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Cognition among Old Age Population in a Rural Area

Pranay A Jadav[1]

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Author's Affiliation:
[1]Assistant Professor, Community Medicine, GMERS Medical College, Gandhinagar

Correspondence
Pranay A Jadav
Dr.pranay298@gamil.com

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ABSTRACT

Background: With the advancement of the age, the chance of cognitive decline is increasing. Screening of the cognitive decline as earliest may prevent complications. The study was conducted to determine prevalence of and factor affecting cognitive decline among old age population.

Methodology: It was a cross-sectional study conducted in the rural area of Vadodara district among old age population from October 2012 to March 2013. A sample size of 600 was obtained using hypothesis testing method. Using simple random sampling, 6 talukas were selected and from each, 4 villages were chosen. From each village, 25 study participants were included in the house to house survey. Mini-mental state examination (MMSE) was applied to measure cognition among study participants.

Results: Overall prevalence of cognitive impairment in terms of an MMSE score < 22 among study participants was 23.5% which was as higher as 61.2% in age group of more than 80 years. Prevalence of cognitive decline in male and female participants was 15.3 and 36.2% respectively. Cognitive impairment was significantly associated with older age group and female sex

Conclusions: Cognitive impairment is more or less inevitable in elderly. Knowledge of burden of the problems and associated factors may help policy makers for designing better geriatric health services.

Keywords: Cognition, Old age, rural

INTRODUCTION

Aging is an ineluctable phenomenon of human life. Population aging is an emerging issue of developed as well as developing countries. Advancement of health care, better nutrition, improved socioeconomic condition brings an increase in life expectancy. The elderly population in India were 5.3% of total population in 1961, 7.5 % in2001, and was currently 8.4% in 2014.It is expected that this number will increase to more than 300 million by 2050. [1,2,3]

The broad meaning of Cognition is information processing which includes a combination of skills that include attention, learning, memory, language, visuo-spatial skills, and executive function, such as decision making, goal setting, planning, and judgment. The cognitive deficit may result in more or less inability to execute all these functions. Older adults are the population most at risk for cognitive impairment. Establishing an early diagnosis enables elderly and their family members adjust to the diagnosis and prepare for the future in an appropriate way.[3,4,5]

Folstein Mini-Mental State Examination (MMSE) is one of the oldest and most widely used to study cognitive measures. The Folstein Mini-Mental State Examination (MMSE) was designed to give a practical clinical assessment of change in cognitive status in geriatric inpatients. It is a widely used and well-validated tool for the evaluation of cognitive impairment. It briefly measures orientation to time and place, registration, immediate recall, short-term verbal memory, calculation, language and construct ability. It may be used as a screening

test for cognitive loss or as a brief bedside cognitive assessment. It cannot be used to diagnose dementia.[6,7,8] Hindi and Gujarati version of MMSE were used successfully in the past to screen the older individuals for cognitive decline.[9,10]

Although there is growing literature on research on elderly, very few studies have focused on this growing public health concern. So, the objective of present study was to know the cognitive status among geriatric age group in rural area of Vadodara district.

MATERIALS AND METHODS

Study type, Study participants, and study duration: This cross-sectional study was carried out in villages of Vadodara district from October 2012 to March 2013 The study participants were geriatric age group population with age more than or equal to 60 completed years. Those persons who were comatose, non-cooperative, totally deaf or dumb, uncomfortable with Hindi, Gujarati or English language, having past history of stroke, and known case of psychiatric or neurological disease (schizophrenia, Parkinsonism, epilepsy) were excluded from the study.

Sample size calculation: A sample size of 600 was obtained using the hypothesis testing method and based on following assumptions: 95% confidence intervals, theprevalence of cognitive decline in geriatric population in arural area India is 14.89 from the previous study[11] and 3% margin of error. The calculated minimum sample had been inflated by 10% to account for anticipated subject non-response.

Sampling technique: Six talukas from Vadodara district were selected by simple random sampling from total 12 talukas of the Vadodara district. From each of these talukas, 4 villages were selected by asimple random technique using random number generation. From each of the selected village, 25 study participants were selected conveniently by thehouse to house survey. The survey was started on the right-hand side of the Village Panchayat Office. The village next to that in the random list was selected to fulfill the study participants if study participants were not enough in a selected village.

Measurement tools

Assessment of cognitive status: The Folstein Mini-Mental State Exam (MMSE) is a widely used and well-validated tool for the evaluation of cognitive impairment. It briefly measures orientation to time and place, registration, immediate recall, short-term verbal memory, calculation, language and constructs ability[6]. The MMSE includes following items: the maximum score is 30 points (10 points for orientation,3 for registration, 5 for attention and calculation, 3 for recall, 4 for naming the objects, 1 for repetition, 1 for following the command, 1 for reading ability, 1 for writing ability and 1 for visuospatial construction). Scores of > 27 are generally considered normal, 22-26 as mild cognitive impairment and those less than 22 as possible dementia. Hindi[9] and Guajarati[10] version of MMSE were used successfully in the past.

Data collection: After getting ethical approval study was started**.** House to house survey was done to find the study subjects from the selected villages. After acquiring the study subject the details regarding the study viz. purpose of the study, method of the study was explained in the vernacular language to each participant and head of the family. Written consent was taken from the each subject with assuring that their name was not be disclosed other than the person's concern with the study. The questionnaire was filled by personal interview. Questionnaires were of two parts. The first part included socio-demographic details regarding age, sex, religion, marital status, education, occupation, income, addiction (tobacco and alcohol), self-reported morbidities drug using for any chronic illness etc. The second part of the questionnaire was of Gujarati version of mini-mental state examination for cognitive assessment. Depression was also measured by Geriatric depression scale short version (GDS-15) as it is a major confounding factor linked with cognitive decline.

Data analysis: The data was entered and analyzed through epi info 7.A categorical variable was expressed as a percentage and continuous variables are presented through mean, standard deviation. Chi-square test and t-test were applied accordingly.a p-value less than 0.05 was considered as statistically significant.

RESULTS

A total of 600 participants of aged 60 and more were analyzed in the study. Table 1 shows socio-demographic features of study participants. Most of them (70.5%) were between ages 60-69 years of age, 60.8% were males. The cumulative Literacy rate was approximately 65.5%, 73.5% were not working at the time of the study. Only 10.8% of the participants were living alone. Prevalence of diabetes was 18.7% and hypertension was 42.7%.

Overall Prevalence of cognitive decline (in terms of Mini-Mental Examination score <22) was 23.5%. Participants aged ≥ 80 years were more cognitively declined (61.2%) than the participants between the age of 60-80 years. Prevalence among male was 15.3% and in the female was 36.2% (table-2)

Table 1: Socio-demographic features of study participants (n=600)

Variables	Participants (%)
Age groups	
60-69 years	423 (70.5)
70-79 years	128 (21.3)
≥ 80	49 (8.2)
Sex	
Male	365 (60.8)
Female	235 (39.2)
Education	
Illiterate/ Just literate	213(35.5)
Primary	215 (35.8)
Secondary/higher secondary	37 (6.2)
Graduate/post graduate	135 (22.5)
Occupation	
Working at present	159 (26.5)
Not working at present	441 (73.5)
Marital status	
Married	441 (73.5)
Unmarried	18 (3.0)
Separated/divorced	10 (1.7)
Widow/widower	131 (21.8)
Living arrangement	
Living alone	65 (10.8)
Living with spouse	131 (21.8)
Living with children	94 (15.7)
Living with both spouse & children	310 (51.7)
Smoking habit	
Never	462 (77.0)
Current	100 (16.7)
Past	38 (6.3)
Smokeless tobacco use	
Never	496 (82.7)
Current	85 (14.1)
Past	19 (3.2)
Alcohol consumption	
Never	536 (89.3)
Current	46 (7.7)
Past	18 (3.0)

Table 2: Prevalence of cognitive impairment (MMSE score < 22) among study participants

Group of participant	Cognition in form of MMSE score	
	Impaired cognition (MMSE<22) (%)	Normal cognition (MMSE≥22) (%)
Age group		
60-69 years	93 (22)	330 (78)
70-79 years	18 (14.1)	110 (85.9)
≥ 80	30 (61.2)	19 (38.8)
Sex		
Male	56 (15.3)	309 (84.7)
Female	85 (36.2)	150 (63.8)
Total prevalence	141 (23.5)	459 (76.5)

DISCUSSION

The present cross-sectional study was conducted to evaluate the prevalence of cognitive impairment and depression among the population 60 years and older residing in the rural area of a Vadodara district of Gujarat.

Table 3: Cognitive impairment according to various factors (n=600)

Variables	Impaired cognition (n=141)	Normal cognition (n=459)	Odds ratio	p-value
Age				
≥ 70 yrs	48 (34.04)	129 (28.10)	1.32	0.21
60-69 yrs	93 (65.96)	330 (71.90)		
Sex				
Female	85 (60.28)	150 (32.68)	3.13	<0.001
Male	56 (39.72)	309 (67.32)		
Living status				
Living alone	28 (19.86)	37 (8.06)	2.83	<0.0001
With family	113 (80.14)	422 (91.94)		
Education				
Illiterate	102 (72.34)	111 (24.18)	8.2	<0.0001
Literate	39 (27.66)	348 (75.82)		
Occupation				
Not working	114 (80.85)	327 (71.24)	1.70	0.031
Working	27 (19.15)	132 (28.76)		
Smoking				
Never used	121 (85.82)	341 (74.29)	2.09	0.0063
Ever used	20 (14.18)	118 (25.71)		
Tobacco use				
Never used	121 (85.82)	375 (81.70)	1.35	0.316
Ever used	20 (14.18)	84 (18.30)		
Alcohol use				
Never used	44 (31.21)	20 (4.36)	9.03	<0.0001
Ever used	105 (68.79)	431(95.64)		
Poly-pharmacy				
No	102 (72.34)	318 (69.28)	1.16	0.556
Yes	39 (27.66)	141 (30.72)		
Depression				
Yes	123 (87.23)	202 (44.01)	8.66	<0.0001
No	18 (12.77)	257 (55.99)		

The overall prevalence of cognitive decline was 23.5% (Table 2) in the study population. Prevalence of cognitive decline among male study participants was 15.3%. Prevalence of cognitive decline among female study participants was 36.2%. Kumar DN et al[12] showed 31% and Maroof M et al[13] showed 16% prevalence of cognitive decline in their studies. Studies done in Uttar Pradesh showed 43% (Varanasi)[14] and 35.7% (Moradabad)[15] prevalence of cognitive decline in old age. Lower prevalence than the present study were also recorded across the India Senugupta P et al[16] showed 8.8% prevalence in Ludhiana while Sharma D et al[17] showed 3.5% prevalence in Shimla. Heterogeneous sample size and sampling methodology are probable explanation for that.

Present study don't find any association between the people of 60-69 years and people ageing 70 or more but it is proved that increasing age leads to reduction in the brain volume, loss of integrity of myelin sheath, thinning of cortex and impaired secretion of neurotransmitter like serotonin, acetylcholine. These changes lead to decreased ability to concentrate and decreased recalling capacity[17,18].

Various studies[12-15,17] in the past showed positive association between increasing age and cognitive decline

Females have significantly higher cognitive decline as compared to males in our study (OR=3.13, p<0.001) (Table 3). Similar results were there in the previous studies[12-15]. While Sharma D et al[17]find no association between gender and cognitive decline. In elderly women, estrogen secretion is reduced especially in postmenopausal stage, which leads to increased risk of Alzheimer's disease. Other reasons for high prevalence among elderly females might be widowhood status, living alone or neglected by family members, poor status in the family, increased physical dependency, lack of income and poor health[16].

Illiteracy is significantly associated with cognitive decline in present study (OR=8.2, p<0.0001) (Table 3). Similar results were observed in the past researches[12,13,14,16,17]. Low literacy is usually associated with to poverty or lower socioeconomic status, which leads to poor healthand poorer access to health care and increased risk of cognitive impairment. Some researchers believe that a higher level of education provides a "cognitive reserve" that enables individuals to better compensate for changes in the brain that could result in Alzheimer's or another dementia[16].

Present study shows negative association between smoking and cognitive decline (OR=2.09, p-0.0063) (Table 3) which may be due to reluctant of the participants regarding giving history of smoking. But previous researches showed that smoking leads to increase plasma homocysteine, increased risk of atherosclerosis and increased oxidative stress which cumulatively leads to narrowing of blood vessels, hypoxia and damage to brain cells. Apart from this smoking tobacco can increase the risk for carriers of Apolipoprotein E (APOE) ε4 allele which is a genetic risk factor for dementia[19,20].

Alcohol intake significantly reduces cognition in the participants of the present study (OR=9.03, p<0.0001) (Table 3). Heavy alcohol consumption leads to neurotoxic effects, vitamin deficiency and pro-inflammatory effects on brain cells. Studies showed that light to moderate consumption[21].

In present study depressive study participants are 8.66 times more cognitively declined than normal (p<0.0001). Our findings are similar to senugupata P et al[22] and Barnes DE et al[23].The relationship between depression and cognitive impairment shows that depression in old age is an associated phenomenon of already existing cognitive impairment rather than an independent risk factor[12].

CONCLUSION

The study shows prevalence of cognitive impairment in a defined rural area which was 23.5% in terms of Mini-Mental Examination score <22. Various demographical factors like female sex, illiteracy, smoking, not engaged in working and depression were significantly associated with the cognitive decline.Awareness regarding mental health must be provided at grass root level and Screening among the old age group must be done timely and periodically so interventions can be provided as early as possible and so better quality of life.

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