Research / Araştırma

Prevalence and Factors Associated with Mild Cognitive Impairment on Screening in Older Malaysians

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ABSTRACT

Prevalence and factors associated with mild cognitive impairment on screening in older Malaysians

Objective: This study was aimed to determine the prevalence and predictors of mild cognitive impairments (MCIs) in Malaysia.

Method: This is a cross-sectional community-based study among elderlies aged 60 years and above in the four states of Malaysia - Perak, Kelantan, Selangor and Johor. A multi-stage stratified random sampling method was used for the data collection. Mini Mental State Examination score ≥22 was used to diagnosed MCI and analyzed by using multivariate logistic regression.

Results: A total of 2112 participants were recruited into this study. Mean age of the participants was 69.2±18.8 years, and 51.4% of them were females. The ethnic distribution was 63.4% Malaysian, 31.4% Chinese, 5.0% Indians, and 0.2% others. The overall prevalence of MCI was 68% (n=1436/2112). In multivariate logistic regression analysis, participant who were older (OR 1.02, 95% CI 1.00-1.04), did not receive formal education (OR 6.85, 95% CI 4.58-10.25), had primary education (OR 2.35 95% CI 1.84-3.00), were lonely (OR 1.18 95% CI 1.05-1.32), and had low level of life satisfaction (OR 1.68 95% CI 1.02-2.67), had significant positive correlations with MCI.

Conclusion: MCI is present in seven out of ten elderly Malaysians. Aging population, presence of low education level, loneliness and low life satisfaction level seem to facilitate development of MCI.

Keywords: Aging, cognitive impairment, dementia, elderly, Malaysia, prevalence

ÖZET

Yaşlı Malezyalılarda hafif kognitif bozukluk tarama prevalansı ve ilişkili faktörler

Amaç: Bu çalışmada Malezyadaki hafif kognitif bozuklukların (HKB) prevalansı ve prediktörlerinin tespit edilmesi amaçlanmıştır.

Yöntem: Malezya'nın dört eyaletinde (Perak, Kelantan, Selangor ve Johor) 60 yaş ve üzeri yaşlılarda gerçekleştirilmiş olan bu toplumsal tabanlı kesitsel çalışmada, veri toplanmasında çok evreli katmanlı örneklem yöntemi kullanılmıştır. HKB tanısı için Mini Mental Durum Muayenesi puanı ≥22 olması kullanılmıştır ve çok değişkenli lojistik regresyon testi kullanılarak analiz edilmiştir.

Bulgular: Bu çalışmaya toplam 2112 katılımcı alınmıştır. Katılımcıların ortalama yaşı 69.2±18.8 yıl olup %51.4'ü kadındı. Etnik dağılım %63.4 Malezyalı, %31.4 Çinli, %5.0'i Hindistanlı ve %0.2'si diğer kökenlere aitti. HKB'nin genel prevalansı %68 (n=1436/2112) idi. Çok değişkenli lojistik regresyon analizde, yaşlı (OR 1.02, 95% CI 1.00-1.04), resmi eğitim almamış (OR 6.85, 95% CI 4.58-10.25), ilkokul eğitimi almış (OR 2.35 95% CI 1.84-3.00), yalnız olan (OR 1.18 95% CI 1.05-1.32) ve düşük yaşam tatminine sahip katılımcılarda (OR 1.68 95% CI 1.02-2.67) HKB ile anlamlı derecede pozitif korelasyonlar saptanmıştır.

Sonuç: HKB 10 yaşlı Malezyalının 7'sinde mevcuttur. Yaşlanan toplum, düşük eğitim seviyesi, yalnız olma ve düşük yaşam tatmini seviyesinin HKB gelişimini hızlandırdığı düşünülmektedir.

Anahtar kelimeler: Yaşlanmak, kognitif yetersizlik, demans, yaşlı, Malezya, prevalans

INTRODUCTION

In recent years, the ratio of elderly population is increasing rapidly in Malaysia. It has increased from 6.2% in 1998 to 8.4% in 2010, which has contributed to increase of 2.2 million of older Malaysian population in numbers (1). Demographic projections indicated Malaysia as the fourth fastest aging country in the world with 2.7 folds of increase in the elderlies between years 2008 and 2040. Malaysia is expected to be an old-aged nation in 2030 when 15% of the total population will be elderlies (2). Along with global aging, age-related diseases, such as cognitive impairment and dementia, will increase dramatically in the coming years, and they will be the major concerns in Malaysia (3).

Cognitive impairment is defined as a decline in function in either one or multiple domains of cognitive function (4). The individuals with cognitive decline have the criterion of memory complaint, preferably corroborated by an informant, memory impairment documented according to appropriate reference values, essentially normal performance in non-memory cognitive domains, generally preserved activities of daily living and are not demented (5).

Mild cognitive impairment (MCI) is the intermediate stage between the cognitive changes of normal aging and those of dementia (5). There are three types of MCI which are amnestic MCI, non-amnestic MCI, and multi-domain MCI (6). Several studies have shown that individuals with MCI predispose a higher risk to develop dementia compared to the normal individuals (7-9).

Study reported that there were numerous factors which contributed to MCI, and it was usually caused by an interaction of genetic and environmental factors acting during the whole lives of individuals (10). The genetic part was widely accepted as the contribution to the pathological progression of disease and usually non modifiable. However, gene-environment interactions were also important in the development of MCI where the environment factors could affect the onset of clinical symptoms among patients with MCI (11,12) as opposed to their overall presence or absence of pathology. Those with higher environmental risks would present their symptoms earlier compared with lower risk groups in which they tend to have later clinical onset. Thus, "prevention" of cognitive impairment and dementia can be hypothesized as postponing the onset of clinical presentation throughout the individual's lifetime.

In Malaysia, several environmental factors have been studied in relation to dementia in late life (13,14). There is still a gap particularly in the knowledge of association between psychosocial aspect and the development of MCI in our country. Furthermore, previous studies were conducted either in rural or urban areas, so their results cannot be generalized. Thus, this study was aimed to determine the prevalence of MCI and its association with psychosocial factors among elderlies in Malaysia community setting.

METHOD

This was a cross-sectional study conducted in four states in the Peninsular Malaysia which covered Perak, Selangor, Kelantan and Johor. This research was a part of the LRGS TUA project where a lot of emphasis was given on a wide range of neuroprotective factors among a population based sample of Malaysian elderly people from four states in Malaysia that had the highest numbers of older adults aged 60 years and above (15). In this study, Peninsular Malaysia was divided into four regions which were north, south, west and east. During the first stage, a multi-stage stratified random sampling method was used for the data collection. The selected states were Johor (South Region), Kelantan (East Region), Perak (North Region) and Selangor (Central Region). During the second stage, selection of clusters with at least 10% of older person for each state were carried out. The cluster number of 35 was selected for each state. Third stage involved selection of 20 living quarters for each selected cluster in the second stage. Elderly populations living in these quarters were selected randomly as respondents.

Inclusion criteria for participants were being 60 years and above, and Malaysian. Exclusion criteria were to have a known Psychiatric Problem (Dementia and Alzheimer Disease), alcohol abuse, serious physical disability (bedridden, wheel chair) and being terminally ill. Psychiatric problems were assessed by self-reporting of participants, whereas they were screened for alcohol abuse by answering a questionnaire about alcohol intake.

The sample size was calculated based on the prevalence in local study of 25 percent (13) using formula below (16):

$$N_H = (z^2) (r) (1\text{-}r) (f) (k) / (p) (n) (e^2)$$

N_H = the parameter to be calculated and is the sample size in terms of number of households to be chosen; Z = the statistic that sets the degree of confidence desired; r = an estimate of a key indicator to be measured by the survey; f = the sample design effect, deff, assumed to be 2.0 (default value); k = a multiplier to account for the anticipated rate of non-response; p = the proportion of the total population accounted for by the target population and upon which the parameter, r, is based; n = the average household size (number of persons per household); e = the margin of error to be attained.

After adjusted for design effect of 2 and level of analysis, the estimated total sample size was 2800 with 90% power, 95% confidence interval (CI), and statistical significant level (α) at 5%, after taking into account a non-respondent rate of 20%. Ethical approval was obtained prior to the study from the National Medical Research Register, Ministry of Health Malaysia (NMRR-13-1023-14660).

Data Collection

The data collection was carried out for 12 months from May 2013 to April 2014. It was a community center based study. Firstly, researcher visited the chosen LQs based on the EB maps which was provided by the Department of Statistics about a week prior to the predetermined date of data collection. Information related to the survey was given to the members of LQs and the Residential Community. The researchers asked participant consents to conduct the study and also explained them purpose of the study, study procedures, risks of the study, as well as the freedom of the subject to withdraw from the study after screening the respondents according to the inclusion and exclusion criteria. Researchers invited the eligible participants to come for next data collection session. Data collection was carried out at the nearest community hall on pre-determined dates. The purpose of the study was explained to every respondent. Anonymity was guaranteed and informed consent was taken from them before commencing data collection. A set of pre-tested questionnaire was used for data collection and a face to face interview was conducted to obtain data from the respondents.

Measures

Mini Mental State Examination

Mental health status of patients was determined by using Mini Mental State Examination (MMSE) (17). MMSE is a 30-point questionnaire that is used to measure cognitive impairment. It will take between 5–10 minutes to complete the test. It examines patients' functions in registration, attention and calculation, recall, language, ability to follow simple commands and orientation. The MMSE Malay Version, which was validated locally as a reliable screening tool for dementia, was used (18). MMSE score of 22 and more were defined as normal and a score of 21 and less was considered as probable presence of MCI during screening (15).

Social Network

Lubben Social Network-6 scale developed by Lubben in 1988 was used to measure the size of the network (friendship network size, family network size, and total network size). Lubben Social Network-6 scale should have a cut-off of 12 as "at risk for social isolation" as determined in previous studies (19). Individuals with a score of less than 12 were identified as socially isolated.

Social Support

Social support was measured by using the Medical Outcome Study Social Support Survey (20). The four subscales were informational, tangible support, affective support and positive social interaction. The higher the score indicated the better function of social support (20).

Satisfaction with Life

Satisfaction with life was measured using Satisfaction with Life Scale (21). It is a short 5-item instrument designed to measure global cognitive judgments of satisfaction with one's life. Scores between 21 and 25 represented slight satisfaction, and scores between 15 and 19 represented slight dissatisfaction with life. Scores between 26 and 30 represented satisfaction, and scores from 5 to 9 were indicative of being extreme dissatisfaction with life (22).

Personality

Personality was measured using Short Scale Eysenck Personality Questionnaire-Revised (23). High total scores indicated strong emotional liability and over activity (23).

Table 1: Sociodemography factors among elderly population (n=2112)

Variables	Overall		No MCI (n=670)		MCI (n=1442)		p
Age, years (mean)	68.8 (6.1)		67.7 (5.7)		69.4 (6.2)		<0.001
	n	%	n	%	n	%	
Age							<0.001
60-69	1237	58.6	448	36.2	789	63.8	
70-79	765	36.2	197	25.8	568	74.2	
>/80	110	5.2	25	22.7	85	77.3	
Gender							0.002
Male	1026	48.6	358	34.9	668	65.1	
Female	1086	51.4	312	28.7	774	71.3	
Ethnicity							0.003
Malay	1339	63.4	394	29.4	945	70.6	
Chinese	663	31.4	232	35.0	431	65.0	
Indian	105	5.0	40	38.1	65	61.9	
Others	5	0.2	4	80.0	1	20.0	
Education							<0.001
Never Attended School	409	19.4	48	11.7	361	88.3	
Primary	1229	58.2	366	29.8	863	70.2	
Secondary	365	17.3	177	48.5	188	51.5	
Tertiary	109	5.1	79	72.5	30	27.5	
Marital Status							<0.001
Married	1476	69.9	524	35.5	952	64.5	
Single	636	30.1	146	23.0	490	77.0	
Religion							<0.001
Islam	1344	63.6	396	29.5	948	70.5	
Christian	89	4.2	43	48.3	46	51.7	
Buddha	547	25.9	176	32.2	371	67.8	
Hindu	86	4.1	32	37.2	54	62.8	
Others	46	2.2	23	50.0	23	50.0	
Employment Status							0.65
Working	505	23.9	156	30.9	349	69.1	
Not Working	1607	76.1	514	32.0	1093	68.0	
Living Arrangement							<0.001
Alone	211	10.0	44	20.9	167	79.1	
With Family Member	1901	90.0	626	32.9	1275	67.1	
Income in Ringgit Malaysia	910.8		1182.4		784.6		<0.001

MCI: Mild cognitive impairment

Loneliness

Loneliness was measured using the Three-Item Loneliness Scale (24). It was three items questions with 3 answer Likert scale. Total score were calculated and persons with higher score tend to be lonelier.

Statistical Analysis

SPSS version 18 (SPSS IBM New York) was used to perform the statistical analysis. Continuous data were described as mean and SD or median and interquartile range (25-75th percentiles). Chi-square test was used to analyze the categorical data. Multiple logistic regressions were used to elucidate the various risk factors influencing probable MCI during screening. The level of significance was set at p-value <0.05.

RESULTS

A total 2112 subjects were enrolled into the study with the response rate of 93.5%. The mean age of the study population was 69.2±18.8 years. Among the subjects, 48.6% were males and 51.4% were females. The distribution of ethnicity was 63.4% Malaysian, 31.4% Chinese and 5.0% Indians. More than half of the study population received primary education (50.2%), 19% of them were illiterate and 17.3% received secondary education, and only 5.2% received tertiary education. Seventy percent of the respondents were married, and most of the respondents lived with their family members (Table 1).

Clinical risk factors between those with and without a probable MCI among elderly population were compared during the screening (Table 2). On univariate analysis, there was a significant association between MCI and age, gender, ethnicity, education level, marital status, religion, estimated household income, dyslipidemia, life satisfaction, personality as well as living alone or with their families.

Table 3 shows the results of multivariate logistic regressions. After adjusting for all the variables in the model, those being older, receiving lower education level, having higher score of loneliness and lower level of life satisfaction were positively and significantly associated with the development of probable MCI.

Table 2: Associations between clinical risk factors and and those with and without a probable mild cognitive impairment on screening among elderly population (n=2112)

Variables	No MCI (n=670)		MCI (n=1442)		p
Hypertension	339	32.0	721	68.0	0.79
Dyslipidemia	243	36.9	415	63.1	<0.001
Diabetes mellitus	181	32.8	371	67.2	0.53
Stroke	2119	23.1	30	76.9	0.24
Cardiovascular disease	70	32.1	148	67.9	0.89
Chronic kidney disease	25	30.9	56	69.1	0.87
Smoking	191	30.3	440	69.7	0.35
Family history of dementia	77	28.1	197	71.9	0.17
Social network					0.19
Normal social network	384	33.0	781	67.0	
Social isolation	285	30.3	657	69.7	
Life satisfaction					0.003
Highly satisfied	335	33.8	655	66.2	
Satisfied	175	33.7	344	66.3	
Average	132	28.2	336	71.8	
Slightly dissatisfied and dissatisfied	25	19.7	102	80.3	
	Mean	**SD**	**Mean**	**SD**	
Social support	70.1	25.6	69.4	25.6	0.56
Loneliness	8.7	1.0	8.8	0.9	0.36
Personality	1.8	2.8	2.2	3.1	0.001

MCI: Mild cognitive impairment

Table 3: Predictors of probable mild cognitive impairment on screening among elderly population (n=2112)

Variables	Adjusted OR	95% CI, lower	95% CI, upper	p
Education level				<0.001
No formal education	6.85			
Primary school	2.35	4.58	10.25	<0.001
Secondary education and above	1.00	1.84	3.00	<0.001
Life satisfaction score				0.015*
Below average & dissatisfied	1.68	1.02	2.77	0.04*
Average satisfied	1.13	0.87	1.47	0.37
Highly satisfied	1.00			
Being loneliness	1.18	1.05	1.32	0.006*
Age	1.02	1.00	1.04	0.03
Religion				
Non-muslim	1.00			
Muslim	0.76	0.11	5.17	0.18
Etnicity				
Non-Malay	1.00			
Malay	1.70	0.25	11.58	0.59
Gender	1.00			
Male				
Female	1.05	0.80	1.37	0.73
Total income	1.00	1.00	1.00	0.18
Marital status				
Not single	1.00			
Single	1.27	0.96	1.66	0.09
Employement status				
Unemployed	1.00			
Employed	0.94	0.73	1.20	0.59
Dementia in the family history				
No	1.00			
Yes	1.15	0.85	1.56	0.38
Smoker	1.03	0.78	1.34	0.85
Presence of chronic disease				
No	1.00			
Yes	1.11	0.83	1.50	0.48
Living alone	1.31	0.87	1.95	0.19
Social isolation	1.05	0.85	1.30	0.65
Social support	1.04	0.91	1.20	0.55
Personality	1.03	0.99	1.07	0.13

The significance levels are *p<0.05

DISCUSSION

Our study reported that the prevalence of probable MCI on screening in this nationwide population study was 68%. This is consistent with another local study where the MCI was reported as 64.7% among elderly patients attending to a tertiary hospital (25). However, this is higher compared with other studies (26,27). A meta-analysis revealed that the prevalence of MCI in the elderlies ranged from 3% to 42% worldwide (26) depending on the concept or definition applied. Among Asians, a meta-analysis on Chinese populations showed that the prevalence of MCI ranged from 2.4% (min. ratio) to 34.9% (max. ratio) (27). Prior studies which noted MCI was frequent in older people, and this could be due to the fact that older population had already underlying co-morbidities, like hypertension, diabetes mellitus, stroke, cardiovascular disease, and all of these factors made them prone to get early dementia onset.

In our study, more than half of the study population received primary education (50.2%), 19% of them

were illiterate, 17.3% received secondary education and only 5.2% received tertiary education. The low education level among subjects in our study population could be the possible explanation for the above finding. It was similar with the finding of a study done in Taiwan to investigate various risk factors associated with MCI in the elderlies and which depicted that those who were uneducated had a higher prevalence of MCI (28). Hogan et al. (29) also reported that low education level made individuals more prone to have MCI. The reason of the increased risk of MCI for those who received low education level could be due to the fact that they did not frequently stimulate their brain to maintain their memory capacity, which predisposed them to develop MCI (30).

Our study also showed that respondents at older ages were more related to MCI when compared to respondents at younger ages. This was consistent with the studies in China and Australia in which the prevalence of MCI was increased with age (27,31). The reason of increased likelihood of getting MCI in elderlies might be due to the fact that aging increased free radical production which led to oxidative stress altering calcium homeostasis, and endothelial damage, which reduced the capability of amyloid clearance of our body (29).

Loneliness was also demonstrated in our study to be significantly related to MCI among elderly subjects. Those who were feeling lonely were 1.2 times greater odds to have MCI compared to their counterparts. This was consistent with previous study findings (32,33). It was suggested that people who felt lonely were more vulnerable to some dangerous age-related neuropathological effects, because of their compromised neural system about memory and cognition which were deepened by loneliness (33). Furthermore, the mean age of the study population was 68.8 years old; and most of them (76.1%) were not working, and they had to stay at home while their children went out to work. They might feel lonely, because spouses of some of them might have passed away before.

Low life satisfaction is reported to be significantly associated with MCI among elderlies in Malaysian population. This was consistent with a prospective cohort study done in Italy, which demonstrated that low quality of life was the meeting criteria for MCI among the elderly subjects (34). The high quality of life helped to improve individual's psychological well-being which reduced the risk (35). The subjects in our study population were faced with financial constraints as 76.1% of them were not working, especially those without any saving or pension scheme. On top of that, they might be suffering from an underlying chronic disease which led to low life satisfaction, so it was another major environmental stress, and it could facilitate deterioration of MMSE (11,12).

Despite chronic diseases like hypertension and diabetes were reported as associated factors for the development of MCI, there was no significant association between the chronic disease and MCI in this study. The probable explanation due to chronic disease was based on self-report, and we did not perform laboratory tests.

MMSE functions more like a screening or a scale for the assessment of the severity of dementia than a diagnostic instrument. Those participants with the low score should be evaluated further. Making a proper diagnosis of MCI will be an important issue for future research. We must interpret the result carefully in the context of limitation. Even though this may functions as a screening tool, given that there is no specific diagnostic studies exist for MCI, the results of this study still can give some insights to the healthcare professional team. We proposed that in the future study, researcher should use a tool like Montreal Cognitive Assessment Questionnaire as this scale not only measures memory impairment but also assesses other aspect like independence in functional activities and change in cognition recognized by the affected individual or observers (36).

Our present study has several strengths and some limitations. This study was the first nationwide community study done in Malaysia. Secondly, our sample size was large enough to give us a better picture of the prevalence of MCI on screening among elderly subjects in Malaysia. One of the limitation of this study is that the questionnaire does not cover the aspect of lifestyle which can affect the mental health status of the respondents. However, it is quite difficult to ask

into this area as the scope is too wide. Another limitation of this study is due to its design as the reported association between some of the variables and MCI have not been a causative relationship as it has been a cross-sectional study rather than a prospective cohort study.

In conclusion, we have determined that the prevalence of MCI is high among elderly subjects in Malaysia. The present study also indicates that respondents with older age are more likely to have MCI compared to their younger counterparts. Similarly, those with no formal education, primary education, loneliness and low level of life satisfaction are more likely to be associated with MCI in this population. Therefore, family members, health care providers and policy makers should place greater emphasis on achieving a good mental health status among elderly Malaysians who have low education level, and are lonely, and dissatisfied with life.

Contribution Categories	Name of Author
Development of study idea	K.K., C.S.M., T.A.H.
Methodological design of the study	K.K., C.S.M., T.A.H.
Data acquisition and process	K.K., C.S.M., T.A.H.
Data analysis and interpretation	K.K., C.S.M., T.A.H.
Literature review	K.K., C.S.M., T.A.H.
Manuscript writing	K.K., C.S.M., T.A.H.
Manuscript review and revisation	K.K., C.S.M., T.A.H.

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