

## Research Article

# Influence of education on cognitive function in the elderly population of Pune city, Maharashtra, India

Shrirang Godbole, Gayatri Godbole\*, Savita Vaidya

Department of Physiology, Bharati Vidyapeeth Deemed University Medical College, Pune, Maharashtra, India

**Received:** 20 July 2016

**Accepted:** 13 August 2016

**\*Correspondence:**

Dr. Gayatri Godbole,

E-mail: [ggodbole7@gmail.com](mailto:ggodbole7@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** A progressive decline in cognitive function is called as dementia. It mostly affects the elderly population. Dementia places a great burden on the patient, on his family and also on the country's healthcare system. It has therefore become the need of the day, to combat its ever increasing prevalence.

**Methods:** In this community based study, 300 Residents (males and females) aged 60 years and above were interviewed. Subjects were administered mini mental state examination (MMSE) questionnaire. MMSE score of <23 indicates the likelihood of cognitive impairment. Educational status of the subjects with MMSE score <23 was compared.

**Results:** Level of education was negatively correlated with MMSE score and it was statistically significant.

**Conclusions:** Education is an important factor in mitigating the effects of dementia. Early investment in education will go a long way installing the progress of dementia.

**Keywords:** Elderly population, Cognitive impairment, MMSE, Education

## INTRODUCTION

A progressive decline in cognitive function is called as dementia.<sup>1</sup> It mostly affects the elderly population. Dementia often presents itself as impairment in short-term and long-term memory associated with impairment in abstract thinking, judgment and other disturbances that many a times interfere with work and social activities.<sup>2</sup>

Across the globe, the population of people over 60 years of age is set to increase from about 600 million in 2000 to almost 2 billion by 2050, with developing countries bearing the brunt of the phenomenon.<sup>3</sup> Consequentially the risk of dementia will increase exponentially.<sup>4</sup> The 2003 World Health Report states that dementia contributed to 11.2% of years lived with disability in people aged 60 years and above.<sup>5</sup> This is significantly higher than cardiovascular diseases and all forms of cancer. Currently, dementia affects 45 million people

worldwide, with the majority being women. This figure is expected to almost double every twenty years reaching 76 million in 2030 and 136 million in 2050.

The total estimated worldwide expenditure on dementia for the year 2010 was estimated to be €430 billion, equivalent to 1% of the world's Gross Domestic Product.<sup>6</sup> Dementia is thus set to become one of the most prevalent diseases with a great financial burden.

It has therefore become the need of the day, to combat its ever increasing prevalence. Dementia places a great burden on the patient, on his family and also on the country's healthcare system for the family, taking care of a person with dementia becomes a tough job.

It leads to increased dependency on the part of the patient and also increases the risk for other co-morbid conditions. Dementia has diverse etiologies. Some of the

causes that can be partially treated are: chronic infections, brain tumours, hypothyroidism, subdural haemorrhage, normal pressure hydrocephalus, metabolic conditions and toxins or deficiencies of vitamin B12 and folic acid.<sup>7</sup> While in other nonmodifiable cases symptomatic treatment may delay the progression of the disease.

Age and gender still remain the predominant non-modifiable risk factors. Compared to them education is a modifiable and less researched risk factor. Preliminary surveys suggest that education sets a trend that several other psychosocial risk factors depend upon.

It has also been suggested that higher education provides more protection against dementia, compared to baseline education. A recent study postulated that for each additional year of education there is an 11% decrease in risk of developing dementia.<sup>8</sup> Thus education proves to be an important factor helping to battle dementia, though it does not protect the brain from actual biological damage.

Comprehensive neuropsychiatric and medical examinations are necessary to diagnose dementia. These are too expensive and time consuming to be used in population based studies. Therefore a brief screening instrument is invaluable for screening and early detection. Timely diagnosis helps to institute early treatment, which is of paramount importance to delay disease progression.

The mini mental state examination (MMSE) is a brief and objective screening test for cognitive impairment and assessment of dementia. It assesses cognitive function in depth, through a series of questions which have their respective scores. People are then categorized based on these scores. It's an easy tool to administer. Also it is well understood by the patients. These characters make MMSE the gold standard in screening for dementia.<sup>9</sup> Therefore this study was planned to screen the elderly for dementia using the MMSE and to study the impact of education associated with it.

**METHODS**

It was a cross sectional study. People above 60 years of age were included in the study. Known cases of dementia or depression and subjects with severe hearing impairment were excluded. Data collection procedures: In this community based study, 300 Residents (males and females) aged 60 years and above were interviewed. Detailed history was recorded from the subject and the informant. Thorough evaluation of education and personal history was carried out. They were also subjected to physical examination.

Subjects were administered mini mental state examination (MMSE) questionnaire.<sup>10</sup> It assesses cognitive function of the subject in relation to orientation, memory, attention and calculation, language and visual construction. The maximum possible score is 30. MMSE

scores above 23 indicate normal cognitive function and score of <23 indicate both the likelihood of cognitive impairment and the need for further evaluation. Education status of subjects with MMSE score <23 was compared.

**RESULTS**

Screening of the subjects with MMSE showed there were 78% subjects with MMSE score of 23 and above and 22% subjects with score below 23 (Table 1). Out of the 300 subjects maximum subjects had completed either their secondary school education or their graduation (Table 2). The level of education was negatively correlated with MMSE score and it was statistically significant (Table 3).

**Table 1: MMSE score in study population (n=300).**

MMSE score	Frequency	%
>23	234	78%
<23	66	22%
Total	300	100%

**Table 2: Distribution of educational levels in study population (n=300).**

Education	Frequency	Percentage
Illiterate	11	3.7
Primary	56	18.7
Secondary	87	29
Higher secondary	30	10
Graduate	90	30
Post-graduate	26	8.6
Total	300	100

**Table 3: Correlation of educational status with MMSE in study population (n=300).**

Education group	MMSE score		Total	p-value
	< 23	> 23		
Illiterate	11	0	11	< 0.001
Primary	23	33	56	
Secondary	19	68	87	
Higher secondary	4	26	30	
Graduate	9	81	90	
Post-graduate	0	26	26	
Total	66	234	300	

**DISCUSSION**

In this study a total of 300 subjects were screened using the MMSE. It was interesting to note that most of them had completed their secondary education. Majority of them had further completed their higher secondary, graduate or postgraduate education.

Out of the total subjects screened, 66 had a score of <23 on the MMSE. This includes people from all categories of education except the postgraduate section. This Study noted that the presence of dementia in the subjects decreased proportionately as the level of education increased. Cognitive impairment is more in those with primary education while it is less in those with higher education and in postgraduates it is almost nil.

Mortimer proposed a relationship between years of formal education and risk for dementia.<sup>11</sup> He suggested that psychosocial factors such as education may be protective against diagnosable dementia by increasing the intellectual reserve. A large-scale study to investigate this relationship was done in Shanghai, China. They found that having no formal education was strongly associated with a higher prevalence of dementia.<sup>12</sup>

Similar results were reported by PS Mathuranath et al. They worked to derive population norms on the Malayalam adaptation of Addenbrooke's Cognitive Examination (M-ACE) and Malayalam Mini Mental State Examination (M-MMSE). Compared to age, education had a seven fold greater effect on the M-ACE and a nine fold greater effect on the M-MMSE.<sup>13</sup> Saldanha D and co-workers also suggest that better educational status had a protective effect. They showed a positive correlation between low levels of education with an increased incidence of dementia.<sup>14</sup>

Data from the Assets and Health Dynamics of the Oldest Old (AHEAD) study in the U.S. showed a relationship between higher education and better maintenance of cognitive function and indicated that those with low levels of education were more likely to become cognitively impaired.<sup>15</sup> A recent study in New York found that lower educational level was associated with a higher risk of dementia.<sup>16</sup>

It has been often postulated that better education entitles the person to a better socio-economic lifestyle.<sup>17</sup> This may help in shielding them from dementia. Education may have a stimulating effect on the lifelong active use of mental facilities which helps to maintain brain function. Education has a major role in increasing baseline cognitive performance in individuals.

A theory postulated by Stern suggests that in subjects with high cognitive reserve; i.e., with higher education, better nutrition and less stresses, dementia has a late onset.<sup>18</sup> At the same time, findings by Wilson suggest that education affects the risk of late life dementia because of its association with level of cognition but not by an association with rate of cognitive decline.<sup>19</sup>

## CONCLUSION

This serves to prove that, education is an important factor in mitigating the effects of dementia. Early investment in

education will go a long way in stalling the progress of dementia.

*Funding: ICMR STS*

*Conflict of interest: None declared*

*Ethical approval: Ethical committee .Bharati Vidyapeeth Medical College, Pune, Maharashtra, India*

## REFERENCES

1. Flier WM, Scheltens P. Epidemiology and risk factors of dementia *J Neurol Neurosurg Psychiatry* 2005;76(Suppl V):v2-7.
2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4<sup>th</sup> ed. Washington D.C.: American Psychiatric Association. 1994.
3. United Nations. Report of the Second World Assembly on Ageing: Madrid, 8-12 April 2002. New York: United Nations. 2002.
4. Alzheimer's disease International. The prevalence of dementia worldwide. Factsheet. 2008.
5. World Health Organization. World Health Report 2003 – Shaping the future. Geneva: WHO. 2003.
6. The Global Impact of Dementia 2013-2050. London, United Kingdom: Alzheimer's Disease International: 2013.
7. Shaji KS, Jotheeswaran AT, Girish N, Srikala Bharath, Amit Dias, Meera Pattabiraman et al. Alzheimer's and Related Disorders Society of India (2010). The Dementia India Report: prevalence, impact, costs and services for Dementia. (Eds) ARDSI, New Delhi.
8. ECLIPSE Collaborative Members, Brayne C, Ince PG, Keage HA, McKeith IG, Matthews FE, et al. Education, the brain and dementia: neuroprotection or compensation? *Brain*. 2010;133(Pt 8):2210-6.
9. Sheehan B. Assessment scales in dementia. *Ther Adv Neurol Disord*. 2012;5(6):349-58.
10. Gaidhane S, Gaidhane AM, Zahiruddin QS, Khatib N. Essential hypertension and cognitive function in elderly. *Global Journal of Medicine and Public Health*. 2014;3:1-12.
11. Mortimer JA. Do psychosocial risk factors contribute to Alzheimer's disease? In: Henderson AS, Henderson JH, editors. Etiology of Dementia of the Alzheimer's Type. New York: John Wiley and Sons. 1988;39-52.
12. 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;27:4280-37.
13. Mathuranath PS, Cherian JP, Mathew R, George A, Alexander A, Sarma SP. MMSE and the Addenbrooke's cognitive examination. *Neurology India*. 2007;55(2):106-10.
14. Saldanha D, Mani MR, Srivastava K, Goyal S, Bhattacharya D. "An Epidemiological Study of Dementia under the Aegis of Mental Health

- Program, Maharashtra, Pune Chapter.” *Indian J Psychiatry.* 2010;52(2):131-9.
15. Cagney KA, Lauderdale DS. Education, wealth, and cognitive function in later life. *J Gerontol B Psychol Sci Soc Sci.* 2002;57:163-72.
  16. Lièvre A, Alley D, Crimmins EM. Educational differentials in life expectancy with cognitive impairment among the elderly in the United States. *J Aging Health.* 2008;20:456-77
  17. Hogervorst E, Clifford A. What is the Relationship between Higher Obtained Education and a Delayed Age at Onset of Dementia? *J Alzheimer’s Dis Parkinsonism* 3: e128. doi:10.4172/2161-0460.1000e128.
  18. Stern Y, Gurland B, Tatemichi TK, Tang MX, Wilder D, Mayeux R. Influence of education and occupation on the incidence of Alzheimer’s disease. *JAMA.* 1994;271:1004-10.
  19. Wilson RS, Hebert LE, Scherr PA, Barnes LL, Mendes de Leon CF, Evans DA. Educational attainment and cognitive decline in old age. *Neurology.* 2009;72(5):460-5.

**Cite this article as:** Godbole S, Godbole G, Vaidya S. Influence of education on cognitive function in the elderly population of Pune city, Maharashtra, India. *Int J Res Med Sci* 2016;4:4119-22.