

RESEARCH ARTICLE

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Evidence-based physiotherapy management of fall prevention for the patient with Alzheimer disease: A case-based study

Md Waliul Islam, Fabiha Alam, Asma Islam, Nadia Afrin Urme

ABSTRACT

Introduction: Alzheimer's disease (AD) is a degenerative disease and dementia is a neurological condition which is significantly caused by AD. Sometimes it is found at early to middle age which is associated with cognitive and functional impairment. There is no significant curative treatment till now but only symptomatic treatment is available. Aim of this study is to describe evidence-based physiotherapy management for fall prevention associated with Alzheimer's disease.

Case Report: This is a case-based study which features an elderly man who has just fallen for the few times and has early Alzheimer's disease (AD). In literature, exercise therapy is proven to be effective for fall management. Exercise was demonstrated by the physiotherapist and follow-up was done on a regular basis. The fall prevention exercise included core muscle strength training, cue gait training, fall prevention strategy, and task-based functional activity practice focused on Alzheimer's symptoms. The patient was assessed with the Tinetti Patient Oriented Mobility Assessment (POMA) and Berg Balance Scale score (BBS). The initial score was 8/28 for POMA and 19/56 for BBS, and after 8 weeks it was recorded as 19/28 and 21/56. Oxford muscle grading system was used for measuring strength.

Conclusion: Final outcomes suggested minor improvements in balance, strength of lower limbs, functional activities. This case study focuses on the importance of physical exercise to improve balance and prevent consequences of fall.

Keywords: Alzheimer's disease, Berg Balance Scale score, Cued gait training, Fall prevention, Physiotherapy

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INTRODUCTION

Alzheimer's disease is a degenerative disease which most commonly affects the elderly. Sometimes it is also found at early to middle age [1]. More than five million people in the United States and about fifty million people globally are suffering from Alzheimer's like dementia. It is estimated that the number will be two times more after 20–30 years [2]. Neurodegenerative characteristics like deterioration in cognitive function, behavioral function, and memory are the characteristics of this disease. It is also characterized by tolerant reduction of functional capacity of an affected person [3]. Clinical biomarkers that can help with an etiologic diagnosis with psycho-education, joint goal setting, and decision-making between patient and caregiver are all used in management [4].

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Those with dementia are three times more likely to have a major fall injury than residents without cognitive impairment. Alzheimer's patients usually fall at least once each year [5]. People with dementia who have a history of falling not only have a higher chance of falling but are also five times more likely to be institutionalized than those with dementia who do not fall. Before symptoms appear, AD bio-pathologic processes take years to mature; this time frame is increasingly being studied to effectively prevent or delay AD dementia [3].

There are for healthcare system it will be a huge burden as the people with AD requires multidimensional service that contain not only general medical attention but also community facility, physical therapy, psychological treatment, and emotional support. Combining pharmacologic and non-pharmacologic treatments slows the course of the disease and eases the burden of care [4]. Currently no disease-modifying intervention is established despite a huge amount of expenditure. Now days there is growing attention for finding the link between cognition and physical activity [4]. Recent evidence suggesting there is possible role of physical exercise is reducing or slowing down process of dementia and dementia-like symptom. It is also suggested that improving behavioral functioning and cognition, physical exercise can be beneficial for people with dementia [6]. Besides falls, necessitate a comprehensive approach to examination and management. In order to decrease the total number of falls and the number of persons who fall, study found that exercise-based therapies that combined two or more motor performance abilities-like balance, strengthening, and endurance were most successful. Additionally, this population's risk of falling was decreased by participating in home exercise programs that were specially designed for them [7]. Although exercise has effect on fall management in Bangladesh there is no study about its evidence-based management. Therefore, the aim of the study is to find out the effect of evidence-based physiotherapy programs for fall prevention of Alzheimer's disease affected patient.

CASE REPORT

This study was about a 69-year-old retired school teacher. Previously he diagnosed as Alzheimer's disease by neurologist, with Clinical Dementia Rating (CDR) score 2 out of 3. In this scale most severity was scored as 3. He was also suffering from hypertension, hyperlipidemia, recurrent urinary tract infection and anxiety. His height was 165 cm, weight was 80 kg, and body mass index was 27.1. The patient had history of fall for several times. Therefore, the doctor referred the patient to us for appropriate rehabilitation.

During physical assessment he was alert and responsive to therapist question. He had no verbal complains of pain. When asking his perception about health he was

positive in response. Upper and lower limb muscle power was grossly 4 and 3+ out of 5 and core strength was rated as 3 out of 5. His body alignment was kyphotic in nature. Sitting balance was rated as good but static standing balance was fair and dynamic standing balance was poor. Sensation was tested with light touch and pin prick and was normal in all extremity. Coordination was checked with figure-nose and heel slide test was smooth but slow. Proprioception was intact. Rolling in the bed he was able to perform. Transitional movement such as sitting to standing, bed to chair, and toiled transferring required supervision and sometime minimal assistance. During gait he required assistance due to his poor balance and fatigue.

Intervention

The assessor begins by attempting to identify lower limb and core strength, balance deficit, and consciousness to fatigability. A treatment plan was formulated according to the findings. The patient was treated with fall intervention consisting of core stabilization exercise, balance practice, lower limb strengthening, and cue gait training focused on fall prevention for the client. Special care was also taken to adapt an appropriate strategy to manage fatigue.

A resisted exercise program for lower limb is tabulated in Table 1. Whole exercise program was trained by physiotherapist. Treatment was continued for 8 weeks with 4 sessions per weeks. Calf strap was used to provide weight resistance [8].

Core strength training consisted of pelvic tilting in supine lying, abdominal curl-ups with upper extremities, bridging, and side-to-side trunk rotation (in long sitting). The core strength training program was initiated on the 2nd week of intervention, initially with low resistance and high repetition, but gradually increasing in resistance and lowering the repetition [9].

Balance training was initially task-specific, with marching in place with open and closed eyes, keeping balance on an unstable surface with support, toe standing, followed by walking. The patient was trained to perform functional tasks, such as placing the chair in a specific position, reaching out from the base of support while standing and passing the ball in different directions. Therapists performed the drill simultaneously to give visual feedback. A variety of assistive devices were used to aid gait reeducation. Initially, patients were introduced with a cane. In this case, the patient was feeling comfortable and safe with the cane. But after two weeks, a fort wheel walker was used for training. At the beginning of using a wheelchair, he was not able to place the walker consistently in an appropriate position. By the end of fourth weeks, he was comfortable with wheelchair and challenged with resisted wheelchair. Straight line walking and balancing one single leg was introduced at sixth week. To encourage the patient's cooperation, everything she

Table 1: Lower extremity strength training

Week	Exercise	Intensity	Reputation per set (set)
First and second	Supine	0.25–0.5 kg	10 (2)
	Hip flexion		
	Straight leg raises	Ankle cuff weight	
	Quadriceps setting	(Gradual increase in weight)	
	Hamstring curl		
Third and fourth	Heel dragging		10 (3)
	Ankle pump		
	Sitting	0.5–1.5 kg	
	Hip flexion	Ankle cuff weight	
	Knee extension	(Gradual increase in weight)	
	Ankle dorsiflexion		
	Standing (holding chair)		
	Hip extension		
	Knee flexion		
	Hip abduction and adduction		
Fifth and sixth	Standing without support	0.5–1.5 kg	15 (2)
	Hip extension	Ankle cuff weight	
	Knee flexion	(Gradual increase in weight)	
	Hip abduction and adduction		
Seventh and eighth	Continue previous exercise and additional	0.5–1.5 kg	15 (2)
	Standing	Ankle cuff weight	
	Squatting	(Gradual increase in weight)	
	Toe and hip raise		

had an interest in throughout the session was integrated. The effectiveness of intervention sessions for Alzheimer's patients who participate in familiar exercises is increased, but the physical therapist must also be adaptable, inventive, and patient. The patient carried out specific and well-known tasks, such putting her clothing away in the closet or bringing her dirty laundry to the dirty utility room, to teach her balance and stride. Her ability to pivot, anticipate postural control, commence walking, and keep an upright stance all improved because of these exercises. The patient did experience trouble focusing in visually challenging or stimulating environments, exhibiting loss of balance when sidetracked by conflicting visual cues [10].

Outcomes

Total eight weeks program was consisting of four hospital-based session per week and three home-based session per day. During discharge his muscle power was 4 for maximum muscle in both lower and upper extremities. Core strength was 3+ on time of discharge. Static standing balance improved from grade fair to good and dynamic standing balance from grade poor to fair.

Improve to fatigue management also noticeable as there were decrees in flex posture.

His initial berg balance score was 10 and during discharge the score increased to 21 out of possible maximum 56 [11]. He demonstrated great improvement in sitting to standing activity. Beside that marked improvement in standing balance. A comparison of the initial and discharge scores for each task assessed is in Table 2.

Table 2: Barg balance scale score comparison

Items	Initial score	Discharge score
1. Sitting unsupported	3	4
2. Transfers	1	2
3. Sitting to standing	2	4
4. Standing to sitting	1	3
5. Standing unsupported	2	3
6. Standing with eyes closed	0	0
7. Standing with feet together	1	2
8. Standing with one foot in front	0	1
9. Standing on one foot	0	0
10. Placing alternate foot on stool	0	0
11. Turning to look behind	0	0
12. Turning 360 degrees	0	1
13. Reaching forward with outstretched arm	0	0
14. Retrieving object from floor	0	1
Total	10	21

As this table shows initially it was severe balance problem but during discharge there was moderate balance problem. The initial patient-oriented mobility assessment (POMA) score was 8 but after intervention the score improved to 19 [12]. According to the scale 8 means high risk of fall and 19 is moderate risk of fall. The scale is consisting of score for both balance and gait as maximum possible score is 28. He showed greatest while turning 360.

DISCUSSION

Reflection of current study shows that an integrated clinical management program designed to train patient with Alzheimer's disease including exercise and modification of behavioral technique can be effective to slow the onset and reduce the symptom. Increasing of care giving time may increase the rate of progression on its severe stage [13]. So, it indicates that slowing the onset it is possible to reduce management duration and

the person himself and care giver can be benefited. The recent study also suggested that the improvement in ADL of people with AD who exercised regularly and lead a better functioning in life [14]. Other studies also focused that reduction of dementia and Alzheimer disease can be archive with physical activity. Exercise to be a part of life style intervention that could help to diminish the occurrence of Alzheimer disease [9].

In this case study, a patient with mild Alzheimer's disease is shown with a typical presentation (AD) as like as other patients. As the condition advances, symptoms can include memory loss, personality changes, balance issues, and a loss of independence in doing ADLs. We developed a modest AD treatment that centered on an exercise intervention. Strength, balance, and function have all been shown to improve with exercise programs. Exercises that combine functional tasks are best for improving specific ADL performance since they are more significant. These exercises can help enhance balance, which has been linked to a lower risk of falling.

CONCLUSION

There are several studies that are conducted to find out the effectiveness of physiotherapeutic exercise to limit the progress of Alzheimer's disease. To prevent fall for the patient with Alzheimer's disease physical exercise is very important in this regard. In the current study the patient was able to achieve the positive outcome with evidence-based intervention. Further study should conduct with large sample to make the result more generalize in Bangladesh.

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Author Contributions

Md Waliul Islam – Conception of the work, Design of the work, Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Fabiha Alam – Design of the work, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Guarantor of Submission

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Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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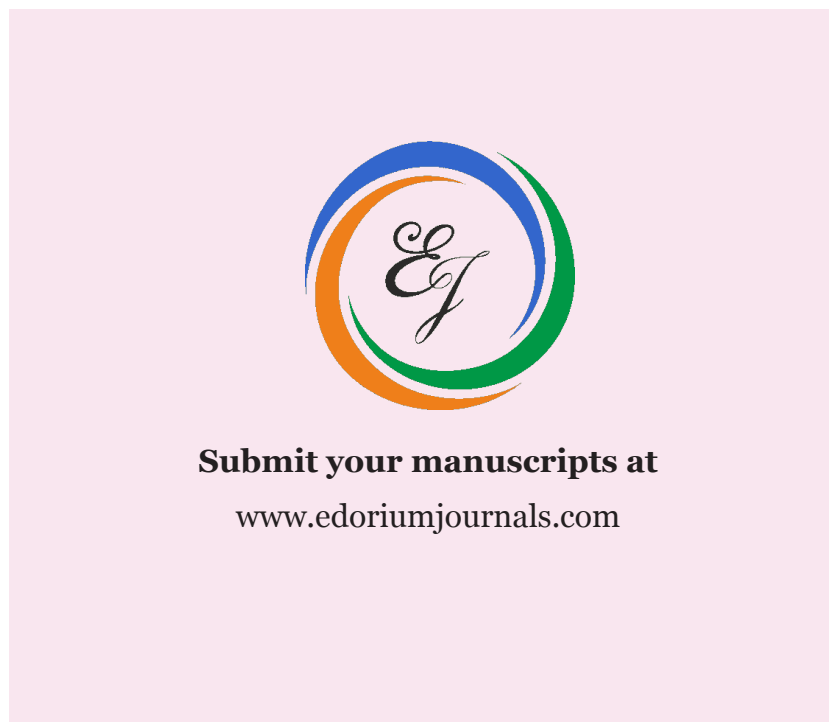
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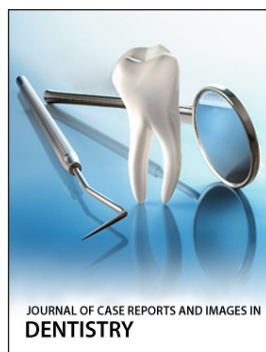
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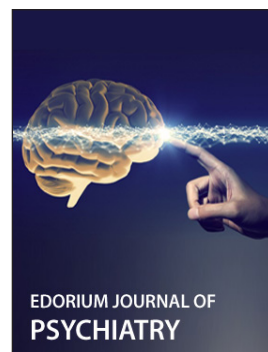
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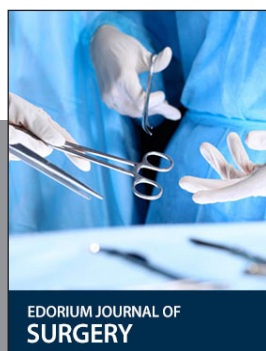
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