The Prevalence of Cognitive Disorder and its Associated Socio-demographic Factors in Elderly from Assisted Living Residences, KlangValley.Malaysia

Jane Wong Zan Mei*; Dr. TheingiMaungMaung*,; Dr. Krishna Kumar Mallick**

*Dept. of Community Medicine; UniversitiTunkuAbdul Rahman
**Professor of Surgery, Melaka Manipal Medical College, Malaysia.
Co-authors: Shervind; Chan Huay Yee; Terry Lee Yong Hong;Ong Wan Jun;Ong Li Yin All from UTAR, K.L.

Abstract: *In relation to the rapid expansion of aged population in Malaysia, the number of cognitive disorder cases among elderly is expected to rise steeply. This will in turn become a major public health burden given its adverse psychosocial and economic consequencesfor the affected person as well as their families. However, data on the prevalence of cognitive impairment among Malaysian elderly is still lacking and lesser is known about the socio-demographic factors associated with cognitive disorder in late life.*
Abbreviations: *SDF Socio-demographic factors; CD Cognitive disorder; CI Cognitive impairment.*
Key Words: *Bumiputera, Dementia, Brain cognitive reserve.*

I. Introduction

Elderly are generally defined as older people aged 60 years and above. Consequent upon increase in life expectancy and continuing fertility decline, population ageing in developing countries is occurring at a much more rapid pace than that experienced by the developed countries.1.

In year 2012, elderly population in Malaysia makes up 8.2% of the total population. The figure is estimated to increase to more than 15% by 2030, which will literally classify Malaysia under ageing nations.2. CI is a common problem in late life and has become a major public health burden given its adverse psychosocial and economic consequences for the affected person as well as their families.3.

In three studies done locally, it was found that the prevalence of CI in Malaysian elderly was high, ranging from 12.3% to 22.4%.4. 5. 6. The number is expected to rise further in relation to the expansion of the aged population.

Numerous studies have been done to determine the risk factors for CI. Among the SDF that have been studied include age, gender, ethnicity, marital status, religion, level of education, employment status, living residence and financial status.4. 5. 6.

However, results obtained vary between studies. While a common finding has been established in different researches for some SDF on their associations with CD, the findings for the others were contradictory. This has led us to wonder what are the SDF associated with CD.Thus, we have chosen several SDF as the study variablesbased on the availability of preliminary data, their relative importance and potential impact to the society, and our interest in finding the answer to previously contradicted results. The SDF chosen are age, gender, ethnicity, marital status, level of education and previous employment status. Therefore, we have decided to conduct a local research to study the prevalence of CD and its associated SDF in elderly from assisted living residences ofKlang Valley. Besides finding out the prevalence of CD in elderly from assisted living residence, the relationship between CD and age, gender, ethnicity, marital status, level of education and previous employment status can be determined. We hypothesized that all these SDF (age, ethnic origin, gender, marital status, education attainment and previous employment status) are associated with the development of CD.

CD emerges as a globally concerned issue with its high prevalence in countries all over the world. In foreign countries such as Taiwan and Turkey, the prevalence are as high as 22.2% and 22.9% respectively.7. 8.

Malaysia has not been able to run away from this global phenomenon, given the rise in ageing population. In a study conducted across the whole Malaysia involving 2980 elderly, it revealed a prevalence of 14.3% for CD.4. Another two research done locally also recorded a prevalence of 22.4% and 12.3% respectively.6.7

The high prevalence of CD among elderly in Malaysia has alarmed the nationaldecision making, goal setting, planning, and judgment.7. Thus, a person is said to have CD when he or she has trouble concentrating, focusing, learning new things, solving problem, interpreting and analysing situations, such that it affects his or her daily life. CD is common in late life and may be due to the normal process of ageing, orassociated with physical or mental disorder.5. Delirium, dementia and amnesia are the common types of CD in the elderly, with dementia being the most common. Dementia is defined as an acquired, persistent and progressive impairment in

intellectual function, at which memory and at least one other cognitive domain are compromised. Dementia can be further classified into Alzheimer's disease, vascular dementia, fronto-temporal dementia and dementia with Lewy bodies.18.20.Focusing on the ethnic groups in Malaysia, the indigenous ethnic group of Sabah and Sarawak, known as the Bumiputera, recorded the highest prevalence rate of dementia compared to other races. As recorded in one of the studies done, the prevalence rate was 32.1% in Bumiputera, 14.8% in Malays, 6.3% in Chinese and 5.8% in Indians.4.Therefore, Bumiputera and Malays are five times and twice more likely to develop dementia respectively than Chinese while there is no significantly difference in likelihood of dementia between Chinese and Indians.4. On the other hand, another study recorded a prevalence of 66.7% in Bumiputera, 35.6% in Indians, 19.2% in Chinese and 16.7% in Malays, in terms of CI.5. Thus, the relative risk of developing CD between the three major races in Malaysia is yet to be determined.

In conclusion, several SDF such as age, gender, ethnicity, marital status, level of education and employment status have been identified for their possible association with CD in elderly through review of multiple literatures. In the effort of addressing the high prevalence of CDs among the elderly in Malaysia, our study will further investigate into this matter to provide evidence based information for subsequent planning of health care.

II. Materials And Methods

A cross sectional study was conducted to study the prevalence of CD and its associated SDF in the elderly. This study spanned 7 weeks from21st July 2014 to 5th September 2014. This study design had enabled us to take a snapshot view on cognitive disorder in the study population at a specific time-point. Besides, it had provided evidence on the mental health status of elderly population from assisted living residences in Klang Valley in the year 2014.Among the residents in four institutions, where the study was conducted, elderly aged 60 years and above, consented and able to communicate were eligible to take part in this study.

Convenient sampling method was used when selecting assisted living residences while universal sampling was applied when recruiting participants in our study. Thus, all elderly from the chosen assisted living residences who meet the inclusion criteria were recruited. A total of 118 participants were obtained.

The independent variables in this study consisted ofSDF which were age, gender, ethnicity, marital status, education attainment and employment history while the dependent variable was CD.The socio-demographic data of participants were collected using questionnaire through face-to-face interview. On the other hand, the presence of CD was assessed by using The Mini-Cog test, which comprised of items recall and clock drawing test. In this test, participants were required to remember three words: chair, apple, monkey. Subsequently, they were asked to draw a clock showing 45 minutes past 10. After clock drawing, participants were asked to repeat the three words mentioned earlier. If all three items were recalled, the participant was tested negative for CD. On the contrary, if none of the three words was recalled, the participant was tested positive for CI. If one or two words were recalled, the clock drawing test was examined. Positive CD was detected in those whose clock was distorted in shape with the hands of the clock displaying the wrong time. For those whose clock was normal in shape with the hands showing the correct time, no CI was detected. Simple and easy to perform, in addition to its high sensitivity and specificity, The Mini-Cog is widely accepted as a screening tool for CI, especially in older adults and for people from various cultures, level of education and language preferences. Moreover, the clock drawing component of The Mini-Cog test allows quick assess of multiple cognitive domains such as memory, cognitive function, language comprehension, executive function and visual-motor skill.

All data collected was analysed using Statistical Package for Social Sciences (SPSS) version 22. In this study, the independent variables were categorised as follows. Age was categorised into 4 age groups: 60-69 years, 70-79 years, 80-89 years and, 90 years and above. Gender was dichotomised as male and female. Ethnicity was classified into Malay, Chinese and, Indians and others. For marital status, it was dichotomised as married and unmarried, which included single, divorced or widowed. Level of education was divided into 3 categories: never went to school, primary, and secondary, diploma, university and higher. Employment history was dichotomised as employed and unemployed. Meanwhile, the dependent variable was categorised into positive CD and negative CD.To establish association between independent and dependent variables, which were both categorical, chi square test was performed and the association was considered to be statistically significant at p-value less than 0.05. The results were tabulated in frequency distribution table, bar chart and contingency table. On the other hand, age was also taken as a numerical variable. Frequency distribution table and histogram were constructed while Independent t-test was carried out to find its association with CD.

III. Results

Out of 278 elderly residents at the four assisted living residences, 141 consented to participate in this study, giving a response rate of 50.7%. After excluding participants with invalid and missing data, the final sample consisted of 118 elderly.

Table 1: Distribution of respondents by socio-demographic factors

Variable/Category	N	(%)
Residence		
Residence 1	68(57.6%)	
Residence 2	12(10.2%)	
Residence 3	4(3.4%)	
Residence 4	34(28.8%)	
Age		
60-69	39	(34.8%)
70-79	43	(38.4%)
80-89	23	(20.5%)
90-99	7	(6.3%)
Gender		
Male	48(40.7%)	
Female	70(59.3%)	
Ethnicity		
Malay	47(39.8%)	
Chinese	54(45.8%)	
Indian and Others	17(14.4%)	
Marital status		
Single/Divorced/Widowed	91	(78.4%)
Married	25	(21.6%)
Education attainment		
Never attend school	41(35.0%)	
Primary	42	(35.9%)
Secondary/Diploma/University/Higher	34	(29.1%)
Employment History		
Employed	97	(82.9%)
Unemployed	20	(17.1%)

Table 2: Distribution of respondents and prevalence of cognitive disorder

CD (Cognitive Disorder)	No.	(%)
Positive	64	(59.3%)
Negative	44	(40.7%)

The prevalence rates of CD showed a clearly increasing trend by age group. From 48.7% in the 60-69 years age group, the prevalence rate increased to 57.9% in the 70-79 years age group and finally recorded the highest prevalence, which was 71.4%, in the 80-89 years age group. However, there was a slight drop in prevalence in the 90-99 years age group.

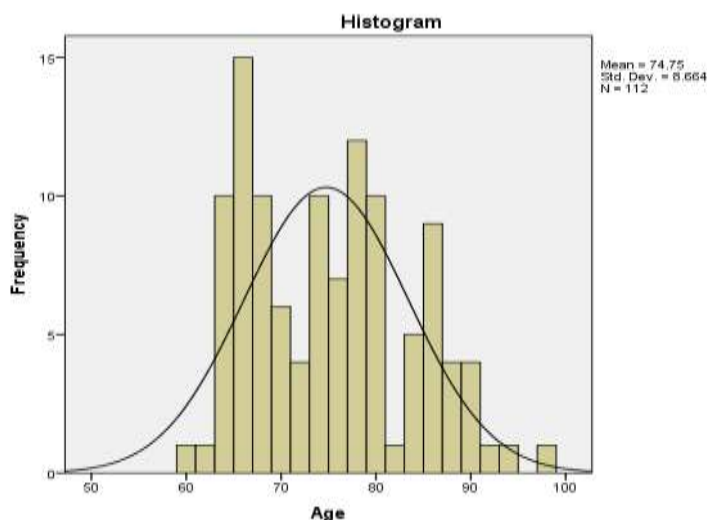**Figure 1: Distribution of respondents by age**

Table 3: Prevalence of cognitive disorder by socio-demographic factors

Variable/Category	Positive Cognitive Disorder		Negative Cognitive Disorder		x^2	df	POR	p-value
	n	%	n	%				
Residence								
Res. 1	38	62.3	23	37.7				
Res. 2	4	36.4	7	63.6	3.032	3	-	0.387
Res. 3	3	75.0	1	25.0				
Res. 4	19	59.4	13	40.6				
Age								
60-69	19	48.7	20	51.3				
70-79	22	57.9	16	42.1	3.109	3	-	0.375
80-89	15	71.4	6	28.6				
90-99	4	66.7	2	33.3				
Gender								
Male	29	64.4	16	35.6	0.859	1	1.450	0.354
Female	35	55.6	28	44.4				
Ethnicity								
Malay	28	70.0	12	30.0				
Chinese	28	54.9	23	45.1	3.361	2	-	0.186
Indian and Others	8	47.1	9	52.9				
Marital Status								
Single/Divorced/Widowed	45	54.9	37	45.1	1.947	1	0.501	0.163
Married	17	70.8	7	29.2				
Educational Attainment								
Never Attend School/ Primary	50	67.6	24	32.4	6.002	1	2.827*	< 0.05
Secondary/Diploma/ University/Higher	14	42.4	19	57.6				
Employment History								
Employed	51	58.6	36	41.4	0.013	1	0.944	0.910
Unemployed	12	60.0	8	40.0				
*95% CI: 1.215 - 6.580								

Male showed a higher prevalence rate of CD (64.4%) compared to female (55.6%) [Table 3]. Similarly, the representation of male in positive CD cases (45.3%) was higher than its representation in negative CD cases (36.4%).

Among the ethnic groups, the highest prevalence of CD was observed in Malay (70.0%), compared to the prevalence in Chinese (54.9%) and, in Indian and others (47.1%) [Table 3]. Malay and Chinese each represented 43.8% of the positive CD cases. However, the representation of Malay (27.3%) was significantly lower than that of Chinese (52.3%) in negative CD cases.

The prevalence of CD in married elderly (70.8%) was considerably higher than in unmarried (single, widowed or divorced) elderly (54.9%) [Table 3]. The representation of married respondents in positive CD cases (27.4%) was also nearly twice greater than its representation in negative CD cases (15.9%).

A higher prevalence of CD was observed in respondents who never attended school or had only primary level of education (67.6%) compared to those who received secondary or higher level of education (42.4%) [Table 3]. The former, which were those with lower education attainment, had also made up the majority of the positive CD cases (78.1%) while those with higher level of education made up only 21.9%.

IV.   Discussion

In this study, 108 elderly aged 60 years and above were assessed for CD and 59.3% of them were tested positive. The prevalence was significantly higher than that reported in other population-based studies conducted in Malaysia, which ranged from 12.3% to 22.4%.3.4.5. The vast difference might be due to sampling error as convenient sampling was used and the sample size in this study was not large enough to represent the whole population.

Among the four assisted living residences, Res. no.3 reported the highest prevalence of CD. It was observed that all residents of Res. no. 3 were diabetic. Thus, we hypothesise that diabetes mellitus is associated with CI. This hypothesis is supported by a study done in Japan who reported hyperglycaemia, hypoglycaemia and hyperinsulinemia as a major cause of CI in diabetic subjects and its underlying pathophysiology.18.

Besides, residents of Res. no.3 were noted to have less access to nutritional food as they were served with meals which contain only rice and vegetables on most days. There might be a lack of Omega-3 fatty acids and Vitamin

B-12 in their meals. These two nutrients, which are more commonly found in fish and meat, are important for neuronal health and are known to have protective role on cognitive decline.17. Moreover, elderly at Res. 3 were found to be more physically and mentally inactive as they often spend time sitting without much activities and interaction. It has been proven that physical activity and maintenance of social ties are important in enhancing memory and preventing cognitive decline.9.

The increasing prevalence rate of CD with age shown in this study was in accordance with that reported in a number of studies, both local and international.4.9.12.
A study done in Turkey reported a significantly higher prevalence of CD in elderly subjects aged 80 and above.8.

This supported the findings in this study where the 80-89 years age group showed the highest prevalence of CD. The decline in cognitive ability with advancing age can be explained by the change in brain physiology. As one grows older, a drop in brain volume and thinning of cortical area observed. Furthermore, myelin sheath disintegration and reduced neurotransmitter secretion occur in ageing process. All these changes lead to decrease in focus and recalling capability, which ultimately result in CI.7.

The reason for the slight drop in prevalence of CD in the 90-99 years age group can be traced back to the small sample size representing this age group. However, contrary to many other studies, the association between age and CD was not statistically significant in this study.

A higher prevalence of CD was noted in male compared to female in this study. This finding is in contrast with that reported in other studies, at which female had a higher risk of developing CD than male.4.8.13.
As explained in these studies, the increased risk of CI in female can be due to social disadvantages such as a lack of educational opportunities, which then hinders their access to employment and personal development. In fact, lower educational attainment and less complex occupational activities have been known to contribute to cognitive decline.4.. Nevertheless, there were a number of studies which found that, statistically, gender was not significantly associated with CD.5.6.7.12.

Previous studies done on Malaysian population have different say on the major ethnic group that is most at risk of developing CD. One study reported a higher prevalence of CI in Malays. 4. while the other study reported a higher risk in Indians than the other major ethnic groups.11. In this study, Malays recorded the highest prevalence of CD, followed by Chinese and Indians and others. The finding was in agreement with study done.4. The higher risk in Malays for being cognitively impaired at old age can be explained by genetic factors as well as lifestyle risks. APOE-4 allele, the gene most strongly associated with Alzheimer's disease, was found to be more common in Malays. In addition, high-fat diet and physical inactivity were also among the contributory factors .4. The prevalence among Malays in this study (70%) was significantly higher than that reported earlier.4. On the other hand, it was found that the association between ethnicity and CI was not statistically significant. The difference in prevalence and the insignificant association can be a result of small sample size in this study.

When investigating the effect of marriage life on cognitive ability, the findings in this study was contrary to a number of studies who reported a higher risk of CI in elderly who were unmarried, either single, widowed or divorced. The advantage of marriage on lowering the risk of CI can be explained by better mental conditions through sharing of life with partners where stimulation of brain activities and growth of neurons occurs. Moreover, unexpected life events might have exposed divorced or widowed elderly to more emotional stress, which negatively affects their memory and cognitive ability.10. The contradicted result shown in this study can be due to relatively small number of representatives from married group. Anyhow, marital status was found to be not significantly associated with CD in this study.

Education attainment is the only socio-demographic factor that showed statistically significant association with CD. The findings in this study revealed a three times higher risk of developing cognitive disorder in individuals with lower education attainment compared to those with secondary or higher level of education. This result is in good record with a large body of evidence, both local and international, which constantly support the strong association between low level of education and CD. 4.7.9. Mentally challenging activities involved in the learning process has been recognised for its powerful role on the maintenance and enhancement of brain reserve, which in turn acts as a protective factor from cognitive impairment.4.5.Moreover, higher education attainment is often linked to better socioeconomic status, which enables access to more nutritional food and better healthcare. 4.

In this study, there was no significant difference in prevalence rate of cognitive disorder between previously employed and unemployed elderly. The association between employment history and cognitive disorder was also not statistically significant. The result was inconsistent with other studies which reported a significant association of unemployment with cognitive disorder. 4.6.8. This can be due to small sample size representing the unemployed group in this study. The protective role of employment on cognitive impairment can be explained by mental stimulation and physical activity involved when working. However, there are also studies which noted that not all types of occupation have protective effect on cognitive impairment. In fact,

blue-collar workers were found to be more at risk of developing cognitive disorder than white-collar workers due to higher toxic exposures and greater psychosocial stress. 6.

There are limitations to this study. First of all, the use of convenience sampling had restricted the variability in characteristics of participants in this study. As the sample population is not representative of the whole population, the results obtained lack generalization. Besides, the small sample size had rendered most of our test of association between variables insignificant, with some of the results differing significantly from findings in other studies.

To overcome these limitations in prospective studies, we recommend that random sampling method is preferable and a larger sample size should be recruited. Besides, the test and questionnaire should be more user-friendly in terms of length and simplicity to prevent participants from losing patience and to avoid misunderstanding.

V. Conclusion

The prevalence of CD among elderly from assisted living residences in Klang Valley was high, recording a prevalence rate of 59.3%. Education attainment was the only SDF that showed statistically significant association with CD at old age. In this study, the risk of being CI was found to be three times higher in those with lower level of education. For other SDF including age, gender, ethnicity, marital status and employment history, their associations with CD in late life were not statistically significant. CD at late life will soon become a major public health burden in Malaysia. More sophisticated studies are needed to accurately identify the risk groups for further assessment of health needs and planning of health services.

References

[1].   University of Malaya, 2012. Report of the International Conference on Population Ageing. In pp. 1–11.
[2].   Second, T.H.E., Of, M. & Committee, T.H.E., 2013. " ACTIVE AGEING IN MALAYSIA ." , pp.1–18.
[3].   Sciences, H., 2011. Prevalence of Cognitive Impairment Among the Members of the National Council of Senior Citizens ' Malaysia in Day Care Centres Within the Klang Valley. Malaysian Journal of Public Health Medicine, 11(October 2008), pp.43–48.
[4].   Hamid, T.A. et al., 2010. Sociodemographic risk factors and correlates of dementia in older Malaysians. Dementia and geriatric cognitive disorders, 30(6), pp.533–9. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21252548 [Accessed July 27, 2014].
[5].   Sherina Mohd Sidik, Lekhraj Rampal, M.A., 2004. Original Article; Physical and Mental Health Problems of the Elderly. Malaysia Journal of Medical Sciences, 11(1).
[6].   Khaw, C., Teo, C. & Rashid, A., 2009. Cognitive Impairment And Depression Among Residents Of An Elderly Care Home In Penang , Malaysia.
[7].   Sharma, D., Mazta, S. & Parashar, A., 2013. Prevalence of cognitive impairment and related factors among elderly: A population-based study. Journal of Dr. NTR University of Health Sciences, 2(3), p.171. Available at: http://www.jdrntruhs.org/text.asp?2013/2/3/171/117182 [Accessed July 18, 2014].
[8].   Keskinoglu, P. et al., 2006. The prevalence and risk factors of dementia in the elderly population in a low socio-economic region of Izmir, Turkey. Archives of gerontology and geriatrics, 43(1), pp.93–100. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16274758 [Accessed July 31, 2014].
[9].   Wu, M.-S. et al., 2011. Socio-demographic and health-related factors associated with cognitive impairment in the elderly in Taiwan. BMC public health, 11(1), p.22. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3027136&tool=pmcentrez&rendertype=abstract [Accessed July 31, 2014].
[10].   Yuen, E.Y. et al., 2012. Repeated stress causes cognitive impairment by suppressing glutamate receptor expression and function in prefrontal cortex. Neuron, 73(5), pp.962–77. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3302010&tool=pmcentrez&rendertype=abstract [Accessed July 14, 2014].
[11].   Sherina, M.S., Rampal, L. & Mustaqim, a, 2004. Cognitive impairment among the elderly in a rural community in Malaysia. The Medical journal of Malaysia, 59(2), pp.252–7.
[12].   Campos, D., 2014. Prevalence of Cognitive Impairment in Community-Dwelling Older Adults. , 5(1), pp.28–30.
[13].   Arslantaş, D. et al., 2009. Prevalence of dementia and associated risk factors in Middle Anatolia, Turkey. Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia, 16(11), pp.1455–9. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19748273 [Accessed July 31, 2014].