

# An epidemiological study of dementia among the habitants of eastern Uttar Pradesh, India

K. Poddar, S. Kant, A. Singh, T. B. Singh<sup>1</sup>

Neurology Centre, <sup>1</sup>Division of Bio-Statistics, Department of Community Medicine, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

## Abstract

Dementia is one of the most serious health problems of the elderly and their caregivers. **Objective:** The objective of this study was to estimate the prevalence of dementia in the community, its sociodemographic and behavioral associates to determine the risk factors among resident of two districts of eastern Uttar Pradesh, India. **Materials and Methods:** This study was based on 2890 subjects aged 50 years and above, residing in rural areas of Mirzapur and urban areas of the Varanasi district of eastern Uttar Pradesh, India. Efforts were made to identify the subjects of age 50 years and above using cluster sampling. The Hindi Mental State Examination was used as the instrument tool to determine the score and a cut-off score of  $\leq 23$  was considered as the presence of dementia among the identified subjects. **Results:** The overall prevalence of dementia was found to be 5.1%. This percentage was increasing with age and decreasing with educational level. Among females, the prevalence of dementia was observed (7.2%) to be double than that in males (3.8%). Widows/widowers/unmarried had a double prevalence (9.3%) as compared with married (4.3%) people. The age, gender, marital status, education, occupation, number of family members in the household and liquor addiction were found to be significantly associated with dementia. The relative risk for the above-mentioned variables was found to be more than 1.

## Key Words

Dementia, Hindi Mental State Examination, prevalence, relative risk

For correspondence:

Dr. S. Kant, Neurology Centre, Varanasi, Uttar Pradesh, India. E-mail: drskpoddar@gmail.com

*Ann Indian Acad Neurol* 2011;14:164-8

## Introduction

Dementia is an acquired syndrome produced by malfunction of the brain in the elderly, and is characterized by persistent impairment in multiple areas of intellectual function. This disorder causes extremely bad consequences for patients, families, societies and nations. The prevalence of dementia is increasing with aging among the world population. It is a major public health problem worldwide among the elderly, particularly in developing countries where the aging population is growing most rapidly.

The prevalence of dementia among rural habitants of age 60 years and above was 2.7%,<sup>[1]</sup> and it was reported to be 3.6% in the urban population.<sup>[2]</sup> Shaji *et al.* (1996)<sup>[3]</sup> have reported this Figure as 3.4% in the rural community of Kerala. Among

the population of age 55 years and above of a rural community in Northern India, the prevalence rate of 8.4 per 1000 was reported.<sup>[4]</sup> Considering the magnitude of this problem, it is essential to focus our attention on the burden of this disease in the elderly population, which can make a significant impact on our society.

## Objectives

The objectives of this study were: (1) to determine the prevalence of dementia, (2) to ascertain the association of dementia with sociodemographic, behavioral and comorbidity variables and (3) to estimate the effect of risk factors and establish a 95% confidence interval for each study variable.

## Materials and Methods

This study was based on 2890 consenting individuals aged 50 years and above from the rural community of Pahari Tehsil of Mirzapur district [Figure 1] Villages taken under the study are highlighted and urban areas of Bhelupur ward in Varanasi district of eastern Uttar Pradesh, India. The complete enumeration was performed from randomly selected clusters of these areas and data were collected through a door to door survey on a predesigned and pretested schedule method by using a cross-sectional study design.

Access this article online	
Quick Response Code:	Website: www.annalsofian.org
	DOI: 10.4103/0972-2327.85874



**Table 1: Association of sociodemographic variables with dementia**

Sociodemographic variables	Category	HMSE score ≤23		HMSE score ≥24		Total		X <sup>2</sup> /P-value	RR 95% CI
		Number	%	Number	%	Number	%		
Age group	50-59	38	2.6	1449	97.4	1487	15.5		-
	60-69	65	6.9	874	93.1	939	32.5	X <sup>2</sup> = 49.9	2.71 (1.84-4.00)
	70-79	31	8.1	353	91.9	384	13.3	Df = 5	3.16 (2.0-4.99)
	80 and above	12	15	68	85	80	2.8	P = 0.000	5.87 (3.18-10.54)
Gender	Male	69	3.8	1755	96.2	1824	63.1	X <sup>2</sup> = 16.60	-
	Female	77	7.2	989	92.8	1066	36.9	Df = 1	1.91 (1.39-2.62)
								P = 0.000	
Nature of residence	Urban	30	3.8	763	96.2	793	27.4	X <sup>2</sup> = 3.67	-
	Rural	116	5.5	1981	94.5	2097	72.6	Df = 1	1.46 (0.99-2.17)
								P = 0.055	
Marital status	Married	105	4.3	2342	95.7	2447	84.7	X <sup>2</sup> = 19.27	-
	Widow(er)	41	9.3	402	90.7	443	15.3	Df = 1	2.16 (1.52-3.04)
								P = 0.0000	
	Total	146	5.1	2744	94.9	2890	100		

HMSE: Hindi mental state examination

for widows/widower/unmarried was 2.16, with a 95% CI of 1.52-3.04.

A continuous pattern of decrease in the prevalence of dementia was observed with increase in the educational level. The prevalence of dementia in the uneducated was 12.6%, which decreased to a significant level of 3.4% for subjects educated up to class 5<sup>th</sup>, then further reduced to 2.8% for classes 6<sup>th</sup> to 9<sup>th</sup> and 2.2% for high school and onwards ( $P = 0.000$ , Table 2). The prevalence in the unemployed subjects was 7.1% as compared with 4.6% in the self-employed, 3.9% in retired subjects and 2.4% in employed subjects ( $P = 0.001$ , Table 2). The total number of earning members in the family had no significant association with the prevalence ( $P = 0.15$ , Table 2). The total number of members in the family had a significant association with the prevalence ( $P = 0.02$ , Table 2), as the subjects from family size of 16 and more had the least prevalence of 2.4% whereas subjects living with family members less than 5, 6-7, 8-10 and 11-15 had a prevalence of 4.4, 3.9, 6.6 and 6.8%, respectively.

The type of diet had no significant association ( $P = 0.163$ ), as Table 3 shows that the prevalence of dementia among vegetarians was 5.6% as compared with 4.4% among nonvegetarians. The RR for vegetarians was 1.26, but this was insignificant. Tobacco chewing and smoking had no significant association ( $P = 0.133$  and  $0.34$ , respectively; Table 3). However the use of liquor had some significance ( $P = 0.043$ ). Subjects taking liquor had a prevalence of 1.4%, and those who claimed not to take liquor had a prevalence of 5.2% [Table 3]. The proportion of subjects with comorbidities of hypertension, diabetes and ischemic heart disease was 29.1, 12.0 and 0.4%, with prevalence of dementia of 6.2, 6.2 and 0%, respectively. These diseases had no significant association ( $P = 0.08, 0.29$  and  $0.44$ , respectively) [Table 3].

## Discussion

The extensive studies from developed countries have provided

a range of prevalence between 3.8 and 10% in the age group above 65 years of age.<sup>[7,8]</sup> Very few studies are available from developing countries. Several community-based urban and rural studies have been reported on dementia from different parts of India, with a varying range of prevalence from 1.02% to 4.86% in the age groups 55-65 years and above.<sup>[1-4,9-12]</sup> The findings of our study show that the prevalence of dementia was 5.1%, which was higher in comparison with other Indian studies, but is consistent with other studies of Asian and western countries. Raina *et al.*<sup>[13]</sup> reported a higher prevalence of dementia of 6.5% among the Kashmiri migrants of age groups 65 years and above. It was ranging between 8 and 15% in the age group of 70 years and above. In our study, the prevalence in females was approximately double than that in males, which is comparable with other studies.<sup>[13]</sup> This may be due to better care given to males as compared with females, as the study area was predominantly a male-dominated society. A large part of the developing countries is still rural. The prevalence rates obtained in this study for rural and urban populations were 5.5 and 3.8%, respectively. Raj Kumar and Kumar<sup>[1]</sup> reported a higher prevalence of dementia in the rural community than in an urban setting, which support the results of our study. Shibayama<sup>[14]</sup> also found higher prevalence rates of dementia in rural areas of Japan compared with that in urban areas. The factors contributing to this difference are probably, different life styles and health awareness. The marital status also had a significant impact on the prevalence of dementia. Widows/widower/unmarried showed an almost double prevalence as compared with married subjects. This may be due to a better social life in married subjects, although this has not been reported in other studies and needs more evaluation. The prevalence rates among uneducated and educated up to class 5<sup>th</sup> were 12.6 and 3.4% respectively in our study. This shows that education, even of primary level, may reduce the prevalence of dementia at a later age. In a pilot study conducted by Shaji<sup>[10]</sup> with a Malayalam adaptation of the MMSE, there was no significant difference in the total MMSE scores between the literate and the illiterate. Mathuranath *et al.*<sup>[12]</sup> also reported the association of low education with

**Table 2: Association of socioeconomic variables with dementia**

Sociodemographic variables	Category	HMSE score $\leq 23$		HMSE score $\geq 24$		Total		X <sup>2</sup> /P-value	RR 95% CI
		Number	%	Number	%	Number	%		
		Education	Uneducated	88	12.6	609	87.4		
	1-5	19	3.4	538	96.6	557	19.3	Df = 3	1.53 (0.86-2.7)
	6-9	12	2.8	417	97.2	429	14.8	P = 0.000	1.25 (0.65-2.41)
	High school and above	27	2.2	1180	97.8	1207	41.8		-
Occupation	Unemployed	74	7.1	971	92.9	1045	36.2		3.0 (1.59-5.70)
	Self-employed	43	4.6	889	95.4	932	32.2	X <sup>2</sup> = 17.13	1.95 (1.01-3.81)
	Employed	10	2.4	413	97.8	423	14.6	Df = 3	-
	Retired	19	3.9	471	96.1	490	17.0	P = 0.001	1.64 (0.79-3.44)
No. of family members	<5	35	4.4	765	95.6	800	27.7		1.85 (0.69-4.91)
	6-7	30	3.9	742	96.1	772	26.7	X <sup>2</sup> = 11.86	1.62 (0.62-4.39)
	8-10	52	6.6	732	93.4	784	27.1	Df = 4	2.77 (1.07-7.32)
	11-15	25	6.8	342	93.2	367	12.7	P = 0.02	2.84 (1.06-7.77)
	16-45	4	2.4	163	97.6	167	5.8		-
No. of earning members in the family	1	51	5.4	890	94.6	941	32.6		1.40 (0.93-2.12)
	2	37	3.9	921	96.1	958	33.1	X <sup>2</sup> = 6.71	-
	3-4	44	6.1	673	93.9	717	24.8	Df = 4	1.59 (1.04-2.43)
	5-6	11	4.5	234	95.5	245	8.5	P = 0.15	1.16 (0.61-2.21)
	7-18	3	10.3	26	89.7	29	1.0		2.68 (0.89-7.27)
	Total	146	5.1	2744	94.9	2890	100		

HMSE: Hindi mental state examination

**Table 3: Association of personal habit and co morbidity variables with dementia**

Personal habit and Co morbidity variables	Category	HMSE score $\leq 23$		HMSE score $\geq 24$		Total		X <sup>2</sup> /P-value	RR 95% CI
		Number	%	Number	%	Number	%		
		Diet	Vegeterian	90	5.6	1530	94.4		
	Nonvegeterian	56	4.4	1214	95.6	1270	43.9	Df = 1	-
								P = 0.163	
Tobacco addiction	Yes	52	4.3	1150	95.7	1202	41.6	X <sup>2</sup> = 2.26	-
	No	94	5.6	1594	94.4	1688	58.4	Df = 1	1.29 (0.93-1.79)
								P = 0.133	
Smoking addiction	Yes	9	3.8	231	96.3	240	8.3	X <sup>2</sup> = 0.93	-
	No	137	5.2	2513	94.8	2650	91.7	Df = 1	1.38 (0.73-2.66)
								P = 0.34	
Liquor addiction	Yes	2	1.4	139	98.6	141	4.9	X <sup>2</sup> = 4.08	-
	No	114	5.2	2605	94.8	2749	95.1	Df = 1	3.69 (1.03-13.54)
								P = 0.43	
Hypertension	Yes	52	6.2	790	93.8	842	29.1	X <sup>2</sup> = 3.13	1.35 (0.97-1.87)
	No	94	4.6	1954	95.4	2048	70.9	Df = 1	-
								P = 0.08	
Diabetes	Yes	23	6.2	350	93.8	373	12.9	X <sup>2</sup> = 1.10	1.26 (0.82-1.93)
	No	123	4.9	2394	95.4	2517	87.1	Df = 1	
								P = 0.29	
IHD	Yes	0	0	11	100	11	0.4	X <sup>2</sup> = 0.59	
	No	146	5.1	2733	94.9	2879	99.6	Df = 1	
								P = 0.44	
	Total	146	5.1	2744	94.9	2890	100		

HMSE: Hindi mental state examination

dementia. In our study, we also tried to establish an association between dementia and occupation. The prevalence of dementia in unemployed subjects was 7.1% in comparison with 2.4%

in the employed. This needs further evaluation. Similarly, an association between types of family and status of dementia showed a lower prevalence in joint families. This is possibly

because of a healthier atmosphere and number of helping members in the family, which strengthens the relevance of Indian culture in the study. This has not been reported in any other study from developing or developed nations. Diet, tobacco chewing, smoking and concomitant diseases had no significant association with dementia. However, the prevalence was found to be less in people who consumed alcohol in our study. This may be due to lesser people confessing intake of alcohol.

## Conclusions

To conclude, the prevalence rate of dementia is higher in our study than that reported in India earlier, except a report from Raina *et al.*<sup>[13]</sup> on Kashmiri migrants. We tried to relate various parameters like gender, marital status, occupation, education, employment, size of family and residential status. Diet, tobacco chewing, smoking, liquor intake and concomitant diseases had no significant association with dementia. The global prevalence of dementia gives the population of demented people in India as 1.5 million in 2001, and says it is set to increase by more than 300% by 2040 (may reach six million).<sup>[8]</sup> Early screening of dementia through the assessment tool of HMSE will be helpful in giving a better quality of life, providing guidelines to care providers as well as launching national health programmes for such types of diseases.

## References

1. Raj Kumar S, Kumar S. Prevalence of dementia in the community. A rural urban comparison from Madras, India. *Aust J Ageing* 1996;15:57-61.
2. Rajkumar S, Kumar S, Thara R. Prevalence of dementia in a rural setting; A report from India. *Int J Geriatr Psychiatry* 1997;12:702-7.
3. Shaji S, Promodu K, Abraham T, Jacob Roy K, Verghese A. An epidemiological study of dementia in a rural community in Kerala, India. *Br J Psychiatry* 1996;168:745-9.
4. Chandra V, Ganguli M, Pandav R, Johnston J, Belle S, Dekosky ST. Prevalence of Alzheimer's disease and other dementia in rural India; The Indo US study. *Neurology* 1998;51:1000-8.
5. Ganguli M, Ratcliff G, Chandra V, Sharma S, Gilby J, Pandav R. A hindi version of the MMSE: The development of a cognitive screening instrument for a largely illiterate rural elderly population. *Int J Geriatr Psychiatry* 1995;10:367-77.
6. Folstein MF, Folstein SE, Mc Hugh PR. Mini mental state: A practical method for grading the cognitive state of the patients for the clinician. *J Psychiatr Res* 1975;12:189-98.
7. Canadian study of health and ageing: Study methods and prevalence of dementia. *CMAJ* 1994;150:899-913.
8. 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.
9. Bharucha NE, Bharucha EP, Bharucha AE, Bhise AV, Schoenberg BS. Prevalence of Parkinson's disease in the Parsi community of Bombay, India. *Arch Neurol* 1988;45:1321-3.
10. Shaji I, Bose S, Verghese A. Prevalence of dementia in an urban population in Kerala, India. *Br J Psychiatry* 2005;186:136-40.
11. Raina S, Razdan S, Pandita KK. Prevalence of dementia in ethnic Dogra population of Jammu Distt, North India: A comparison survey. *Neurol Asia* 2010;15:65-9.
12. Mathuranath PS, Cherian PJ, Mathew R, Kumar S, George A, Alexander A, *et al.* Dementia in Kerala, South India: Prevalence and influence of age, education and gender. *Int J Geriatr Psychiatry* 2010;25:290-7.
13. Raina S, Razdan S, Pandita KK. Prevalence of dementia among Kashmiri migrants. *Ann Indian Acad Neurol* 2008;11:106-8.
14. Shibayama H, Kasahara Y, Kobayashi H. Prevalence of dementia in a Japanese elderly population. *Acta Psychiatr Scand* 1986; 74, 144-151.

**How to cite this article:** Poddar K, Kant S, Singh A, Singh TB. An epidemiological study of dementia among the habitants of Eastern Uttar Pradesh, India. *Ann Indian Acad Neurol* 2011;14:164-8.

**Received:** 19-02-11, **Revised:** 22-11-10, **Accepted:** 23-05-11

**Source of Support:** Nil, **Conflict of Interest:** Nil

## Dispatch and return notification by E-mail

The journal now sends email notification to its members on dispatch of a print issue. The notification is sent to those members who have provided their email address to the association/journal office. The email alerts you about an outdated address and return of issue due to incomplete/incorrect address.

If you wish to receive such email notification, please send your email along with the membership number and full mailing address to the editorial office by email.