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BEHAVIORAL SYMPTOMS AND COGNITIVE IMPAIRMENT IN ALZHEIMER'S PATIENTS: A CROSS-SECTIONAL STUDY

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Abstract

Objectives: The primary objective of this case-control, cross-sectional study will be to assess the cognitive reserve model in AD by comparing the identified levels of cognitive impairment of AD with different severities of neuropsychiatric symptoms.

Materials and Methods

Overall 120 of the Alzheimer's were evaluated for cognitive function based on the MMSE and for behavior based on the NPI.

Results

Overall, 70% of patients assessed had at least one neuropsychiatric symptom, whereas apathy had the highest prevalence rate of 55%. A significant negative relationship between MMSE and NPI was established; r=- 0.75, meaning a higher level of cognitive dysfunction is associated with a higher level of behavioural disturbances.

Conclusion

It also highlights that much of the treatment approaches for Alzheimer's disease have to include both the cognitive and behavioural components presented and their interaction significantly influences the level of presented distress among patients with Alzheimer's disease and their caregivers.

Key Words: Alzheimer's disease, cognitive impairment, behavioral symptoms, neuropsychiatric symptoms, caregiver burden.

INTRODUCTION

Alzheimer's disease (AD) is a form of dementia that affects the patient's ability to think, communicate, and process memory impairments, progressively diminishing as the disease progresses. This condition progressively affects functions like thinking, solving problems, and even memory, making the lives of patients and their attendants miserable. Alzheimer's disease affects the cognitive function of the patient and varies Neuropsychiatric symptoms, including agitation, depression, and apathy (1). These symptoms greatly limit the patient's ability to follow activities of daily living

(ADL), which is a source of stress for the caregivers besides causing poor patient health (2). Given that more and more patients are diagnosed with AD and that the number of elderly people is increasing in the world, it is necessary to consider the relationship between cognitive impairments and behavioural disturbances in such patients in order to develop appropriate strategies for organizing their further care.

Neuropsychiatric disturbances in AD are among the most assessed behavioural symptoms that refer to a broad range of aggressive, agitated, apathetic, depressed, and psychotic patients (3). Some of these symptoms may be seen at any stage of Alzheimer's, while others become more noticeable as the disease progresses. For example, research has observed a high level of association between cognitive impairment and apathy, in which those with severe cognitive dysfunction will demonstrate a lack of motivation or disinclination towards activities (3). Likewise, assertiveness and irritability that predominate in the middle and later phases of the disease have been associated with increased care needs and institutionalization rates (4). Hence, behavioural disturbances in AD patients directly impact disease management and entail critical therapeutic implications.

In AD, changes in cognitive abilities are described as gradual, although patients are likely to progress from MCI to more advanced dementia subtypes (5). Some of the cognitive domains that are affected first are memory, executive function as well as visuospatial competence, and these make it harder for a person to perform ADLs. Other studies have also established that the physical and cognitive motor problems evident in AD patients are particularly linked because these performance deficits affect the willingness of such patients to perform routine, self-care tasks independently (4). This decline also influences their social responsiveness and regulation of emotions, which translates to neuropsychiatric symptoms (6). Because of the dual nature of AD, there is a need for a multi-professional approach to handling the patients by providing both the cognitive and behavioural aspects of the disease.

Many other investigations have attempted to determine the effects of sampling neuropsychiatric symptoms and cognitive functions on AD patients and employ cross-sectional investigations to establish global pictures of the illness at various stages. For instance, Clemmensen et al. (2020) assessed physical and cognitive activity as predictors of ADLs in patients with mild to moderate AD. They concluded that efforts that enhance or sustain cognitive and physical functional status could postpone functional disability (4). In the same vein, Wiels et al. (2021) described the pattern of neuropsychiatric symptoms change with the advancement of AD, and this showed that there is an increase in the manifestations of agitated behaviours and depression in more serious stages (6). These results stress the interaction between the cognitive and behavioural changes in AD patients and suggest that both need to be addressed when a patient care plan is being developed.

Besides neuropsychiatric symptoms, the COVID-19 pandemic has posed new self- and caregiving difficulties for AD patients. It has been documented that social isolation and limited healthcare access intensify cognitive decline in AD esp, especially in patients with MCI (8). In another study, Ismail et al. (2021) assessed the effects of the pandemic on AD patients and indicated that the rates of cognitive decline rose during this period because the patients' normal regimes had been interfered with, and they were experiencing reduced social contact (8). This emphasizes the importance of process-oriented care approaches that can buffer the impact of precursors from outside the care environment like the outbreak and spread of a disease that will impact negatively on the clocking forward of the disease in AD.

Further, there is still concern about the management of ADC patients, especially the burden of care on the caregivers. The burden tends to emerge from the additional requirement of offering care in terms of physical emo,tional and psychological support as the patient displays more stuporous behavior regarding cognition and behavior (10). This study provides objective evidence that caregivers are highly stressed, anxious, and maybe depressed, especially when attending to patients with severe neuropsychiatric problems such as irritability and lack of motivation (10). In such cases, caregivers experience a complex care process because the patient has both cognitive and behavioural disorders that need different approaches to handling.

Objective: The objective of this study is to examine the relationship between cognitive impairment and behavioral symptoms in Alzheimer's patients, to better understand how these factors interact and impact the progression of the disease.

MATERIALS AND METHODS:

Study Design: Cross sectional study

Study setting: The study took place in an outpatient neurology and geriatry clinic focusing on extensive dementia treatment in a large urban medical center.

Duration of the study: The data was collected over a period of 12 months, from January 2023 to December 2023.

Inclusion Criteria:

Participants had to be diagnosed with Alzheimer's disease, at least 60 years old, and capable of giving consent. Dementia had to have been assessed and evidenced through tests such as the Mini-Mental State Examination (MMSE).

Exclusion Criteria:

Those who have other forms of dementia or other major psychiatric disorders not related to Alzheimer's or severe physical illness which would affect the assessments were not selected for the study.

Methods:

The participants selected were patients diagnosed with Alzheimer's disease who visited the neurology and geriatrics clinic. With written informed consent, assessment of the severity of the cognitive impairment was done by using the Mini-Mental State Examination (MMSE). A behavior was assessed using the Neuropsychiatric Inventory (NPI) that quantifies the neuropsychiatric alterations including agitation, apathy and aggression. Additional data such as age, gender and duration of the disease diagnosis was also obtained. The results obtained were compared to relationships existing between the data sets with regard to the level of cognitive impairment and behavioural symptoms. Academic validation was done by comparing the gathered data with Pearson's correlation coefficient to compare the association between the MMSE scores and the NPI results with the predetermined level of statistical significance at $p < 0.05$. All the data collected during the study were kept secure and de-identified.

RESULTS:

The study involved 120 patients who had been diagnosed with Alzheimer's disease. The participants' ages were 75.3 years (SD = 7.5), and there were 62 female and 58 male participants. The average time since diagnosis of Alzheimer's was between 1 –10 years, with a mean duration of 4.5 years (SD = 2.8). MMSE for assessment of cognitive function showed that 35% of patients had mild cognitive impairment, 45% moderate and 20% severe impairment, respectively. Twenty-five of the patients were male, and 15 were female. The overall mean MMSE score was 20.2 (SD = 5.3). Depending on the NPI, we evaluated the behavioural symptoms. The studies revealed that seventy per cent of the patients had at least one neuropsychiatric symptom, of which apathy at 55% was the highest, followed by agitation at 45% and depression at 40%. The average NPI score for all the participants was 22.1 (SD = 10.4), depicting a fairly high level of behavioural disturbances.

Table 1: Distribution of Cognitive Impairment Levels Among Participants

Cognitive Impairment Level	Number of Patients	Percentage (%)
Mild (MMSE ≥ 24)	42	35
Moderate (MMSE 18–23)	54	45
Severe (MMSE < 18)	24	20

Table 2: Prevalence of Behavioral Symptoms (NPI) Among Participants

Behavioral Symptom	Number of Patients	Percentage (%)
Apathy	66	55
Agitation	54	45
Depression	48	40
Hallucinations	18	15
Delusions	12	10

Table 3: Correlation Between MMSE Scores and NPI Scores

MMSE Score Range	Mean NPI Score	Correlation Coefficient (r)
24–30	10.5	-0.75
18–23	20.3	-0.55
0–17	30.2	-0.45

The mean MMSE score was used to estimate cognitive impairment, and the mean NPI score was used to estimate the severity of the behavioural symptoms; a negative Pearson correlation, $r = -0.24$ ($p < 0.05$), was found between cognitive impairment and the severity of the behavioural symptoms, indicating that patients with higher cognitive impairment have worse neuropsychiatric symptoms. The findings highlight the effects of cognitive impairment on behavioural expressions in patients diagnosed with Alzheimer's disease.

Discussion: The purpose of this work was to understand the connection between lower cognitive abilities and symptoms manifested by patients diagnosed with Alzheimer's disease (AD). The study evidence underscores the existence of a strong relationship between cognitive impairment and the prevalence of neuropsychiatric symptoms, arguing for a close link between cognitive pathology and behavioural symptoms in these patients. The results suggest that 70% of patients described at least one neuropsychiatric symptom, with apathy being the most common, reported by 55% of patients. This accords with other researchers who have noted that indifference is a typical behavioural manifestation of Alzheimer's Disease, particularly when the disease is still in its infancy (1, 2). The findings in this study regarding agitation at 45% and depression at 40% support the complexity of behavioural symptoms in AD and accord with other studies that note these symptoms as major factors contributing to the global burden of AD (3).

The cognitive status was evaluated by Mini-Mental State Examination (MMSE) where the patient had mild cognitive impairment, whereas 35% of patients had mild and 65% had moderate to severe cognitive impairment. These results are in agreement with the usual course of the disease, whereby deterioration in cognitive function is increasingly manifested over a period of time (4). The study also shows that a mean MMSE of 20.2 (SD= 5.3) means moderate cognitive deficit across the study subject, which is in synergy with other different kinds of research that show varying ways of cognitive indigency among patients with Alzheimer's disease (5).

The results of the correlation showed negative correlations between both the MMSE scores and the NPI scores indicating that an escalating MMSE score was proportional to increased NPI scores. This discovery supports other research which states that aging affects the quotient of thinking leading to

compromised self-control and temperance (6). The developed study has demonstrated that the correlation coefficient is equal to -0.75 for patients with mild dementia, -0.55 for those with moderate dementia, and - 0.45 for patients with severe dementia; therefore, the behavioural symptomatology is worse in patients with higher cognitive impairments.

General and neuropsychiatric symptoms including aggressive and agitated behaviours also significantly impair the quality of life among patients and imposes an extra care giving burden to caregivers (7). High-stress levels identified by caregivers while handling patients with these symptoms contributes to possible caregiver burnout (8). The results from the current study point to the significance of assessing cognitive and behavioural symptoms in the care delivery of Alzheimer's disease to optimize outcomes in both the patients and the caregivers.

Interestingly, as part of Alzheimer's disease, the study also pointed out that depression was a common occurrence amongst the patients, with approximately 40% of the patients showing symptoms of depression. Depression in AD patients can worsen, create further deterioration of the clinical condition and reduce compliance (9). This should serve to underscore the clinical importance of performing not only cognitive probes but depressive symptoms and other neuropsychiatric disorder screens as well in order to implement a patient-centered, multi-faceted approach.

External factors, such as the COVID-19 pandemic, can affect the mental health of patients and caregivers and should also be considered. Social isolation, which has been the main impact of the pandemic, worsens cognitive and behavioural issues in the elderly (10). Regulations that may have been further elaborated during this period may have aggravated some of the existing problems that caregivers and patients experience and stressed the need for further assistance and the implementation of practical care approaches in view of such external pressures. In addition, the research findings presented in this paper are useful to the development of the existing literature supporting the need for an effective approach to Alzheimer's disease that considers multidimensional care that targets both the cognitive and behavioural domains of the participants. Non-pharmacological measures, including cognitive-behavioural therapy, occupational therapy, and caregiver support programs, have been shown to reduce the severity of behavioural symptoms and improve the prognosis of the patient (11).

CONCLUSION

The current findings of this study demonstrate a strong association between neuropsychological deficits and behavioural disturbances in patients with Alzheimer's disease. The outcomes highlight the data that with a worsening of cognition, the risk and manifestation of neuropsychiatric symptoms like apathy, agitation, and depression significantly rise. Such conclusions emphasize the relevance of comprehensive assessment and management approaches interfering with both cognitive and behavioural symptoms to enhance exogenous and endogenous outlooks concerning Alzheimer's disease patients and their carers. Studies in the future should focus on external treatment for concrete behavioural symptoms and examine the effects of external variables such as loneliness on the severity of AD in Alzheimer's patients. Finally, it should noted that in practice, care management requires a comprehensive and interprofessional approach.

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