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Study of Cognitive Impairment and Existing Co-Morbidities Observed Among Geriatric Population in an Urban Slum

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ABSTRACT

Background: Among vascular risk factors, chronic arterial hypertension is a major contributor to cognitive impairment. Hypertension important risk factor for cerebrovascular pathology leading to stroke and dementia

Objectives:1. To study certain risk factors of cognitive impairment and suspected dementia like hypertension, diabetes, ischemic heart disease, cerebro-vascular disease.**2**. To study the association of addiction with cognitive impairment and dementia.

Methods: The study was community based descriptive study with cross sectional design. The period of study was from January 2005 to June 2006.

Result: Prevalence of mild cognitive impairment and suspected dementia was 18.6% and 4.1% respectively. Out of the total 242 respondents 88 were known to have hypertension. They had higher proportion of cognitive impairment (26.2%).

Conclusions: Known hypertensive's had higher proportion of cognitive impairment as compared to those with no history of hypertension. But the duration or treatment of hypertension was not found to be associated with cognitive status. The study showed no association of diabetes with the cognitive status. Individuals with cerebrovascular disease showed significantly higher proportion of cognitive impairment.

Keywords: Cognitive impairment, Dementia, co-morbidities.

BACKGROUND

Cognitive impairment and dementia are increasing globally and are predicted to increase proportionately more in developing countries. Studies done in various parts of world show that, by 2050 the number of individuals older than 60 years will be approximately 2 billion and will account for 22%.[1] Four fifths of the people older than 60 years will be living in developing countries. It is estimated that 35.6 million people are currently living with dementia worldwide and that the number will nearly double every 20 years., with the majority living in developing countries.

Cognitive impairment can be detected as early as 7 years before the diagnosis of dementia. The literature suggests that 63-80% [2] of patients with mild cognitive impairment will have progression to dementia.

In India, the total population at the age of 60 is projected to increase from 8 percent in 2015 to 19 percent in 2050[3]. By the end of the century, the elderly will constitute nearly 34 percent of the total population in the country.

Among vascular risk factors, chronic arterial hypertension is a major contributor to cognitive impairment. The brain is one of the main target organs affected by hypertension. Hypertension is the most important risk factor for cerebrovascular pathology leading to stroke and dementia

As Cognitive impairment and dementia were very important health problem in elderly the present

study has been conducted in urban slum to know the prevalence and their association with co morbidities like Diabetes, Hypertension, Cerebrovascular disease and addiction etc.

OBJECTIVES

The research was conducted to study certain risk factors of cognitive impairment and suspected dementia like hypertension, diabetes, ischemic heart disease, cerebro-vascular disease. The study also aimed to study the association of addiction like alcohol intake, tobacco consumption with cognitive impairment and dementia.

METHODS

The present study was carried out in Kumbharwada Health Post area in Dharavi slums in Mumbai. The study was community based descriptive study with cross sectional design. The period of study was from January 2005 to June 2006. The total population of the area was 62,042. The entire health post area is divided into 8 sections. Out of the 8 sections of the health post, 4 sections were selected randomly by lottery method. Total population of these 4 sections was 29,713. Approximate number of households in this area was calculated as 5,943 taking average family size of 5.

According to WHO Mental Health Report 2001[2], the percentage of geriatric population in India is 7.7. Applying this percentage to the study population, the estimated geriatric population of study area was 2,287.

Required sample size was estimated using the formula[4] $n= Z^2 1\text{-}\alpha/2 \times p\ (1–p)/d^2$ where n = required sample size, Z = standard vitiate = 1.96 for alpha error of 5,p = anticipated proportion of cognitive impairment in geriatric population = 0.128, d = absolute precision in percentage points = 5 % = 0.05, confidence interval = 95 %. The calculated sample size was 171.

Data collection: As the list of geriatric persons in the study area was not available, 'household' was taken as a sampling unit rather than an individual. It was estimated that approximately 488 households (10% of anticipated refusal response of 444) would have to be selected to interview geriatric age group (to get 171 geriatric people, 2287:5943 so, 171:444 household) Sample was selected using Systematic random method. Sampling interval was calculated as, 5943 / 488 = 12.17.

Thus every 12th household was selected. First household was chosen randomly. In case, in a house there was more than one member satisfying inclusion criteria, all of them were included in the study. If there was no person satisfying inclusion criteria in the house, the consecutive house was visited until the respondent satisfying inclusion criteria was identified. If the individual was not present at the time of visiting household, the same household was revisited twice, in the following two consecutive weeks and in case the person was still not found, he was labelled as 'unavailable' for the study and excluded. Data collection was to be continued till the desired sample size was obtained or till the entire area was covered, whichever appeared later.

Data was collected using a semi structured interview schedule, which included identifying data and information about sociodemographic factors and few questions assessing functional activity status of the individual. Second part of the interview schedule was to detect cognitive impairment and / or suspected dementia, using modified version of Minimental State Examination (MMSE) called as HMSE-Hindi Mental State[5] Examination which is not affected by educational level. Sensitivity and specificity of HMSE with cut-off point at 23 is reported to be 94% and 98% respectively. There are total 22 items in HMSE, covering several areas of cognitive functioning such as orientation to time and place, memory, attention, concentration, recognition of object, language function, motor functioning and praxis. The maximum score is 30. Score of less than or equal to 23[6] is indicative of cognitive impairment and less than or equal to 17 is indicative of suspected dementia.

Pretesting of the study tool was done by interviewing 30 individuals. Few of the questions were restructured after consultation with Psychiatrists and Neurologists. The subjects detected as having cognitive impairment or suspected dementia were referred to Psychiatry OPD of the teaching hospital, with a referral card. A total of **281** persons in geriatric age group were visited out of which **242** persons were interviewed. So, final sample size was 242.The remaining were excluded because of the refusal, language barrier and hearing, vision or speech impairment. Data thus collected was compiled and analyzed using software package SPSS (10.0).

Operational definitions used in the study were as follows.

Mild cognitive impairment – Individual who scored between 18 to 23 on applying HMSE was labelled as having mild cognitive impairment.

Severe cognitive impairment or Suspected dementia – Individual who scored less than 18 on applying HMSE was labelled as having severe cognitive impairment or suspected dementia.

Statistical method: To test the significance of results Chi square test, 'Z' test of mean and binary logistic

regression was applied. Level of significance was fixed as 5%.

RESULTS

In present study; out of 242 respondents, it was observed that 25.6% of the respondents were from 60-64 years of age, 28.9% were from 65 to 69 years of age. Proportion of respondents above 80 years of age was only 0.1%. Mean age of the respondents was 68.9 years (S.D. 6.73 years) with a minimum age of 60 years and maximum of 90 years. Majority of the respondents (70.2%) were females. Proportion of females in each age group was at least two thirds of the total. **[Table no .1]**.

The distribution of respondents according to the cognitive status as defined by Hindi Mental State Examination (HMSE) was found as, 77.3% of the respondents have no cognitive impairment. Prevalence of mild cognitive impairment and suspected dementia was 18.6% and 4.1% respectively. The mean HMSE score for all the respondents was 24.6 (SD =3.2). Minimum score obtained was 11 and maximum was 30. Mean HMSE score of respondents with mild cognitive impairment was 21.5 and that of those with suspected dementia was 14.3. For the further analysis purpose 'mild cognitive impairment' and 'suspected dementia' were considered together. **[Table no. -2]**

Out of the total 242 respondents 88 were known hypertensives. They had higher proportion of cognitive impairment (26.2%) as compared to those who were not known hypertensive's (20.8%). The difference did not reach statistical significance. The mean duration of hypertension in cognitively impaired individuals was 2.38 years as compared to 2.29 years in those who were cognitively normal. On applying 'Z' test of mean, it was observed that the difference was not statistically significant (Z = 0.11). Out of the 88-known hypertensive, 68 were on regular treatment as advised by the physician. Out of these 21 had cognitive impairment. 20 individuals were taking irregular treatment or absolutely no treatment; 2 of which had cognitive impairment. As regards the systolic and diastolic blood pressure, no significant difference was observed in the cognitive status of individuals with different range of blood pressure. **[Table No. 3]**

Out of the 242 respondents, 31 were known diabetic patients. It was seen that the proportion of cognitive impairment in known diabetic individuals and non-diabetic individuals was almost similar (22.6% and 22.7% respectively). Mean duration of diabetes in respondents with cognitive impairment was 0.79 years as compared to 1.00 year in those without cognitive impairment.

Table 1: Age and Sex-wise Distribution of the Respondents

Age (Years)	Male (n=72) (%)	Female (n=170) (%)	Total (n=242) (%)
60 – 64	13 (21.0)	49 (79.0)	62 (100.0)
65 – 69	24 (34.3)	46 (65.7)	70 (100.0)
70 - 74	19 (33.9)	37 (66.1)	56 (100.0)
75 - 79	11 (37.9)	18 (62.1)	29 (100.0)
80 - 84	05 (29.4)	12 (70.6)	17 (100.0)
≥ 85	00 (00.0)	08 (100.0)	08 (100.0)

Table 2: Distrbution of Respondents according to Cognitive Status

Cognitive Status	Respondent (%)
No cognitive impairment	187 (77.3)
Mild cognitive impairment	45 (18.6)
Suspected dementia	10 (4.1)
Total	242 (100)

Table 3: Association of Hypertension with Cognitive Impairment:

Factor	Cognitive Impairment		p value
	Present (%)	Absent (%)	
Known case of hypertension			
Yes	23 (26.2)	65 (73.9)	0.339
No	32 (20.8)	122 (79.2)	
Treatment of hypertension			
Regular	21 (30.9)	47 (69.1)	0.06*
Irregular/No	02 (10.0)	18 (90.0)	

* Yates' correction, not significant

Table 3: Association of blood pressure with Cognitive Impairment

Blood Pressure (mmHg)	Cognitive Impairment		P value
	Present (%)	Absent (%)	
Systolic BP			
70-120	08 (16.0)	42 (84.0)	>0.270*
121-140	35 (26.5)	97 (73.5)	
> 140	12 (20.0)	48 (80.0)	
Diastolic BP			
< 80	29 (21.6)	105 (78.4)	> 0.5*
80-90	18 (22.5)	62 (77.5)	
> 90	08 (28.6)	20 (71.4)	

* not significant

Table 4: Association between Diabetes and Cognitive Impairment

Factor	Cognitive Impairment		p value
	Present (%)	Absent (%)	
Known case of Diabetes			
Yes	07 (22.6)	024 (77.4)	0.834
No	48 (22.7)	163 (77.3)	
Treatment of diabetes			
Regular	06 (23.1)	(20 (76.9)	0.664*
Irregular/No	01 (20.0)	04 (80)	

*yates' correction, not significant

Table 5: Association between Ischemic Heart Disease (IHD) and Cognitive Impairment

Factor	Cognitive Impairment	
	Present (%)	Absent (%)
Known case of IHD		
Yes	03 (18.8)	013 (81.3)
No	52 (23.0)	174 (77.0)
Treatment of IHD		
Regular	03 (23.1)	10 (76.9)
Irregular/No	00 (00.0)	03 (100)

Table 6: Association of Cerebro-Vascular Disease (CVD) with Cognitive Impairment

Factor	Cognitive Impairment		p value
	Present (%)	Absent (%)	
Known case of CVD			
Yes	10 (58.8)	007 (41.2)	0.000*
No	45 (20.0)	180 (80.0)	
Treatment of CVD			
Regular	06 (54.6)	05 (45.5)	0.624#**
Irregular/No	04 (66.6)	02 (33.3)	

#Yates' correction, * **significant;** ** not significant

Table 7: Association of Alcohol Intake and Cognitive Impairment

Factor	Cognitive Impairment	
	Present (%)	Absent (%)
Alcohol intake		
Ever	01 (06.7	014 (93.3
Never	45 (20.0	180 (80.0
Status of intake		
Past	00 (00.0	09 (100.0
Current	01 (16.7	05 (083.5

Table 8: Association between Tobacco Consumption and Cognitive Impairment

Factor	Cognitive Impairment		p value
	Present (%)	Absent (%)	
Tobacco consumption			
Ever	30 (20.6	115 (79.3	0.355
Never	25 (25.8	072 (74.2	
Smoking			
Ever	02 (16.7	010 (83.3	--
Never	53 (23.0	177 (76.9	
Status of tobacco consumption			
Past	004 (21.1	015 (78.9	--
Current	026 (20.6	100 (79.3	
Number of forms of tobacco			
One	27 (22.3)	94 (77.6)	0.245*
> Ονε	03 (12.0)	22 (88.0)	

not significant; *Yates correction

The difference was not significant (Z = 0.32). Out of the 31 known diabetic patients 26 were on regular treatment, 6 (23%) of which had cognitive impairment. Out of the 5 who were on irregular or no treatment, 1 individual had cognitive impairment. **[Table No.4]**

Out of total respondents,16 respondents were known cases of ischemic heart disease, 3 of which had cognitive impairment. As the number was very small, statistical test could not be applied. Mean duration of IHD in respondents with cognitive impairment was 0.18 years as compared to 0.43 years in individuals with no cognitive impairment. The difference was not statistically significant (Z=0.97). Out of the 16 individuals with IHD, 13 were on regular treatment, 3 (23.1%) of which had cognitive impairment. **[Table No.5]**

As regards the vascular dementia, cerebro-vascular disease is a proven important risk factor. The relative risk of cerebro-vascular lesions in current smokers aged 65 years and above is 1.9 in males and 1.5 in females. Thus, smoking may act as an indirect risk factor for vascular dementia. **[Table No.6]**

It was seen that, out of the total 242 respondents 15 had ever consumed alcohol of which single individual had cognitive impairment. The number was too small to apply a statistical test. 9 respondents had past history of alcohol intake and all of them were cognitively normal. 6 respondents had current history of alcohol intake, one of which had cognitive impairment. Mean duration of alcohol intake in individuals with cognitive impairment was 0.90 years as compared to 1.85 years in those with no cognitive impairment.

Difference was not statistically significant (Z= 0.83) Frequency of alcohol intake per week was significantly higher in individuals with cognitive impairment. (Z = 5.66). **[Table No.7]**

Cognitive impairment was observed in 20.6% of the respondents who had ever consumed tobacco as compared to 25.8% who had never consumed tobacco. The difference was not statistically significant. The proportion of cognitive impairment in ever smoker was 16.7% and that of non-smoker was 23%. The respondents who were consuming tobacco in the past showed proportion of cognitive impairment as 21.1% as compared to 20.6% in those who were consuming tobacco currently.

No Significant difference was observed between the two groups as regards the duration of tobacco consumption and frequency per day of tobacco consumption (Z=0.10 and 0.22 respectively). **[Table No.8]**

On applying binary logistic regression analysis, it was observed that respondents in higher age groups i.e. those above 80 years of age had significantly higher odds of having cognitive impairment. Cerebro vascular disease was found to have significantly higher odds of cognitive impairment (10.470). Hypertension and tobacco consumption did not show association with cognitive impairment. **[Table No.9]**

Table 9: Binary Logistic Regression Analysis

Variable	B	S.E.	Df	Exp B	C.I.	P value
Hypertension	0.039	0.449	1	1.040	0.431 - 02.507	0.930
CVD	2.349	0.837	1	10.470	2.032 - 53.954	0.005*
Tobacco consumption	-0.658	0.444	1	0.518	0.217 - 01.236	0.138
Constant	-5.223	22.401	1	0.005	---	0.816

* Significant

DISCUSSION

In present study mean age of the respondents was 68.9 years, in study done by **Desai et** al[7] had described risk factors and protective factors for Alzheimer's disease (AD). It was stated that by the age of 90 about one half of the first-degree relatives of the AD patients develop dementia.

In present study, those were known hypertensive's; proportion of cognitive impairments more in them as compared to those who were not. The results were consistent with the study conducted by **Scherr et al[8]**. The study found no consistent relation between blood pressure and cognitive function test score. Neither high diastolic blood pressure nor isolated high systolic pressure was significantly related to immediate memory score. Even the antihypertensive medications showed no significant association with memory score. Contrast to present study, in Study conducted by **Guo et al[9]** showed that subjects with dementia had lower mean systolic and diastolic blood pressures than those who were not demented.

In present study, the proportion of cognitive impairment in known diabetic individuals and non-diabetic individuals was almost similar. But in study done by, **Lawrence et al[10]**, found that cognitive function was inferior in the patients with type II diabetes compared with a comparably aged non diabetic control group. Duration of diabetes was not found to be associated with the cognitive function. **Yaffe et al[11]** found that the risk of developing cognitive impairment among older women with diabetes was increased by two folds: (age and treatment adjustment OR=1.79, 95% CI=1.14 to 2.81).

Study conducted by **Monique et al[12]** showed that history or electro cardio graphic evidence of previous myocardial infarction was associated with a shift of cognitive scores towards lower values in elderly population aged 55 to 94 years.

Elwood[13] (1999) has documented that stroke is one of the most powerful predictive factors and it alone increases the risk of dementia by nine folds.

No significant association was obtained between addiction and cognitive status in present study. Alcoholic can show cognitive impairment for weeks or months after an alcoholic binge. These changes are often reversible, returning towards normal after a year or more of abstinence. However, few cases may develop 'alcohol induced persisting dementia'.[14]

Kim et al[15] conducted a study in older Korean men above 75 years of age, to find out association between alcoholism and cognitive impairment and dementia in urban and rural community. It was observed that in urban sample, alcoholism was associated with dementia more strongly than that in the rural sample.

CONCLUSIONS

Advancing age was found to be associated with increased prevalence of cognitive impairment. There was no difference in the cognitive status of male and female. Known hypertensive's had higher proportion of cognitive impairment as compared to those with no history of hypertension. The study showed no association of diabetes with the cognitive status. Individuals with cerebrovascular disease showed significantly higher proportion of cognitive impairment. Duration of disease was also found to be associated with the cognitive status. No significant association was obtained between tobacco consumption and cognitive status.

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LIMITATIONS:

All the risk factors of cognitive impairment and dementia could not be studied, e.g. genetic and nutritional factors. Biochemical parameters like cholesterol, LFT etc were also not studied.

REFERENCES:

1. Angelique Mavrodaris, John Powell, Margaret Thorogood. Prevalence of dementia and cognitive impairment among older people in sub-Saharan Africa: a systematic review. Bulletin of the World Health Organization.2013;91:773-783.
2. World Health Report 2001, Mental Health: New Understanding, New Hope. World Health Organization. [Internet].

Geneva: 2001. [cited 2018 April 4]. Available from: http://www.who.int/whr/2001/en/whr01_en.pdf?ua=1

3. Ageing in India. World Health Organization. [Internet].Geneva. 1999. [cited 2005 April. Available from: http://apps.who.int/iris/bitstream/10665/65965/1/WHO_HSC_AHE_99.2.pdf

4. Lwanga S.K., Lemeshow S. Sample size determination in health studies A practical manual WHO, Geneva 1991.

5. Tsolaki M., Iakovidou V., Novrozidou H., Aminta M.,Pantazi T., Kazis A., Hindi Mental State Examination (HMSE) as a screening test for illiterate demented patients. Int J Geriatr Psychiatry. 2000, Jul; 15 (7):662-4.

6. De Silva H.A., Gunatilake S.B., Smith A.D., Prevalence of dementia in a Semi-urban population of in Sri Lanka: report from a regional survey. Int. J. Geriatric Psychiatry. 2003, Aug; 18 [8]: 711-715.

7. Desai A., Grossberg G.. Risk factor and protective factors for Alzheimer's disease. International Epidemiological Association. 1991.

8. Paul A Sherr, Liesi E Hebert, Laurel A Smith, Denis A Evans, Association of blood pressure to cognitive function in the elderly, American Journal of Epidemiology 1991; 134 : 1303-15.

9. Gao S., Hendrie H., Kathleen S, Siu Hui. The relationships between age, sex and the incidence of dementia and Alzheimer Disease. A Meta-Analysis. Archives of General Psychiatry. 1998; 55:809-815.

10. Lawrence C., Hakami M., Harrington C., Ginsberg J., Katz J., Singer D., Nathan D., Decreased cognitive function in ageing non-insulin-dependent diabetic patients, The American Journal of Medicine, 1984;77:1043-48.

11. Yaffe K., Blockwell T., Kanaya H., Daviddowilz N., Barrett E., Diabetes, impaired fasting glucose and development of cognitive impairment in older women. Neurology 2004; 63: 658-663.

12. Monique M., Claus J., Grobbee D., Hofman A., Cardiovascular disease and distribution of cognitive function in elderly people: the Rotterdam Study. British Medical Journal 1994; 308:1604-8.

13. Peter Elwood, Cognitive Decilne, in a book 'Geriatric care in India', by O P Sharma.1999; chapter 48. pg 404-409.

14. Schuckit M., Alcohol and alcoholism, in Harrison's Principles of Internal Medicine,15th edition, published by McGraw-Hill Medical Publishing Division, chapter 9, pg 36-46.

15. Kim J. M., Shin IS, Stewart R, Yoon JS., Alcoholism in older Korean men: prevalence, etiology and co morbidity with cognitive impairment and dementia in urban and rural communities. International Journal of Geriatric Psychiatry. 2002. Sep; 17 (9) : 821-7