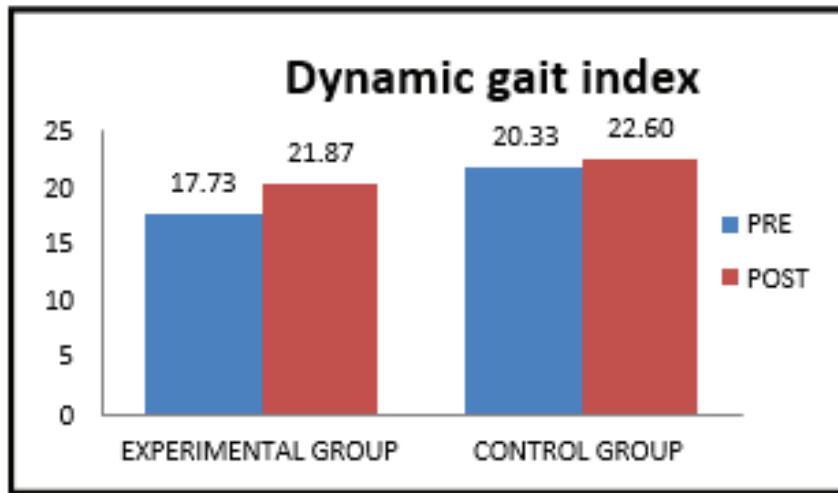
Demographic Data	Experimental group Mean± SD	Control group Mean± SD	P value
Age (years)	66.98±5.40	68.78±4.76	0.39
Male	11(73%)	12(80%)	0.32
Female	4(27%)	3(20%)	0.67
Parkinson's diagnosed since (years)	2±1.51	3±1.58	0.34

Table 2: Comparison of all outcome measures within and between experimental group and control group

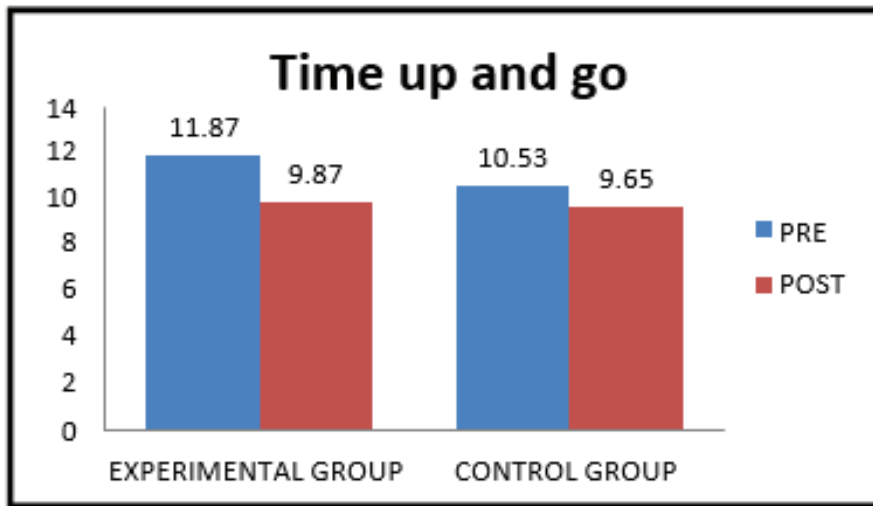
Outcome Measures		Experimental group Mean± SD	Control group Mean± SD	P value
Dynamic gait index	Pre	17.73±3.23	20.33±4.25	0.37
	Post	21.87±3.81	22.6±3.43	
	P value	0.0001	0.0001	
	Pre and post difference	4±1.36	2.33±1.49	0.003
Time up and go (second)	Pre	11.87±1.40	10.53±1.40	0.27
	Post	9.86±1.64	9.6±1.59	
	P value	0.0001	0.0001	
	Pre and post difference	2±0.92	0.93±0.70	0.001
PDQ 39	Pre	137.7±10.94	136.7±10.98	0.67
	Post	92.67±6.69	94.13±7.17	
	P value	0.0001	0.0001	
	Pre and post difference	45.07±10.62	42.53±10.56	0.005

Paired t- test was used for pre-test and post-test analysis.

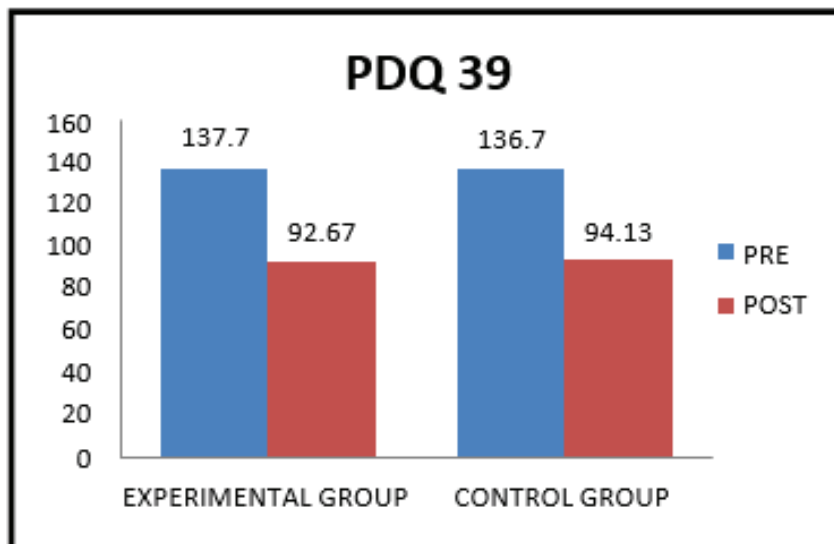
Unpaired t-test was used for comparison of pretest and posttest differences in all outcome measures between experimental and control group



Graph 1: Comparison between pre and posttest values of DGI in experimental and control group



Graph 2: Comparison of pre and posttest values of Time up and go score in experimental group and control group



Graph 3: Comparison of pre and posttest values of PDQ 39 questionnaire in experimental and control group

Discussion

The aim of the research was to study the effect Physical therapy with music therapy on gait balance and quality of life in patients with Parkinson's disease. Parkinson's disease (PD) is a second most common degenerative disorder of nervous system characterized by large number of motor and non-motor symptoms may have severe consequences for functioning of patients, affecting their activities of daily living and quality of life.⁴

Graph 1 and 2 show there is more significant improvement on dynamic gait index and time up and go test in individual who were undergoing physical therapy with music therapy as compare to conventional physical therapy. A similar study was carried out by Claudio P. et al in 2000, to study active music therapy in PD on emotional status, gait, balance and QOL, concluded that music improves emotional status, rhythmic limb movements, gait and freezing in patients with PD.⁵

It is difficult to determine the underlying mechanisms for improvements in gait and dynamic balance which reduces risk of fall in PD patients. Musical rhythm acts as template for organization of series of active movements, as well as reduces cognitive issues that affect motor performance and emotional state.⁸ It naturally combines cognitive movement strategies, cueing techniques, balance exercises and physical activity while focusing on the enjoyment of moving on music instead of the current mobility limitations of the patient. Motor facilitation in response to music therapy may be based on emotional reactions momentarily activating the cortical basal ganglia motor loop, the circuit which is primarily affected in PD.⁷ Music helps in movement facilitation, coordination and synchronization of active movement, improving emotional and mood state, that reduces clinical symptoms and improve their gait and balance.⁶

In our study Graph 3 show there is more significant improvement on PDQ 39 questionnaire in experimental group as compare to control group. It shows more significant improvement in quality of life in individuals who were undergoing Physical therapy with Music with therapy as compare to conventional physical therapy. Another analogous study was performed by M.J. de Dreua et al in 2008, who concluded that Music with movement therapy helps patients to Imagine and engaging in multiple activities which helps in improving motor symptoms in patients with Parkinson's disease. Mindful active ROM exercises program help in

improving abilities of individuals and in improving QOL of Parkinson's disease.⁶

A possible explanation for this result may be Physical therapy serve as reinforcement of the

motor program, but this type of intervention is usually lacking in the motivational and emotional spheres.⁹ So it has little influence on mood and emotional state. These psychosocial variables such as emotional state or psychosocial stress, strongly influence abnormalities in gait, posture and other motor performance, which affect their functional, emotional and social aspect of patient's life.¹⁰ Music such as rhythm, pitch & timbre has been shown to relax and reduce anxiety, modifying release of stress hormones, improve cardiac function and respiratory pattern. It also promotes socialization, involvement with the environment, expression of feeling, awareness and responsiveness.⁷ Hence music act as specific stimuli to increase motivation, reduce psychosocial stress and improve mood state which ultimately improve their QOL.

Conclusion

The study concluded that physical therapy with music therapy is effective in improving Gait, Balance and Quality of Life in patients with Parkinson's disease.

Conflict of Interest : There is no conflict of interest

Source of Funding : No Funding

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