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Effect of Flexibility Exercises with Muscle Energy Techniques in Improvement of Gait in Parkinson Patients – A Pilot Study

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Abstract

Background: Parkinson's Disease (PD) is a common chronic neurodegenerative disease affecting 1% of the population over 60 years of age with incidence and prevalence 1.5 to 2.0 times higher in men than in women. Mobility and gait limitations are major issues for people with PD and these clinical characteristics affect their daily life activities and participation in society. Several studies have been carried out to understand the relationship between mobility, gait limitations and HRQoL with mixed results. **Aims and objectives of the study:** To observe and analyse the effect of flexibility exercises with muscle energy techniques to improve the gait in Parkinson patients. **Data Analysis and Results:** This study shows that the pre and post mean values of average step length were 13.75 cm and 18 cm. Results of non-significant P value was $P < 0.05$ and also pre and post intervention of cadence were 45.65 / min and 55.45 / min. Results of significance P value was $P < 0.05$. **Conclusion:** It was concluded that flexibility exercises along with muscle energy technique shall have statistically significant improvement on cadence and not in step length and overall gait pattern in Parkinson patients was improved significantly.

Keywords: Flexibility exercises, Muscle energy techniques, Step Length, Cadence, Gait Pattern and Parkinson Disease.

1. Introduction

Parkinson's Disease (PD) is a common chronic neurodegenerative disease affecting 1% of the population over 60 years of age with incidence and prevalence 1.5 to 2.0 times higher in men than in women. PD affects physical, mental and psychosocial health, impacting quality of life (QoL).¹ QoL is a multi-dimensional construct defined as the individual self-perceived life function.²

Mobility and gait limitations are major issues for people with PD and these clinical characteristics affect their daily life activities and participation in society. Several studies have been carried out to understand the relationship between mobility, gait limitations and HRQoL with mixed results.^{3,4}

Parkinson's disease (PD) is a neurodegenerative disease that occurs in more than a million people in the United States. This disease is mainly characterized by the following symptoms: impaired gait, bradykinesia, rigidity, tremors, diminished expression, kyphotic posture, seborrhoea, and sialorrhoea. Onset of this disease can range from 40 to 70 years of age. There has also been a form of the disease that strikes people in their teens. Relatives of individuals with PD have an increased risk of the disease. Presently, PD is attributed to the lack of a neurotransmitter called dopamine.⁵

A chemical imbalance due to the lack of dopamine aggravates the symptoms of the disease, leaving patients eventually incapable of accomplishing simple tasks of daily living. Consequently, physicians usually prescribe carbidopa-levodopa to offset the imbalance. The molecule dopamine cannot be used as treatment because it is too large to cross the blood brain barrier; therefore, its precursor levodopa is used. Research suggests that an exercise regimen can increase dopamine levels and metabolism, which subsequently increases

functional independence in PD subjects.^{6,7} One study investigated the history of physical activity in adulthood prior to the occurrence of PD in order to determine if regular physical activity was associated with a lower incidence of PD.⁶

In neurological patients, Parkinson's disease is the most common disorder leading to gait disturbance and falls.⁷ Despite advances in pharmacological treatments and surgical techniques, gait and balance deficits still persist and are associated with loss of independence, immobility and high cost for healthcare systems.⁸ Therefore, the development of rehabilitation approaches that work in conjunction with current treatment is important to manage these problems.

Gait abnormalities in Parkinson's disease are characterised by bradykinesia and a shuffling gait pattern, "marche a petit pas". More specific changes in Parkinson's disease gait include decreased walking speed, shortened stride length, insufficient heel strike and toe clearance, inadequate flexion about the hip, ankle, and knee, and asymmetric stride times for both lower limbs.^{9,10} Impaired control of purposive limb movement resulting, in part, from postural instability and disequilibrium contribute to the overall parkinsonian profile.

Functional independence is related to the capacity to perform activities of daily living (ADL) independently. Balance and mobility are crucial to their performance. Motor disturbances related to Parkinson's disease (PD) can contribute to the decline of balance and mobility^{11,12} which subsequently can lead to a reduction in functional independence. As a consequence, individuals with PD experience an increase both with difficulties in performing daily activities and in the risk of falls.¹³

The aim of this study to observe and analyse the effect of flexibility exercises with muscle energy techniques to improve the gait in Parkinson patients. By obtaining and understand of Parkinson patients, the physiotherapy treatment may include flexibility exercises with muscle energy techniques to improve the gait in Parkinson patients.

2. Material and Methods

Study Design:

Pilot Study.

Study Setting

Chandrabhai Hospital, Madurai.

Study Duration

12 Months.

Study Sampling

Convenient Sampling.

Study Population

In and Around Madurai District.

Study Sample

15 Patients.

Criteria of Selection

Inclusion Criteria

Parkinson patients with ambulatory capacity

Age Group: 50-70 years

Sex: Both

Exclusion Criteria

Psychological Patients

Non-co-operative Patients

Amputated Patients

Cardiovascular diseases

Variables

Step Length

Cadence

Intervention

Flexibility exercises with Muscle Energy Techniques.

Procedure

15 patients fulfil the criteria of selection were selected and recruited for this study through convenient sampling. Their signed informed consents were taken to participate in this study. Their demographic data including vitals were collected and documented.

Pre intervention step length (in cm) and cadence in cm were measured and documented. Flexibility exercises with Muscle energy techniques for both upper and lower limbs were given for 45 minutes per session per day, 5 days per week for 12 weeks.

Post intervention step length and cadence measurement were measured and documented. Appropriate statistical method for data analysis were selected and applied. Data analysis was done by spss 16.0 software version for windows.

3. Data Analysis and Results

Shapiro Wilk test was used for checking normality distribution of data and student t test was used for analysis between variables.

Pre and post intervention values of mean values of step length in Parkinson patients of this study were 13.75 cm and 18 cm respectively. Results were of non-significant p value was $p < 0.05$ explained that after flexibility exercises with muscle energy technique to the patients the gait pattern was improved statistically in the mean value but overall due to a smaller number of patients the results are not statistically significant.

Pre and post intervention mean values of cadence in Parkinson patients of this study were 45.65 / min and 55.45/ min respectively. Results of significance p value were $p < 0.05$ explained that after Flexibility exercises with Muscle energy technique to the patients the gait pattern was improved statistically.

Table 1: Comparison of pre and intervention values of mean, SD and p value with student t test (Source: Author).

No of Subjects	Variables	Pre	Post	P value
15	Step Length (in cm)	13.75 ± 12.25	18.0 ± 13.33	0.7192 [#]
	Cadence (in cm)	45.65 ± 15.67	55.45 ± 21.68	0.0423 [*]

[#] Non-Significant p value, ^{*} Significant p value



Fig 1: Muscle Energy Technique Performance (Source: Author)



Fig 2: Measurement of Step Length (Source: Author)

4. Discussion

Improvement in gait pattern of the patients involved in this study after the intervention of Muscle energy technique (MET) was happened might be due to physiological response and changes in neurons of central nervous system in response to flexibility exercises to the affected musculature and development of new neuron and its connections and neural plasticity as a whole.

This study results strengthened the concept of J. Battie et al stated that moderate-intensity Pole Striding exercise promotes perceived independence in activities of daily living and quality of life in persons with stage one, two, or three PD. Additionally, the finding from this study provides sufficient evidence to merit a larger randomized clinical trial.¹⁴

On the basis of this study results it can be referred that Muscle energy technique to the Parkinson patients to improve gait pattern. As a whole Muscle energy technique was improved functional activities of Parkinson patients in their various day to day activities has been proved by this study results.

This study can be further explored to do in large number of subjects and experimental study design to extract better statistically significant results.

5. Conclusion

It was concluded that flexibility exercises along with muscle energy technique shall have statistically significant

improvement on cadence and not in step length and overall gait pattern in Parkinson patients was improved significantly.

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