

# Cognitive impairment and its predictors: A cross-sectional study among the elderly in a rural community of West Bengal

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## ABSTRACT

**Context:** With the aging of Indian society, maintaining salubrious cognitive health in late life is a public health priority. Early detection and possible prevention of cognitive impairment (CI), thus, will help in increasing the quality of life of elderly people and decreasing the social, psychological, and economic burden of their families and caregivers. **Aims:** The study aimed to assess proportion of CI and its predictors. **Settings and Design:** This community-based cross-sectional study was conducted among 135 elderly people selected from 15 villages out of a total 64 villages in rural field practice area Singur of AIIPH&PH, Kolkata. **Methods and Material:** Cluster sampling technique was used and villages were selected according to probability proportional to size method. Data was collected using a predesigned, pretested structured schedule, which included sociodemographic and behavioral variables, Montreal cognitive assessment tool, Geriatric depression scale short form (GDS 15), and mini nutritional assessment tool. **Statistical Analysis Used:** Predictors of CI were assessed by univariate and multivariable logistic regression using MS-Excel 2016 and SPSS version 16 software. **Results:** Mean age of the study participants was  $67.03 \pm 6.7$  years with 51.9% of them being females. Proportion of CI was observed to be 48.1% which was significantly associated with increasing age [AOR = 1.1 (1.02-1.13)], decreasing years of schooling [AOR = 1.1 (1.01-1.2)], depression [AOR = 2.7 (1.3-5.8)], and malnourished group [AOR = 4.5 (1.01-20.3)] **Conclusion:** The burden of CI among the study population was found to be quite high. It is an alarming situation which needs improved screening facility for early detection. Nutritional upliftment and screening for depression should also be done on a regular basis.

**Keywords:** Cognitive impairment, elderly, Montreal cognitive assessment (MoCA) tool

## Introduction

Global population of elderly is growing at a fast pace. India, the projected second highest contributor to world's elderly after China, will be home for 330 million elderly population (60 years or older) by the year 2050<sup>[1]</sup> compared to 93 million according to the population census 2011. Cognitive

impairment (CI) is defined as “confusion or memory loss that is happening more often or is getting worse during the past 12 months.”<sup>[2]</sup> CI debilitates daily life routine ultimately resulting in decreased quality of life and increased dependence. Elderly with CI have increased risk for progression to dementia and increased likelihood of contracting Alzheimer's disease than the general population.<sup>[3]</sup> It is estimated that the number of people living with dementia will almost double every 20 years to 42.3 million in 2020 and 81.1 million in 2040.<sup>[4]</sup> The rate of growth will be the highest (around 336%) in India, China, South Asia, and western Pacific regions.<sup>[4]</sup> It is estimated that over 3.7

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million people were affected by dementia in our country in 2010 which is expected to double by 2030.<sup>[5]</sup> CI, being the most consistent and characteristic symptom of Alzheimer's disease, can be considered a proxy for dementia and Alzheimer's disease in population-based studies.<sup>[6]</sup> Till date, the treatment of CI is not available; therefore, only preventive measures taken at an appropriate time can help in reducing the burden of disease. For lack of realization and understanding of dementia in majority of countries including India, stigmatization, barriers to diagnosis and care happen, which impact caregivers, families, and societies physically, psychologically, and economically.

Various sociodemographic, physical, and psychological factors have been found to be associated with CI. Increasing age,<sup>[7]</sup> male gender,<sup>[8]</sup> poor socioeconomic status, low levels of education, and working status have been identified as risk factors in different settings.<sup>[9]</sup> Patients with diabetes mellitus<sup>[10]</sup> and hypertension<sup>[11]</sup> are at higher risk of developing CI. Psychiatric disorders like anxiety and depression also predispose older adults to develop CI later in life.<sup>[12]</sup> Increasing years of schooling<sup>[7]</sup> and socialization<sup>[13]</sup> have been reported as protective against CI. Nutrition is also known to be a key factor that regulates aging. Relationship between nutritional status and cognitive status of elderly, particularly in those who are malnourished and at risk of malnutrition, has been observed both in hospital and community-based research.<sup>[14-16]</sup>

All these call for more research work on the risk factors for this very much dreaded impairment and, therefore, a study was conducted in a rural area of West Bengal to assess the status of CI among the geriatric population and also to identify its contextual factors. This study may prove to be useful in improving the quality of life of elderly population by delaying CI and dementia and, thus, drastically reducing the social, psychological, and economic burden of their families and caregivers.

The demographic shift with an increase in the number of elder people is particularly relevant for primary care physicians (PCPs) who provide the majority of medical care for them. But, ironically, CI recognition by PCPs in the absence of frank dementia is very difficult. Therefore, knowing the important predictors of CI will be extremely useful for them in order to delay the CI and, thus, preventing dementia.

WHO states that "The Decade of Healthy Aging (2020-2030) is an opportunity to bring together governments, civil society, international agencies, professionals, academia, the media, and the private sector for 10 years of concerted, catalytic, and collaborative action to improve the lives of older people, their families, and the communities in which they live."<sup>[17]</sup> Hence, just before the beginning of the decade of healthy aging, this study may provide a small contribution for bigger good of older people.

## Subjects and Methods

### Study type and setting

This community-based observational study with cross-sectional design was conducted in the rural field practice area of All India

Institute of Hygiene and Public Health (AIHH&PH), Kolkata, i.e., Singur in the district of Hooghly from May 2019 to August 2019. It serves a population of 99299 (according to 2011 census) residing in 64 villages in Singur Block of Hooghly district. Study population was all the elderly aged 60 years and above in rural field practice area of All India Institute of Hygiene and Public Health. All elderly who were residing for at least 1 year in the village were included in study. Those who had not given informed written consent, critically ill at the time of the study and with severe speech, visual and hearing impairment were excluded from the study. Ethical approval was obtained from Institutional Ethics Committee (IEC) of All India Institute of Hygiene and Public Health. Date of approval 11-10-2018.

### Sampling

A study<sup>[18]</sup> on CI among elderly persons of rural area of Thrissur district, Kerala, India in 2016 showed the prevalence of 55% CI among the study population. Based on this prevalence, taking confidence interval as 95% with  $Z_{1-\alpha} = 1.96$ ; relative error (L) = 20% according to the formula  $(Z_{1-\alpha})^2 \times (P \times Q/L^2)$ , where  $P = 0.55$ ,  $Q = 1-P = 0.45$ , calculated sample size was  $78.58 \approx 79$ . As the sampling was conducted by cluster sampling and not by simple random sampling, considering design effect of 1.5 sample size was  $79 \times 1.5 = 118.5 \approx 119$ . Adding 10% as nonresponse rate the sample size comes to  $119 + (119 \times 10/100) = 130.9 \approx 131$ . 15 clusters had been decided. Thus, the number of elderly people per cluster was  $131 \div 15 = 8.73 \approx 9$ . Therefore, the final sample size was  $= 15 \times 9 = 135$  elderly people.

Cluster sampling method was used taking fifteen villages (cluster) and nine study participants in each village. Rural field practice area had 64 villages. List of population of all villages was obtained. From the list, 15 villages were selected by probability proportional to size (PPS) technique.

After going to center of the selected village with the help of local maps and local people, at first one direction was chosen randomly with the help of a currency note. Then, one house number was chosen randomly by the currency note. If an elderly person was present in that house, the house was taken as first house. If not present, then the next and then the neighbouring houses were visited continuously till all the nine elderly people had been covered in the selected cluster. In case of end of road, restart from the next lane was done. The same procedure was followed in all the 15 clusters.

### Data collection

After obtaining permission from the Institutional Ethics Committee of AIHH&PH, Kolkata, a house-to-house visit was done. Informed written consent was taken from all study participants before data collection. Face-to-face interview was done for all study participants using a predesigned, pretested, structured schedule (in Bengali language) containing the following contents:

- Sociodemographic and behavioral information
- Morbidity profile

- Geriatric depression scale (short form) schedule
- Mini nutritional assessment (MNA) tool (Bengali version)
- Montreal cognitive assessment (MoCA) tool (Bengali version)

### Operational definition

- **Cognitive Impairment:** CI was measured by Montreal Cognitive Assessment (MoCA) tool (Bengali version). According to that tool, a score of less than 26 was considered as the presence of CI. The maximum score attainable was 30. [Supplementary file 1]
- **Depression:** Depression was measured by Geriatric depression scale (GDS) 15. In GDS 15, a score  $>5$  was considered as depression. [Supplementary file 2]
- **Nutritional status:** Nutritional status was measured by MNA tool for the elderly. A score of  $\geq 12$  was taken as normal, 8–11 at risk, and  $\leq 7$  was considered as malnourished. [Supplementary file 3]

### Statistical analysis

Data were analyzed using Microsoft Excel 2016 and Statistical Package for the Social Sciences (SPSS for Windows, version 16.0, SPSS Inc., Chicago, USA) software. Descriptive and inferential statistics including univariate and multivariable logistic regression were performed. Level of statistical significance was defined as  $P$  value  $<0.05$ . Biologically plausible variables which were statistically significant in univariate models were selected in final multivariable model.

### Ethical permission

Ethical approval was taken from the Institutional Ethics Committee (IEC) of AIHH&PH, Kolkata.

## Results

### Sociodemographic and behavioral characteristics

Background information of the study subject participated in the current study revealed the mean age of the study participants as  $67.03 \pm 6.7$  years ranging from 60 to 88 years. Female participants consisted of 51.9% of total participants. Mean years of schooling was  $4.05 \pm 4.6$  years with 37.8% of illiteracy. According to B.G. Prasad socioeconomic scale 2019, most of them belonged to Class III socioeconomic group (52.6%). Mean per capita income of the participants was  $2786.9 \pm 1169$  INR per month. Most of the study participants were married (68.9%) and the majority belonged to a joint family (65.9%). Majority of the study participants were financially dependent (62.2%) and approximately two-thirds of them were not working and staying at home (66.7%).

Addiction to tobacco smoking was found in 34.8% study participants, whereas 11.1% consumed alcohol. Smokeless tobacco products were used by 18.5% of the study participants.

### Proportion of cognitive impairment

CI was found in 48.1% of the study participants by Montreal cognitive assessment tool.

### Morbidity profile

Medical reports and self-reporting revealed that 63% of the study participants were hypertensive and 19.3% were diabetic. According to GDS, 45.9% of the participants suffered from depression, whereas MNA tool for elderly assessed that 7.4% participants were malnourished and 46.7% were at risk of malnutrition.

### Associated factors

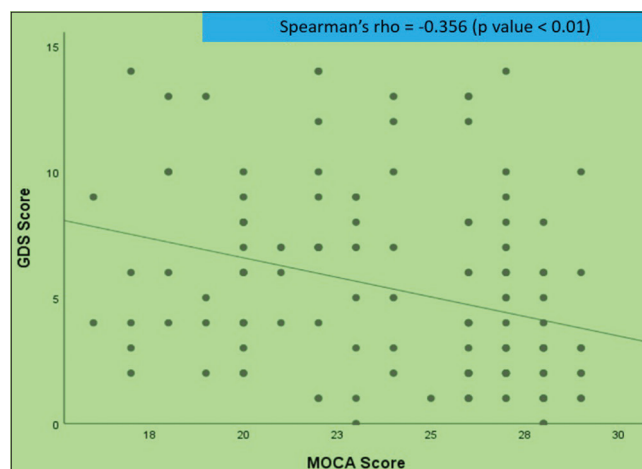
Univariate logistic regression showed that CI was significantly associated with increasing age [OR = 1.08 (1.02–1.14);  $P$  value 0.007] and lesser years of schooling [OR = 1.1 (1.02–1.2);  $P$  value 0.012]. Association with various sociodemographic and behavioral characteristics is given in Table 1.

Association with various morbidity profiles is given in Table 2. CI was found to be significantly associated with depression [OR = 3.1 (1.5–6.2);  $P$  value 0.002]. Both “at risk” of malnourishment [OR = 2.8 (1.3–5.7);  $P$  value 0.006] and “malnourished” [OR = 4.6 (1.1–19.4);  $P$  value 0.04] group according to MNA were significantly associated with CI.

Multivariable Logistic Regression showed that increasing age, decreasing years of schooling, depression, and “malnourished” group according to MNA retained their significance [Table 3]. This model was fitting well evident from insignificant  $P$  value in Hosmer and Lemeshow test and 17.9% to 23.9% variability of dependent variable was explained by this model through Cox and Snell and Nagelkerke R square.

Figure 1 shows very strong negative correlation between MoCA score and GDS score (Spearman’s rho =  $-0.356$ ;  $P$  value  $< 0.01$ ).

Figure 2 shows very strong positive correlation between MoCA score and MNA score (Spearman’s rho =  $0.379$ ;  $P$  value  $< 0.01$ ).



**Figure 1:** Scatter diagram with fit line showing correlation between MoCA score and GDS score

**Table 1: Univariate logistic regression showing association of cognitive impairment with various sociodemographic and behavioral factors (n=135)**

Characteristic	Total (%)	Cognitive Impairment		OR (95% CI)
		Absent (%)	Present (%)	
*Age↑	135(100)	**65(60-69.25)	**68(62.5-72)	1.1(1.02-1.14)
Gender				
Male	65(48.1)	34(52.3)	31(47.7)	1(Reference)
Female	70(51.9)	36(51.4)	34(48.6)	1.04(0.5-2)
Marital status				
Married	93(68.9)	51(54.8)	42(45.2)	1(Reference)
Widow/ Widower	42(31.1)	19(45.2)	23(54.8)	1.5(0.7-3.1)
*Years of schooling↓	135(100)	**4(0-7.25)	**2(0-4)	1.1(1.02-1.2)
Socioeconomic class				
I	3(2.2)	2(66.7)	1(33.3)	1(Reference)
II	17(12.6)	12(70.6)	5(29.4)	0.8(0.06-11.4)
III	71(52.6)	36(50.7)	35(49.3)	1.9(0.2-22.4)
IV	44(32.6)	20(45.5)	24(54.5)	2.4(0.2-28.4)
Financial dependency				
Dependent	84(62.2)	40(47.6)	44(52.4)	1.6(0.8-3.2)
Independent	51(37.8)	30(58.8)	21(41.2)	1(Reference)
Working status				
Working	45(33.3)	28(62.2)	17(37.8)	1(Reference)
Staying at home	90(66.7)	42(46.7)	48(53.3)	1.88(0.9-3.9)
Smoking				
Present	47(34.8)	27(57.4)	20(42.6)	1(Reference)
Absent	88(65.2)	43(48.9)	45(51.1)	1.4(0.7-2.9)
Alcohol				
Present	15(11.1)	10(66.7)	5(33.3)	1(Reference)
Absent	120(88.9)	60(50)	60(50)	2(0.6-6.2)
Smokeless tobacco				
Present	25(18.5)	14(56)	11(44)	1(Reference)
Absent	110(81.5)	56(50.9)	54(49.1)	1.2(0.5-3)

\*Continuous Variable; \*\* Median (IQR) of the continuous variable among that group mentioned

**Table 2: Univariate logistic regression showing association of cognitive impairment with various morbidity profiles (n=135)**

Characteristics	Total (%)	Cognitive Impairment		OR (95% CI)
		Absent (%)	Present (%)	
Chronic Illness				
Hypertension				
Present	85(63)	41(48.2)	44(51.8)	1.5(0.7-3)
Absent	50(37)	29(58)	21(42)	1(Reference)
Diabetes Mellitus				
Present	26(19.3)	13(50)	13(50)	1.1(0.4-2.6)
Absent	109(80.7)	57(52.3)	52(47.7)	1(Reference)
Depression				
Present	62(45.9)	23(37.1)	39(62.9)	3.1(1.5-6.2)
Absent	73(54.1)	47(64.4)	26(35.6)	1(Reference)
Nutritional Status				
Normal	62(45.9)	41(66.1)	21(33.9)	1(Reference)
At risk	63(46.7)	26(41.3)	37(58.7)	2.8(1.3-5.7)
Malnourished	10(7.4)	3(30)	7(70)	4.6(1.1-19.4)

## Discussion

The proportion of CI observed in the current study was 48.1%. The prevalence of CI was found to be 55% in a study conducted in Thrissur, Kerala by Ramachandran *et al.*<sup>[18]</sup>, whereas the

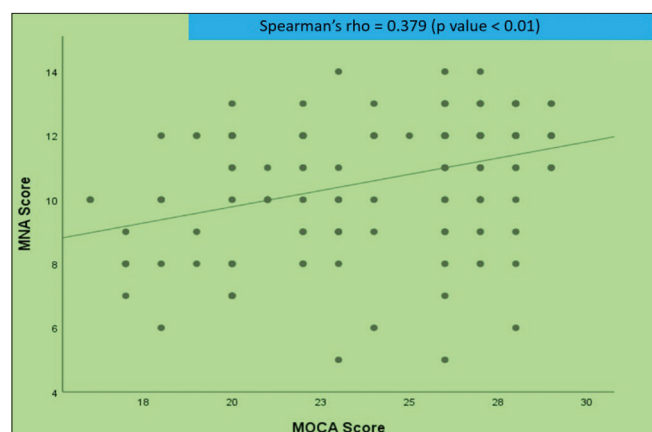
prevalence of CI was 31% as reported in an outdoor patient department (OPD)-based study in Tirupati.<sup>[19]</sup> A camp-based study carried out in a rural population of Varanasi by Gambhir *et al.* showed that 42.9% of the elderly had CI<sup>[20]</sup> and in another study among the inmates of old age home in Hyderabad,



**Table 3: Multivariable logistic regression showing the association of cognitive impairment with various covariates (n=135)**

Characteristic	AOR (95% CI)	P
Increasing Age	1.1 (1.01-1.13)	0.04
Decreasing Years of schooling	1.1(1.01-1.2)	0.04
Depression		
Present	2.7 (1.3-5.8)	0.01
Absent	1 (Reference)	
MNA		
Normal	1 (Reference)	
At Risk	1.7 (0.8-3.9)	0.19
Malnourished	4.5 (1.01-20.3)	0.04

Cox and Snell R Square value=0.179. Nagelkerke R square value=0.239. Hosmer and Lemeshow test, P-value=0.052 (Not significant)

**Figure 2: Scatter diagram with fit line showing correlation between MoCA score and MNA score**

it was found to be 38%.<sup>[21]</sup> The prevalence of CI among community-dwelling older adults in Jamaica was found to be 32.2%,<sup>[22]</sup> whereas, in a study conducted in elderly care home in Malaysia, it was found to be 36.5%.<sup>[23]</sup> All these were more or less similar to our study. However, CI prevalence was much less (8.8%) in the study by Sengupta *et al.* in Ludhiana, Punjab.<sup>[6]</sup> The prevalence of CI was also less in a study conducted in Shimla hills (3.5%; 1.3%-urban, 2.3%-rural) by Sharma *et al.*<sup>[24]</sup>

CI was significantly associated with increasing age, decreasing years of schooling, depression, and poor nutritional status in the current study. The study conducted in Thrissur, Kerala found that CI was significantly associated with older age groups, female gender, elderly belonging to below poverty line (BPL) families, financial dependence, single/widowed status, and nutritional status.<sup>[18]</sup> The OPD-based study of Tirupati by Kumar *et al.* showed that CI significantly related to age, gender, and literacy status. CI was higher in females compared to males.<sup>[19]</sup> The camp-based study of Varanasi found that literate and male elderly had statistically significant higher mean score as compared to illiterates and females. Significant correlation of CI with increasing age was also observed.<sup>[20]</sup> The study in Hyderabad by Rao *et al.* among the inmates of old age home showed a significant association of CI with age and literacy

status. However, no significant association with gender, marital status, socioeconomic status, type of family, residence was seen.<sup>[21]</sup> The study from Ludhiana, Punjab found that increasing age, unmarried/widowed status, illiteracy, unemployment, and poverty were independently associated with CI.<sup>[6]</sup> The study in Shimla hills showed that increasing age, educational level, and marital status acting as significant predictors of CI in the elderly.<sup>[22]</sup> Ferdous *et al.* in a study done in 457 elderly subjects in rural Bangladesh, found that poorer cognitive performance was independently associated with older age, female sex, and illiteracy.<sup>[25]</sup> The Jamaican study by Waldron *et al.* showed that CI was significantly associated with age, educational level, gender, area of residence, hospitalization in the last 3 years, falls in the last 3 months, limited activities for fear of falling, self-reported diabetes mellitus and hypertension, depression, and dependence in ADL.<sup>[23]</sup> The study conducted in elderly care home in Malaysia by Al-Jawad *et al.* found that CI was significantly related to age but not with gender.<sup>[24]</sup>

CI was significantly associated with increasing age in the current study, which is a similar finding in almost all other studies mentioned above. There are structural and functional changes in the brain that correlate with these age-related cognitive changes, including alterations in neuronal structure without neuronal death, loss of synapses, and dysfunction of neuronal networks. Age-related illnesses accelerate the rate of neuronal dysfunction, neuronal loss, and cognitive decline, with many persons developing CIs which is critical enough to reduce their everyday functional abilities, the definition of dementia.<sup>[26]</sup>

CI was significantly associated with decreasing years of schooling in the current study, which is a similar finding across all other studies mentioned above. There are several possible explanations for the association between literacy and cognitive function. The association could be a test bias, in which elderly persons with higher literacy levels perform better on cognitive tests because they are more adept at taking tests in general. Literacy also could reflect a person's innate level of cognitive ability or the effect of early life exposures and educational experiences. Alternatively, literacy could be causally associated with better cognitive function or could be a marker of other causal factors. For example, reading and writing could lead directly to the enrichment of neural networks, which could enable persons with higher levels of literacy to have larger cognitive reserves and to process cognitive information more efficiently.<sup>[27]</sup>

Depression is associated with CI in our study which was also found in the Jamaican study by Waldron *et al.*<sup>[23]</sup> Emotional processing, motivational processing, and cognitive processing each require interactions within and among specific brain networks. Common psychiatric illnesses involve varying degrees of dysregulation in these three domains. Although major depressive disorder may be viewed primarily as a disease of emotional dysregulation, it also involves significant cognitive changes.<sup>[28]</sup> CI is familiar among elderly with late-life depression (LLD). CI in LLD possibly appears as a result of various abnormalities, including

structural brain changes (i.e., cerebrovascular vascular changes, grey matter atrophy) and molecular abnormalities, in particular in inflammatory and neurotrophic cascades.<sup>[29]</sup> Different type of psychotherapies, such as cognitive behavioral therapy, may lead to an improvement in the clinical symptoms of depression. But it is still remaining unclear if effective psychotherapies also lead to progress in cognitive deficits associated with depression.<sup>[28]</sup>

Nutritional status is also one important significant finding associated with CI in this study which is similar to the study done by Ramachandran *et al.* in Thrissur district of Kerala.<sup>[18]</sup> Mantzorou *et al.* also found that malnutrition in the elderly was associated with CI independently of age, gender, educational level, BMI, and mid-arm and calf circumference from their study among Greek population in seven Greek cities.<sup>[30]</sup> This relationship can be explained by the effect of dietary factors on multiple brain processes by regulating neurotransmitter pathways, synaptic transmission, membrane fluidity, and signal-transduction pathways. Particularly to note is the effect of oxidative damage on the brain, wherein lies the importance of vitamins C, E and  $\beta$ -carotene.<sup>[31]</sup>

## Conclusion

Cognitive health maintenance among aging population for a better quality of life is a public health priority. This study offers baseline information regarding the magnitude of CI among the rural elderly population in the area studied. The study design was cross-sectional and, therefore, it was not possible to make causal inferences from the associations found. Nevertheless, the findings of the study revealed that various sociodemographic factors like age, years of schooling as well as depression and nutritional status were associated with CI.

Therefore, timely screening and early intervention of the important preventable risk factors identified in this study may prove useful in improving the quality of life of elderly population by delaying CI and dementia. Cognitive health screening for early detection of CI could be introduced as a part of existing geriatric services at the level of Primary Health Center through the National Programme for Health Care of the Elderly (NPHCE). To prevent or delay CI, counseling of the elderly for the intake of a balanced diet and screening for depression should also be done on a regular basis. There is growing evidence that healthy lifestyles may decrease the rate of cognitive decline seen with aging and help delay the onset of cognitive symptoms in the setting of age-associated diseases. These healthy lifestyle components may comprise physical activity, mental stimulation, avoiding excessive exposure to neurotoxins (e.g., alcohol), treating depression and managing stress, and controlling common medical conditions such as hypertension, diabetes, and obstructive sleep apnea.<sup>[26]</sup> Hence, we may already hold the keys to driving a successful movement to minimize the detrimental impact of age on cognition and to delay the onset of dementia in the elderly.

There is also a need for a multicentric prevalence study with associated factors of CI in India in order to generate robust data,

using which strengthening of the geriatric care services can be done so as to minimize the destructive effect of CI and holding the onset of dementia in the elderly. This will go a long way in increasing the quality of life of elderly people and decreasing the social, psychological, and economic burden of their families and caregivers.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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<b>Geriatric Depression Scale (Short Form)</b>			
Patient's Name: _____		Date: _____	
<b>Instructions:</b> Choose the best answer for how you felt over the past week. Note: when asking the patient to complete the form, provide the self-rated form (included on the following page).			
No.	Question	Answer	Score
1.	Are you basically satisfied with your life?	YES / <b><i>No</i></b>	
2.	Have you dropped many of your activities and interests?	<b>YES</b> / No	
3.	Do you feel that your life is empty?	<b>YES</b> / No	
4.	Do you often get bored?	<b>YES</b> / No	
5.	Are you in good spirits most of the time?	YES / <b><i>No</i></b>	
6.	Are you afraid that something bad is going to happen to you?	<b>YES</b> / No	
7.	Do you feel happy most of the time?	YES / <b><i>No</i></b>	
8.	Do you often feel helpless?	<b>YES</b> / No	
9.	Do you prefer to stay at home, rather than going out and doing new things?	<b>YES</b> / No	
10.	Do you feel you have more problems with memory than most people?	<b>YES</b> / No	
11.	Do you think it is wonderful to be alive?	YES / <b><i>No</i></b>	
12.	Do you feel pretty worthless the way you are now?	<b>YES</b> / No	
13.	Do you feel full of energy?	YES / <b><i>No</i></b>	
14.	Do you feel that your situation is hopeless?	<b>YES</b> / No	
15.	Do you think that most people are better off than you are?	<b>YES</b> / No	
TOTAL			
<small>(Sheikh &amp; Yesavage, 1986)</small>			
<b>Scoring:</b>			
Answers indicating depression are in bold and italicized; score one point for each one selected. A score of 0 to 5 is normal. A score greater than 5 suggests depression.			
<b>Sources:</b>			
<ul style="list-style-type: none"> <li>• Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. <i>Clin Gerontol.</i> 1986 June;5(1/2):165-173.</li> <li>• Yesavage JA. Geriatric Depression Scale. <i>Psychopharmacol Bull.</i> 1988;24(4):709-711.</li> <li>• Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: a preliminary report. <i>J Psychiatr Res.</i> 1982-83;17(1):37-49.</li> </ul>			

<b>Geriatric Depression Scale (Short Form) Self-Rated Version</b>			
Patient's Name: _____		Date: _____	
<b>Instructions:</b> Choose the best answer for how you felt over the past week.			
No.	Question	Answer	Score
1.	Are you basically satisfied with your life?	YES / No	
2.	Have you dropped many of your activities and interests?	YES / No	
3.	Do you feel that your life is empty?	YES / No	
4.	Do you often get bored?	YES / No	
5.	Are you in good spirits most of the time?	YES / No	
6.	Are you afraid that something bad is going to happen to you?	YES / No	
7.	Do you feel happy most of the time?	YES / No	
8.	Do you often feel helpless?	YES / No	
9.	Do you prefer to stay at home, rather than going out and doing new things?	YES / No	
10.	Do you feel you have more problems with memory than most people?	YES / No	
11.	Do you think it is wonderful to be alive?	YES / No	
12.	Do you feel pretty worthless the way you are now?	YES / No	
13.	Do you feel full of energy?	YES / No	
14.	Do you feel that your situation is hopeless?	YES / No	
15.	Do you think that most people are better off than you are?	YES / No	
TOTAL			
<small>(Sheikh &amp; Yesavage, 1986)</small>			

**Supplementary File 2: GDS 15**

## Mini Nutritional Assessment MNA®

## Nestlé Nutrition Institute

নামের শেষ অংশ		নামের প্রথম অংশ		
পিতা	বয়স	ওজন (কেজিতে)	উচ্চতা (সেণ্টিমিটারে)	তারিখ

যথামত সংখ্যার মাধ্যমে বক্স পূরণ করে মূল্যায়ন (স্ক্রীনিং) কাজ সম্পন্ন করতে হবে। চূড়ান্ত মূল্যায়ন (স্ক্রীনিং) স্কোরের সর্বমোট নম্বর।

### স্ক্রীনিং

**ক.** বিগত তিন মাস ধরে ক্ষুধা মন্দা, হজমে সমস্যা, চিবানো বা গিলতে অসুবিধার কারণে আপনার খাবার গ্রহণ কি পরিমাণ কমেছে?  
 ০ = অত্যধিক পরিমাণে কমেছে  
 ১ = মাঝারি পরিমাণে কমেছে  
 ২ = খাবার গ্রহণ কমেনি

**খ.** বিগত তিন মাসে আপনার কি পরিমাণ ওজন কমেছে?  
 ০ = ওজন ৩ কেজির বেশী কমেছে (৬.৬ পাউন্ডস)  
 ১ = জায়েগ না  
 ২ = ১ থেকে ৩ কেজির মধ্যে ওজন কমেছে (২.২ এবং ৬.৬ পাউন্ডস)  
 ৩ = ওজন কমেনি

**গ.** আপনি আপনার বর্তমান চলাফেরা কিভাবে মূল্যায়ন করবেন?  
 ০ = বিছানা বা চেয়ারে সীমাবদ্ধ থাকেন  
 ১ = বিছানা/চেয়ার থেকে উঠতে সক্ষম, কিন্তু বাইরে যেতে পাবেন না  
 ২ = বাইরে বেব হতে পাবেন

**ঘ.** বিগত তিন মাসে আপনি কোনো মাসিক চাপ বা প্রথর কোনো রোগে ভোগেছেন?  
 ০ = হ্যাঁ ২ = না

**ঙ.** আপনি আপনার স্নায়ুিক ও মানসিক সমস্যা কিভাবে মূল্যায়ন করবেন?  
 ০ = অত্যধিক ভুলে যাওয়া বা বিশৃঙ্খলতা  
 ১ = কম ভুলে যাওয়া  
 ২ = কোনো মানসিক সমস্যা নেই

**চ-১.** বি এম আই (ওজন কেজিতে/উচ্চতা মিটার)  
 ০ = বি এম আই ১৯ এর নিচে  
 ১ = বি এম আই ১৯ থেকে ২১ এর নিচে  
 ২ = বি এম আই ২১ থেকে ২৩ এর নিচে  
 ৩ = বি এম আই ২৩ বা তার উপর

যদি বি এম আই বা পাওয়া যায় তাহলে চ-১. প্রশ্নের পরিবর্তে চ-২. প্রশ্নে যেতে হবে। যদি চ-১. প্রশ্ন সম্পন্ন হয় তাহলে চ-২ প্রশ্নের উত্তর দরকার নেই।

**ফ-১.** পায়ের (কান্দ) মাংসপেশীর পরিধি (সেণ্টিমিটারে)  
 ০ = পায়ের (কান্দ) মাংসপেশীর পরিধি ৩১ এর নিচে  
 ১ = পায়ের (কান্দ) মাংসপেশীর পরিধি ৩১ বা উপরে

### মূল্যায়ন (স্ক্রীনিং) স্কোর (সর্বোচ্চ ১৪ পয়েন্ট)

১২-১৪ = পুষ্টি স্বাভাবিক  
 ৮-১১ = অসুস্থির ঝুঁকিতে আছে  
 ০-৭ = অসুস্থিতে ভুগছে

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### Supplementary File 3: MNA Tool