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CASE REPORT

Effectiveness of Otago Exercise on Fall Risk Prevention in Elderly – A Case Study

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ABSTRACT

Globally falls and their consequences are significant public health challenges for the older population, caregivers and healthcare providers. The present study was undertaken to find out the effectiveness of Otago exercise on fall risk prevention in elderly. The study was performed on a 72 years' old to find out the effectiveness of Otago exercise on fall risk prevention in elderly. The study was done on 72 years old female patient to assess the effectiveness of Otago exercise in prevention of fall risk. The timed up and go test was used to assess. After 6 weeks of treatment there was significant reduction in TUG test score. According to this case study the Otago exercise program was found to be highly effective in reducing fall risk in elderly.

Keywords: Otago, Otago exercise program, Fall prevention, Fall risk

INTRODUCTION

Conventionally, "Elderly" has been defined as a chronological age of 65 years older, while those from 65 through 74 years old are referred to as "early elderly" and those over 75 years old as "late elderly"¹. According to the 2022 United nations world population prospects, the percentage of people aged 65 and older is projected to increase from 10% in 2022 to 16% by 2050². This demographic shift not only increases the population of older adults but also significantly heightens the total number of falls, which are now recognized as a major

health concern globally³. However, with progressive aging, older individuals are commonly subjected to the following complications: reduced muscle mass, strength, bone density, abnormal breathing, a long reaction time, cognitive ability deterioration and a tendency to fall⁴.

Falling refers to falling on the ground or below the level without conscious or external force⁵. Fall may be first indication of undetected illness⁶. Globally falls and their consequences continue to be significant public health challenges for the older adult population caregivers and health care providers⁷.



Although not all the falls are life threatening, it has been reported that 10-20% of falls result in severe injuries, such as fractures, that can lead to increase morbidity and decreased quality of life ⁸.

Fear of falling (FoF) is defined as a lasting concern about falling that can lead individuals to avoid activities that they remain capable of performing ⁹. After a fall, older adults frequently report increased fear of falling or reduced balance confidence. This can lead to activity restriction because of concerns about possible falls ¹⁰.

Concurrently, balance plays a major role in constituting a high risk fall and a subsequent reduction in balance confidence ¹¹. Balance is defined as the ability to maintain the projection of the body's center of mass within the limits of the base of support, as during walking ⁸.

The Otago Exercise Program (OEP) is a multimodal exercise program which was developed by Professor John Campbell at the university of Otago in Dunedin, New Zealand, encompassing all the components necessary to yield improvements in the balance and functional capacity of the elderly population. The OEP comprises six balance exercises and 4 strengthening exercises and has been considered a feasible approach to be utilized as a home-based rehabilitation ⁴.

CASE PRESENTATION

A 75 years old female patient presented with complains of weakness in the legs, swaying of body while getting up from the chair and also while walking. She was apparently normal 3 years back, after which she got infected with corona and started developing weakness in the legs. Also, she experienced swaying of body while walking and she developed fear of falling.

She has no significant surgical or family history. She is a known case of hypertension since 2 years. Her personal history shows a mixed diet, normal bowel and bladder habits and normal appetite. Based on the Kuppuswamy Scale she belongs to upper middle class.

On observation, the patient had a mesomorphic built. On palpation, crepitus on right knee was noted. Manual muscle testing revealed lower limb (left side) muscle strength as 4/5, while (right side) muscle strength as 3/5. Special test performed was timed up and go test. The score was 13.8 seconds which indicated that she has increased risk of falls.

MATERIALS & METHODS

The participant was a resident from a village in Karkala. Informed consent was obtained.

Inclusion criteria

- Old age ≥ 65 years
- Having a risk of fall (TUG ≥ 14 seconds)
- Able to ambulate independently (with or without the assistance of walking aid).

Exclusion criteria

- Older adults with vision or hearing impairments
- Experience of postural hypotension
- Elderly having previous hip replacement surgery or previous lower extremities fracture in last 12 months
- Patient with any neurological conditions.

Outcome measure

Timed Up and Go Test (TUG Test)

Procedure

- The test begins with the person sitting in a chair, with armrests
- They rise from a chair, walk three meters, turn around walk back to chair and sit down.
- The time taken to complete the entire task is recorded in seconds.

Interpretation

1. Normal: Generally, 10 seconds or less.
2. Good mobility: Times within 10-20 seconds range may indicate good mobility, allowing the individual to go outside alone and move around independently without needing a gait aid.
3. Increased risk of falls: A TUG time of 13.5 seconds or more.
4. Significant impairment: Time exceeding 30 seconds.

Procedure

The patient was scheduled for physiotherapy three times per week for total six weeks. The exercise was given totally for 30 minutes per day. Treatment consists of-

Strengthening exercises

1. Front knee strengthening exercise

Strap the weight cuff onto the patient's ankle. Sit in a chair with feet flat on the floor. Straighten the leg out as far as you can. Then slowly lower the leg. Repeat 10 times on both the legs [Fig. 1](#).





Fig. 1: Front knee strengthening

2. Side hip strengthening exercise

Strap the weight cuff onto the patient's ankle. Stand up straight beside the chair and hold onto it. Lift the leg out to the side and slowly return. Repeat 10 times on both the legs [Fig. 2](#).



Fig. 2: Side hip strengthening

3. Calf raises

Stand with feet hip-width apart rise up onto your tip toes, hold for second and then slowly lower your heels back to the starting position. Repeat is exercise for 10 times [Fig. 3](#).



Fig. 3: Calf raises

4. Toe raises

Stand with your feet flat. Lift your toes and the balls of your feet off the ground, keeping your heels down, then

slowly lower them back down. Repeat is exercise for 10 times [Fig. 4](#).



Fig. 4: Toe raises

Balance exercises

1. Sit to stand up from a chair

Scoot forward in the chair sit up straight and look straight ahead. Use the hands if needed to. Or, try with one hand. Or, no hands. Stand up straight. Go all the way down. Pause. Repeat for 10 times [Fig. 5 a & b](#).



a



b

Fig. 5: (a) Sit to stand up from a chair, (b) Sit to stand up from a chair

2. Heel toe stand

Stand up tall with your side to a chair. Place one foot directly in front of other so your feet form a straight line. Hold this position for 10 seconds. Repeat 5 times per both the legs [Fig. 6](#).



Fig. 6: Heel toe stand

3. One leg stand

Stand up tall with your side to a chair and look ahead. Stand on one leg. Try to hold this position for 10 seconds. Repeat 5 times for both the legs [Fig. 7](#).



Fig. 7: One leg stand

4. Sideways walking

Stand up tall near a wall. Takes 10 steps to the right. Take 10 steps to the left. Repeat 4 times each direction [Fig. 8](#).



Fig. 8: Sideways walking

5. Heel walking

Stand up tall beside a wall and look ahead. Come back onto the heels, raising the front of your foot off the floor. Walk 10 steps on the heels. Lower the feet to the ground and turn around. Walk 10 steps on your heels. Repeat 4 times (progress to holding for balance support to no support) [Fig. 9](#).



Fig. 9: Heel walking

6. Toe walking

Stand up tall beside a wall and look ahead. Come up onto the toes. walk 10 steps on the toes, then lower your legs Repeat 4 times [Fig. 10](#).



Fig. 10: Toe walking

Walking

Walking is done for 30 minutes.

RESULTS

The patient reported an overall improvement in TUG test.

Physiotherapy sessions were given for a total of 6 weeks, and good prognosis was noticed in the balance of patient [Table. 1](#).

Table 1: Treatment scores

Test	Pre-Treatment Score	Post-Treatment Score
TUG Test	13.8 Seconds	11.2 seconds

DISCUSSION

The aim of this study was to find out the effectiveness of Otago exercise on fall risk prevention in elderly.

An experimental study was done on 72 years old female patient to assess the effect of Otago exercise in prevention of fall risk. The data was collected based on timed up and

go test. In pre-treatment evaluation the score of TUG test was 13.8 seconds which indicated patient was at high risk of falls. The total duration of this study was 6 weeks. Treatment was given 3 days/week for 30 minutes per session.

By the end of sixth week the TUG score was 11.2 seconds, and patient was able to perform all the balance exercises independently with correct posture and minimal supervision. Strength and endurance improved, with significant reduction in fatigue level.

A study done by Yang *et al.*, on “The impact of Otago exercise program on the prevention of falls in older adult” concluded that OEP is helpful to improve the falling efficiency of older adult and help older adult overcome the fear of falling ⁵.

Hence as per the studies, Otago exercise was found to be effective on fall risk prevention in elderly, and the results were same as per my case study.

CONCLUSION

Otago exercise was found to be highly effective on fall risk prevention in elderly.

DISCLOSURE

Funding:

None.

Conflict of Interest:

The authors declare no conflict of interest.

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