Original article

Prevalence of cognitive impairment among people aged ≥ 50 years in rural population of Belagavi Taluka – A community based cross sectional studySunilkumar S. Jadenur^a, A.O. Saroja^b, Annapurna Kari^{a,*}, Mubhashir Angolkar^a^a Department of Public Health, J. N. Medical College, KAHER, Belgaum, 590010, Karnataka, India^b Department of Neurology, J. N. Medical College, KAHER, Belgaum, 590010, Karnataka, India

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ABSTRACT

Introduction: Cognitive Impairment is one of the neglected disorders in India, compared to developed countries and one amongst the emerging public health issues. In older cohort if left undiagnosed, it may lead to dementia or Alzheimer's disease. Till now, treatment for CI isn't available. Hence, only preventive measures are being taken at a right time, which may help to relieve the burden of disease.

Objective: To estimate the prevalence of Cognitive Impairment among people aged ≥ 50 years in rural population of Belagavi Taluka and to determine association with its socio-demographic variables.

Study design: A community-based cross-sectional study.

Methodology: House to house survey was conducted by simple random sampling method, after obtaining the required permission from the respective authorities. Demographic profile, Vernacular ACE III questionnaire [literate or illiterate version] was accustomed to discover CI and HADS scale. Statistical Analysis was done through SPSS version 22. Chi - Square test and Karl Pearson's parametric statistic test were applied.

Results: The prevalence of CI was found to be 14% in the present study. Female gender, widow/widower status, illiteracy and advanced old age (≥ 70 years) were statistically significant risk factors.

Conclusion: Early diagnosis, necessary social support and required therapeutic interventions to enhance cognitive level of old aged community dwellers and vulnerable groups need much priority.

1. Introduction

Ageing is a normal physiological process. As per Seneca, 'Old age itself is an incurable disease'. Sir J.S. Ross recently commented on old age, 'No one can heal old age. Only you can protect it, promote it and extend it.'¹

Ageing starts at the time of birth and it lasts till last breath of person. In early years of 20th century, with improvements in public health services, preventing communicable diseases through vaccination, standard of living conditions, good income and less pollution led to increase in life expectancy of individuals. Whereas, in later years of twentieth century rapid growth in health care technologies, inventions of new antibiotics, antimicrobial and active immunization, preventive, curative, primitive approach of primary health facilities led to increase in life expectancy. Hence, by all these improvements in health facility, the number of old age population also increased.²

There is a significant and gradual increase in an elderly population across the world. As per the ageing of world population statistics - 2013,

the population of older people (aged ≥ 60 years) increased from 9.2% in 1990 to 11.7% in 2013 and if it continues to grow at the same speed, older population will reach to 21.1% by 2050. At present, about 75% of the world's elder persons are living in developing countries. Due to an increase in old-age population globally, cognitive impairment (CI) is becoming a major public health problem. It can progress into other conditions like dementia and Alzheimer's disease which could affect the quality of life and dependency on family members.³

CI refers to mainly when elderly people have trouble in remembering things, lacks in learning, concentrating and memorizing or could not make any kind of decisions which affects the quality of their day-to-day life. It may be mild to severe form. In persons with mild CI, decline in cognitive functions are notified but, they can perform their daily activities independently. In severe cases of impairment, there may be inability to understand, lack of memorization, inability to talk or write.⁴

Annually 5–15% of old age people have Cognitive Impairment to different forms of Dementia and Alzheimer's disease. As per studies done in India and Taiwan, prevalence of CI was found to be 22.2% and 18%

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respectively.⁵ In India, the prevalence of cognitive impairment varies from 3.5% to 11.5% from north to southern parts of India in people aged >65 years. The prevalence of CI is high in rural areas of India compared to urban areas, whereas the studies in rural areas are very few compared to urban population.⁶

Very few studies have been done in rural areas on CI. It is of utmost importance to detect the prevalence of CI and then proceed in a step wise systematic approach to promote a healthy, graceful and active ageing. Considering all this, present study was undertaken to study cognitive functions in elderly and also to find out the prevalence of CI.

2. Materials and methods

Study Design: A Cross-Sectional Study.

Study Period: September 2019 to March 2021.

Source of Data: Population residing in the rural areas of Vantamuri PHC of Belagavi Taluka.

Sampling Technique: Simple random sampling technique.

Sample Size: 125

Presuming $p = 8.8\%$

$$q = 91.2\%$$

$$n = \frac{Z^2 \times p \times q}{d^2}$$

Where n = number of subjects,

$$Z = 1.96$$

$$p = 8.8\% \text{ taken from previous studies}$$

$$q = (100 - P) = 91.2\%$$

$$d = 5\% \text{ (possible error)}$$

$$\text{Hence, } \frac{\text{sample size} = (1.96)^2 \times 8.8 \times 91.2}{(5)^2} = 125$$

As the Covid-19 situation was at peak, the sample size was rounded off to **100**.

2.1. Inclusion criteria

- Community dwellers aged ≥ 50 yrs selected from rural area of Vantamuri PHC of Belagavi Taluka. Vantmuri PHC was selected by lottery method in rural area of Belagavi.

2.2. Exclusion criteria

- Persons with mental disorders {already diagnosed}
- Participants with anxiety and depression {HADS Scale}
- Those who did not give consent

2.3. Data collection procedure

The present study was conducted on people residing in rural area of Vantamuri PHC of Belagavi Taluka. House to house survey was conducted by simple random sampling method, after obtaining the necessary permission from the respective authorities. The participants were briefed about the study and informed consent was obtained from them. Demographic profile, Vernacular ACE III questionnaire [literate or illiterate version] was used to find out CI and HADS scale was used to exclude participants who were facing anxiety and depression. The interview lasted for approximately 20–30 min. Data was collected by trained post graduate students of public health department.

2.4. Tools used for data collection

Demographic profile: Age, Gender, Education, Occupation, personal history etc of participants was included.

Fig. 1. Prevalence of Cognitive Impairment in present study.

2.5. Addenbrooke's cognitive examination scale [ACE III scale]

It is the Neuro-psychological examination administered to detect the CI. It consists of 19 tasks to evaluate five sectors of cognition about Attention, Fluency, Memory, Language and Visio-spatial processing.¹

2.6. Scoring

Each activity of the questionnaire was given a total score out of 100.

18 for Attention
26 for Memory
14 for Fluency
26 for Language
16 for Visuo-spatial skills

2.7. Score

88 and more = Normal or No cognitive impairment.
Below 83 = Abnormal or Having CI (case)
Between 83 and 87 = Inconclusive

Table 1
Socio-demographic profile of respondents.

Characteristics	No of respondents	% of respondents
Age groups		
50–59yrs	31	31.00
60–69yrs	40	40.00
≥ 70 yrs	29	29.00
Gender		
Male	53	53.00
Female	47	47.00
Literacy Status		
Illiterates	34	34.00
Primary	20	20.00
Secondary	20	20.00
PUC	14	14.00
Graduates	12	12.00
Marital status		
Married (living with spouse)	82	82.00
Widow/Widower	18	18.00
Type of family		
Nuclear	57	57.00
Joint	43	43.00
Personal history		
No	68	68.00
Alcoholic consumption	8	8.00
Tobacco	24	24.00
Co-morbidities		
No	69	69.00
DM	6	6.00
HTN	18	18.00
DM + HTN	7	7.00
Total	100	100.00

Table 2

Association between prevalence of Cognitive Impairment and Gender.

Gender	Normal	%	Inconclusive	%	Cognitive impairment	%	Total
Male	44	83.02	2	3.77	7	13.21	53
Female	31	65.96	9	19.15	7	14.89	47
Total	75	75.00	11	11.00	14	14.00	100

Chi-square = 6.3710, p = 0.0410

Table 3

Association between prevalence of Cognitive Impairment and Marital Status.

Marital status	Normal	%	Inconclusive	%	Cognitive Impairment	%	Total
Married	67	81.71	9	10.98	6	7.32	82
Widow/Widower	8	44.44	2	11.11	8	44.44	18
Total	75	75.00	11	11.00	14	14.00	100

Chi-square = 17.2660, p = 0.0001

Table 4

Association between prevalence of Cognitive Impairment and Literacy Status.

Educations	Normal	%	Inconclusive	%	Cognitive impairment	%	Total
Illiterates	18	52.94	7	20.59	9	26.47	34
Primary	14	70.00	2	10.00	4	20.00	20
Secondary	18	90.00	2	10.00	0	0.00	20
PUC	13	92.86	0	0.00	1	7.14	14
Graduates	12	100.00	0	0.00	0	0.00	12
Total	75	75.00	11	11.00	14	14.00	100

Chi-square = 19.4470, p = 0.0130

2.8. Hospital anxiety & depression scale. [HADS]

This was to determine the presence of depression and anxiety. It consists of 14 components, out of which 7 for Anxiety and 7 for Depression subscale. Anxiety scale focused on general anxiety disorders whereas depression scale on symptoms related to depressive disorders.

2.9. Score

- 0 to 7 = Normal
- 8 to 10 = Borderline abnormal
- 0. 11 to 21 = Abnormal (case)

2.10. Data analysis

Statistical Analysis was done through SPSS version 22. Chi square test was applied.

2.11. Ethical clearance

The present research project was approved by Institutional Ethics Committee on Human subjects Research, J. N. Medical College, KAHER. (Ref: MDC/DOME/384 Date 18/05/2021).

3. Results

Fig. 1 represents the prevalence of CI. Prevalence of CI was 14%.

Table 5

Association of age group with cognitive impairment.

Age groups	Normal	%	Inconclusive	%	Cognitive impairment	%	Total
50–59yrs	27	87.10	1	3.23	3	9.68	31
60–69yrs	31	77.50	7	17.50	2	5.00	40
≥70yrs	17	58.62	3	10.34	9	31.03	29
Total	75	75.00	11	11.00	14	14.00	100

Chi-square = 13.6650, p = 0.0080

Fig. 2. Correlation between Anxiety and Depression scores by Karl Pearson's Correlation Coefficient.

The above graph shows linearity with $r = 0.7232$ and demonstrate that increasing levels of anxiety is associated with depression.

Almost 75% respondents had no CI, 11% did not have clear signs of CI so classified as inconclusive.

Table 1 represents the distribution of Socio-demographic profile of

respondents.

Table 2 represents the association between prevalence of CI with gender. Prevalence was seen higher in females around 14.89% as compared to males which was 13.21%, found to be statistically significant ($p = 0.0410$).

Table 3 shows that prevalence of CI was higher in widow/widower that is 44.44% and in married it was 7.32%. This is highly statistically significant ($p = 0.0001$).

Table 4 shows the association between prevalence of CI and education. About 26.74% CI was observed in illiterates, whereas 20% in primary education, 7.14% in PUC passed and 0% in secondary schooling and graduates. Prevalence was statistically significant in illiterates (p value-0.0130).

Table 5 shows the association between age group with CI. Prevalence of CI was seen highest in age group ≥ 70 years that is 31.03%, whereas it was 9.68% and 5% in age group 50–59 years and 60–69 years respectively, which is significantly high ($p = 0.0080$).

Fig. 2 Correlation between anxiety and depression scores by Karl Pearson's Correlation Coefficient.

4. Discussion

CI not only affects life quality of elderly persons but also affects care givers and family. Therefore, early detection and implementation of measures of social support and therapeutic intervention helps in improving quality of life and decreasing the progression of disease.

In present study the prevalence of CI was found about 14%, whereas other studies done in Lucknow and Kerala also have shown the prevalence 14.42% and 14.95% respectively,^{34,35} which were similar to our results. A study done by Deepak Sharma et al., has shown least prevalence, which was 3.5%.⁹

As our aim was to find out the prevalence of CI and its association in selected rural community dwellers aged ≥ 50 years, which was significant. Other experiments also expressed that in rural population CI prevalence was more^{5,8,9} when compared with urban population like a recent study conducted by Khanna et al., in urban population of Belagavi²⁶ and a study done by Yuan Lu et al. in China.²³

CI was seen more among females, which was 14.89% ($p = 0.041$) in our study. Few more studies conducted by various researchers like, Genaro G, Ganguli, and Devi Mohan had also revealed the same observation.^{8,10}

In the present study illiterates had shown more prevalence of CI compared to literates. Most of the experiments also revealed a strong association between low level of education and cognitive functions.^{7,9}

Marital status of each respondent was collected and it was found that widow/widower more prone to suffer with CI (44.44%, $p = 0.0001$) which was highly significant in present study. A lot of experiments were also presented the association of CI with widow/widower status.^{7,9,26}

5. Limitations

- The limitation of our study includes small sample size and single assessment.
- The reasons being Covid Pandemic and lockdown status affecting recruitment and assessment
- Detailed assessment of duration of co-morbidities, medications used and nutritional status have not been done.

6. Conclusion

Present study concluded that prevalence of CI is more in rural population when compared to urban. Illiteracy, older age group, female

gender and widow/widower status were risk factors for CI. Setting up screening facility in primary health centre in geriatric population and referring to higher centre of suspected individuals with CI may be helpful in early detection and proper management.

7. Recommendations

- Training of ASHA's to detect CI in old age people by using any of cognitive examination scales and further examination by medical officer at PHC level. Referring to higher centre of detected cases for further management.
- Geriatric department should be initiated at all health care levels.

Ethical approval

Obtained Ethical Clearance from Institutional Ethics Committee (I.E. C) of JNMC, KLE Academy of Higher Education and Research, Belagavi.

Consent to participate

Obtained.

Consent for publication

Not applicable.

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Declaration of competing interest

The authors declare that they have no conflict of interest.

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