Original Research Article

Risk factors of dementia: a comparative study among the geriatric age group in Ernakulam, Southern India

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ABSTRACT

Background: Dementia is the global deterioration of the individual's intellectual, emotional and cognitive faculties in a state of normal consciousness. Dementia impacts personal, family and societal life. It reduces life span, induces caregiver's strain at family level and over utilizes health care facility. This study was aimed at describing the risk factors attributing to dementing disorders for developing preventive measures to slow down the incidence of dementia.

Methods: The study was conducted in geriatrics OPD of a tertiary hospital in South India. A total of 50 dementia patients and 50 controls aged more than 65 years were selected for the study in a period of 6 months. A semi-structured questionnaire was used to collect data.

Results: 40% in the age group of 65-74 years, 61% in the age group of 75-84 years and 63.6% in the age $\geq$85 years had dementia. 43.5% of males and 55.5% of females had dementia. Multivariate analysis was done to find out the independent predictors of dementia. Among the morbidities dyslipidemia 3.93 (1.12-13.87) and COPD/bronchial asthma 4.57 (1.02-20.55), less than 5 days of fruit consumption 14.98 (38-59), hearing loss 4.67 (1.15-18.91) were found to be independent risk factors for dementia. Living alone was found to be a protective factor 0.029 (0.003-0.29).

Conclusions: Our study reported various risk factors of dementia that were in agreement with findings from other studies conducted in India. Avoidable risk factors such as living alone, fruit intake and control of comorbidities such as hypertension, dyslipidemia and COPD/bronchial asthma needs more attention in old age group.

Keywords: Dementia risk factors, Geriatrics, Case control, South India

INTRODUCTION

Dementia, defined as the global deterioration of the individual's intellectual, emotional and cognitive faculties in a state of impaired consciousness.[1] Dementia is usually a disease of the elderly and is characterized by progressive loss of memory and other mental functions such as language, judgment, planning, impairment of daily activities, and deficiency in social interaction. Dementia impacts personal, family and societal life.[2] It

reduces life span, induces caregiver's strain at family level, and utilizes health care facility, inflicting strain on national income.[3,4]

Globally there are over 47 million people living with dementia. According to WHO, the number of people living with dementia doubles every 20 years. The rate of growth in the burden is expected to be highest in developing countries like India. It is a major cause of disability among the geriatric population. As per global

burden of disease study, dementia contributes 4.1% of all disability-adjusted life years (DALYs).[1]

The burden of dementia varies among different settings in India. However the risk factors for dementia have been reported to be alike in many settings. The major risk factors of dementia are advancing age, illiteracy, addiction, hypertension, diabetes, poor socio-economic status, trauma, familial or genetic factors, nutritional factors and stroke.[3]

It is high time to make necessary steps for implementing preventive measures to slow down the incidence of dementia as well as to improve the quality of life of such patients. This will become possible by studying the characteristics of patients with dementia systematically through epidemiological studies conducted at multiple settings. Thus, offering the best possibility of planned developments of strategies for therapeutic intervention and preventive procedures.

This study has aimed at describing the risk factors attributing to dementing disorders attended in a specialized outpatient clinic in Ernakulam, Kerala.

METHODS

Amrita Institute of Medical Science is a 1450 bedded super specialty tertiary care centre in Kochi, Kerala. It provides care to patients coming mainly from the southern part of Kerala. The department of Geriatrics is a specialty department catering services to person above 65 years of age. The present study was conducted among the out patients of Geriatric OPD.

Cases of dementia were identified by screening the patients by using a validated Mini Mental Status Examination questionnaire, taking the cut off score as 23 out of 30. The screened patients were clinically diagnosed by a neurologist before including in the study. The comparative group was selected adjusting to age and gender [+5 years]. A total of 50 dementia patients and 50 controls aged more than 65 years were selected for the

study in a period of 6 months (July 2016 to January 2017). Patients, who are not a resident of Kerala and was aged less than 65 was not included in this study.

A semi-structured questionnaire was used to collect data from the informant. The informant was preferably the spouse of the person with dementia. After obtaining informed consent, the validated questionnaire was administered which covered components such as socio-demographic characteristics, physical activity, use of tobacco and alcohol, geriatric depression scale, morbidity profile, diet history, hearing loss and history of dementia among family members and spouse.

The group comparisons were made using the Chi-squared test. Fisher's exact test was used to find out the statistical significance whenever the expected frequency was less than 5. Odds ratios were used to find out the relative risk of various risk factors pertaining to dementia and 95% confidence intervals were determined. Analysis was done using Statistical Package for Social Sciences version 18.

RESULTS

Socio demographic factors like age, sex, education level and past occupation were analysed. 53 respondents belonged to the age group of 65-74, 36 respondents to the age group of 75-84 and 11 respondents were in the age group of >85 years. 40% in the age group of 65-74 years, 61% in the age group of 75-84 years and 63.6% in the age >85 years had dementia. Regarding sex, 46 respondents were males and 54 were females. 43.5% of males and 55.5% of females had dementia. Considering educational level, 41 respondents had an education level above degree, 14 had diploma/predegree, 37 had upper primary/high school level of education and 8 had primary school level of education. None of the respondents were illiterate.22% of the respondents with educational level above degree, 57% with diploma/predegree and 67.5% with upper primary/high school level of education had dementia. Among the 52 respondents with a sedentary past occupation, 42.3% had dementia while 58.3% of the 48 respondents with physically active past occupation had dementia.

Table 1: Socio-demographic characteristics of the study population.

Sl No	Variables	Dementia (%) (n=50)	Non dementia (%) (n=50)
1	Age		
	65-74	21	32
	75-84	22	14
	≥85	07	04
2	Sex		
	Male	21	26
	Female	29	24
3	Educational level		
	Degree & above	9	32
	Diploma/predegree	8	06
	Upper primary and high school	25	12
	Primary school	8	0
	Illiterate	0	0

Sl No	Variables	Dementia (%) (n=50)	Non dementia (%) (n=50)
4	Past occupation		
	Sedentary	22	30
	Physically active	28	20

Table 2. Univariate analysis of the risk factors of dementia.

Sl No	Variables	Dementia (%)	Non dementia (%)	OR (95% CI)	P value
1	Age				
	65-74	21 (39.6)	32 (60.4)	1	
	75-84	22 (61.1)	14 (38.9)	2.39 (1.00-5.70)	0.04
	≥85	07 (63.6)	04 (36.4)	2.66 (0.70-10.24)	0.18
2	Sex				
	Male	20 (43.5)	26 (56.5)	1	0.23
	Female	30 (55.6)	24 (44.4)	1. 62 (0.73-3.59)	
3	Education				
	Primary	08 (100)	00 (00)	0	<0.0001
	Upper primary & high school	25 (67.6)	12 (32.4)	7.40 (2.70- 20.34)	
	Pre-degree/diploma	08 (57.1)	06 (42.9)	4.74 (1.30- 17.24)	0.01
	≥Degree	09 (22.0)	32 (78)	1	
4	Physical activity				
	Mainly sitting	06 (28.6)	15 (71.4)	0.28 (0.09-0.85)	0.02
	Sitting or standing	32 (58.2)	23 (41.8)	1	
	Walking	08 (42.1)	11 (57.9)	0.52 (0.18-1.50)	0.22
	Heavy manual work	04 (80)	01 (20)	2.87 (0.30-27.43)	0.32
5	Living alone				
	Yes	01 (05.9)	16 (94.1)	0.04 (0.01-0.34)	<0.0001
	No	49 (59)	34 (41)	1	
6	Tobacco				
	Yes	10 (58.8)	07 (41.2)	1.53 (0.53- 4.42)	0.42
	No	40 (48.2)	43 (51.8)	1	
7	Alcohol				
	Yes	07 (58.3)	05 (41.7)	1.46 (0.43-4.96)	0.53
	no	43 (48.9)	45 (51.1)	1	
8	Depression				
	Yes	18 (39.1)	28 (60.9)	0.44 (0.19- 0.98)	0.04
	No	32 (59.3)	22 (40.7)		
9	Morbidities				
	Hypertension	16 (34.8)	30 (65.2)	0.31 (0.13-0.71)	0.004
	Diabetes mellitus	16 (41.0)	23 (59.0)	0.55 (0.24- 1.24)	0.15
	Dyslipidemia	11 (34.4)	21 (65.6)	0.39 (0.16- 0.93)	0.03
	COPD/BA	04 (26.7)	11 (73.3)	0.31 (0.09- 1.04)	0.05
	Visual impairment	06 (20.7)	23 (79.3)	0.16 (0.05- 0.44)	<0.0001
10	Diet				
	Veg	14 (46.7)	17 (53.3)	1.32 (0.56-3.10)	0.51
	Non veg	36 (52.2)	33 (47.8)		
	Fruit consumption				
	<5 days	40 (63.5)	23 (36.5)	4.70 (1.93- 11.41)	<0.0001
	>5 days	10 (27.0)	27 (73.0)		
	Vegetable consumption				
	<5 days	03 (75.0)	01 (25.0)	767.66 (77.09- 7643.98)	<0.0001
	>5 days	47 (49.0)	49 (51.0)		
11	Physical activity				
	Sedentary	09 (75.0)	03 (25.0)	3.44 (0.87-13.56)	0.06
	Active	41 (46.6)	47 (53.4)	1	

Sl No	Variables	Dementia (%)	Non dementia (%)	OR (95% CI)	P value
12	Hearing loss				
	Yes	11 (34.4)	21 (65.6)	0.39 (0.16- 0.13)	0.03
	No	39 (57.4)	29 (42.6)	1	
13	Spouse dementia				
	Present	02 (33.3)	04 (66.7)	0.48 (0.08- 2.74)	0.33
	Absent	48 (51.1)	46 (48.9)	1	
14	Family history of dementia				
	Present	11 (64.7)	06 (35.3)	2.06 (0.70- 6.11)	0.18
	Absent	39 (47.0)	44 (53.0)	1	

Table 3.Multivariate analysis for independent risk factors of dementia.

Sl No	Variables	aOR (95% CI)	P value
1	<5 days of fruit consumption	14.98 (3.80- 59.06)	0.000
2	Living alone	0.029 (0.003-0.29)	0.003
3	Dyslipidemia	3.93 (1.12- 13.87)	0.03
4	Hearing loss	4.67 (1.15- 18.91)	0.03
5	COPD/BA	4.57 (1.02- 20.55)	0.04

On univariate analysis of the risk factors of dementia, age, education, physical activity, living alone, depression, hypertension, dyslipidemia, visual impairment, fruit consumption, vegetable consumption and hearing loss were found to be significantly associated with dementia with a p<0.05.

Multivariate analysis was done to find out the independent predictors of dementia. Among the morbidities dyslipidemia 3.93 (1.12-13.87) and COPD/BA 4.57 (1.02-20.55), less than 5 days of fruit consumption 14.98 (38-59), hearing loss 4.67 (1.15-18.91) were found to be independent risk factors for dementia. Living alone was found to be a protective factor 0.029 (0.003-0.29).

DISCUSSION

We compared and studied different risk factors of dementia in a hospital setting. Multivariate analysis of the variables showed 5 independent risk factors of dementia in the present study.

Independent risk factors of dementia

Dementia has major societal and individual impact. It's estimated that about one third of all people living with dementia live on their own.[5] Patients with dementia have reported with social embarrassment and fear of fall due to which they reduce their social activities.[6] Feldman proved that people with dementia where often socially embarrassed or less interested in going on, and they or their relatives physical illness or fear of falls led to reduced social activity. Social interaction among patients with dementia have a positive impact on their cognition.[7] Contradictory to this, our study showed living alone [aOR 0.029 (0.003-0.29)] as a risk factor for dementia. A

few other studies also shows living alone as not an independent risk factor for dementia.[8,9] With demographic transition occurring in India and increase in geriatric population, the cultural patterns are changing. There is increase in nuclear families which make the elderly more prone for living alone

Many studies in developing countries have established that dementia has association with the type of diet intake. Diet rich in fruits, vegetables and fibers slow down the neurodegenerative disease process.[10-12] Likewise, the present study also showed that reduced consumption of fruits has higher risk of dementia [aOR 14.98 (3.80-59.06)].

Co-morbidities such as dyslipidemia [aOR 3.93 (1.12-13.87)] and COPD/BA [aOR 4.57 (1.02-20.55)] were found to be independent risk factors in the present study. Whereas, Shaji et al and Das et al reported hypertension and Diabetes Mellitus as a risk factors for dementia.[4,13] Reduced hearing [aOR 4.67 (1.15-18.91)] was a significant predictive factor of dementia in our study. Even though no causal link has been established between hearing loss and dementia, many epidemiological studies have shown hearing loss as a risk factor for developing dementia.[14,15]

Our study showed significantly higher risk of dementia among the middle old age group [OR 2.39 (1.00-5.70)]. Studies conducted in Kerala, Tamil Nadu and other parts of Northern India also reported increasing age as a non-modifiable risk factor of dementia.[4,13,16-20] Zhang et al reported the first time regarding the strong association of low education with dementia.[21] Similar association was also noted in the present study [OR 7.40 (2.70- 20.34)]. Studies conducted in Chennai, Trivandrum as well as various other studies conducted in developed and

developing regions also showed significant association of low education and dementia.[16,20,22]

Dementia needs to be recognized as a geriatric health priority. Preventive measures have to be initiated to delay onset of Dementia by targeting the risk factors. An urgent action is required to study on the attributing factors of dementia among the elderly for the advancement of the health services.

Limitations

We were able to study only a small sample to detail about the possible risk factors of dementia. The patients were from different parts of Kerala and therefore the results from the present study may not be extrapolated to the whole of Kerala. Details provided by the caregivers may contributed to information bias. Various variables such as the environmental risk factors were not considered in this study

CONCLUSION

Our study reported various risk factors of dementia that were in agreement with findings from other studies conducted in India. Avoidable risk factors such as living alone, fruit intake and control of comorbidities such as hypertension, dyslipidemia and COPD/BA needs more attention in old age group. Recognizing dementia as a geriatric health priority and developing measures pointing at preventing the development of the disease and mitigating the effects of dementia should be brought to light.

REFERENCES

1. WHO. WHO: Dementia. World health organization; 2017. Available at: http://www.who.int/media-centre/factsheets/fs362/en/. Accessed on 5 January 2018.
2. Kant S, Singh T, Poddar K, Singh A. An epidemiological study of dementia among the habitants of Eastern Uttar Pradesh, India. Ann Indian Acad Neurol. 2011;14(3):164.
3. Das S, Ghosal M, Pal S. Dementia: Indian scenario. Neurol India. 2012;60(6):618.
4. Das SK, Bose P, Biswas A, Dutt A, Banerjee TK, Hazra A, et al. An epidemiologic study of mild cognitive impairment in Kolkata, India. Neurology. 2007;68(23):2019–26.
5. Miranda-Castillo C, Woods B, Orrell M. People with dementia living alone: what are their needs and what kind of support are they receiving? Int Psychogeriatr. 2010;22(04):607–17.
6. Singleton D, Mukadam N, Livingston G, Sommerlad A. How people with dementia and carers understand and react to social functioning changes in mild dementia: a UK-based qualitative study. BMJ Open. 2017;7(7):e016740.
7. Feldman L, Wilcock J, Thuné-Boyle I, Iliffe S. Explaining the effects of symptom attribution by carers on help-seeking for individuals living with dementia. Dementia. 2017;16(3):375–87.
8. Lin H-R, Otsubo T, Imanaka Y. Survival analysis of increases in care needs associated with dementia and living alone among older long-term care service users in Japan. BMC Geriatr. 2017;17(1):182.
9. Eichler T, Hoffmann W, Hertel J, Richter S, Wucherer D, Michalowsky B, et al. Living Alone with Dementia: Prevalence, Correlates and the Utilization of Health and Nursing Care Services. Monastero R, editor. J Alzheimers Dis. 2016;52(2):619–29.
10. Luchsinger JA, Noble JM, Scarmeas N. Diet and Alzheimer's disease. Curr Neurol Neurosci Rep. 2007;7(5):366–72.
11. Martin A, Cherubini A, Andres-Lacueva C, Paniagua M, Joseph J. Effects of fruits and vegetables on levels of vitamins E and C in the brain and their association with cognitive performance. J Nutr Health Aging. 2002;6(6):392–404.
12. Kalaria R, Gladys EM, Arizaga R, Friedland RP, Galasko D, Hall K, et al. Alzheimer's disease and vascular dementia in developing countries: prevalence, management, and risk factors. Lancet Neurol. 2008;7(9):812-26.
13. Shaji S, Bose S, Verghese A. Prevalence of dementia in an urban population in Kerala, India. Br J Psychiatry. 2005;186(02):136–40.
14. Thomson RS, Auduong P, Miller AT, Gurgel RK. Hearing loss as a risk factor for dementia: A systematic review: Hearing Loss and Dementia Systematic Review. Laryngoscope Investig Otolaryngol. 2017;2(2):69–79.
15. Lin FR, Metter EJ, O'Brien RJ, Resnick SM, Zonderman AB, Ferrucci L. Hearing Loss and Incident Dementia. Arch Neurol. 2011;68(2):214-20.
16. Samuel R, McLachlan CS, Mahadevan U, Isaac V. Cognitive impairment and reduced quality of life among old-age groups in Southern Urban India: home-based community residents, free and paid old-age home residents. QJM. 2016;109(10):653–9.
17. Rajkumar S, Kumar S, Thara R. Prevalence of dementia in a rural setting: A report from India. Int J Geriatr Psychiatry. 1997;12(7):702–7.
18. Chandra V, Ganguli M, Pandav R, Johnston J, Belle S, DeKosky ST. Prevalence of Alzheimer's disease and other dementias in rural India: The Indo-US study. Neurology. 1998;51(4):1000–8.
19. Vas CJ, Pinto C, Panikker D, Noronha S, Deshpande N, Kulkarni L, et al. Prevalence of dementia in an urban Indian population. Int Psychogeriatr. 2001;13(4):439–50.

20. 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(3):290–7.

21. Zhang MY, Katzman R, Salmon D, Jin H, Cai GJ, Wang ZY, et al. The prevalence of dementia and Alzheimer's disease in Shanghai, China: impact of age, gender, and education. Ann Neurol. 1990;27(4):428–37.

22. Sharp ES, Gatz M. Relationship Between Education and Dementia: An Updated Systematic Review. Alzheimer Dis Assoc Disord. 2011;25(4):289–304.