RESEARCH ARTICLE

Association Between Cognitive Deterioration and Activities of Daily Living (ADLs) among Community-Dwelling Older People

Norsyahira Abdullah[1], Nur Sakinah Baharudin[2*], Noor Amiera Alias[1]

[1]Centre for Occupational Therapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Selangor Branch Puncak Alam Campus, 42300 Bandar Puncak Alam, Selangor, Malaysia; [2]Faculty of Health Sciences, Universiti Teknologi MARA, Pulau Pinang Branch,Bertam Campus, 13200 Kepala Batas,Pulau Pinang Malaysia.

*Corresponding Author

Nur Sakinah Baharudin
Email:
sakinahbaharudin@uitm.edu.my

Abstract:

Cognitive deterioration causes limitation in Activities of Daily Living (ADLs) performance among older people. However, this problem is often overlooked as an important feature in older people. Therefore, this study aimed to determine the association between cognitive deterioration and ADLs, and the association between cognitive deterioration and socio-demographic variables among community-dwelling older people. A purposive sampling method was used in a cross-sectional study of 115 community-dwelling older people aged more than 60 years old in Malaysia. The Malay Version of Short Informant Questionnaire on Cognitive Decline in the Elderly (MS-IQCODE) was used to measure the cognitive deterioration and the Modified Barthel Index (MBI) was used to measure the dependency in ADLs among the community-dwelling older people. One quarter of the participants have experienced noticeable cognitive deterioration (n = 31, 27.00%). A negative correlation was found between cognitive deterioration and ADLs (p = 0.00), with a medium effect size (r = -0.48). There was also a significant difference between cognitive deterioration with age, marital status, education level, and medical condition (p = 0.00). A noticeably large proportion of community-dwelling older people in Malaysia had cognitive deterioration, which further impacted the ADLs. There is a new demand for increasing awareness for healthy living geriatric services to community-dwelling older people.

Keywords: Cognitive deterioration, Activities of Daily Living (ADLs), Older people

1. INTRODUCTION

Both rich and developing countries around the world are experiencing an increase in elderly population and Malaysia is on track to become an ageing nation by 2030, with 15 percent of the population are aged 60 and up (Rashid et. al., 2016). According to the Department of Statistics Malaysia (2021), Malaysia's population is aged in 2021, when the people aged 65 and up accounted for 7.1 percent of the total population. Malaysia's old population is expected to grow by 269 percent between 2008 and 2040, making it the fourth-fastest-aging country in the world, behind Singapore, Colombia, and India (Rashid et. al., 2016).

One of the most feared elements of being elderly is the progression of cognitive deterioration (Deary et. al., 2009). Because of its link to an increased risk of dementia, disability, and mortality, cognitive deterioration and impairment among older adults are becoming a growing public health problem (Lim et. al., 2020). Cognitive deterioration is a stage that occurs between normal cognitive function and the onset of dementia symptoms. Early detection of cognitive deterioration is uncommon in Malaysia due to a lack of understanding of the older people population's risk profile. Malaysians had a prevalence of cognitive deterioration of 11% to 22.4%, which was comparable to other populations (Lim et. al., 2020).

The deterioration in physical and cognitive abilities in older people makes it more difficult for them to handle their daily activities independently and to improve their quality of life (Kim et. al., 2022). Cognitive functions, including thinking and planning, motor functions, including balance and dexterity, and perceptual functions, which include sensory abilities, are all required to conduct ADLs. These abilities can be affected by changes in attention, executive functioning, visuospatial skills, and memory in the later stages of dementia (Mlinac et. al., 2016). A higher level of cognitive impairment was linked to a faster drop in ADL performance (Jones et. al., 2020).

It's important to identify the factors that lead to cognitive deterioration in older persons and figure out which ones may be improved to help slow down the deterioration. Therefore, it is important to find out the factors that contribute to individual variability in cognitive ageing in Malaysia (Foong et al., 2016). Therefore, this study aims to identify the cognitive deterioration status and performance of Activities of Daily Living (ADLs) among community-dwelling older adults. Besides this study also attempts to determine the association between cognitive deterioration and Activities of Daily Living (ADLs) among community-dwelling older people.

2. MATERIALS AND METHODS

Data Collection Procedure

This cross-sectional study was executed after being granted ethical approval (FERC/FSK/MR/2022/0357) from the Ethics Committee of the Health Sciences Faculty, Universiti Teknologi MARA (UiTM). A total of 115 (n=115) participants fulfilled the inclusion criteria and were recruited via purposive sampling in this study. The inclusion criteria for this study include; (1) aged more than 65 years old (2) can provide informed consent independently or having verbal assistant by caretakers to answer the questions (3) healthy or having mild medical conditions, while the exclusion criteria include: (1) participants who are mentally unstable (2) having serious illness or condition (3) participants who are bed-ridden. Participants in this study were contacted through online platforms such as WhatsApp, Facebook, Instagram, Twitter and email, and the data were collected using an online questionnaire. After participants had given their consent to take part in the study, an online survey was used to administer a self-reported questionnaire.

Instrument

The questionnaire used in this study consisted of three sections: Section 1: Socio-Demographic Data of participants, Section 2: Malay Version of Short Informant Questionnaire on Cognitive Decline in the Elderly (MS-IQCODE) and Section 3: Modified Barthel Index (MBI). The questionnaire was distributed through several online platforms such as WhatsApp, Facebook, Instagram, Twitter and Telegram using Google Forms. Participants were required to answer all questions as responses for all items in all three sections.

For Section1, the demographic data in this study will be gathered to get the participant's overall characteristics. It will include gender (male and female), age (65 to 74 years, 75 to 84 years and above 85 years), race (Malay, Chinese, Indian), marital status (single, married, widowed, divorced), level of education (primary school education, secondary school education, tertiary school education, no education), medical condition (cerebrovascular accident or stroke, Parkinson disease, myocardial infarction, arthritis), and others.

The Malay version of short IQCODE is a reliable instrument for assessing cognitive deterioration in Malaysian elderly. The MS-IQCODE is a reliable test for assessing cognitive deterioration in Malaysia's older population. The 16 items had a Cronbach's alpha coefficient of 0.94, indicating that they formed a scale with excellent internal consistency. It was determined that the MS-IQCODE had good face and content validity (Othman et. al., 2015).

The Modified Barthel Index is a well-established and extensively used tool for evaluating a person's performance in a set of planned and fixed daily tasks ADLs (Carone et. al., 2017). The MBI uses the 5-category scale which are unable to complete task, attempts task but unsafe, moderate help required, minimal help required, and fully independent. However, for the 5-category scale, there are three scoring methods which are 0, 1, 3, 4, or 5 points for "personal hygiene," "bathing self," and "wheelchair;" "Feeding," "toilet," "stair climbing," "dressing," "bowel control," and "bladder control" are assigned 0, 2, 5, 8, or 10 points, respectively; and "ambulation" and "chair/bed transfer" are given 0, 3, 8, 12, or 15 points. The higher the total scores will indicate a higher degree of independence in ADLs (Yang, et. al., 2020). The MBI had high ICCs in general which is 0.94 for both that indicate high agreement.

Data Analysis

The data gathered was analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. To describe the variables derived from the demographic data, the cognitive deterioration status and the ADLs performance, descriptive analysis were carried out. On the other hand, the Pearson Product-Moment Correlation Coefficient were used to determine the association between cognitive deterioration and ADLs among community-dwelling older people. Furthermore, the Independent Sample T-Test and One-way ANOVA was used to identify the association between variables of socio-demographic factors such as gender, age, race, marital status, education level, living status, diseases, work history, and smoking status with cognitive deterioration among community-dwelling older people.

3. RESULTS AND DISCUSSION

3.1 Results

Table 1 shows that 115 respondents participated in this study, as calculated by G-Power. The male-female ratio was similar among the respondents which accounts 47.00% and 53.00% respectively. As shown in Table 2, 64.30% participants are between the age of 65 to 74 years old (n = 74). Of the participants 60.90% are married and the rest are single, divorced, and widowed. Next, majority of the participants are Malay (81.70%) followed by Chinese and Indians (13.00% and 5.20%). Moreover, most of the sample receive education until secondary (41.70%) and primary level (33.00%). Among all samples, 70.30% have disease

and the disease is further divided into 6 categories and most of them have medical condition (37.40%). In addition, the majority of the respondents live with their family 25 (47.00%) and are not smoking (79.10%). Moreover, most of the respondents have work as low-skilled workers (40.90%).

Table 1: Demographic Data of the Sample (n = 115)

Variables	*n* (%)
Gender	
Male	54 (47.00)
Female	61 (53.00)
Age	
65 to 74 years old	74 (64.30)
75 to 84 years old	37 (32.20)
Above 85 years old	2 (1.70)
Marital Status	
Single	11 (9.60)
Married	70 (60.90)
Divorced	20 (17.40)
Widowed	14 (12.20)
Race	
Malay	94 (81.70)
Chinese	15 (13.00)
Indian	6 (5.20)
Education Level	
Primary school	38 (33.00)
Secondary school	48 (41.70)
Tertiary school	25 (22.60)
No education	3 (2.60)
Medical Condition	
No diseases	34 (29.60)
Musculoskeletal condition	3 (2.60)
Medical condition	43 (37.40)
Neurological condition	5 (4.30)
Musculoskeletal + Medical condition	5 (4.30)
Musculoskeletal + Neurological condition	5 (4.30)
Medical + Neurological condition	20 (17.40)
Living Status	
Spouse	51 (44.30)
Family	54 (47.00)
Alone	10 (8.70)
Work History	29 (25.20)
Skilled workers	39 (33.90)
Semi-skilled workers	47 (40.9)
Low-skilled workers	
Smoking Status	24 (20.90)
Smoking	91 (79.10)
Not smoking	

Most of the respondents have no significant cognitive deterioration (73.00%). Moreover, out of all the respondents

27.00% are reported to have significant cognitive deterioration as shown in Table 2.

Table 2: Malay Version of Short Informant Questionnaire on Cognitive Decline in the Elderly (MS-IQCODE) Scores of the Sample (n=115)

No.	Total Score MS-IQCODE	*n* (%)
1.	No significant cognitive decline	84 (73.00)
2.	Significant cognitive decline	31 (27.00)

Most of the respondents have moderate dependence level (41.70%). Next, out of all the respondents have severe dependence and slight dependence (20.00% and 20.00%). Lastly, 13.90% and 4.30% of the respondents has independence level and total dependence level as shown in Table 3.

Table 3: Modified Barthel Index (MBI) Scores of the Sample (n=115)

No	Total Score MBI	*n* (%)
1.	Total dependence	5 (4.30)
2.	Severe dependence	23 (20.00)
3.	Moderate dependence	48 (41.70)
4.	Slight dependence	23 (20.00)
5.	Independent	16 (13.90)

Table 4 shows the relationship between cognitive deterioration and activities of daily living. It was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. There was a medium, negative correlation between the two variables, $r = -0.48$, $n = 115$, $p < 0.00$, with high levels of cognitive deterioration associated with lower levels of activities of daily living (ADLs).

Table 4: Association between cognitive deterioration and activities of daily living (ADLs) among community-dwelling older people

	Mean Score of MS-IQCODE	Total Score of MBI
Mean Score of MS-IQCODE		-0.48
		0.00
		115
Total Score of MBI	-0.48	
	0.00	
	115	

** Correlation is significant at the 0.01 level (2-tailed)

An independent sample t-test was conducted to compare the cognitive deterioration scores for smoking and not smoking. There was a significant difference in scores for smoking (M = 3.05, SD = 0.69) and not smoking, M = 2.58, SD = 0.96; t (113) = 2.23, p = 0.02 (two-tailed). The magnitude of the differences in the means (mean difference) = 0.46, 95% CI: 0.51 to 0.88 was very small (eta squared = 0.04) as shown in Table 5.

Table 5: Association between variables of socio-demographic factors e.g., smoking status and cognitive deterioration among community-dwelling older people

Variables	Mean (SD)	t	df	F	Sig. (p)
Smoking Status					
Smoking	3.05 (0.69)	2.23	113	5.46	0.02
Not smoking	2.58 (0.96)				

Table 6 shows the analysis using the One-Way ANOVA test that was conducted to compare the level of cognitive deterioration with age, marital status, education level, diseases, and work history. There was a significant difference at the p = < 0.05 in cognitive deterioration score for all the socio-demographic factors. The actual differences in the mean score between all variables was large.

Table 6: Association between variables of socio-demographic factors and cognitive deterioration among community-dwelling older people

Variables	Mean (SD)	Sig. (p)
Age		
65 to 74 years old	2.41 (0.83)	0.00
75 to 84 years old	3.13 (0.92)	
Above 85 years old	3.60 (0.57)	
Marital Status	2.17 (0.92)	
Single	2.47 (0.79)	
Married	3.44 (0.91)	0.00
	3.06 (0.92)	
Widowed		
	3.25 (0.88)	
	2.49 (0.77)	
Divorced	2.19 (0.82)	
	2.79 (1.45)	
Education Level		
Primary school		
	1.95 (0.64)	
Secondary school	2.04 (0.58)	0.00
	2.57 (0.69)	
Tertiary education	3.61 (0.51)	
	3.40 (0.63)	
No education	3.79 (0.74)	
	3.56 (0.73)	
Diseases	2.13 (0.78)	
No diseases	2.61 (0.75)	
	3.08 (0.96)	
Musculoskeletal		0.00
Medical		
Neurological		
Musculoskeletal + Medical		
Musculoskeletal + Neurological		
Medical + Neurological		
Work History		
Skilled workers		
Semi-skilled workers		
Low-skilled workers		0.00

3.2 Discussion

Cognitive deterioration status and ADLs performance among community-dwelling older people

The results of this study suggest that a significant proportion of the community-dwelling older people population in Malaysia did not exhibit significant cognitive deterioration. Specifically, 73.00% of the community-dwelling older people population did not exhibit significant cognitive deterioration while the remaining 27.00% of the population experienced noticeable cognitive deterioration. These results are consistent with previous studies conducted in similar populations of community-dwelling older people (Tianyi et. al., 2019; Peng et. al., 2019). A study by Bhatia et. al., 2020 and Zhang et. al., 2019 reported that cognitive deterioration may be caused by several factors including lifestyle factors such as diet, drinking, smoking, and exercise.

The results indicate that the majority of respondents exhibited a moderate level of dependence (41.70%), followed by severe dependence and slight dependence (20.00% each). A smaller proportion of respondents demonstrated an independent level (13.90%), while a minority had a total dependence level (4.30%). This result is consistent with a study by Usha et. al., 2020, they found that among the sample population of older patients who were dependent on others, 63.39% had moderate to severe dependency and 2.68% were totally dependent.

Association between cognitive deterioration and ADLs among community-dwelling older people

The results showed a medium, negative connection between these two variables, showing that higher levels of cognitive deterioration were associated with lower levels of ADLs. This result is consistent with previous study by Wu, C. (2021) who found that poor cognitive function had higher the probability of Basic Activities of Daily Living (BADL) disability in elderly people. Moreover, the negative correlation found in this study supports the concept that cognitive deterioration can significantly impact a person's ability to carry out ADLs as daily tasks become more difficult and death risk increases (Wang et. al., 2020). According to Toth et. al., (2022), it has been discovered that cognitive problems in memory, attention, and decision-making processes relate to difficulties carrying out daily tasks such as bathing, feeding, dressing, grooming and others.

Association between variables of socio-demographic factors and cognitive deterioration among community-dwelling older people

Age

The significant difference in cognitive deterioration scores across age groups is consistent with previous research that has reported about concerns regarding cognitive deterioration are becoming increasingly important as the population ages and come up in doctor appointments (Jessen et. al., 2020). There is a noticeable increase in cognitive deterioration as people age which cognitive deterioration had affected 2.18 million people in 2020 and 52 4.66 million people in 2060 which is a rise of 2.48 million (113.80%) over the course of four decades (Rajan et. al., 2021).

Marital Status

The results of the study suggest that there is a significant difference in cognitive deterioration scores among the four groups of participants based on their marital status. This finding aligns with previous research by Zhang et. al., (2019), who reported that widowhood has been associated with a greater risk of dementia and faster decreases in several cognitive abilities, such as verbal understanding, spatial ability, and episodic memory. Further research is needed 53 to study the complex relationship between marital status, cognitive health, and activities of daily living.

Education level

The findings showed a statistically significant difference in cognitive deterioration scores between people with varying levels of education, demonstrating that education has a major effect on cognitive functioning in later age. This study's findings align with the study by Zhang et. al., (2019) which was according to the study, older adults with greater levels of education had less deterioration in cognitive function, which is consistent with earlier research from other nations. Higher levels of schooling may give people cognitive protection against the damaging effects of ageing on cognitive functioning. This is shown from a study which states that education enhances cognitive function and reduces the risk of dementia in old life (Lövdén et. al., 2020).

Diseases

The results of the study showed significant differences in the level of cognitive deterioration across the seven groups classified according to condition. The significant difference in cognitive deterioration scores that was discovered shows that different health issues have different consequences on cognitive ability. This finding is supported by other research that looked at the connection between health issues and cognitive impairment in older people. A study by Beeri et.

al., (2022) found that neurological conditions such as diabetes mellitus, hypertension, and cholesterol were associated with a higher risk of cognitive deterioration compared to people without any conditions.

Work History

There was a significant difference in cognitive deterioration scores across participants with various work histories. The results of this study also showed a significant difference between skilled and low-skilled workers' cognitive deterioration scores. This finding aligns with the study by Mani et. al (2013), which also reported those who worked in low-skilled jobs had a higher risk of cognitive deterioration than those who worked in skilled jobs. Furthermore, the fact that skilled professionals and low-skilled workers had significantly different scores for cognitive deterioration suggests that the complexity and cognitive demands of skilled employment may provide some protection against cognitive decline as people age.

Smoking Status

According to the result of the study, there is a significant difference in cognitive deterioration scores between smoking status among community-dwelling older people. These findings align with prior research that has consistently demonstrated a link between smoking and cognitive deterioration. For instance, research on the relationships between smoking behavior and cognitive function discovered that smoking cigarettes accelerates the deterioration and impairment of cognitive function (Tsai & Chang, 2019). In addition, Tsai & Chang (2019) had shown that cigarette smoking is significantly linked to cardiovascular disease and cognitive impairment since it has been shown to enhance thrombosis, oxidative stress, and inflammation.

This study on the association between cognitive deterioration and Activities of Daily Living (ADLs) among community-dwelling older adults has several limitations. The purposive sampling method restricts generalizability, as the sample may not represent the broader population. Additionally, the cross-sectional design provides only a temporal snapshot, limiting the ability to establish causality between cognitive deterioration and ADLs; a longitudinal approach could better elucidate this relationship. Reliance on self-reported data may also introduce bias due to potential inaccuracies or social desirability. The study's use of the Malay Version of the Short Informant Questionnaire on Cognitive Decline in the Elderly (MS-IQCODE) may not capture all cognitive domains, suggesting that a broader assessment could yield more comprehensive insights. Finally, unmeasured variables like physical health, social support, and activity levels could act as confounders, impacting both cognitive function and ADLs. Addressing these limitations could strengthen future

research findings and enhance their applicability across settings.

4. CONCLUSION

This study reveals that there is an association between cognitive deterioration and Activities of Daily Living (ADLs) among community-dwelling older people. The findings from this study also suggest that cognitive deterioration is influenced by demographic variables including age, marital status, education level, diseases, work history, and smoking status. Occupational therapist can utilize this knowledge to develop evidence-based interventions that prioritize cognitive rehabilitation to improve the independency level in ADLs for older people in Malaysia.

This study brings a potential of future research in cognitive deterioration among community-dwelling older people in Malaysia. Future studies could identify the different types of cognitive abilities in different age groups, and genders among older people. This could improve the provision of interventions, thus increasing the quality of services given to older adults. Next, future studies could determine the severity of the diseases to know which stage hinders cognitive deterioration and investigate the best activities that are suitable for their health.

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