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

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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. It is also projected to raise by 64% by 2030. 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. 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...
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 $p=14.89\%$ 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 pre-designed and pre-tested 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. Depression and functional status were assessed using 15 Geriatric Depression Scale (15GDS), Activities of Daily Living (ADL) of Katz Index and Instrumental Activities of Daily Living (IADL) of Lawton Index were used. Classification of smoking status was done as per the Centers for Disease Control and Prevention (CDC) guidelines. Hypertension was diagnosed using JNC 8 criteria. Fasting blood sugar estimation was measured by Accu chek active blood glucose meter and classified as per the WHO classification.

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)

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

| Socio-demographic factors | Mild cognitive impairment |
|----------------------------|--------------------------|
|                            | Absent ($n=447$) | Present ($n=129$) |
|                            | Count    | %      | Count    | %      |
| Age                        |           |        |           |        |
| 60-69 years                | 285(63.8) | 79.2   | 75(58.1) | 20.8   |
| 70-79 years                | 126(28.2) | 73.7   | 45(34.9) | 26.3   |
| >80 years                  | 36(8)     | 80.0   | 9(7.0)   | 20.0   |
| Gender                     |           |        |           |        |
| Male                       | 240(53.7) | 83.3   | 48(37.2) | 16.7   |
| Female                     | 207(46.3) | 71.9   | 81(62.7) | 28.1   |
| Living arrangement          |           |        |           |        |
| With relatives or caregivers| 6(1.3)    | 100.0  | -         | -      |
| With spouse                | 223(49.9) | 84.2   | 42(32.6) | 15.8   |
| With children and spouse   | 116(26.0) | 79.5   | 30(23.3) | 20.5   |
| With children              | 57(12.8)  | 55.9   | 45(34.9) | 44.1   |
| Education                  |           |        |           |        |
| Professional               | 17(3.8)   | 100.0  | -         | -      |
| Graduates and above        | 157(35.1) | 89.7   | 18(14.0) | 10.3   |
| High School                | 27(6.0)   | 81.6   | 6(4.7)   | 18.2   |
| Matriculate                | 39(8.7)   | 81.3   | 9(7.0)   | 18.8   |
| Middle School              | 108(24.2) | 80.0   | 27(20.9) | 20.0   |
| Primary School             | 39(8.7)   | 61.9   | 24(18.6) | 38.1   |
| Illiterate                 | 60(13.4)  | 57.1   | 45(34.9) | 42.9   |

Figures in parenthesis represent the column-wise percentage.

## 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. 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%). 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 2: Association of the various risk factors with mild cognitive impairment.

| Risk factors | Mild Cognitive Impairment | Absent (n=447) | % | Present (n=129) | % | Total | % | P-value |
|--------------|---------------------------|----------------|----|----------------|----|-------|----|---------|
| Type of diet | Vegetarian                | 54(12.1)       | 78.3| 15(11.6)       | 21.7| 69(12.0) | 100|         |
|              | Non-vegetarian            | 393(87.9)      | 77.5| 114(88.4)      | 22.5| 507(88.0) | 100| 0.089 |
| Smoking status | Ex-user                 | 75(16.8)       | 89.3| 9(7.0)         | 10.7| 84(14.6) | 100|         |
|              | Current user              | 39(8.7)        | 81.3| 9(7.0)         | 18.8| 48(8.3)  | 100| 0.013 |
|              | Never user                | 333(74.5)      | 75.0| 111(86.0)      | 25.0| 444(77.1) | 100|         |
| Alcohol users | Current user             | 102(22.8)      | 82.9| 21(16.3)       | 17.1| 123(21.4) | 100|         |
|              | Never user                | 213(47.7)      | 81.3| 49(38.0)       | 18.7| 262(45.5) | 100| 0.002 |
| Diabetes     | No                        | 327(73.2)      | 76.8| 99(76.7)       | 23.2| 426(74.0) | 100| 0.413 |
|              | Yes                       | 120(26.8)      | 80.0| 30(23.3)       | 20.0| 150(26.0) | 100|         |
| Hypertension | No                        | 213(47.7)      | 78.9| 57(44.2)       | 21.1| 270(46.9) | 100| 0.087 |
|              | Yes                       | 234(52.3)      | 76.5| 72(55.8)       | 23.5| 306(53.1) | 100|         |
| ADL status   | Intact                    | 443(99.1)      | 78.5| 121(93.8)      | 21.5| 564(97.9) | 100| 0.000 |
|              | Not intact                | 4(0.9)         | 33.3| 8(6.2)         | 66.7| 12(2.1)  | 100|         |
| IADL status  | Intact                    | 438(98.0)      | 79.2| 115(89.1)      | 20.8| 553(96.0) | 100| 0.000 |
|              | Not intact                | 9(2.0)         | 39.1| 14(10.9)       | 60.9| 23(4.0)  | 100|         |
| Social and leisure engagement | Adequate | 246(53.0) | 82.8 | 51(39.5) | 17.2 | 297(51.6) | 100 | 0.002 |
|              | Inadequate                | 201(45.0)      | 72.0| 78(60.5)       | 28.0| 279(48.4) | 100|         |
| Sleep disturbance | Adequate | 129(28.9) | 66.2 | 66(51.2) | 33.8 | 195(33.9) | 100 | 0.000* |
|              | Inadequate                | 318(71.1)      | 83.5| 63(48.8)       | 16.5| 381(66.1) | 100|         |
| Depression   | Absent                    | 391(87.5)      | 93.5| 27(20.9)       | 6.5 | 418(72.6) | 100| 0.000 |
|              | Present                   | 56(12.5)       | 35.4| 102(79.1)      | 20.9| 158(27.4) | 100|         |

Figures in parenthesis represent the column-wise percentage.

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. People with high education level may adopt healthier lifestyle that is related to good cognitive function. The alcohol consumption among the elderly had a significant association with MCI. The significant relationship between alcohol intake and MCI 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. 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. 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 whereby found that depression increases the risk of incident MCI, AD and vascular dementia. 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.

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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 Assessment-3; MoCA: Montreal Cognitive Assessment.

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