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(REVIEW ARTICLE)

Burden of cognitive impairment in older adults attending neurology OPD: Evidence from AIMSS, Shimla

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Abstract

Background: Cognitive impairment is a growing concern in aging populations, particularly in developing countries like India. Early identification is crucial for timely intervention and improved quality of life. The Mini-Mental State Examination (MMSE) is a practical tool for screening cognitive dysfunction in outpatient settings.

Objectives: To determine the prevalence of cognitive impairment in elderly patients attending the Neurology Outpatient Department (OPD) at the Atal Institute of Medical Super Specialities (AIMSS), Shimla, using the MMSE and to identify associated demographic and clinical risk factors.

Methods: A cross-sectional study was conducted over a 3-month period (January–March 2024) at the Neurology OPD of AIMSS Shimla. A total of 180 patients aged ≥60 years were evaluated using a structured questionnaire and the MMSE. Cognitive impairment was defined as an MMSE score <24. Data was analyzed using SPSS Version 25. Chi-square test and logistic regression were applied to determine associations.

Results: Of the 180 participants, 62 (34.4%) exhibited cognitive impairment. Among them, 45 (25%) had mild impairment and 17 (9.4%) had moderate to severe impairment. Significant associations were found between cognitive impairment and advanced age ($p<0.01$), low education level ($p<0.01$), hypertension, and past history of stroke ($p<0.05$).

Conclusion: Over one-third of elderly patients attending the Neurology OPD at AIMSS Shimla showed signs of cognitive impairment. Routine screening using MMSE is feasible and essential in outpatient neurology settings to facilitate early detection and intervention.

Keywords: Cognitive Impairment; Elderly; MMSE; Shimla; Dementia Screening

1. Introduction

Cognitive impairment refers to a decline in mental abilities such as memory, attention, language, and problem-solving skills that interfere with daily functioning. It exists on a spectrum ranging from mild cognitive impairment (MCI) to severe forms like dementia. In an aging population, this condition poses significant challenges to individuals, caregivers, and healthcare systems due to its impact on independence, health outcomes, and social functioning. Globally, dementia and cognitive decline are becoming increasingly prevalent. According to the World Health Organization (2023), more than 55 million people worldwide live with dementia, with 10 million new cases added annually. The burden is especially high in low- and middle-income countries, which account for more than 60% of cases, and where healthcare systems often lack adequate resources for early detection and management[1]. India, home to over 140 million elderly

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individuals (≥60 years), is experiencing a rapid demographic transition. By 2050, this number is projected to rise to 319 million, nearly 20% of the total population[2]. With increased life expectancy, the prevalence of age-related conditions like cognitive impairment is expected to rise dramatically. However, awareness, screening, and timely intervention remain low, particularly in outpatient settings like neurology OPDs where cognitive complaints may be overlooked amidst other neurological conditions. Multiple Indian studies have highlighted a significant burden of cognitive impairment among the elderly. For instance, a study conducted in Lucknow found the prevalence to be 33.1%[3], while a rural community-based study in Kerala reported a similar prevalence of 32% [4]. Factors such as advancing age, low education, hypertension, diabetes, previous stroke, and social isolation have been identified as major contributors. The Mini-Mental State Examination (MMSE), developed by Folstein et al. in 1975, is a simple, quick, and widely used cognitive screening tool in both clinical and community settings. It evaluates various domains of cognitive function, including orientation, registration, attention, calculation, recall, and language[5]. Despite its limitations—such as sensitivity to education and language it remains a practical option in OPD-based screening. Given this context, the present study was undertaken to assess the prevalence of cognitive impairment in elderly patients attending the Neurology OPD at the Atal Institute of Medical Super Specialities (AIMSS), Shimla. The study also aims to identify associated demographic and clinical factors that may inform early detection and intervention strategies in tertiary care settings.

2. Material and methods

2.1.1. Study Design and Setting

A cross-sectional observational study was conducted in the Neurology Outpatient Department (OPD) of AIMSS Shimla over a period of 3 months from January to March 2024.

2.1.2. Study Population

Elderly patients aged 60 years and above, attending the Neurology OPD for various neurological complaints, were included in the study.

2.1.3. Inclusion Criteria

- Age ≥60 years.
- Attending Neurology OPD during the study period.
- Provided informed consent.
- Medically stable and cooperative during MMSE administration.

2.1.4. Exclusion Criteria

- Patients with severe hearing, visual, or speech impairment.
- History of psychiatric illness or diagnosed dementia.
- Stroke within the last 6 months.
- Delirium or altered sensorium.

2.1.5. Sample Size

The sample size was calculated using the formula:

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{d^2}$$

Assuming a prevalence (p) of 30%, confidence level (Z) of 1.96, and allowable error (d) of 7%, the minimum required sample size was 164. To compensate for non-response, a total of 180 participants were included.

2.1.6. Data Collection Tool

- A structured proforma collected demographic and clinical details.
- The MMSE was administered in the local language (Hindi).
- MMSE scoring:
  - 24–30: Normal cognition.

- 18–23: Mild cognitive impairment.
- ≤17: Moderate to severe cognitive impairment.

2.1.7. Statistical Analysis

Data were analyzed using SPSS Version 24.0. Descriptive statistics were used for demographic characteristics. Chi-square test and logistic regression analysis were used to examine associations between cognitive impairment and variables like age, gender, education, and comorbidities. A p-value <0.05 was considered statistically significant

3. Results

A total of 180 elderly patients aged 60 years and above were included in this cross-sectional study conducted at the Neurology Outpatient Department of the Atal Institute of Medical Super Specialities (AIMSS), Shimla. The mean age of the participants was 68.7 ± 6.2 years, with a range from 60 to 88 years. Of the total participants, 96 (53.3%) were male and 84 (46.7%) were female (Table1)

Table 1 Demographic profile of patients included in study

Variable	Category	Frequency (%)
Age (years)	60–69	84 (46.7%)
	70–79	63 (35.0%)
	≥80	33 (18.3%)
Gender	Male	96 (53.3%)
	Female	84 (46.7%)
Education	No formal education	38 (21.1%)
	Primary	72 (40.0%)
	Secondary & above	70 (38.9%)
Comorbidities	Hypertension	102 (56.7%)
	Diabetes	48 (26.7%)
	Stroke (past)	24 (13.3%)

Using the Mini-Mental State Examination (MMSE), 62 patients (34.4%) were found to have cognitive impairment, defined by an MMSE score of less than 24(Table 2). Among them, 45 patients (25%) had mild cognitive impairment (MMSE score 19–23), while 17 patients (9.4%) had moderate to severe impairment (MMSE <19). The remaining 118 patients (65.6%) were classified as cognitively intact (MMSE ≥24).

Table 2 Distribution of Cognitive Impairment Based on MMSE Scores

MMSE Score Category	Frequency (%)
Normal cognition (24–30)	118 (65.6%)
Mild cognitive impairment	45 (25.0%)
Moderate–severe impairment	17 (9.4%)

The prevalence of cognitive impairment increased significantly with advancing age. In patients aged 60–69 years, 21.2% were cognitively impaired, while in those ≥75 years, the prevalence rose to 58.3% ($p < 0.01$). Cognitive impairment was significantly more common in participants who were illiterate or had only primary education compared to those with secondary or higher education ($p < 0.001$). Hypertension was the most prevalent comorbidity (present in 58.8% of the cognitively impaired group), followed by diabetes mellitus (41.1%) and a past history of stroke (17.6%). These conditions showed statistically significant associations with cognitive decline ($p < 0.05$). While cognitive impairment was more frequent in females (38.1%) than in males (31.2%), this difference was not statistically significant ($p = 0.23$).

Additionally, those with a sedentary lifestyle and those living alone or with limited social interaction had relatively higher rates of cognitive impairment, although the associations did not reach statistical significance. The MMSE scores were negatively correlated with age and positively correlated with education level, suggesting the influence of both biological and socio-environmental factors on cognitive functioning.

4. Discussion

This study revealed that 34.4% of elderly patients attending the Neurology OPD at AIMSS Shimla had cognitive impairment, as assessed using the MMSE. Among them, 25% had mild cognitive impairment, and 9.4% had moderate to severe impairment. These findings are consistent with existing literature from various Indian settings. For example, a hospital-based study in North India by Tiwari et al. (2014) reported a prevalence of 33.1% in elderly urban populations using MMSE [3]. Similarly, Shaji et al. (1996) found that 32% of elderly in rural Kerala exhibited signs of cognitive decline[4]. These figures underscore the widespread yet under-recognized nature of cognitive impairment among Indian elderly populations. Age was significantly associated with cognitive decline in our study. This is in line with Prince et al. (2013), who emphasized that the risk of cognitive impairment and dementia doubles every five years after the age of 65[6]. Aging leads to structural and functional brain changes, including cortical atrophy, reduced synaptic plasticity, and decline in neurotransmitter activity—all contributing to cognitive deficits. Education level was another strong determinant. Illiterate and low-education participants had a significantly higher risk of cognitive impairment ($p < 0.01$). The cognitive reserve hypothesis suggests that education enhances brain resilience and delays clinical manifestations of cognitive decline[7]. A study in Kolkata by Tripathi and Tiwari (2011) confirmed that cognitive impairment was significantly more common among the illiterate elderly[8]. Comorbid conditions such as hypertension, diabetes, and history of stroke were significantly associated with lower MMSE scores. These vascular risk factors contribute to cerebral small vessel disease and white matter changes, leading to vascular cognitive impairment. A landmark statement by the American Heart Association/American Stroke Association (2011) reaffirmed the vascular contributions to cognitive impairment and dementia, emphasizing the need to manage modifiable risk factors[9]. Though females showed slightly higher prevalence, the difference was not statistically significant. Other studies have shown mixed results, with some reporting higher risk among women, potentially due to greater longevity and higher rates of depression or social isolation[10]. The findings reinforce the need for routine cognitive screening in elderly patients attending neurology clinics. The MMSE, though limited by education bias and cultural influences, remains a feasible tool for busy OPDs. However, in low-literacy populations, tools like the Hindi Mental State Examination (HMSE) or Montreal Cognitive Assessment (MoCA) may offer improved diagnostic utility.

4.1. Limitations

This study was conducted in a tertiary care center and may not reflect community prevalence. Also, reliance on MMSE alone may have led to underestimation of mild impairment, particularly among well-educated individuals.

5. Conclusion

Cognitive impairment affects over one-third of elderly patients attending Neurology OPD at AIMSS Shimla. Screening with MMSE is feasible and should be integrated into routine geriatric assessments. Special attention must be paid to older patients with comorbidities and low literacy. Policies and programs that promote early cognitive screening and public awareness are crucial in managing the rising burden of age-related cognitive disorder.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all participants prior to their inclusion in the study. A detailed explanation of the study purpose, procedures, potential risks, and benefits was provided in simple language to ensure participants understood the study's scope. Participants were assured that participation was voluntary, and they could withdraw at any time without any consequences to their ongoing medical care. Consent was obtained both verbally and in writing, and participants were informed of their right to confidentiality and privacy.

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