

Efficacy of Otago Exercises versus Pilates Exercises on Balance and Low Fall Risk in Stage 3 Parkinson's disease.

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ABSTRACT

Background: Parkinson's disease is a neurological condition that primarily affects people between the ages of 50 and 60. In individuals over 65, the incidence and prevalence of Parkinson's disease is 1%. The disease's motor characteristics include bradykinesia, stiffness, truncal hypertonia, and poor motor coordination, which impairs balance. Evidence-based research has demonstrated the effectiveness of Pilates and Otago exercises in enhancing balance. However, there aren't many studies that compare these two regimens, and additional research is needed to determine how beneficial they are.

AIM & OBJECTIVE: To compare the effectiveness of Otago exercises versus Pilates exercises on balance among stage 3 Parkinson's subjects.

METHODOLOGY: A total of the 65 participants who were recruited, 60 participants who met the inclusion criteria were split into two groups: 30 people in Group A (Otago) and 30 people in Group B (Pilates exercise). The subjects were all between the ages of 40 and 60. Interventions were administered five days a week for eight weeks. Outcome measures were evaluated using The Berg Balance Scale to assess balance in both before and after the intervention.

Result: A paired student t test revealed that there was a statistically significant difference within the group. Otago (group A) had pre-test and post-test mean scores of 46.63 and 50.9, while Pilates (group B) had pre-test and post-test mean scores of 47.07 and 50.43, respectively. An independent student t test was employed to ascertain whether the post-test mean value differed across the groups in a way that was statistically significant.

Conclusion: This study found that 8 weeks of Pilates and Otago exercises significantly improved balance. But when the groups were compared, it was discovered that Otago exercise was more successful in enhancing balance in stage 3 Parkinson's disease patients.

Keywords: Berg Balance Scale, Otago exercise, Pilates exercise, Parkinson's disease, and balance.

INTRODUCTION

Parkinson's disease is a chronic, progressive neurodegenerative disease characterized by both motor and non-motor features of unknown etiology causing disability, increased mortality and reducing the quality of life¹. Parkinson's disease affects 1% of adults over 65, and its incidence and prevalence rise with advancing years. A disorder of the extra pyramidal system, Parkinson's disease is caused by damage to the basal ganglia, which leads to progressive degeneration of dopaminergic neurons in the substantia nigra and pars reticulata, which project to the striatum. Parkinson's disease patients only experience the disease's motor features after 50% to 80% of their dopaminergic neurons have been lost, suggesting that the disease may have been involved in the early stages².

Parkinson's disease's motor symptoms include bradykinesia, resting tremors, stiff muscles, trouble walking, and loss of balance, bad posture, and stiff joints. Before the start of motor symptoms, it may also include a variety of non-motor presentations, such as depression, sleep difficulties, and cognitive abnormalities.

The goals of physiotherapy programs for people with Parkinson's disease are to increase their functional ability, mobility, and balance³.

Physiotherapy management focuses on improving the functional capacity, mobility and balance. Otago exercises and Pilates are shown to decrease the symptoms and improve balance thereby reduce fall incidence in Parkinson's patients. Otago workouts have 3 components i.e. walking, balance training, and

muscle strengthening. The Otago exercise program seeks to improve general health, fitness, balance, and falls prevention. It has been shown that older adults over sixty years old experience an average 35% decrease in falls⁴. The Pilates method uses the subject's own body weight as resistance during floor exercises. Pilates has become increasingly popular recently and appears to be an effective way to improve quality of life, postural balance, and trunk muscles³.

The Berg balance scale was designed to evaluate older persons' balance, identify various balance deficiencies, and forecast falls. There are 14 components in all, and the highest possible score is 56⁵.

This study is done to compare the effectiveness of Otago exercises and Pilates in improving balance thereby reducing risk of falls in Parkinson's patients.

METHODOLOGY

A total number of 65 subjects were selected from Department of Physiotherapy, KIMS General Hospital, Amalapuram. 60 subjects fulfilled the inclusion criteria were randomly assigned into two groups, 30 Subjects in Group A (Otago) and 30 Subjects in Group B (Pilates). An Experimental study comparative in nature pre-test and post-test design is used. The treatments were conducted for a period of 1 Hour a day, 5 days a week for 8 weeks. The subjects were selected by using purposive convenient sampling method. Berg balance scale scores were evaluated pre-test and post-test in both Group A (Otago) and Group B (Pilates). The inclusion criteria are both Male and female patients between the ages of 40 and 60 who have Stage 3 in Hoehn and Yahr scales of disability for Parkinson's disease and a Minimental state examination (MMSE) score of 24 or above, as well as low fall risk scores between 41 and 56 in berg balance scale. The exclusion criteria are the subjects with sensory and auditory deficits, non-ambulatory subjects, subjects with cognitive impairment, and subjects with Parkinson's plus syndrome. Before the treatment all the subjects were explained about the study and the procedure. They were asked to inform if they any discomfort during the course of study. Written consent was obtained from all the subjects.

PROCEDURE

Subjects in Group A and Group B both received treatment for 1 hour duration consisting of 30 minutes of intervention 30 minutes of conventional therapy.

Exercise Intervention in Group A: Otago Exercise

Otago exercise program consists of mainly 2 exercises:

1. Strengthening exercises of lower limb that includes knee extensors, knee flexors, hip abductors, ankle plantar flexors, and ankle dorsiflexors. The starting levels are determined by the amount of ankle cuff weight, the person can use to perform 8-10 repetitions before fatigue. This is to be assessed for each muscle group.
2. Balance retraining program which consists of knee bends, backward walking, walking and turning round, sideways walking, tandem stance, tandem walk, one leg stand, heel walking, toe walking, heel toe walking backwards, sit to stand, stair walking⁸.



Fig.1. Knee strengthening exercise



fig.2. toe walking on parallel bar

Exercise intervention in Group B: Pilates Exercise

Pilates exercise consists of 10 types of exercises as follows: ¹⁰.

1. Hundred (with head down)
2. Shoulder bridge
3. Single leg circles
4. Alternate toe tap
5. Leg pull front
6. Spine twist
7. Ball leg lift
8. Standing side splits.
9. Ball wall squat.
10. Tandem walking.



Fig.3.shoulder bridge of pilates exercise

Conventional Program for Both Groups:

- Range of motion exercises of lower extremity done 10 times for one set.
- Stretching exercises for lower extremity which was held for 15 sec hold time for 3 sets.
- Strengthening exercises for the lower extremity which was done 12 times for 3 sets
- Progressive weight shifts done for 10 repetitions alternative unilateral weight bearing done in sitting position for 10 repetitions
- Reaching done in sitting position for 10 repetitions
- Axial rotation of the head and trunk done in sitting position for 10 repetitions.

RESULTS

The results of this study were analyzed using Microsoft Excel 2007 and SPSS software version 25.0. Mean $\pm$ standard deviation was used to display descriptive statistical data, and mean difference percentages were computed and shown. To determine whether there was a statistically significant difference in the mean value between Group A (OTAGO) and Group B (PILATES) exercises, an independent student t test was used.

To determine the statistical difference between the groups for the OTAGO and PILATES exercises, a paired student t test was used. All 60 participants finished the research, which lasted eight weeks in the outpatient setting.

DATA ANALYSIS

TABLE-1: ANALYSIS OF PRE TEST AND POST TEST MEANS OF BERG BALANCE SCALE within GROUP-A & GROUP-B

Groups	Test	Mean	S.D	T-Value	P-Value
Group A (otago)	Pre test	46.63	0.93	17.82	0.00
	Post test	50.90	1.18		
Group B (pilates)	Pre test	47.07	1.23	12.51	0.00
	Post test	50.43	1.30		

This table refers a significant difference between pre-tests and post-tests in Bergbalance scale measures between Group A & Group B, p value is <0.05

The berg balance score averages of post-test groups A [Otago] and B [Pilates] have significantly improved, as shown in the above table. But when the groups are contrasted, group A exhibits a notable improvement over group B.

DISCUSSION

In this study, out of sixty-five subjects five subjects dropped out, two from the Otago exercises and three from the Pilates exercises due to various reasons. The Berg balance scale is used as an outcome measure to assess balance.

The subjects in Otago Group showed significant improvement when compared to pre-test and post-test mean values. The reason for improvement in Otago group might be because of Otago workout programs consists of a series of exercises for strengthening the leg muscles thereby improving balance. The underlying mechanism might be because of improvement in bone density of the pelvis and spine, as well as enhanced muscle coordination and activation. Additionally Improved balance is also linked to the visual, vestibular, and proprioceptive systems, which are all activated by receptors found in muscles, joints, and the ligaments that surround them. These receptors react to strengthening exercises by sending information to the brain, where it is processed and signals muscles to contract or relax to produce the desired action. Exercise-induced neural circuits improve balance by applying more effective neuronal units, reorganizing the somatosensory cortex, and increasing the strength and efficiency of synaptic connections¹⁷.

Pilates showed a significant difference in subjects of group B after 8 weeks of interventions in berg balance scores. This may be attributed to the Pilates workout program's incorporation of core stability exercises, including trunk flexion, trunk extension, lateral trunk flexion, and the engagement of the lumbo-pelvic complex²⁴. Research indicates that Pilates movements, a type of resistance exercise utilising body weight as resistance and increasing repetitions for overload, significantly affect skeletal muscle activity.

Consequently, the analysis of the current study indicates that individuals with Parkinson's disease derive advantages from both Otago and Pilates activities, in conjunction with conventional physiotherapy, to enhance balance. However, OTAGO exercises shown superior results than PILATES activities when analysed on their mean values. According to the results of this study individuals with Parkinson's disease will exhibit significant improvement in balance with Otago exercise program along with conventional physiotherapy.

CONCLUSION

The study determined that both Otago and Pilates exercises are useful in enhancing balance in individuals with Parkinson's disease; however, Otago exercise is superior to Pilates in this regard.

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