*Original Research*

Marital Status as a Predictor of Amnesic Mild Cognitive Impairment in Indonesia

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ABSTRACT

Introduction: Several modifiable risk factors have been identified as the predictors of amnesic mild cognitive impairment (aMCI). However, research focusing on factors beyond biological is limited. Marital status is a psychosocial factor with recognized impact on health that needs further exploration.

Objective: This study aimed to evaluate the association between marital status and aMCI amongst older Indonesian population.

Material and methods: This was a cross-sectional study of Indonesian Family Life Survey-5. The participants (≥ 60 years old), excluding individuals with functional dependency, were subdivided into two based on word list recall (WLR) score (cut-off < 6.5). Sociodemographic, psychological factors, physical activity, and body mass index were included as predictors. Bivariate and multivariate analyses were conducted.

Result: A total of 4287 participants were included. Significant associations were observed between low WLR score and older age, low education, low socioeconomic status, rural residential area, being unmarried, life dissatisfaction, no social engagement, negative affect, and obesity. Multivariate analysis revealed being unmarried was significantly associated with aMCI (AOR 2.38, 95% CI 1.014–5.589, $p=0.046$), along with older age, low education, low socioeconomic status, and obesity.

Discussion: Being unmarried (never married, divorced, or widowed) is a significant predictor of aMCI amongst Indonesian older people. This finding can be explained by the marital resource model and the stress model.

Conclusion: This nationwide study is one of the first to explore marital status as a potential yet underexplored factor of aMCI in Indonesia. Being unmarried is associated with an increased risk of aMCI, prompting different approaches in this population.

Keywords: marital status; aMCI; predictor

INTRODUCTION

As the elderly population increases due to higher life expectancy, an increase in age-associated diseases, particularly dementia, is also observed. Dementia is defined as a decline in cognitive function sufficient to affect activities of daily

living or social functioning.¹

Dementia, once considered as neither preventable nor treatable, is a growing public health concern which is estimated to increase from 57.4 (95% uncertainty interval [UI] 50.4 – 65.1) million cases globally in 2019 to 152.8 (95% UI 130.8 – 175.9) million

cases in 2050.² The adjusted weighted dementia prevalence in Indonesia as calculated by The Strengthening Responses to Dementia in Developing Countries (STRiDE) program was 27.9%, which might translate to more than 4.2 million people living with dementia nationwide in 2021.³

The morbidity that comes along with dementia rises along with the prevalence, with the number of disability-adjusted life-years (DALYs) increasing from 9.66 million in 1990 to 25.28 million in 2019 worldwide.⁴ The 2020 update to the *Lancet* Commission on dementia prevention, intervention, and care highlighted the evidence of 12 established modifiable risk factors for dementia, which together account for around 40% of worldwide dementias, namely less education, hypertension, hearing impairment, smoking, obesity, depression, physical inactivity, diabetes, low social contact, excessive alcohol consumption, traumatic brain injury, and air pollution.⁵ Halting the progression of mild cognitive impairment (MCI) to dementia by addressing these factors could potentially reduce disease

prevalence and, subsequently the consequences.

The burden of dementia is higher in low-income and middle-income countries (LMIC),⁵ prompting urgent identification of other contributing factors of dementia to direct policy making to specific populations for a better targeted intervention. Additionally, research focusing on factors beyond behavioral and biological is limited. Marital status is a psychosocial factor with recognized impact on health, such as the risk of cardiovascular, cancer, and all-cause mortality.^{6,7} Several nationwide studies abroad have proven marital status, specifically being unmarried (never married, divorced, and widowed), as a significant risk factor for amnesic MCI.⁸⁻¹⁰ Similar studies have been conducted in Indonesia,¹¹⁻¹³ however there were several methodological limitations prompting further research to evaluate the association between marital status and amnesic MCI.

This association is of interest, considering that a decline in marriage has been observed in the last ten years from 2.21 to 1.58 million in 2023, in which only 30.61% of adults aged 16 – 30 years are married, according to

the Indonesian Central Bureau of Statistics.¹⁴ This study aimed to evaluate the association between marital status and amnesic MCI amongst Indonesian older population.

MATERIAL AND METHODS

This research was a cross-sectional study, extracting data from the Fifth Wave of Indonesian Family Life Survey (IFLS-5). IFLS is a nationwide longitudinal survey conducted by RAND (Research and Development) Corporation first fielded in 1993, including almost 30,000 samples from 7,224 households which represent around 83% of Indonesian population living in 13 of the 27 provinces at the time, and still an ongoing survey to this day. All IFLS waves underwent human subject protection review with the Institutional Review Board at RAND and the participating institutions in Indonesia, with an ethical clearance number of s0064-06-01-CR01.

The participants included in this research were ≥ 60 years old, excluding functionally dependent individuals with Katz Activities of Daily Living (ADL) score of ≥ 1 . Participants were subdivided into two groups based on word list recall

(WLR) score of < 6.5 from the Telephone Interview for Cognitive Status (TICS). The cut-off used has sensitivity and specificity of 81.4% and 63.2%, respectively, to differentiate older adults with amnesic MCI from normal cognitive function, with area under the curve comparable to the CERAD (Consortium to Establish a Registry for Alzheimer Disease) neuropsychological battery.¹⁵

Sociodemographic and psychological factors, body mass index (BMI), and physical activity were included as predictors. Age was divided into two categories (60 – 69 years and ≥ 70) based on the Decree of the Minister of Health of the Republic of Indonesia Number 25 of 2016.¹⁶ Marital status was divided into two categories: unmarried (never married, separated, divorced, or widowed) and married (including cohabitating).

Level of education was divided into two categories: high (> 6 years) and low (≤ 6 years).¹ Self-perceived socioeconomic status was categorized into two groups (high or low) based on a 6-point Likert scale of the question, “On which step are you today on a six-step ladder from poorest to richest?” Negative affect

was categorized into two groups (yes or no) based on a 4-point Likert scale of the question, “Taken all things together, how would you say things are these days – would you say you were very happy, happy, unhappy, or very unhappy?” Sleep quality was categorized into two groups (good or poor) based on an item from the Patient-Reported Outcomes Measurement Information System Sleep Disturbance (PROMIS-SD). Life satisfaction was categorized into two groups (satisfied or not) based on a 5-point Likert scale of the question, “How satisfied are you with your life as a whole?”

Depression was categorized into two groups (depressed or not) based on the 10-item Centre for Epidemiologic Studies Depression Scale (CESD-10) which has been validated in Indonesia, using ≥ 10 points as the cut-off.¹⁷⁻¹⁸

Social engagement was categorized into two groups (yes or no) based on any involvement in regular social gathering in the last 12 months. Child-free household was categorized into two groups (with child or child-free).

The BMI was calculated by dividing the participant’s body weight by their body height. The BMI classification

used was the Asian BMI classification, with a cut-off of 27.5 kg/m² to differentiate obese from non-obese.¹⁹ Physical activity was divided into two categories: sufficiently and insufficiently active. The classification was based on whether the sample achieved the recommended amount of physical activity, which was 150 minutes per week of moderate-intensity physical activity or 75 minutes per week of vigorous physical activity.²⁰ The physical activity measurement tool was the International Physical Activity Questionnaire Short Form (IPAQ-SF).¹⁹

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 23. Bivariate analyses (Chi-square or Fisher-exact tests) were used to determine significant factors associated with amnesic MCI. Variables with a p value of < 0.25 were further analyzed using stepwise logistic regression test to generate odd ratios (OR) and 95% confidence intervals (CI).

RESULT

A total of 4,287 participants were included in this study. Table 1 summarized the baseline

characteristics of the study population stratified by WLR score and the bivariate analyses. The majority of the respondents were 60 – 69 years old (70.0%), married (66.7%), non-obese (87.8%); had low education (75.3%) and low socioeconomic status (74.0%). Most of the respondents did not have negative affect (82.6%) and depression (84.2%); were not socially engaged

(72.5%) and lived in a child-free household (86.3%). The variables with almost equal distribution were sex, residential area, physical activity, and sleep quality. Low WLR score was associated significantly with older age, low level of education, being unmarried, living in rural areas, low socioeconomic status, negative affect, no social engagement, life dissatisfaction, and obesity

Table 1. Baseline characteristics and factors associated with WLR score among Indonesian older people.

Variables	n (%)	WLR, n (%)		P value	Unadjusted OR (95% CI)
		Low (<6.5)	Normal (≥6.5)		
Age* (years)	≥70	1287 (30.0)	1286 (99.9)	1 (0.1)	20.468 (2.821 – 148.510)
	60 – 69	3000 (70.0)	2953 (98.4)	47 (1.6)	1.00
Sex	Female	2170 (50.6)	2145 (98.8)	25 (1.2)	0.942 (0.533 – 1.666)
	Male	2117 (49.4)	2094 (98.9)	23 (1.1)	1.00
Education (years)	≤6	3226 (75.3)	3206 (99.4)	20 (0.6)	4.345 (2.437 – 7.746)
	>6	1061 (24.7)	1033 (97.4)	28 (2.6)	1.00
Marital status	Unmarried	1435 (33.3)	1429 (99.6)	6 (0.4)	3.561 (1.510 – 8.397)
	Married or cohabiting	2871 (66.7)	2809 (98.5)	42 (1.5)	1.00
Residential area	Rural	2112 (49.3)	2097 (99.3)	15 (0.7)	2.155 (1.167 – 3.979)
	Urban	2174 (50.7)	2141 (98.5)	33 (1.5)	1.00
Socioeconomic status	Low	3171 (74.0)	3147 (99.2)	24 (0.8)	2.885 (1.631 – 5.100)
	High	1115 (26.0)	1091 (97.8)	24 (2.2)	1.00
Negative affect*	Yes	745 (17.4)	1 (0.1)	744 (99.9)	9.795 (1.349 – 71.137)
	No	3540 (82.6)	46 (1.3)	3494 (98.7)	1.00
Physical activity	Insufficient	2509 (58.5)	2479 (98.8)	30 (1.2)	0.845 (0.470 – 1.521)
	Sufficient	1778 (41.5)	1760 (99.0)	18 (1.0)	1.00
Depression	Yes	677 (15.8)	667 (98.5)	10 (1.5)	0.710 (0.352 – 1.431)

	No	3609 (84.2)	3571 (98.9)	38 (1.1)		1.00
Sleep quality	Poor	2333 (54.5)	2306 (98.8)	27 (1.2)	0.803	0.930 (0.524 – 1.650)
	Good	1950 (45.5)	1929 (98.9)	21 (1.1)		1.00
Social engagement	No	3103 (72.5)	3075 (99.1)	28 (0.9)	0.027	1.897 (1.064 – 3.380)
	Yes	1178 (27.5)	1158 (98.3)	20 (1.7)		1.00
Life satisfaction*	Unsatisfied	756 (17.6)	753 (99.6)	3 (0.4)	0.037	3.243 (1.005 – 10.463)
	Satisfied	3528 (82.4)	3483 (98.7)	45 (1.3)		1.00
Child-free household	Child-free	3698 (86.3)	3656 (98.9)	42 (1.1)	0.805	0.897 (0.380 – 2.120)
	With child	588 (13.7)	582 (99.0)	6 (1.0)		1.00
BMI (kg/m ²)	≥ 27.5	516 (12.2)	500 (96.9%)	16 (3.1)	<0.001	0.282 (0.153 – 0.521)
	< 27.5	3725 (87.8)	3693 (99.1)	32 (0.9)		1.00

*Fisher exact. Abbreviations: BMI, body mass index; OR, odd ratio; WLR, word list recall.

As shown in Figure 1, most unmarried respondents were widowed (31%), followed by divorced (2.4%), and the least was never married (0.6%). Married respondents had higher WLR score ($\bar{x} = 2.56 \pm 1.540$) compared to their unmarried counterparts ($\bar{x} = 2.29 \pm 1.464$).

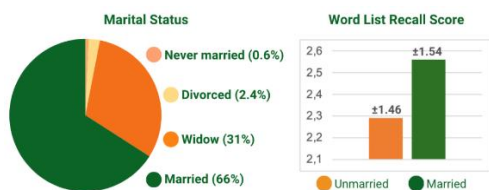


Figure 1. Marital status distribution and WLR score based on marital status.

Table 2 depicted the adjusted association between amnesic MCI and the significant factors found in bivariate analyses. In the present study, multivariate analysis proved that being unmarried was associated

with low WLR score, with an adjusted OR (AOR) of 2.38 (95% CI 1.014 – 5.589). Other factors associated with low WLR score were older age (AOR 10.469, 95% CI 1.809 – 60.575), low education (AOR 2.560, 95% CI 1.396 – 4.696), and low socioeconomic status (AOR 1.926, 95% CI 1.065 – 3.484). On the contrary, obesity was protective against low WLR score (AOR 0.425, 95% CI 0.226 – 0.798).

Table 2. Stepwise logistic regression analysis of the significant factors associated with WLR score among Indonesian older people.

Variables	Low WLR Score	
	Adjusted OR (95% CI)	p value
Unmarried	2.381 (1.014 – 5.589)	0.046
Older age	10.469 (1.809 – 60.575)	0.009
Low education	2.560 (1.396 – 4.695)	0.002
Low socioeconomic status	1.926 (1.065 – 3.484)	0.030

Obesity	0.425 (0.226 – 0.798)	0.008
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DISCUSSION

This study is one of the first to use nationally representative data to explore marital status as a potential social risk/protective factor for amnesic MCI among older adults in Indonesia – a growing pandemic in the context of rapid population ageing. Consistent with previous literatures conducted in Korea,⁸ China,⁹ and the US,¹⁰ the present study showed that being unmarried (never married, divorced, or widowed) is a significant predictor of amnesic MCI amongst Indonesian older population. A recent meta-analysis of observational studies reported that people who are never married have a 42% higher risk and that those who are widowed have a 20% higher risk of developing dementia than their married counterparts.²¹

The etiology of the association between marital status and cognitive function has not been fully elucidated, however several possible explanatory mechanisms have been suggested (Figure 2), namely the marital resource model and the stress model. Being married is associated with

unique psychosocial conditioning and economic resources that are unobtainable from other types of relationships – even cohabitation.⁹ Being married exposes one to increased access to social engagement, social support, and social integration – all collectively referred to as social participation, a factor with an established relationship to dementia.²² The underlying mechanism may be through constant daily cognitive stimulation provided by the spouse which may increase neuroplasticity, thereby maintaining and improving cognitive reserves.⁹

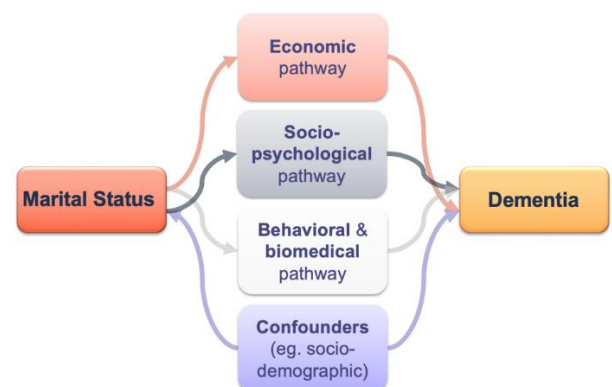


Figure 2. Hypothetical pathways linking marital status and dementia.

Married people also have greater access to economic resources than their unmarried counterparts due to specialization and pooling of wealth in marriage. Increased economic returns may enhance overall health status and cognitive capacities and

build cognitive resilience via better access to nutrition and other health-enhancing resources such as education.⁹

The stress model highlights the role of stress process associated with divorce and widowhood, which activates the hypothalamic-pituitary-adrenocortical (HPA) axis and sympathetic nervous system, subsequently increasing cortisol levels which may have deleterious effects on hippocampal synaptic plasticity and hence memory.^{7,23}

Marital loss can lead to negative emotional consequences (e.g., psychological distress and loneliness), loss of social support, and an increase in financial hardships – all of which were known to be associated with dementia.^{22–24} Moreover, marital disruption may increase the chance of engaging in unhealthy behaviors (e.g., smoking, drinking, and social isolation) which may have detrimental effect on cognition.⁹

Interestingly, inconsistency persists regarding the association between divorce and cognitive decline.^{10,21,25}

Divorced people have obtained benefits that come along with marriage up to a point when marital conflicts cause stress, in which

divorce becomes somewhat protective through the mitigation of stress. Skirbekk *et al* showed that being continuously divorced (risk ratio [RR] 1.66, 95% CI 1.14 – 2.43) and intermittently divorced (RR 1.50, 95% CI 1.09 – 2.06) has a higher risk of dementia compared to the continuously married, implying that marital duration has an important role which needs further exploration.^{8,25}

The current study has several limitations. Firstly, the majority of the data was self-reported and collected via survey; thus, the risk of biased results cannot be excluded.

Future studies are needed to fully discern the link between specific marital status, duration, quality, and cognitive function. Lastly, the cross-sectional design hinders the identification of the direction of association between marital status and amnesic MCI, considering that individuals with cognitive disabilities are less likely to be involved in marriage.

Nevertheless, the strengths of this study include the relatively large sample size, with results being representative of Indonesian older population aged 60 years and above, and thus applicable nationwide.

Additionally, under the changing trends in marriage culture in Indonesia, this study represents the most updated data on current topic. Finally, by exploring the relationship between marital status and amnesic MCI, this study provides substantial implications for stakeholders in developing integrated public health strategies and policies focusing on preventive measures and supervision targeting vulnerable groups to halt further cognitive function deterioration.

providing raw data of IFLS-5.

CONCLUSION

This nationwide study is one of the first to explore marital status as a potential yet underexplored factor of amnesic MCI in Indonesia. Being unmarried is associated with an increased risk of amnesic MCI, prompting special attention and tailored preventive measures for this high-risk population. Further studies focusing on marital transition, duration, and quality are needed.

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