

Prevalence and Risk Factors of Mild Cognitive Impairment (MCI) among the Elderly of Guwahati City, Assam: A Cross-sectional Study

Anku Moni Saikia, Vinoth Rajendran*

ABSTRACT

Background: WHO defines “Healthy Ageing” as the process of developing and maintaining the functional ability that enables well-being in older age. The population among the elderly is growing constantly and with increased life expectancy, there is a tremendous increase in morbidity and disability. MCI is an intermediate stage between dementia and cognitive decline in normal individuals. It is important to understand various factors associated with MCI to develop preventive strategies. **Objectives:** To find out the prevalence and risk factors of mild cognitive impairment among the elderly in Guwahati, Assam. **Settings and Design:** A community-based, cross-sectional study was conducted in Guwahati City. **Materials and Methods:** This study was conducted among the elderly of 60 years or above of both the sexes in Guwahati City. Considering $p=14.89\%$, sample size was calculated as 576 elderly. Fifty percent of the total wards i.e. 16 wards were selected randomly and 36 elderly were selected from each ward. The data were collected using a predesigned and pretested schedule, Hindi Mini-Mental State Examination (HMMSE) scale for mild cognitive impairment, Activities of Daily Living (ADL) of Katz Index and Instrumental Activities of Daily Living (IADL) of Lawton Index for functional status. **Results:** The prevalence of MCI was 24.2%. The risk factors like gender, living arrangement, education, alcohol consumption, constipation, sleep disturbance were associated with mild cognitive impairment on binary logistic regression. **Conclusion:** A very high prevalence of MCI was found among the elderly. Various modifiable risk factors like living arrangement, education, alcohol consumption, sleep disturbance and depression were found to be associated with MCI and it can be targeted to prevent MCI.

Key words: Prevalence, Mild cognitive impairment, Elderly, HMMSE, Assam.

Key Messages: The prevalence of MCI was found high among the elderly which requires mandatory inclusion of screening for cognitive function.

INTRODUCTION

Along with the world, India is also experiencing the stage of demographic transition. The elderly population has increased from 5.6% in 1961 to 8.6% in 2011.¹ It is also projected to raise by 64% by 2030.² The vulnerability to different diseases increases with increasing life expectancy. This leads to various types of morbidities and disabilities. One of the important causes of disability is dementia. This puts a huge burden on the family, the caregivers and the society as a whole. There are many causes of dementia in the elderly. However, Alzheimer Dementia (AD) is the most common cause in old age. Dementia is the broad term used for a decline in cognitive ability that is severe enough to restrict with daily life. Mild cognitive impairment (MCI) is an intermediate stage between dementia and normal cognition. It can involve problems with memory, language, thinking and judgment that are greater than normal age-related changes but the person's day to day activities are not interfered. Hence, it is under-reported or unrecognised.

More than half of them with mild cognitive impairment progress to dementia within 5 years while some seem to remain stable or return to normal over time.³ Early diagnosis of MCI may help in decreasing the incidence of MCI.

Studies on MCI are limited from India and there are no published studies from this part of the country. There are multiple risk factors associated with mild cognitive impairment. Though MCI is prevalent among the elderly, this issue is not getting due priority. MCI is a reversible stage, so identifying MCI at the early stage and Effective intervention will help in the prevention of Alzheimer's disease. So the present study has been conducted to find out the prevalence and risk factors of mild cognitive impairment among the elderly in Guwahati, Assam.

MATERIALS AND METHODS

This community-based, cross-sectional study was conducted among the elderly of 60 years or above of

Anku Moni Saikia, Vinoth Rajendran*

Department of Community Medicine, Gauhati Medical College and Hospital (GMCH), Bhangagarh, Guwahati, Assam, INDIA.

Correspondence

Dr. Vinoth Rajendran

Department of Community Medicine, Gauhati Medical College and Hospital (GMCH), Bhangagarh-781032, Guwahati, Assam, INDIA.

Phone no: +91 9597459322

Email: rvinoth351@gmail.com

History

- Submission Date: 27-11-2019
- Revised Date: 20-04-2020
- Accepted Date: 15-05-2020

DOI : 10.5530/ijmedph.2020.2.16

Article Available online

<http://www.ijmedph.org/v10/i2>

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Cite this article : Saikia AM, Rajendran V. Prevalence and Risk Factors of Mild Cognitive Impairment (MCI) among the Elderly of Guwahati City, Assam: A Cross-sectional Study. Int J Med Public Health. 2020;10(2):77-80.

both the sexes in Guwahati City, Assam from July 2018 to August 2019. Those who were residing in the study area permanently for more than 1 year preceding the study and those who were giving consent to participate were included in the study. Critically ill elderly, institution bound elderly, elderly who failed to comprehend the question due to severe hearing loss, severely depressed elderly and known or diagnosed cases of Parkinson's disease (PD) were excluded from the study.

Considering $p=14.89\%^4$ and applying the formula, $n=4pq/L^2$, the minimum sample size was calculated as 572 for this study. Fifty percent of the total wards i.e. 16 wards were selected randomly from the list of the ward from Guwahati Municipal Corporation. From each ward 36 elderly were selected, making a total of 576 for this study. Thirty-six households were randomly selected using random number table assuming that each household would have one elderly. All the elderly in a household who were fulfilling the inclusion criteria were included in this study. The information obtained is verified with the close family member or caregiver as and when necessary.

The data were collected using a predesigned and pretested schedule. Different variables like type of diet, smoking status, alcohol consumption, diabetes, hypertension, functional status, social and leisure activities and depression were included in this study. MCI was screened using Hindi Mini-Mental State Examination (HMMSE) scale.⁵⁻⁷ Depression and functional status were assessed using 15 Geriatric Depression Scale (15GDS),^{8,9} Activities of Daily Living (ADL) of Katz Index and Instrumental Activities of Daily Living (IADL) of Lawton Index were used.^{10,11} Classification of smoking status was done as per the Centers for Disease Control and Prevention (CDC) guidelines.¹² Hypertension was diagnosed using JNC 8 criteria.¹³ Fasting blood sugar estimation was measured by Accu chek active blood glucose meter and classified as per the WHO classification.¹⁴

Operational definitions were made for classifying individuals based on the type of diet, sleep disturbance, alcohol consumption and social and leisure activities. Those who have been taking a vegetarian diet for the last 6 months were considered vegetarian and vice versa. Regarding alcohol users, those who have taken fewer than 12 drinks in a lifetime were taken as never users, Ever users of alcohol includes both former and current users. Those who have taken at least 12 drinks in any one year in a lifetime but no drinks in the past year were taken as former users. Those who have taken more than 12 drinks in a lifetime and who have taken at least one or a few drinks in the past year were taken as current users. Social and leisure engagement was assessed based on the type of activities and the duration of hours spent per week. The types of activities include television viewing, hobbies/ crafts, participating in community work, participating in social gatherings/ religious place, visiting friends/ neighbours and interaction with family members. For each activity, one point was given. Out of a total score of 6, those who have scored more than 2 were further assessed for the duration of social and leisure engagement. Those whose duration was more than 5 hrs per week were considered adequate in social and leisure engagement.

The data collected were analyzed using IBM SPSS Statistics version 25. Proportions were calculated for different study variables. The chi-square test was used for the analysis of categorical variables. The criteria of significance used in the study were $p<0.05$. Binary logistic regression analysis was used for the different study variables.

RESULTS

The prevalence of MCI was 22.4% among the elderly. Among the elderly participants (576) interviewed, majority (62.5%) were in the age group of 60-69 years. Among the elderly with mild cognitive impairment, females were found to be comparatively higher than the males. (Table 1)

While assessing the relationship between various risk factors and MCI, the risk factors like smoking, functional status, social leisure engagement, depression, sleep disturbance were found to be significant. (Table 2)

The variables that were found significantly associated with mild cognitive impairment were further analyzed with binary logistic regression. The living arrangement, education status, alcohol consumption and depression was found to be a potential risk factor for mild cognitive impairment. (Table 3)

DISCUSSION

The prevalence of mild cognitive impairment was found to be high among the elderly. However, it could be viewed as the tip of an iceberg as a decline in cognition may be perceived as a part of normal ageing. Further study with bigger sample size is required to assess the MCI. Similarly, a high prevalence of MCI (26.06%) was found among community-dwelling older adults in a South India metropolitan area.¹⁵ Population-based studies in older adults reported a prevalence of MCI ranging from 11% to 17%, higher than previously reported prevalence of dementia (6–8%).¹⁶⁻¹⁹

MCI and age were not significantly associated in the present study and this could be due to more number of the sample population in the age

Table 1: Relationship of socio-demographic factors and mild cognitive impairment.

Socio-demographic factors	Mild cognitive impairment				Total	% Total	P-value
	Absent (n=447)		Present (n=129)				
	Count	%	Count	%			
Age							
60-69 years	285(63.8)	79.2	75(58.1)	20.8	360(62.5)	100	
70-79 years	126(28.2)	73.7	45(34.9)	26.3	171(29.7)	100	0.339
>80 years	36(8)	80.0	9(7.0)	20.0	45(7.8)	100	
Gender							
Male	240(53.7)	83.3	48(37.2)	16.7	288(50.0)	100	.001*
Female	207(46.3)	71.9	81(62.7)	28.1	288(50.0)	100	
Living arrangement							
With relatives or caregivers	6(1.3)	100.0	-	-	6(1.0)	100	
With spouse	223(49.9)	84.2	42(32.6)	15.8	265(46.0)	100	
Alone	45(10.1)	78.9	12(9.3)	21.1	57(9.9)	100	.000*
With children and spouse	116(26.0)	79.5	30(23.3)	20.5	146(25.3)	100	
With children	57(12.8)	55.9	45(34.9)	44.1	102(17.7)	100	
Education							
Professional	17(3.8)	100	-	-	17(3.0)	100	
Graduates and above	157(35.1)	89.7	18(14.0)	10.3	175(30.4)	100	
High School	27(6.0)	81.8	6(4.7)	18.2	33(5.7)	100	
Matriculate	39(8.7)	81.3	9(7.0)	18.8	48(8.3)	100	<0.000*
Middle School	108(24.2)	80.0	27(20.9)	20.0	135(23.4)	100	
Primary School	39(8.7)	61.9	24(18.6)	38.1	63(10.9)	100	
Illiterate	60(13.4)	57.1	45(34.9)	42.9	105(18.2)	100	

Figures in parenthesis represent the column-wise percentage.

Table 2: Association of the various risk factors with mild cognitive impairment.

Risk factors	Mild Cognitive impairment					P-value
	Absent (n=447)		Present (n=129)		Total	
	No.(%)	%	No.(%)	%		
Type of diet						
Vegetarian	54(12.1)	78.3	15(11.6)	21.7	69(12.0)	0.889
Non-vegetarian	393(87.9)	77.5	114(88.4)	22.5	507(88.0)	
Smoking status						
Ex-user	75(16.8)	89.3	9(7.0)	10.7	84(14.6)	.013*
Current user	39(8.7)	81.3	9(7.0)	18.8	48(8.3)	
Never user	333(74.5)	75.0	111(86.0)	25.0	444(77.1)	
Alcohol users						
Current user	102(22.8)	82.9	21(16.3)	17.1	123(21.4)	.002*
Never user	213(47.7)	81.3	49(38.0)	18.7	262(45.5)	
Ex-user	132(29.5)	69.1	59(45.7)	30.9	191(33.2)	
Diabetes						
No	327(73.2)	76.8	99(76.7)	23.2	426(74.0)	0.413
Yes	120(26.8)	80.0	30(23.3)	20.0	150(26.0)	
Hypertension						
No	213(47.7)	78.9	57(44.2)	21.1	270(46.9)	0.487
Yes	234(52.3)	76.5	72(55.8)	23.5	306(53.1)	
ADL status						
Intact	443(99.1)	78.5	121(93.8)	21.5	564(97.9)	.000*
Not intact	4(0.9)	33.3	8(6.2)	66.7	12(2.1)	
IADL status						
Intact	438(98.0)	79.2	115(89.1)	20.8	553(96.0)	.000*
Not intact	9(2.0)	39.1	14(10.9)	60.9	23(4.0)	
Social and leisure engagement						
Adequate	246(55.0)	82.8	51(39.5)	17.2	297(51.6)	.002*
Inadequate	201(45.0)	72.0	78(60.5)	28.0	279(48.4)	
Sleep disturbance						
Adequate	129(28.9)	66.2	66(51.2)	33.8	195(33.9)	.000*
Inadequate	318(71.1)	83.5	63(48.8)	16.5	381(66.1)	
Depression						
Absent	391(87.5)	93.5	27(20.9)	6.5	418(72.6)	.000*
Present	56(12.5)	35.4	102(79.1)	64.6	158(27.4)	

Figures in parenthesis represent the column-wise percentage.

group of 60-69 years. These findings were contrary to the other studies, where they found that the increase in the incidence of MCI with age is not unexpected.^{20,21}

Among the elderly, low education were more likely to have cognitive problems than their counterparts. Education is shown to be a protective factor in Alzheimer's disease. The findings are similar to the previous studies that have also shown that low education is associated with increased risk of cognitive impairment.^{22,23} People with high education level may adopt healthier lifestyle that is related to good cognitive function.²³ The alcohol consumption among the elderly had a significant association with MCI. The significant relationship between alcohol intake and MCI

Table 3: Binary logistic regression on various risk factors of mild cognitive impairment.

Risks factors	B	S.E.	df	Sig.	Exp(B)
Gender	0.236	0.378	1	0.533	1.266
Living arrangement (with relatives or care-givers) a					
With spouse	-18.493	14828.745	1	0.999	0.000
Alone	-0.176	0.461	1	0.702	0.838
With children and spouse	-2.075	0.637	1	0.001	0.126
With children	-1.611	0.543	1	0.003	0.200
Education (Professional) a					
Graduates and above	-19.121	9284.277	1	0.998	0.000
High school	-1.241	0.515	1	0.016	0.289
Matriculate	-1.427	0.753	1	0.058	0.240
Middle school	-1.579	0.641	1	0.014	0.206
Primary school	-1.378	0.455	1	0.002	0.252
Illiterate	-0.256	0.521	1	0.624	0.775
Type of diet	-0.337	0.461	1	0.465	0.714
Smoking status (Ex-user) a					
Current user	-0.423	0.584	1	0.469	0.655
Never user	-0.596	0.587	1	0.309	0.551
Alcohol consumption (Current user) a					
Never user	-1.052	0.481	1	0.029	0.349
Ex-user	-0.019	0.379	1	0.961	0.981
ADL status	-0.512	1.116	1	0.646	0.599
IADL status	0.303	0.872	1	0.728	1.354
Social and leisure activities	-0.512	0.317	1	0.106	0.599
Sleep disturbance	1.382	.341	1	.000	3.984
Depression	-4.297	0.436	1	0.000	0.014

^a Reference group

was in conformity with various studies done across the globe. Light to moderate drinking may be associated with the decreased danger of dementia and Alzheimer's disease, but there is no definite decreased risk of cognitive decrease and pre-dementia.^{24,25} However, the current study could not assess the type of alcohol consumed by the elderly.

Sleep disturbances was found to be a risk factor for mild cognitive impairment. On contrary, individuals with Alzheimer's disease and mild cognitive impairment have the same frequency of sleep disorders. But mild cognitive impairment was not significantly associated with sleep-disordered breathing, behaviour disorder, restless legs syndrome and excessive daytime sleepiness.²⁶ This variation may be due to the reason that the participants taken in their study may have problem in remembering the duration of sleep, since it was not assessed considering the cross-sectional study design.

Depression was significantly associated with mild cognitive impairment. It could be attributed due to the less time spent in social and leisure time activities which may indirectly influence the mild cognitive impairment. It is in conformity to the findings of other studies wherethey found that depression increases the risk of incident MCI, AD and vascular dementia.^{27,28}

The study has got few limitations like the tools with more accuracies like Addenbrooke's Cognitive Examination-3 (ACE-3) and Montreal Cognitive Assessment (MoCA) were not taken due to resource constraints, many

variables where lifetime exposure influences MCI (smoking, alcohol use) could not be assessed due to the cross-sectional study design and assessment of variables like diet could not be assessed in depth because of resource constraint.

CONCLUSION

A high prevalence of mild cognitive impairment was found among the elderly which requires mandatory inclusion of screening for cognitive impairment in all geriatric assessment. The comprehensive assessment should also include screening for depression as it was significant with MCI. Proper counselling and education regarding use of alcohol has to be done as a life-course approach.

ACKNOWLEDGEMENT

The authors would like to thank all study participants.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

MCI: Mild Cognitive impairment; **HMMSE:** Hindi Mini-Mental State Examination; **ADL:** Activities of Daily Living; **IADL:** Instrumental Activities of Daily Living; **AD:** Alzheimer Dementia; **PD:** Parkinson's Disease; **15 GDS:** 15 Geriatric Depression Scale; **CDC:** Centers for Disease Control and Prevention; **ACE-3:** Adden brooke's Cognitive Examination-3; **MoCA:** Montreal Cognitive Assessment.

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