

A Comparative Study between General Exercise and Frenkel's Exercise among Parkinson's

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Abstract

Background: Parkinson's disease affects the neuromuscular system due to the degeneration of the dopamine producing cells. The major symptoms are rigidity of the muscles, unilateral tremors, slow movements, postural changes. An even distribution of weight enabling someone or something to remain upright and steady is known as balance. Parkinson patients are prone to falls due to the gait changes and postural instability. The causes of postural changes in Parkinson's patients can be attributed to a numerous factors and the parkinsonian population is diverse. The effect of Parkinson's disease on active daily living appears unclear, with studies reporting decrease activities of the patient. The decrease activities are effective predictors of postural deficits and falling of Parkinson's disease patients.

Objective: To compare the effects of general exercise and Frenkel's exercise in Parkinson's.

Methodology: 10 Parkinson's patients under medications, both male and female aged above 50 years and categorised between mild to moderate according to PDQ 39 questionnaire were selected and divided in to two groups, Group A and Group B. General exercise and Frenkel's exercises were given to each groups respectively. The pre and post test scores were analysed.

Outcome Measures: PDQ-39 questionnaire.

Results: The results show that Frenkel's exercise shows much more improvement than general exercise.

Conclusion: From the results it is evident that Frenkel's exercise is effective than general exercise. Hence it is suggested that Frenkel's exercise can be used to show better improvement.

Keywords: Parkinson's, general exercise, Frenkel's exercise, posture, balance.

I. INTRODUCTION

Parkinson's disease is progressive and affects the central nervous system. Parkinsonism collectively describes the disorders of the disease where the disturbance is seen in the dopamine system of the basal ganglia due to both genetic and environmental influences. It was described by James Parkinson in 1817 as "shaking palsy". Among the neurodegenerative disorder Parkinson affects 2% of the people of age 65 or above second to Alzheimer's. 50-60 years is the average age of onset of the disease while the early onset may be between 21-40 years. Men are affected more common

than women. The most common type of Parkinsonism is idiopathic that affects around 78% of the patients¹.

Secondary parkinsonism is caused due to varying causes such as drugs, toxins, vascular conditions such as infarct, viral infections etc. Genetic mutations results in familial Parkinsonism. The environmental factors that may cause the disease are manganese, carbon monoxide, organic solvents and pesticides. The degradation of the dopaminergic neurons causes the disease. Dopamine is produced by the nerve cells present in the basal ganglia in the pars compacta of the substantia nigra. The clinical symptoms appear only after 30% to 60% of the degeneration.¹

Symptoms can be classified as motor and non motor symptoms. The primary motor symptoms or the cardinal signs of Parkinsonism are the tremor, rigidity, bradykinesia / slowness of movement and postural instability. The symptoms initially begins unilaterally and the progresses to both sides. The secondary motor symptoms are loss of muscle strength, fine motor skills and festinating gait pattern due to postural instability. Postural instability and alteration of gait increases the risk of falls.¹

Frequent falls results in loss of independence, injuries, decreased activity which will eventually result in social isolation. The loss of activity may cause osteoporosis and cardiovascular disorders that eventually leads to increase in cost of health care, and decrease in the quality of life. Also there may also be poor hand to eye coordination that affects everyday activities such as dressing, bathing, eating. The non motor symptoms include dysphagia, sensory symptoms, speech and cognitive disorders, anxiety, depression and sleep disturbances³

Progression of the disease varies with patients. There is no definitive diagnosis for the disease and diagnosis is based on the basis of history. The motor deficits cannot be treated with drugs or neurosurgery alone. As time progresses the symptoms may tend become worsened but does not result in death. The effects of Parkinson disease can be reduced using pharmacological treatments. The pharmacological treatment relieves only the symptoms and does not stop the disease progression. Hence non pharmacological treatment is necessary for an effective treatment.³

Dr. H. S. Frenkel devised a system of exercises to treat ataxia which is commonly known as Frenkel's exercise when the coordination was improved in a tabes dorsalis patient which was a result of constant practice. The exercise was designed to restore dexterity and increase the ambulation and also to bring back rhythmic, smooth and composed developments. Frenkel recommended that the pursuit of voluntary regulation of movement through the use of any part of sensory mechanism is similar to that of learning a new exercise.^{2,6}

Patients with alternate sensation which is intact, usually vision and hearing can develop control of movement. The principles of the exercises are repetition, precision, concentration, progression and speed. The progression should not be in power; only the difficulty has to be increased. Only when the patient achieves perfection of the movement the exercise has to be progressed. The re education usually starts in the lying position and progresses to sitting then finally standing.

Exercise is aimed to improve the physical fitness of the individual. Exercises have neuroprotective mechanism as it increases oxygenation of the brain, releases neurotrophic factors, promote the growth of cells which in turn increases the quality of life and increases the effects of medication. The benefits of exercise include increase in the flexibility, range of motion, muscle fatigue, reduction in anxiety, depression insomnia and constipation.

Parkinsonism disease progression can be slowed down with the help of exercises. Individually prescribed exercise programs have proven to be effective in reducing falls in elderly patients with Parkinson's disease.⁵ For exercises to be beneficial consistency is the key and the exercises must be progressive in nature. Early parkinsonism can be slowed down as dopaminergic neurons are highly responsive to exercises and understanding the mechanism of exercise effects on brain would yield a better result..

Aim Of The Study

Aim of the study is to find the effect of general exercise vs frenkel's exercise among Parkinson's patients.

Need For the Study

Parkinson's patients are often presented with co-ordination problems due to disruption of basal ganglia. By minimizing the co-ordination problems will reduce the patient's dependency level. Hence the study is to administer an interventional program and compare the effects in reducing the patient's dependency level.

Hypotheses

Null Hypothesis:

There is no significant difference between the General Exercise and Frenkel's Exercise among Parkinson's.

Alternate Hypothesis:

There is a significant difference between the General Exercise and Frenkel's Exercise among Parkinson's.

II. METHODOLOGY

STUDY DESIGN	:	Experimental Study
STUDY TYPE	:	Comparative Study
STUDY SAMPLING	:	Convenient Sampling
SAMPLE SIZE	:	10
STUDY DURATION	:	8 Weeks
STUDY SETTING	:	Dr. Arjundas Rehab Centre. m)

Inclusion Criteria

Both Men and Women

Age more than 50 years

Parkinson disease questionnaire 39 (mild to moderate grade)

Patients who are diagnosed with Parkinson's disease and under medication – Syndopa

EXCULSION CRITERIA

Any other secondary diseases.

Any recent injury.

Any recent fracture

Procedure

A total number of 10 parkinson's patients were selected according to the inclusion and exclusion criteria. The procedure was explained and informed consent was obtained. The pre-test score was obtained using the PDQ-39 questionnaire. The PDQ-39 questionnaire is a 39 item self report questionnaire with 8 domains that assess the impact and well being of the Parkinson's patient. Based on the score the patients were categorised from mild to moderate. After obtaining the pre test score the patients were divided into two groups with 5 patients in each group, Group A and Group B.

GROUP A were given General Exercise

GROUP B were given Frenkel's Exercise.

For Group A

The general exercise program included flexibility, stretching, posture, co-ordination, balance, walking, relaxation and breathing exercises.

Flexibility

1. Head tilt forward and backward
2. Head tilt sideways.
3. Move chin forward and backward

Stretching

1. Arms raised above the head and clasped
2. Bend the trunk sideways

POSTURE

1. Trunk pressed against the walls with shoulder tucked in backwards
2. Position was held for 30 seconds and relaxed.

Coordination

In sitting

1. Simultaneously lift left arm and right knee
2. Lift right arm and left knee
3. The alternating movement was repeated

Balance:

Exercise I

1. Stand with feet apart
2. Shift weight from one hip to other

Exercise II

1. Stand with chair support
2. Swing one leg forward and backward
3. Repeat for the other leg

Exercises were given for a period of one month and for 45 minutes a day. The post test score was obtained after a month of completion of general exercises.

FOR GROUP B Frenkel’s exercises were performed in lying, sitting and standing positions.

FRENKEL’S EXERCISE FOR THE LEG IN LYING

1. Heel sliding
2. Heel of one limb to the opposite leg
3. Heel sliding from knee along the shin of the other leg

FRENKEL’S EXERCISE FOR THE LEGS IN SITTING:

A point was marked on the floor

1. Leg was slid to reach the marked point
2. The alternate limb was also placed on the marked point
3. In stride standing, the patient was asked to stand and sit

Frenkel’s Exercise For The Legs In Standing:

1. Patient was asked to stand in stride standing and weight transfer from one leg to another.
2. One leg was placed forward and backward
3. Side walking
4. Walk along the strip

Frenkel’s exercise will be given for a period of 4 weeks. Each exercise was repeated 10 times. Both the pre and post test scores were analysed and the results were obtained.

Outcome Measure

Parkinson disease questionnaire 39

III. STATISTICAL ANALYSIS

The collected data was tabulated and data analysis was done using **IBM SPSS version 2.0 software.**

TABLE I

COMPARISON OF PRE TEST AND POST TEST MEAN VALUES OF PDQ 39 QUESTIONNAIRE IN GROUP A AND GROUP B

		Mean	N	Std dev	Mean difference	T	Sig
Group A	Pre-test general exercise	87.8	5	3.2555	4.42	3.60	.023
	Post-test general exercise	83.4	5	4.1016			
Group B	Pre-test frenkel’s exercise	80.6	5	5.9419694	42.08	8.82	.001
	Post-test frenkel’s exercise	38.6	5	7.6148			

Table I represents the mean of Group A and group B.

The table shows pre test mean value 87.8 of PDQ-39 QUESTIONNAIRE has statistically significant reduction to 83.4 in post test (P<0.05) in GROUP A who have undergone general exercises, similarly the pre test mean value 80.6 of

PDQ-39 QUESTIONNAIRE has a statistically significant reduction to 38.6 in the post test p(<0.05) in GROUP B who have undergone frenkel’s exercises.

GRAPH I

GRAPHICAL REPRESENTATION OF THE PRE TEST AND POST TEST OF GENERAL EXERCISE AND FRENKEL'S EXERCISE

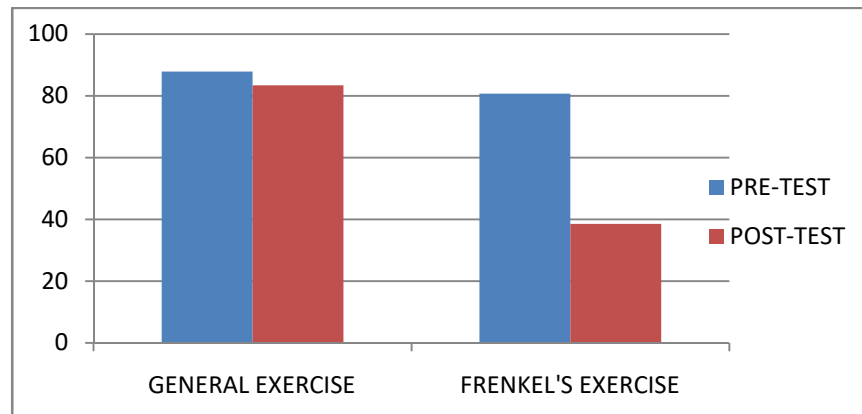


TABLE II

COMPARISON OF THE POST TEST OF GROUP A AND GROUP B

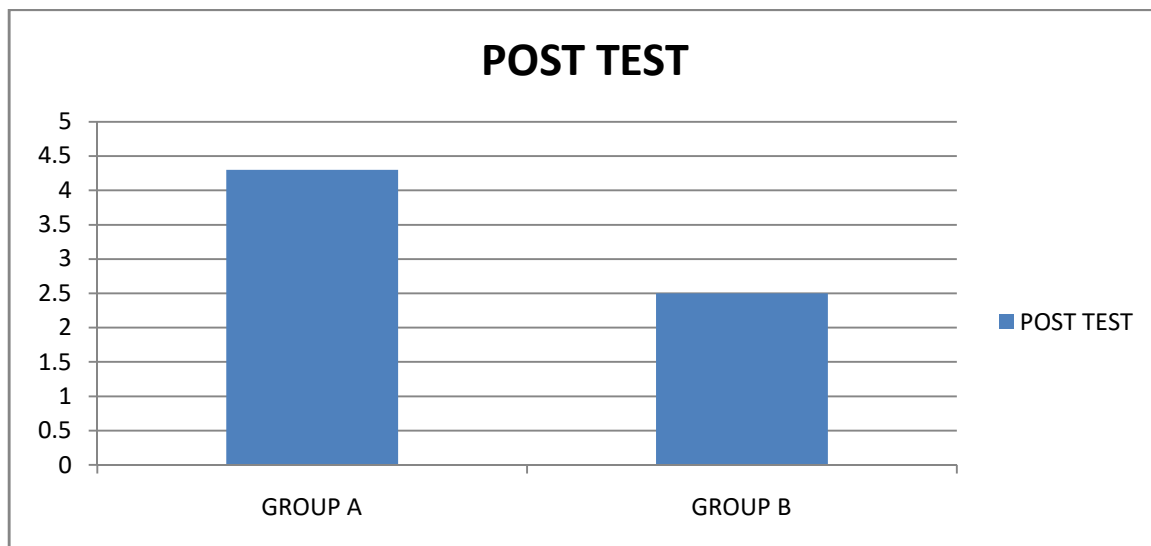
Outcome measure	Post test group	Mean	N	Std dev	t value	Df	Sig(2 tailed)
Parkinson disease questionnaire	Group A	83.4	5	4.1	11.5	8	.000
	Group B	38.6	5	7.6			

P value <0.05 shows the significant results.

According to table II the mean post test value for GROUP B is 38.6 which shows statistically significant reduction than the mean post test values 83.4 in Group A in PDQ 39 QUESTIONNAIRE(p<0.05).

GRAPH II

GRAPHICAL REPRESENTATION OF POST TEST OF GROUP A AND GROUP B



IV. RESULTS

The Table I and Graph I shows the pre test mean value 87.8 of PDQ-39 QUESTIONNAIRE has statistically significant

reduction to 83.4 in post test (P<0.05) in GROUP A who have undergone general exercises ,similarly the pre test mean value 80.6 of PDQ-39 QUESTIONNAIRE has a statistically

significant reduction to 38.6 in the post test $p(<0.05)$ in GROUP B who have undergone Frenkel's exercises.

According to Table II and graph II the mean post test value for GROUP B is 38.6 which shows statistically significant reduction than the mean post test values 83.4 in GROUP A in PDQ 39 QUESTIONNAIRE ($p<0.05$).

Comparing the result of group A and group B, Group B (Frenkel's exercise) is statistically significant.

V. DISCUSSION

Parkinson's disease leads to mobility impairments, cognitive dysfunction, reduced balance, in coordination and postural instability. The study is formulated to demonstrate the effectiveness of general maintenance exercise and Frenkel's exercise in Parkinson's in improving the symptoms of the Parkinson's. The study does not target on individual symptom but focuses on the overall improvement of the patient. There are 2 major factors which is said to worsen the disease. The inability to perform movements which is a hallmark of the Parkinson's disease. This inability in turn results in reduction of the physical activity and the sedentary behaviours. Eventually the patient is disabled due to these multiple impairments. The other factor is the poor management of the Parkinson disease which is said to be the cause of premature death.²²

The total number of participants for this study is 10, age group of 50 and above and those who have mild to moderate Parkinson disease. They were categorised as mild to moderate according to the PDQ 39 questionnaire. The questionnaire consists of 8 domains such as activities of daily living, attention and working memory, cognition, communication, depression, functional mobility, quality of life, social relationships and social support. Hence this questionnaire is valuable in assessing the Parkinson's patients.

Frenkel's exercise is given for the patients with in-coordination or balance disorders. There are studies which suggest that Frenkel's exercise improves in-coordination and there are other studies which says that exercise has effect on Parkinson's. Frenkel's exercise is not intended to improve the strength. Frenkel's exercises are repeated and then progressed that helps in improving the co-ordination. Exercise induces change in the behaviour as well as cognitive functions. There are very less studies available on the effect of Frenkel's exercise for Parkinson and there are no studies comparing the Frenkel's exercise and general exercise.

The results from this study show that Frenkel's exercise is significant than the general exercise. The table 1 shows that the value comparing the pre and post test of Frenkel's exercise is .001 and the pre test and post test value of general exercise is 0.23.

Petzinger G Met al. said that exercises induce alterations in the basal ganglia and behavioural changes due to cortical hyper excitability. Studies show that during exercise

the oxygenation to the brain increases which helps in the synthesis and metabolism of neurotransmitters, neurotrophic factors improves the neural learning. Comparing both the exercises, Frenkel's shows significant improvement in the post test than general exercise. **Rojhani-Shirazi** stated that frenkel's exercise needs higher concentration levels and visual feedback which have to utilize the internal and external perturbation to improve balance. **Mohammed Reza Vafaenasab** stated that Frenkel's exercise can be given to improve both static and dynamic balance.

Since there are no studies available on the effect of Frenkel's and general exercise, this study intends to compare both. It is evident that Frenkel's is much more significant compared to the general exercises.

VI. CONCLUSION

This study concludes that both Frenkel's and General exercises had an impact in the pain and cramps among the Parkinson's disease. But, Frenkel's exercise had an overall improvement in the coordination, balance, emotions, communication etc. Hence, comparing the values of both the exercises it is evident that Frenkel's exercise can be used in effectively treating the parkinson's patients.

VII. LIMITATIONS AND RECOMMENDATIONS

Limitations

- Small sample size.
- Difficulty in handling the patients.

Recommendations

- Sample size can be increased.
- Duration can be increased.
- Can be done in early Parkinson's patients.
- Patients with severe Parkinsonism can be taken for the study.

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