

# Prevalence and Determinants of Cognitive Impairment and Depression among the Elderly Population in a Rural Area of North India

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## Abstract

**Background:** Demographic transition has resulted in population aging, which has led to advancement in multiple geriatric problems including cognitive impairment (CI) and depression. **Objectives:** The objective was to find the prevalence and determinants of CI and depression in the rural elderly population. **Materials and Methods:** This was a community-based cross-sectional study conducted in a rural area. The prevalence of CI was measured using the Mini-Mental State Examination scale and depression was assessed using the Geriatric Depression Scale. The data so collected were analyzed using SPSS software. **Results:** The mean age of the study participants was  $67.47 \pm 6.43$  years. The prevalence of CI and geriatric depression was found to be 36% (153/425) and 29.1% (124/425), respectively. Variables which were found to have independent significant association on multivariate analysis with CI were literacy, memory complaints, and depression. For geriatric depression, an independent association was seen with literacy, socioeconomic status, memory complaints, stress in the family, and presence of CI. CI and geriatric depression were found to be strongly correlated with each other ( $r = -0.252, P < 0.001$ ). **Conclusions:** Almost one-third of the geriatric population is suffering from depression (29.1%) and CI (36%). This necessitates for accurate and timely diagnosis, so as to ensure proper care and support to the elderly population with emphasis on geriatric mental health care.

**Keywords:** Cognitive impairment, elderly, geriatric depression, prevalence, rural area

## INTRODUCTION

The world is aging rapidly through “demographic transition” and is about to enter a new paradigm where older people will outnumber the youngsters. This shift is getting reflected in epidemiological transition in the form of increasing burden of degenerative diseases. Common among them are neurodegenerative diseases, with cognitive impairment (CI) and depression being the most common. As per definition, CI is a transitional stage between normal aging and dementia and it reflects the clinical situation where a person has memory complaint and objective evidence of CI but no evidence of dementia.<sup>[1]</sup> A large proportion of people with cognitive disability live in low- or middle-income countries (60% in 2001, estimated to rise to 71% by 2040); it is estimated that the rate of increase over the decades is only 100% for high-income countries, whereas it is around 300% for India.<sup>[2]</sup>

Late-life depression occurring in patients over the age of 60 is another serious illness of concern. Geriatric depression is

considered as both, a disease and risk factor of other diseases. It is mainly responsible for cognitive dysfunction, dementia, impaired functional activities of daily living, and quality of life.

Till date, treatment for CI is not available. Therefore, preventive measures taken at the appropriate time can only help in reducing the burden of disease. Considering the usefulness of early screening in the elderly population in extending appropriate care to those at risk, the present study was planned. There is a dearth of literature related to CI and depression in India at present, especially in North India and more so in rural areas. Hence, this study was conducted with the objectives to

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estimate the prevalence of CI and depression in this population and to identify various factors associated with them.

## MATERIALS AND METHODS

### Setting and study design

This cross-sectional study was conducted in a rural health block, attached as field practice area to the Postgraduate Department of Community Medicine of a tertiary care institute in North India. The study was conducted after obtaining permission from the Institutional Ethical Committee.

### Sample size calculation

The sample size for the current study was calculated using the formula  $N = 4PQ/L^2$  at 95% confidence interval, with an allowable error of 20%. Taking the prevalence of CI and geriatric depression to be 20% each, the sample size was calculated as 400. Considering the nonresponse rate to be 10%, the final sample size arrived at 440.

### Sampling technique

For the purpose of providing efficient health-care services, the block has been divided into eight zones. Out of them, one of the zones was selected by a simple random sampling technique. A list of all the villages falling in that zone was procured from the health centers, before the start of the study. First, village was selected by simple random sampling and all the houses falling in that village were surveyed by the house-to-house visit to collect the data from the elderly population. Then next adjoining villages were included till the required sample size was reached.

### Data collection

Before the start of the study, the local community leaders of the respective areas were approached and sensitized about the purpose of the study. All the elderly in selected areas constituted the sampling frame. Data collection was done by the house-to-house visit. On reaching the house, after introducing oneself, the reason of visit and purpose of the study was explained and then verbal informed consent of the subject was sought. Those who replied in affirmation were included in the study and those who replied in negative were again requested for participation and if still not willing, were excluded. Privacy during the interview was ensured by taking them in a separate room. All the elderly people (aged >60 years) residing in the surveyed villages, who met the eligibility criteria and were willing to participate in the study by giving verbal informed consent were interviewed.

### Inclusion criteria

All the elderly people (aged >60 years), apparently healthy, who agreed to participate in the study.

### Exclusion criteria

All those elderly people (aged >60 years) who (a) were sick with any acute illness, (b) had some known neurodegenerative disease or psychiatric condition, (c) were taking psychotropic medication, (d) were having communication difficulties due

to reasons of hearing loss or language barrier and who did not give consent or were not available even after visiting the household twice.

### Study tool

The questionnaire used for the study purpose comprised of three parts: (a) sociodemographic details (b) scale for Mini-Mental State Examination (MMSE)<sup>[3]</sup> and (c) Geriatric Depression Scale (GDS).<sup>[4]</sup> The sociodemographic details included age, gender, literacy status, socioeconomic status, marital status, type of family, memory complaints, family history of dementia, and any chronic comorbidity. Modified Uday–Pareek Scale was employed to assess their socioeconomic status.

### Mini-Mental State Examination

Assessment of cognitive function was done by applying the standardized Mini-Mental State Examination (MMSE) of Folstein. MMSE score ranges from 0 to 30, with lower scores indicating increasing severity of CIs in the domains of orientation, memory, attention, and executive functions. CI was classified as follows: scores between 24 and 30 indicate no CI, 18–23 as mild CI, and 0–17 as severe CI.

### Geriatric Depression Scale

Depression was assessed with the Geriatric Depression Scale (GDS), a 15-point scale questionnaire, specifically developed for screening depressive symptoms in elderly populations. Subjects scoring >5 were defined as having depressive symptoms. Further, a score ranging between 6 and 10 indicates mild depression and a score of 11–15 as severe depression.

### Statistical analysis

Data thus collected was compiled and analyzed using PSPP (Free open access software). The prevalence of CI and depression was calculated in percentages (%). Univariate analysis was done by employing the Chi-square test to find the statistical significance of the association of different variables with CI and geriatric depression. Correlation between CI and geriatric depression was calculated using Pearson's correlation coefficient. To determine the independent association of variables, those variables which were found to be significant on univariate analysis were entered into the logistic regression model. A value of  $P < 0.05$  was taken as statistically significant.

## RESULTS

A total of 443 elderly were interviewed, out of which 18 subjects did not give answers to all the questions. Hence, after excluding the incompletely filled questionnaires, the final analysis was done on 425 subjects. The mean age of the study population was  $67.47 \pm 6.43$  years. Females constituted 56.47% of the study subjects. About 47.29% of the study population was illiterate and only 2.59% of the subjects were educated beyond the higher secondary level. A larger proportion of participants belonged to the middle class of socioeconomic status (86.36%). The prevalence of CI was found to be 36% (153/425) and geriatric depression 29.1% (124/425).

However, the coexistence of both the disorders was seen in 16% (68/425) of the subjects. The distribution and prevalence of CI and geriatric depression among participants according to sociodemographic variables is detailed in Table 1.

Variables which had a statistically significant association with CI were literacy, marital status, type of family, presence of memory complaints, any chronic comorbidity, and presence of any stress in the family ( $P < 0.05$ ). At the same time, geriatric depression was significantly associated with age, literacy, socioeconomic status, marital status, presence of memory complaints, any chronic comorbidity, and presence of any stress in the family ( $P < 0.05$ ) [Table 1]. However, gender and family history of dementia had shown no statistically significant association with either of these disorders ( $P > 0.05$ ).

CI and geriatric depression strongly correlated with each other ( $r = -0.252$ ,  $P < 0.001$ ). The distribution of the study population according to the severity of CI and geriatric depression is shown in Figures 1 and 2.

Tables 2 and 3 depict multivariate analysis of CI and geriatric depression, respectively. Variables which were found to have independent significant association with CI were literacy, memory complaints, and geriatric depression. For geriatric depression, independent association was seen for literacy, socioeconomic status, memory complaints, stress in the family, and presence of CI.

## DISCUSSION

The prevalence of CI in the current study was found to be 36%. A slightly lesser prevalence of 31% was reported in a study conducted by Kumar and Sudhakar in South India.<sup>[5]</sup> However,

**Table 1: Association of cognitive impairment and geriatric depression with sociodemographic variables (n=425)**

Variables	Frequency, n (%)	Cognitive impairment, n (%)	Geriatric depression, n (%)
Age groups (years)			
60-70	287 (67.52)	96 (33.45)	70 (24.39)
71-80	115 (27.05)	45 (39.13)	41 (35.65)
>80	23 (5.41)	12 (52.17)	13 (56.52)
<i>P</i>		0.142	0.001 <sup>#</sup>
Literacy status			
Illiterate	201 (47.29)	87 (43.28)	83 (41.29)
Primary	94 (22.12)	36 (38.30)	22 (23.40)
Secondary	119 (28)	29 (24.37)	18 (15.13)
Higher secondary and above	11 (2.59)	1 (9.09)	1 (9.09)
<i>P</i>		0.002 <sup>#</sup>	0.000 <sup>#</sup>
Marital status			
Married	323 (76)	103 (31.88)	83 (25.70)
Single*	102 (24)	50 (49.02)	41 (40.2)
<i>P</i>		0.002 <sup>#</sup>	0.005 <sup>#</sup>
Socioeconomic status**			
Upper	11 (2.59)	4 (36.36)	1 (9.09)
Middle	367 (86.36)	128 (34.88)	103 (28.06)
Lower	47 (11.06)	21 (44.68)	204 (2.55)
<i>P</i>		0.419	0.04 <sup>#</sup>
Type of family			
Nuclear	146 (34.35)	62 (42.47)	49 (33.56)
Joint	279 (65.65)	91 (32.62)	75 (26.88)
<i>P</i>		0.045 <sup>#</sup>	0.15
Memory complaints			
Yes	197 (46.35)	96 (48.73)	83 (42.13)
No	228 (53.68)	57 (25)	41 (17.98)
<i>P</i>		0.00 <sup>#</sup>	0.00 <sup>#</sup>
Any chronic morbidity			
Yes	222 (52.23)	90 (40.54)	76 (34.23)
No	203 (47.76)	63 (31.03)	48 (23.64)
<i>P</i>		0.04 <sup>#</sup>	0.016 <sup>#</sup>
History of any stress in family			
Yes	124 (29.18)	54 (43.55)	70 (56.45)
No	301 (70.82)	99 (32.89)	54 (17.94)
<i>P</i>		0.037 <sup>#</sup>	0.000 <sup>#</sup>

<sup>#</sup> $P < 0.05$  taken as significant, \*Single includes unmarried, widow, divorcee, \*\*For analysis purpose, socioeconomic status has been grouped into three classes

**Table 2: Logistic regression analysis of cognitive impairment**

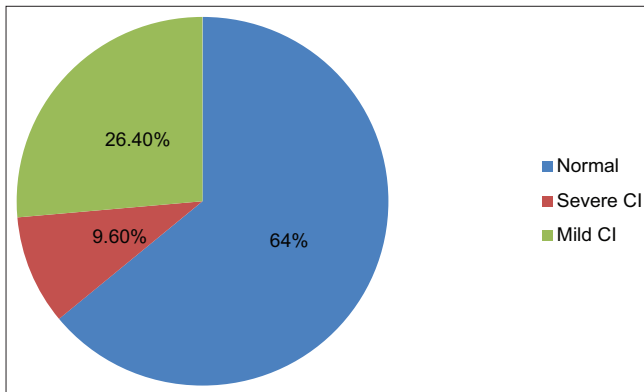
Variable	B	SE	P value	Exp(B)	95% CI for Exp(B)
Age group	-0.00	0.09	0.975	0.99	0.82-1.21
Literacy status	0.27	0.13	0.034 <sup>#</sup>	1.31	1.02-1.68
Socioeconomic status	-0.26	0.32	0.411	0.76	0.41-1.45
Marital status	-0.28	0.26	0.274	0.75	0.45-1.26
Type of family	0.31	0.23	0.164	1.37	0.88-2.15
Memory complaints	0.86	0.24	0.000 <sup>#</sup>	2.36	1.49-3.75
Stress in family	-0.23	0.26	0.382	0.79	0.48-1.33
Morbidity	0.09	0.23	0.671	1.10	0.70-1.73
Geriatric depression	-0.79	0.26	0.002 <sup>#</sup>	0.45	0.27-0.75
Constant	0.48	1.15	0.673	1.62	

<sup>#</sup>P<0.05 taken as significant. CI: Confidence interval, SE: Standard error

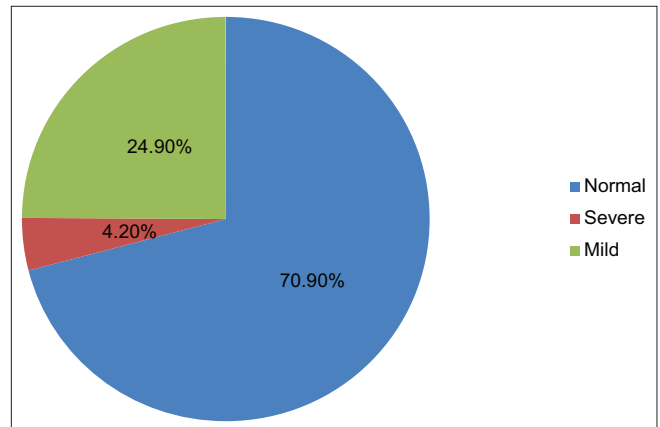
**Table 3: Logistic regression analysis of geriatric depression**

Variable	B	SE	P value	Exp(B)	95% CI for Exp(B)
Age group	0.13	0.11	0.234	1.14	0.91-1.42
Literacy status	-0.52	0.15	0.001 <sup>#</sup>	0.59	0.44-0.81
Socioeconomic status	0.75	0.36	0.038 <sup>#</sup>	2.11	1.04-4.27
Marital status	-0.11	0.29	0.703	0.89	0.49-1.60
Type of family	-0.17	0.26	0.507	0.84	0.50-1.40
Memory complaints	-0.78	0.27	0.004 <sup>#</sup>	0.46	0.26-0.78
Stress in family	-1.59	0.27	0.000 <sup>#</sup>	0.20	0.12-0.34
Morbidity	0.13	0.27	0.624	1.14	0.67-1.93
Cognitive impairment	-0.76	0.26	0.003 <sup>#</sup>	0.46	0.28-0.77
Constant	3.44	1.21	0.004	31.39	

<sup>#</sup>P<0.05 taken as significant. CI: Confidence interval, SE: Standard error



**Figure 1:** Distribution of study population according to the severity of cognitive impairment



**Figure 2:** Distribution of study population according to the severity of geriatric depression

a quite lesser prevalence of 10%, 8.8%, and 11.5% was reported by Konda *et al.*,<sup>[6]</sup> Sengupta *et al.*<sup>[7]</sup> and Shaji *et al.*<sup>[8]</sup> *et al.*, respectively, in their studies. Few studies conducted outside India also reported a comparable prevalence rate of CI, i.e., 30% in China<sup>[9]</sup> and 33% in Australia.<sup>[10]</sup> A systematic review of literature from Europe revealed the prevalence to range from 8% to 34%, but these data were inclusive of diverse ethnic population.<sup>[11]</sup>

Literacy, marital status, type of family, presence of memory complaints, any chronic co-morbidity, and presence of any stress in the family were found to be significantly associated

with CI on univariate analysis. However, the variables which had an independent association with CI on multivariate analysis were literacy, presence of memory complaints, and depression. Konda *et al.* reported higher age, illiteracy, and bed ridden for the past 6 months as the independent correlates of CI.<sup>[6]</sup> Few other studies also have reported illiteracy or no formal education to be associated with CI and increased risk of dementia.<sup>[12,13]</sup> In a similar vein, Kumar and Sudhakar in their study concluded that age, gender, literacy, and economic status to be significant factors associated with CI.<sup>[5]</sup>

A study from Mexico revealed that as the cognitive status of the elderly individual is impaired, depression levels also increase.<sup>[13]</sup> Thus, early detection of depressive symptoms in elderly people with CI is crucial to take preventive and early rehabilitative measures.

The prevalence of depression in our study population was found to be 29.1%. Majority of respondents had mild type of depression. Surprisingly, a study conducted in Mexico also reported a similar rate of prevalence of depression (29.1%).<sup>[13]</sup> The results are also congruent with a study conducted by Sangma *et al.*<sup>[14]</sup> Higher prevalence rates of 35.5%, 42.7%, and 44.8% were reported by others.<sup>[5,15,16]</sup> A slightly lesser prevalence of 23% was reported in a study conducted among the South Indian geriatric urban population by Konda PR *et al.*<sup>[17]</sup> The use of different instruments to measure the geriatric depression is likely to be one of the reasons for variation in prevalence rates of depression from country to country and even among different regions within a single country.

On multivariate analysis, various independent risk factors found to be associated with geriatric depression were literacy, socioeconomic status, presence of memory complaints, stress in the family, and CI. The association between illiteracy and depression was also reported by various other authors.<sup>[18,19]</sup> Variables such as female gender, nuclear family, being widowed, unemployed status, low socioeconomic status, and illness of self/family members were reported to be significantly associated with depression by Bhuvneshkumar *et al.*<sup>[16]</sup> In a meta-analysis by Cole and Dendukuri, using multivariate techniques, risk factors identified for depression were medical illness, poor health status, and bereavement.<sup>[20]</sup>

## CONCLUSIONS

Mental health problems, especially CI and geriatric depression are the leading health problems, putting a lot of disease burden for the society and health-care delivery system, in the developing countries, most of which are ill-prepared for fulfilling such demands. Hence, strengthening of the existing health-care system, especially geriatric health services is the need of the hour.

## Limitations

The cross-sectional design of the study limits our capability to find out the temporal associations.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Burns A, Zaudig M. Mild cognitive impairment in older people. *Lancet* 2002;360:1963-5.
2. Ferri CP, Prince M, Brayne C, Brodaty H, Fratiglioni L, Ganguli M, *et al.* Global prevalence of dementia: A Delphi consensus study. *Lancet* 2005;366:2112-7.
3. Folstein MF, Folstein SE, McHugh PR. "Minimal state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975;12:189-98.
4. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, *et al.* Development and validation of a geriatric depression screening scale: A preliminary report. *J Psychiatr Res* 1982;17:37-49.
5. Kumar ND, Sudhakar TP. Prevalence of cognitive impairment and depression among elderly patients attending the medicine outpatient of a tertiary care hospital in South India. *Int J Res Med Sci* 2013;1:359-64.
6. Konda PR, Sharma PK, Gandhi AR, Ganguly E. Correlates of cognitive impairment among Indian urban elders. *J Gerontol Geriatr Res* 2018;7:1-13.
7. Sengupta P, Benjamin AI, Singh Y, Grover A. Prevalence and correlates of cognitive impairment in a north Indian elderly population. *WHO South East Asia J Public Health* 2014;3:135-43.
8. Shaji S, Bose S, Verghese A. Prevalence of dementia in an urban population in Kerala, India. *Br J Psychiatry* 2005;186:136-40.
9. Ren L, Zheng Y, Wu L, Gu Y, He Y, Jiang B, *et al.* Investigation of the prevalence of Cognitive Impairment and its risk factors within the elderly population in Shanghai, China. *Sci Rep* 2018;8:3575.
10. Low LF, Brodaty H, Edwards R, Kochan N, Draper B, *et al.* The prevalence of 'cognitive impairment no dementia' in community-dwelling elderly: A pilot study. *Aust N Z J Psychiatry* 2004;38:725-31.
11. Adelman S, Blanchard M, Livingston G. A systematic review of the prevalence and covariates of dementia or relative cognitive impairment in the older African-Caribbean population in Britain. *Int J Geriatr Psychiatry* 2009;24:657-65.
12. Alkhenizan M, Alkhenizan A, Basudan L. Prevalence of Mild cognitive impairment and dementia in Saudi Arabia: A community-based study. *Dement Geriatr Cogn Dis Extra* 2018;8:98-103.
13. Ortiz GG, Arias-Merino ED, Flores-Saiffé ME, Velázquez-Brizuela IE, Macías-Islas MA, Pacheco-Moisés FP. Prevalence of cognitive impairment and depression among a population aged over 60 years in the metropolitan area of Guadalajara, Mexico. *Curr Gerontol Geriatr Res* 2012;2012:1-6.
14. Sangma RJ, Konjengbam S, Laishram J, Elangbam V. Depression and its associated risk factors among elderly in an urban area: A cross-sectional study. *J Med Soc* 2018;32:106-10.
15. Bhuvneshkumar M, John KR, Logaraj M. A study on prevalence of depression and associated risk factors among elderly in a rural block of Tamil Nadu. *Indian J Public Health* 2018;62:89-94.
16. Sinha SP, Shrivastava SR, Ramasamy J. Depression in an older adult rural population in India. *MEDICC Rev* 2013;15:41-4.
17. Konda PR, Sharma PK, Gandhi AR, Ganguly E. Geriatric depression and its correlates among south Indian Urbans. *J Depress Anxiety* 2018;7:1-15.
18. Swarnalatha N. The prevalence of depression among the rural elderly in Chittoor District, Andhra Pradesh. *J Clin Diagn Res* 2013;7:1356-60.
19. Singh AK, Singh TB, Gupta S, Yadav JS. Prevalence of depression with medical co morbidities among the elderly. *Indian J Psychosoc Sci* 2013;3:427.
20. Cole MG, Dendukuri N. Risk factors for depression among elderly community subjects: A systematic review and metaanalysis. *Am J Psychiatry* 2003;160:1147-56.