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CASE REPORT

Physiotherapy for Alzheimer's Disease: A Case Report

Fisioterapia para la enfermedad de Alzheimer: Informe de un caso

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ABSTRACT

Alzheimer's disease is a progressive neurological condition characterized by brain changes resulting in the accumulation of specific proteins, leading to brain shrinkage and eventual cell death. It is the primary cause of dementia, resulting in a gradual decline in memory, cognition, behaviour, and social skills, impairing overall functionality. The case study involves an 84-year-old woman displaying symptoms of Alzheimer's disease requiring physiotherapy rehabilitation. Assessment reveals joint pain, abnormal gait, respiratory issues due to pneumonia, reduced balance and cognitive function, concentration difficulties, impaired decision-making, fluctuating moods, and behavioural issues such as depression and aggression. Physical examination shows shoulder shrugging and slight tension in the upper trapezius muscle. The rehabilitation program involves various interventions like stretching, strengthening, aerobic exercises, breathing exercises, lung clearance techniques, active range of motion exercises, postural control, and gait training. The role of the physiotherapist is to address the both physical and cognitive decline and improve mood and behaviour.

Keywords: Alzheimer's disease; Physiotherapy; Rehabilitation; Exercises.

RESUMEN

La enfermedad de Alzheimer es una afección neurológica progresiva caracterizada por cambios cerebrales que dan lugar a la acumulación de proteínas específicas, lo que conduce a la contracción del cerebro y, finalmente, a la muerte celular. Es la principal causa de demencia y provoca un deterioro gradual de la memoria, la cognición, el comportamiento y las habilidades sociales, lo que afecta a la funcionalidad general. El estudio de caso se refiere a una mujer de 84 años que presenta síntomas de la enfermedad de Alzheimer y necesita rehabilitación fisioterapéutica. La evaluación revela dolor articular, marcha anormal, problemas respiratorios debidos a una neumonía, disminución del equilibrio y de la función cognitiva, dificultades de concentración, deterioro de la toma de decisiones, fluctuaciones del estado de ánimo y problemas de comportamiento como depresión y agresividad. La exploración física muestra encogimiento de hombros y ligera tensión en el músculo trapecio superior. El programa de rehabilitación incluye diversas intervenciones como estiramientos, fortalecimiento, ejercicios aeróbicos, ejercicios respiratorios, técnicas de depuración pulmonar, ejercicios activos de amplitud de movimiento, control postural y entrenamiento de la marcha. El papel del fisioterapeuta es abordar el deterioro tanto físico como cognitivo y mejorar el estado de ánimo y el comportamiento.

Palabras clave: Enfermedad de Alzheimer; Fisioterapia; Rehabilitación; Ejercicios.

INTRODUCTION

Alzheimer's disease (AD) significantly impacts physical functioning, yet the association between physical health and AD receives minimal attention despite consistent findings indicating a detrimental relationship.[1]

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Studies demonstrate that mobility, ambulation, self-care, and home management skills decline more rapidly over time.[2] The cognitive impairment characteristic of AD, coupled with physical health issues such as falls and frailty, may be modifiable through intervention and prevention efforts.[1,3]

The American College of Sports Medicine (ACSM) recognizes the benefits of exercise and has issued comprehensive guidelines for exercise testing and programming tailored to individuals with various chronic diseases and disabilities.[4] However, the literature lacks data on the utilization of exercise testing and training in individuals with Alzheimer's disease, as highlighted by Rimmer (1997).[5]

Alzheimer's disease is believed to result from abnormal protein accumulation in and around brain cells, particularly involving amyloid, which forms plaques around cells, and tau, which forms tangles within cells.[4] This accumulation leads to decreased levels of neurotransmitters, such as acetylcholine, essential for communication between brain cells. As the disease progresses, different brain regions shrink, initially affecting memory-related areas, although atypical forms may manifest with symptoms related to vision or language impairment.[4]

Research indicates that physical activity consistently enhances the ability of dementia patients to perform daily activities.[6] However, the specific frequency, intensity, and duration of exercises necessary to achieve benefits vary widely across studies.[6]

Case Presentation

The 84-year-old female patient, previously enjoying good health with no medical history, had been employed as a school teacher. However, she has been afflicted with Alzheimer's disease for the past 1.5 years, leading to a deterioration in her condition and ultimately rendering her unable to continue her job for the past year. Over time, she has experienced various cognitive symptoms, including confusion and memory issues, alongside difficulties with fine motor skills such as writing and dressing herself. Initially exhibiting early signs of the disease, she later developed joint discomfort and pneumonia.

Observations revealed that the patient displayed slight disorientation and significant muscle tightness in the upper trapezius region. Her bilateral shoulder flexion active range of motion was decreased, and there was a slight limitation in cervical extension active range of motion. Sensation in both upper and lower extremities was intact. Coordination tests indicate smooth and controlled finger-to-nose movements with slight bilateral dysmetria, along with mild impairment in bilateral finger opposition coordination.

Clinical impression

As the patient's Alzheimer's disease advanced, it became increasingly difficult to elicit compliance with instructions. Now, a family member's persuasion is necessary to ensure adherence. During a subjective interview, notable clinical findings emerged, including a history of falls, abnormalities in gait, and cognitive decline reflecting the progression of her condition. These changes have adversely affected her activities of daily living, sleep patterns, and social interactions. The combination of cognitive and physical alterations has rendered her unable to continue working, despite previously functioning at a high level. Poor performance in reactive postural control tasks, specifically in compensatory walking when correcting for external disturbances, signals the need for physical therapy intervention. Additionally, assessments of fine motor skills through finger opposition and finger-to-nose testing reveal mild dysmetria.

Intervention

To reduce the symptoms, it was crucial to collaborate with the consultant to prescribe the appropriate prescription such as intake of anti-Alzheimer medication and sedatives, but there may be additional benefits. For receiving physiotherapy care to address her issues for months, the patient needed to understand the benefits of this exercise therapy program for her health. Only her family members could persuade her of this. She was informed that by following the instructions or exercises prescribed, her pain would cease to be a problem for her. She saw a doctor twice a week for the first month of her treatment program & a nurse was always there with her to take care, then once every three weeks for the next four months. There was a comprehensive follow-up evaluation.

In addition to utilizing Transcutaneous Electrical Nerve Stimulation (TENS) for pain relief,[7] passive elbow and knee movements were incorporated due to the patient's dementia,[6] which hindered her ability to recall these actions. Our treatment plan also included postural drainage, nebulization percussion, and vibration, as well as active breathing exercises utilizing a spirometer, along with chest physical therapy. The exercise regimen adhered to the guidelines outlined by the American College of Sports Medicine (ACSM). Patient education covered several important areas such as cognitive strategies, relaxation techniques, the importance of physical activity and strategies to mitigate associated risks, and knowing when to seek medical advice. Breathing exercises included diaphragmatic and pursed lip breathing exercises, and incentive spirometer exercises.[8,9,10,11]

The patient engaged in two sets of breathing exercises for 20 minutes daily over four months. Routine sessions of chest physical therapy and nebulization were utilized to clear mucus from the lungs and improve

breathing. Postural drainage techniques were also employed to clear mucus from the upper lobe, thereby enhancing oxygen saturation and supporting the patient's overall well-being. Brisk walking commencing at 50 minutes per week, the duration gradually increased to 80 minutes per week. Balance training: the patient performed three sets of ten repetitions of sit-to-stand and toe-raise exercises with support, around four to five sessions per week. Strengthening exercises: exercises targeting the trunk, abdomen, and upper and lower extremities were conducted three to four times weekly, with two-minute rest intervals between sets and three sets of ten repetitions per exercise. Fine motor tasks: the patient completed three sets of ten repetitions of finger opposition, finger-to-nose, heel-to-shin, and shin-dragging exercises.[8,9,10,11]

Routine flexibility exercises focusing on the upper and lower limbs, trunk, and abdominal muscles were performed two to three times weekly, with three sets of ten repetitions and two-minute rest intervals between sets. Transcutaneous Electrical Nerve Stimulation (TENS) therapy involves the application of low-frequency electrical currents through electrodes attached to the skin to manage pain. While TENS is commonly used for pain relief, its application in dementia treatment is rare. The TENS protocol administered ranged from 2 to 10 Hz for durations of 10 to 15 minutes.

In four months, there was a slight increase in her muscular strength and active range of motion (AROM), although her vital signs remained unchanged. Improvement was noted in her motor control of scapulothoracic stabilizing muscles, along with a partial enhancement in postural awareness. Additionally, there was a reduction in both back and knee pain. However, she continues to experience issues with bowel control and suffers from constipation, necessitating frequent administration of enemas to alleviate gastrointestinal discomfort.

Table 1. Self-reported outcome measures

Test	Pre-Intervention	Post-Intervention
FAQ	13/30	18/30
GAD-7	9/20	12/20
MMSE	12/30	18/30
TUG test	5 seconds	9 seconds

Abbreviation: FAQ: Functional Activities Questionnaire, GAD-7: Generalized Anxiety Disorder, TUG: Time up and go, MMSE: Mini-mental state examination.

DISCUSSION

There are numerous instances, like this one, where individuals who were previously healthy and exceptionally fit have developed Alzheimer's disease. Hence, it is crucial for us, as physiotherapists, to strive towards rehabilitating all patients to the best of their abilities. Establishing shared and realistic goals with the patient is paramount, while also being mindful of not only their physical challenges but also the social, emotional, psychological, and economic hurdles they may face along the journey. It is essential that, at every stage of rehabilitation, the patient remains the focal point of the interdisciplinary team. Rehabilitation is a dynamic process, necessitating continually revised training programs, with effective communication and education being key components. Among the most critical aspects in such cases is the provision of emotional and physical support from the patient's family. The exercise program faced a range of distinct challenges, which can be divided into three main categories: difficulties stemming from the deteriorating physical health of both the individual undergoing care and their caregiver, challenges related to the cognitive impairments and behavioural issues of the person with dementia, and obstacles arising from the caregiver's approach to interacting with the individual.[2]

Research has shown that integrating strength and aerobic training can improve physical function.[1,8,9,10,11] Furthermore, participating in exercise routines at home and within the community, which involve daily activities and a gradual walking program, has been proven to boost independence in performing daily tasks and overall quality of life.[1,8,9,10,11] Studies suggest that home exercise programs benefit patients by enhancing their functional capabilities and reducing the physical and emotional burden on their caregivers.[1]

Cognitive decline and Alzheimer's disease affect a considerable portion of the elderly population. Caregivers, family members, and medical professionals must recognize signs and symptoms early to mitigate the progression of the condition. Healthcare providers should utilize the most appropriate screening methods when evaluating the presence of cognitive disorders.[11]

CONCLUSION

Physiotherapy rehabilitation plays a crucial role in managing these symptoms by addressing physical limitations, enhancing cognitive function, and improving overall well-being. Through a combination of targeted exercises and interventions, physiotherapists aim to mitigate the effects of the disease, enabling patients to

maintain independence, and quality of life to the fullest extent possible and promoting greater independence in everyday tasks.

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