



## Original Research Article

## Prevalence and determinants of cognitive impairment in an elderly population: A hospital based study

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## ABSTRACT

**Background and Objective:** Dementia and cognitive impairment (CI) are some of the common problems associated with ageing. However, a lot of other factors apart from ageing can increase this risk. In this study, prevalence of CI and its correlation with different sociodemographic and clinical factors was assessed among patients attending outpatient department of a geriatric healthcare facility.

**Materials and Methods:** A total of 240 elderly OPD patients (>60 years) having recovered from different acute illnesses or making follow-up visits were enrolled in the study. Critically ill, hospitalized patients and those with history of COVID-19 exposure were excluded from the study. Demographic and social profile of the patients was noted. Mini Mental State Examination (MMSE) was used for assessment of cognition. MMSE score <27 was considered as CI. Data was analyzed using chi-square test for univariate and binary logistic regression for multivariate assessment.

**Results:** Mean age of patients was 72.58±6.46 years (range 62-91 years), majority of patients were males (55%). Prevalence of CI was 41.2%. There were 59 (24.6%) elderly with mild and 40 (16.7%) with moderate cognitive impairment. On univariate assessment, older age (p=0.003), male sex (p=0.024), living without spouse (p=0.040) and history of hospitalization in last one year (p=0.031) were found to be significantly associated with CI. On logistic regression age (OR=1.072), female sex (OR=0.561), ability to perform routine work (OR=0.461) and hospitalization history (OR=1.823) were identified as independent predictors of CI.

**Conclusion:** Prevalence of CI was 41.2% in our study. Age, sex, ability to perform routine works and hospitalization history were independently associated with CI risk.

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## 1. Introduction

Cognitive functions, like various physical functions have a strong association with age. By cognitive functions, we imply to refer to one's ability of "remembering, learning new things, concentrating, or making decisions that affect one's daily life".<sup>1</sup> Its global prevalence has been reported to range from 5.1 to 41% in adults aged 50 years or

above.<sup>1</sup> It is one of the most common causes of functional loss in older age and is also responsible for decline in their quality of life.<sup>2</sup> In India, its prevalence in elderly community dwelling population above 65 years of age has been shown to range from 3.5% in Northern to 11.5% in Southern India.<sup>3</sup> The prevalence of cognitive impairment in elderly is affected by a host of factors including age, sex, marital status, education, work status, social support, and a host of other sociodemographic factors apart from their physical and mental well-being.<sup>3-6</sup> Despite being an

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important factor affecting the daily life of the elderly and being responsible for a decline in their quality of life, it remains to be one of the less systematically studied problem in elderly, especially in elderly outpatients. It has also been seen to be associated with other psychiatric problems like anxiety and depression in the elderly.<sup>6</sup> Our facility is a specialized healthcare facility for elderly in Northern India. Understanding the significance of cognitive impairment as a part of holistic routine assessment of elderly, the present study was carried out to study the prevalence and determinants of cognitive impairment in elderly outpatient patients of a premier geriatric care institution in Lucknow city.

## 2. Materials and Methods

The present study was carried out at specialized geriatric care facility over a period of two months starting from January, 2023 to February, 2023. The sample size of the study was based on a previous hospital-based study that reported the prevalence of memory complaints/cognitive impairment to be 62.6%.<sup>7</sup> At 95% confidence level and 10% absolute error allowance the calculated sample size was 93. However, we included all the patients falling in inclusion criteria during the study period. Finally, a total of 240 patients completed the study. The permission for the study was sought from the Institutional Research Committee vide letter No. \_\_\_\_\_ dated \_\_\_\_\_. Only routine data was collected from the patients and no intervention was made.

As per inclusion criteria of the study, all those outpatients aged >60 years having post-acute illness recovery or follow-up visit for a chronic illness (diabetes, hypertension, COPD, CAD), post-hospitalization follow-up visits for patients having history of hospitalization during last one year or those coming for routine clinical check-up were eligible for participation. Critically ill and currently hospitalized patients and those who had history of exposure to COVID-19 were excluded from the study.

At enrolment, demographic details like age, sex, personal habits (alcohol/ tobacco use), socioeconomic status and social factors like whether patient was living with dependents/family or living alone/in institution, presence/absence of spouse as the living partner were noted. Patient's ability to perform their own personal routine tasks was also enquired. Weight and height of the patients were measured and body mass index (BMI) was calculated. Proportion of patients with BMI<18.5 kg/m<sup>2</sup> was noted. Details of chronic illnesses requiring regular medication were noted. Hospitalization history during last one year was also noted.

Cognitive status of the patients was assessed using Mini Mental Status Examination (MMSE). The following criteria was used for the purpose of identification of cognitive status and its stratification:

MMSE Score	Cognitive Status
>26	No impairment
21-26	Mild impairment
13-20	Moderate impairment
<13	Severe impairment

## 3. Data Analysis

The data obtained from the patients was fed into computer using IBM SPSS Stats software version 21.0. Association between cognitive impairment and different sociodemographic/clinical factors was assessed using chi-square test. Binary logistic regression was performed for multivariate assessment.

## 4. Results

Age of enrolled patients ranged from 62 to 91 years. Maximum number of patients (n=110; 45.8%) were aged between 71 and 80 years followed by those aged <70 years (n=89; 37.1%) and >80 years (n=41; 17.1%) respectively. Mean age of patients was 72.58±6.46 years. Majority of patients were males (55%). There were 108 (45%) females. Sex-ratio of the study population was 1.22. A total of 52 (21.7%) patients revealed history of alcohol/tobacco use. Maximum (n=115; 47.9%) patients were from middle class, 112 (46.7%) were from upper middle and 13 (5.4%) were from upper socioeconomic class. There were 112 (46.7%) patients who were living with dependents in a joint family, whereas remaining 128 (53.3%) were either living away from their dependents or in institutions. Majority (70.8%) were living with their spouse, remaining 70 (29.8%) were separated from their spouse. A total of 145 (60.4%) were able to perform their routine works themselves. There were 85 (35.4%) patients having BMI <18.5 kg/m.<sup>1</sup> Majority (n=151; 62.9%) had history of chronic illness requiring regular medication. There were 76 (31.7%) patients who had history of hospitalization during last one year. Majority of patients had MMSE scores >26, representing no cognitive impairment. MMSE scores reflective of mild and moderate impairment were seen in 59 (24.6%) and 40 (16.7%) patients. None of the patients had severe cognitive impairment. Mean MMSE score was 25.37±4.38 (Table 1).

On evaluating the association of different clinicodemographic variables with cognitive impairment, older age (p=0.003), male sex (p=0.024), inability to live with spouse (p=0.040), inability to perform routine works (p=0.001) and history of hospitalization during last one year (p=0.031) were found to be significantly associated with cognitive impairment in elderly (Table 2).

On binary logistic regression, after adjusting for covariates sex and ability to live with spouse, age (OR=1.072; 95% CI=1.024-1.121), sex (OR=0.561; 95% CI=0.319-0.985), ability to perform routine

**Table 1:** Profile of study population (n=240)

SN	Characteristic	Number	Percentage
	Age		
	<70 Years	89	37.1
1.	71-80 Years	110	45.8
	>80 Years	41	17.1
	Mean age±SD (Range) in years		72.58±6.46 (62-91)
	Sex		
2.	Male	132	55.0
	Female	108	45.0
3.	H/o alcohol/tobacco use	52	21.7
	Socioeconomic status		
4.	Middle	115	47.9
	Upper Middle	112	46.7
	Upper	13	5.4
5.	Living with dependents/family	112	46.7
6.	Living with spouse	170	70.8
7.	Able to perform routine works	145	60.4
8.	Low BMI (<18.5 kg/m <sup>2</sup> )	85	35.4
9.	Chronic illness requiring regular medication	151	62.9
10.	H/o hospitalization during last one year	76	31.7
	MMSE Scores		
	>26 (No impairment)	141	58.8
11.	21-26 (Mild impairment)	59	24.6
	13-20 (Moderate impairment)	40	16.7
	Mean MMSE±SD (Range)		25.37±4.38 (13-30)

works (OR=0.461; 96% CI=0.263-0.810) and history of hospitalization during last one year (OR=1.823; 95% CI=1.008-3.299) were found to be significantly associated with cognitive impairment in elderly (Table 3).

## 5. Discussion

In the present study, prevalence of cognitive impairment (CI) in outdoor elderly patients was found to be 41.2%. None of the elderly had severe impairment. Out of 99 elderly with cognitive impairment, majority (n=59/99; 59.6%) had mild impairment and remaining 40/99 (40.4%) had moderate cognitive impairment. Compared to this hospital-based study, community-based studies from India have reported a relatively much lower prevalence of cognitive impairment in elderly. Khanna and Chandra<sup>8</sup> reported the prevalence of cognitive impairment as 8.4% only, however, a relatively lower prevalence of CI in their study could be owing to selection of a lower cut-off (MMSE<24) as compared to that in the present study (MMSE<26) apart from difference in profile of elderly. In the present study, the elderly were selected from amongst hospital visiting patients whereas the index study by Khanna and Chandra<sup>8</sup> was carried out in community-dwelling urban elderly patients. Moreover, the mean age of patients in their study was 67.7 years only as compared to 72.58 years in the present study. Another study from Northern India, but carried out among community dwelling elderly

also reported the prevalence of cognitive impairment to be 8.8% only using MMSE cut-off <25,<sup>3</sup> moreover, their study<sup>3</sup> also had a dominance of those aged 61-65 years (51.5%) as compared to the present study that had majority of patients above 70 years of age (62.9%) apart from being a community-based rather than the present hospital-based study. However, even in community-based studies, the prevalence of cognitive impairment in elderly has been reported to be as high as 35.1%.<sup>9</sup> In other hospital-based studies, that involve elderly patients with comorbidities like type 2 diabetes mellitus, hypertension, etc., the prevalence of cognitive impairments tends to be high. In one such recent study, that assessed the prevalence of cognitive impairment in elderly patients with type 2 diabetes mellitus, it was reported to be 46.9%.<sup>6</sup> In the present study too, majority of patients had history of chronic illnesses requiring regular medication (62.9%), and hence this high prevalence of cognitive impairment could be justified. It may be noted that in the present study, there were no patients having severe cognitive impairment. These findings are in agreement with the observations made by Khanna and Chandra<sup>8</sup> who also observed only mild and moderate CI in elderly and did not find any elderly with severe CI. A similar observation was also made by Rajesh et al.<sup>9</sup> in their study. Severe CI in otherwise healthy elderly population is reported rarely. Most of the studies do not report it. Among those, that report it, the prevalence is relatively much smaller. In a recent study, Gela et al.<sup>10</sup> found the prevalence of CI in

**Table 2:** Association of cognitive impairment in elderly with sociodemographic and clinical factors

SN	Characteristic	Cognitive impairment (n=99)		No cognitive impairment (n=151)		Statistical significance	
		No.	%	No.	%	c <sup>2</sup>	p
1.	Age						
	<70 Years	28	31.5	61	68.5	11.84	0.003
	71-80 Years	45	40.9	65	59.1		
>80 Years	26	63.4	15	36.6			
2.	Sex					5.078	0.024
	Male	63	47.7	69	52.3		
	Female	36	33.3	72	66.7		
3.	H/o Alcohol/tobacco use					2.097	0.148
	Yes	26	50.0	26	50.0		
	No	73	38.8	115	61.2		
4.	Socioeconomic status					0.678	0.712
	Middle	49	42.6	66	57.4		
	Upper Middle	46	41.1	66	58.9		
	Upper	4	30.8	9	69.2		
5.	Living with dependents/ family					3.194	0.074
	Yes	53	47.3	59	52.7		
	No	46	35.9	82	64.1		
6.	Living with spouse					4.225	0.040
	Yes	63	37.1	107	62.9		
	No	36	51.4	34	48.6		
7.	Able to perform routine works					11.80	0.001
	Yes	47	32.4	98	67.6		
	No	52	54.7	43	45.3		
8.	Low BMI (<18.5 kg/m <sup>2</sup> )					1.165	0.280
	Yes	39	45.9	46	54.1		
	No	60	38.7	95	61.3		
9.	Chronic illness requiring regular medication					2.405	0.121
	Yes	68	45.0	83	55.0		
	No	31	34.8	58	65.2		
10.	H/o hospitalization					4.650	0.031
	Yes	39	51.3	37	48.7		
	No	60	36.6	104	63.4		

**Table 3:** Binary logistic regression for association of cognitive impairment in elderly with different sociodemographic and clinical factors

SN	Variable	b±SE	'p' value	OR (95% CI)
1.	Age	0.069±0.023	0.003	1.072 (1.024-1.121)
2.	Sex (1=Male, 2=Female)	-0.578±0.287	0.044	0.561 (0.319-0.985)
3.	Living with spouse (0=No, 1=Yes)	-0.342±0.316	0.280	0.710 (0.382-1.320)
4.	Able to perform routine work (0=No, 1=Yes)	-0.774±0.287	0.007	0.461 (0.263-0.810)
5.	Hospitalization history (0=No, 1=Yes)	0.601±0.303	0.047	1.823 (1.008-3.299)
6.	Constant	-4.059±1.789	0.023	-

elderly community living population to be 43.8%, however, the prevalence of severe CI was only 1%, thus showing that in most of the cases with CI, it is only from mild to moderate order. The present study also endorses the same.

In the present study, on univariate analysis, age, male sex, inability to live with spouse, inability to perform routine works and hospitalization history, and on multivariate analysis, age, male sex, inability to perform routine work and hospitalization history were found to be significantly associated with cognitive impairment in elderly. Sociodemographic factors and engagements have been shown to have a significant impact on the cognitive function in other studies too. Khanna and Chandra<sup>8</sup> in their study found advancing age, female sex, unmarried or widow/widower, illiterate, not working presently, staying alone, and poverty. Most of these factors except sex show a similar association with cognitive impairment in the present study too. Interestingly, in the present study, male sex, instead of female sex was found to have a significant association with cognitive decline. Sengupta et al.<sup>3</sup> too found significant association of increasing age, unmarried/widowed status, illiteracy, unemployment and poverty. In another study, Rajesh et al.<sup>9</sup> however, did not find an association of age, sex, religion, number of family members, occupational status and family type with cognitive impairment, however, they found factors like living without spouse and more than ten years of schooling to be significantly associated with cognitive impairment. In their study, the association of cognitive impairment was also assessed against dietary preference, type of drinking water, history of illness, h/o diabetes, hypertension, other comorbid conditions and surgical history but amazingly did not find any of these except the type of drinking water to be significantly associated with cognitive impairment. In the present study, no significant association of chronic illness history, BMI or personal habits was seen with cognitive impairment which is in agreement with the observation of Rajesh et al.<sup>10</sup> In fact, sociodemographic factors and health status of patients definitely has an impact on the cognitive function of the elderly, however, none of the studies have evaluated them exhaustively. Given the multifactorial dependence of cognitive function, further studies on a larger sample size with inclusion of more variables are recommended.

## 6. Conclusion

The present study found that cognitive impairment is highly prevalent in a hospital visiting elderly population, increasing age, male sex, inability to live with spouse, inability to perform routine work and hospitalization history have a significant association with its prevalence.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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