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Relationship between depression and physical disability by gender among elderly in Indonesia

Ana Satria[1], Yeni[1], Hairil Akbar[2], Henny Kaseger[3], Linda Suwarni[4], Abubakar Yakubu Abbani[5,6], and Maretalinia[5,7]

ABSTRACT

BACKGROUND

The increasing population of older people can be a positive impact if they could be productive, or it could be negative as a burden if they depend on others. Elderly with physical disabilities can be influenced by various factors, including depression, which can be caused by functional changes in the body due to aging, loss of work, or even the loss of a loved one. This study aimed to determine the relationship between depression and physical disabilities among the elderly in Indonesia who were stratified by gender.

METHODS

A cross-sectional study using a national survey dataset namely Basic Health Survey and Socio-Economic Survey for 2018 involving 85,427 elderly. Depression and disability were assessed using Mini International Neuropsychiatric Interview and Barthel Index. Chi-Square test and multiple binary logistic regression were used to analyze the data.

RESULTS

The results revealed that 24.75% of elderly people experienced physical disabilities. The probability of males and females with depression having physical disabilities was respectively 2.95 (95% CI = 2.74-3.17) and 2.49 (95% CI = 2.36-2.64) times higher compared to those without depression. The interaction between depression and gender was statistically significant, in that females with depression had an 11% probability of having physical disability.

CONCLUSION

This study reaffirmed that disability is a risk factor for depression in the elderly and female gender is the effect modifier rather than the risk factor. The male depression group showed more physical disability symptoms than the female depression group. There is collaboration from various sectors to prevent depression and physical disabilities.

Keywords: Depression, physical disability, elderly, 2018 basic health survey

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INTRODUCTION

Aging is the decreased ability of biological organs to maintain and rebuild their structure and function normally.[1] One of the health issues among the elderly is psychological, including depression. Depression is a disability of human feeling which disturbs the sleeping pattern and appetite, as shown by decreased concentration, anhedonia, and attempt at suicide.[2] Physical disability among the elderly is the condition when the elderly cannot independently, routinely, and universally do their activities of daily living.[3] Life expectancy is one indicator to assess the public health index. From 2000 to 2016, global data showed that the combined life expectancy for males and females has increased by 5.5 years to 72 years.[4] The elderly population is increasing due to the high quality of life.[5] However, the dependency ratio increased to 18.4 in 2019.[6]

As a result of demographic transition in Indonesia, several impacts have occurred, such as increasing numbers of those aged 60 years and over, declining fertility and mortality, modernization in all aspects of life, the practice of good disease prevention programs, and increasing life expectancy.[6] The Indonesian population pyramid in 1950, 1990, and 2020 showed an increased number of elderly, while the projections for 2030, 2050, and 2100 are showing a rapid increase in elderly.[7] Population aging is defined as a significant decline of fertility level in a certain group of people, that leads to infertility and mortality, and the increased proportion of elderly is calculated by comparing the number of the older population and the total population.[8] Indonesia has an aging population, since the proportion of elderly was 9.6% in 2019 or very close to 10%. The structure of the older population shows that the proportion of older people has increased over time. The quantity and well-being of the elderly can indicate the quality of health, economic, and social status in a country. The adults of reproductive age are also important to support the economic development as well as the elderly's quality of life. The Indonesian

Ministry of Health has categorized Indonesia as an aging country since 2017 because the proportion of elderly has reached 9.03%.[9] In the past five decades, the population of elderly in Indonesia had increased twice from 1971 to 2019, from 9.6% or around 25 million which consisted of 1% more elderly women than men.[10] According to Ministry of Social Affair data, as of 31 March 2020, there were 6,452 staff supporting 176,283 older individuals, of which 20,000 individuals were receiving home care; 2,655 receiving therapy services, and 7,000 were under family support.[11] Overall, Indonesia had 9.6% elderly in 2019 which had increased from 9.03% in 2017.[12] In 2015, every 100 persons of working age had to support 13 persons aged less than 15 or more than 60 years.[10] In the same year, the Indonesian Ministry of Health reported that 28.62% of the elderly were likely to be at higher risk of morbidity due to non-communicable diseases.[9]

One of the human development indexes in Indonesia is the life expectancy, which increased to 71.2 years in 2018.[6] The increasing life expectancy also affects the number of elderly. According to data from Statistics Indonesia, the population of elderly in Indonesia in 2019 was 25,901.9 million.[10] The World Health Organization reported that about 280 million elderly in the world are depressed at an average age of 60 years.[13] In Indonesia, the prevalence of adults more than 15 years old is 6.1% and 91% do not have access to health services.[14] The dependency ratio is also related to the vulnerable physical condition to perform the activities of daily living.[15]

The common result found from previous studies was age as the mediator of correlation between depression and physical disabilities. It was revealed that the risk of disabilities is higher for older people because of their declining physical function. The correlation between depression and age may arise from medical reasons, because higher age leads to a higher risk of cognitive function and dementia. However, depression and age are not exactly positively linked since one

study found that younger participants endorsed a higher level of depression.[16] In contrast with previous studies, one Indonesian study found that severe functional status has the greatest influence on depression in old age.[17] The attractiveness of this new topic is shown by the fact that there is a study that examined the correlation between gender, depression, and disabilities,[18] the results of which are still controversial because some researchers assert that the correlation between gender and depression is variable throughout the life span.[18] The lack of studies examining the association between depression and physical disabilities among the elderly stratified by gender led the authors to conduct this study. This study aimed to examine the relationship between depression and physical disability by gender among the elderly in Indonesia.

METHODS

Research design

This was a quantitative study of cross-sectional analytic design. The Basic Health Research is the official representative survey which is conducted every 5 years in 34 provinces, 416 districts, and 98 cities. The original survey on which the present study was based, was conducted from April to May 2018.

Research subjects

The subjects of this study were persons aged 60 years or older. The study sample was selected from the sampling designed by SUSENAS (*Survei Sosial Ekonomi Nasional*). The original survey was the cross-sectional Primary Health Research (RISKESDAS 2018) that had been conducted by the Ministry of Health, Indonesia. The data are closed national data from: https://labmandat.litbang.kemkes.go.id/menu-layan. The Primary Health Research 2018 study was a large-scale multi-topic household and community survey that covered 34 provinces on a national scale, in which were visited 300,000 households from 30,000 census blocks selected by probability proportional to size sampling. This sampling

method has been selected by two-stage linear systematic sampling. The total number of respondents in this study was 85,427 elderly aged more than 60 years.

The inclusion criteria for the sample used in this study were: elderly 60 years or older who completely answered the questions about depression and physical disabilities. The exclusion criterion was elderly who did not answer the questions completely. The present study used supporting variables such as age, gender, marital status, place of residence, employment status, and history of chronic diseases.

Instruments

The physical disabilities variable is defined by using the Barthel Index questionnaire for activities of daily living.[19] This index uses the ordinal scale with 10 items (D24 to D33) to measure the functional independence for activities of daily living and mobility. The total score of this variable is 20. The interpretation of assessment is as follows: 20 (independent), 12-19 (slight dependence), 9-11 (moderate dependence), 5-8 (severe dependence), and 0-4 (total dependence).

The depression variable was defined by using the Mini International Neuropsychiatric Interview questionnaire (MINI ICD-10).[20] This questionnaire is a tool to diagnose the main psychiatric problems in the International Classification of Diseases and consists of 10 questions (items C01-C10) with a total score of 10. Interpretation of the assessment: a score of 4 or higher is defined as depression and a score of less than 4 is defined as not having depression.

Statistical analysis

This study conducted the univariate, bivariate, and multivariate analyses. The univariate analysis aims to describe the sociodemographic information of the subject by using frequency, percentage, median, and mean. The bivariate analysis aims to determine the association between stress and disability and the association between confounders and disability.

The bivariate analysis was done by using the Chi-square test. Finally, the multivariate analysis aims to examine the association between depression and disability by controlling the confounders, namely age, gender, educational level, occupation, and place of residence. The analysis was done using SPSS software.

Ethical clearance

Ethical approval for the use of secondary data was obtained from the Health Research Ethics Committee, Faculty of Public Health, Universitas Sriwijaya under No. 019/UN9.1.10/ KKE/2020.

RESULTS

The results of this study were categorized into bivariate, and multivariate analysis. Table 1 below describes the cross-tabulation by gender and the bivariate results. The data were presented as frequency. Among 85,427 elderly who were eligible to be included in this study, about one-fourth of them had physical disabilities. In total, 24.75% of the study sample experienced physical disabilities. The crude odds ratio (COR) explains the correlation between each independent variable and physical disabilities. The results were categorized by gender to explore the differences between males and females who have depression regarding the physical disabilities. The probability of those males and females with depression of having physical disabilities was respectively 2.95 (95% C.I. 2.74-3.17) and 2.49 (95% C.I. 2.36-2.64) times higher than those without depression. In terms of age, male and female elderly who were older than 70 years had a higher probability of respectively 1.97 (85% C.I. 1.87-2.06) and 2.10 (95% C.I. 2.02-2.19) times for having physical disabilities compared to those aged less than 70 years. Males with low educational level have a higher probability of physical disabilities compared to females (1.24 and 1.33, respectively). Males without a job had a higher probability of physical disability (2.45 and 1.92, respectively). Females who lived in urban areas

had a higher probability of physical disabilities (1.07 and 0.95, respectively). Females who were single or divorced had a higher probability of physical disability than did males (1.50 and 1.39, respectively). Females with a history of chronic diseases had a higher probability of physical disability than did males (1.54 and 1.47, respectively). Generally, among seven independent variables, five of them showed that the probability of physical disability was higher for females than males.

The multiple binary logistic regression has been done to examine the relationship between depression and physical disability by controlling the confounders. Table 2 below presents the results of the multivariate analysis. It shows in detail that depression is significantly associated with physical activity, after controlling for other independent variables. Compared with the elderly without depression, the elderly with depression significantly 2.64 (95 % C.I. 2.45 - 2.84) times more likely to have physical disabilities. Compared with elderly aged 61 to 69 years, elderly aged 70 or above tend to be 1.74 (95% C.I. 1.68 - 1.80) times more likely to have a physical disability. In terms of educational level, compared to the elderly who had high educational levels, the elderly who had low educational levels were 1.15 times more likely to have physical disabilities. After controlling for other independent variables, compared to elderly who worked, elderly who did not work were 1.78 times more likely to have physical disabilities. Additionally, compared with married ones, single or divorced elderly were 1.13 times more likely to have physical disabilities. Then, compared to the elderly who did not have a history of chronic disease, the elderly who did have a history of chronic disease were 1.42 times more likely to have physical disabilities. The interaction between gender and depression was included in this study, and it was found that compared with males without depression, females with depression had a decreased probability of 11% (AOR= 0.89;95% C.I. 0.81-0.98) of having a physical disability. However, the variables of gender and place of residence did not show a significant association with physical disability.

Table 1. The characteristics of respondents and each independent variable related to physical disability stratified by gender

Independent variables	Male (n=40,609)				Female (n=44,818)			
	Physical disabilities		COR (95% CI)	p value	Physical disabilities		COR (95% CI)	p value
	No	Yes			No	Yes		
Depression				0.000				0.000
Absent	29,729	7,303	1		29,343	9,734	1	
Present	2,074	1,503	2.95 (2.74-3.17)		3,142	2,599	2.49 (2.36-2.64)	
Age (years)				0.000				0.000
61-69	21,464	4,521	1		21,021	5,745	1	
≥70	10,339	4,285	1.97 (1.87-2.06)		11,464	6,588	2.10 (2.02-2.19)	
Educational level				0.000				0.000
High	5,772	1,337	1		3,224	941	1	
Low	26,031	7,469	1.24 (1.16-1.32)		29,261	11,392	1.33 (1.24-1.44)	
Employment status				0.000				0.000
Employed	25,255	5,387	1		14,409	3,611	1	
Unemployed	6,548	3,419	2.45 (2.33-2.58)		18,076	8,722	1.92 (1.84-2.01)	
Place of residence				0.025				0.001
Rural	18,956	5,365	1		19,230	7,089	1	
Urban	12,847	3,441	0.95 (0.90-0.99)		13,255	5,244	1.07 (1.03-1.12)	
Marital status				0.000				0.000
Married	26,669	6,944	1		15,007	4,492	1	
Single or divorced	5,134	1,862	1.39 (1.31-1.48)		17,478	7,841	1.50 (1.44-1.56)	
History of chronic disease				0.000				0.000
Absent	11, 179	2,375	1		11,531	3,249	1	
Present	20, 624	6,431	1.47 (1.39-1.55)		20,954	9,084	1.54 (1.47-1.61)	

COR : crude odds ratio;CI : confidence interval

Table 2. The multiple binary logistic regression of physical disability and the interaction between females and depression

Independent variables	AOR	95% CI for AOR		p-value
		Lower	Upper	
Depression				
Absent	1			
Present	2.64	2.45	2.84	0.000
Age (years)				
61-69	1			
>70	1.74	1.68	1.80	0.000
Gender				
Male	1			
Female	1.02	0.98	1.06	0.460
Educational level				
High	1			
Low	1.15	1.09	1.21	0.000
Employment status				
Employed	1			
Unemployed	1.78	1.72	1.85	0.000
Place of residence				
Rural	1			
Urban	0.99	0.96	1.03	0.630
Marital status				
Married	1			
Single/and divorce	1.13	1.09	1.17	0.000
History of chronic disease				
Absent	1			
Present	1.42	1.37	1.47	0.000
Depression X gender				
No X male	1			
Yes X female	0.89	0.81	0.98	0.017

LR chi2 (9) = 5618.24, Prob > chi2 = 0.000, Pseudo R2 = 0.0588, Log likelihood = -44988.776
AOR: adjusted odds ratio; CI: confidence interval

DISCUSSION

Depression is a mental illness that can be coped with by spiritual practices as shown by the study that found a relationship between spirituality and depression.[21] In an aging society, social participation is important for cognitive functioning.[22] A study in Korea found that comorbidity such as anxiety and depression is increasing the risk of physical disorders and disability after a follow-up of over two years.[23] The COVID-19 situation also influences the emotional and social experience of older people in England and as a result, it also affects physical disabilities.[24] Physical disability itself is also influenced by several factors including malignancies, female gender, and depressive mood.[25] In line with the previous study, the study by Lamonica et al. [16] found that depressive symptoms were the most significant variable related to disability.Click or tap here to enter text. The role of gender was found by the study of Mahwati [21] in Indonesia who revealed that females comprise the largest population that is prone to depression. Similar to the results of our study, Mahwati [21]also found that the variables age ≥70 years, low educational level, unemployed, unmarried, and multimorbidity were risk factors of depression.) However, Mahwati's [21]study did not include physical disabilities as one of the dependent variables. In contrast to Mahwati's study, a study in Brazil found that severe depression is increasing among males, rather than females.[24] However, according to Girgus and

Yang,[18] females are twice more likely to be diagnosed with depression.Click or tap here to enter text.

Vice versa to our study, a study in four South Asian countries found that lower frequencies of physical activity lead the higher rates of depression.[25] Another study also put depression as a dependent variable instead of a predictor. It was shown by a study in Korea that disability is a risk factor for depression and that female gender is the effect modifier.[26] The recommendation for decreasing depression and physical disability among the elderly is by human-animal interaction.[27] A study in China that put depression as the dependent variable found that the mobility problem among the elderly is one factor that increases the risk of depressive symptoms.[28] Previous studies also put depression as the outcome, and found that the number of physical activities was negatively associated with depression.[29,30] The finding by a study in Germany was that physical activity as shown by sports activity was associated with a lower occurrence of depression.[31] The manner in which physical activity can influence depression may be explained by changes in neuroplasticity, inflammation, oxidative stress, the endocrine system, self-esteem, social support, and self-efficacy.[32] Social support has negatively mediated the relationship between physical disability and depressive symptoms.[33]

Our study found depression as the risk factor for physical disabilities among the elderly aged >60 years. The findings from our study are in line with those of previous studies, in that psychological aspects could influence physical disabilities. Two studies found a relationship between depression or anxiety and physical condition.[34,35] Mental health is also found to be the predictor of the physical condition among the elderly in the United States of America.[36] The physical disorders were found to be associated with depression and other medical conditions. Depression in late life had a relationship with worse physical health, while dementia was also found to be associated with physical health and

accommodation. Studies in China and India found a strong association between depression and physical disabilities that also affect social support.[33,37] In Indonesia, a strong association between depression and physical disabilities was also found.[38] Two studies showed partial dependence among almost all elderly with physical disabilities.[39,40] Depression itself is stimulated by several factors including social networks.[41] Overall, most of the findings from previous studies found an association of stress or depression or other kinds of mental health problems with physical disabilities. The rationale of the findings might be that health status is the combination of 3 health conditions namely mental health, social health, and physical health, each of which needs the other.

Many other factors might have an association with depression and physical disabilities. A study in Spain found that non-communicable diseases could affect depression status.[42] The psychological health problem is also linked with Crohn's disease.[43] In terms of the age of the elderly, one study found age and low education as the risk factors for disability of community mobility.[44] A study in Japan found that living with children tends to reduce the risk of having physical disabilities.[45] Based on one study, the factors of older age, unmarried status, and having NCDs are associated with physical disabilities.[46] Physical disabilities have been investigated by previous studies, most of which included physical health problems. For example, one study has found that diabetes mellitus is the major risk factor for physical disabilities. This study brought the mental health instead of the physical health problem to examine the risk factors of physical disabilities. Therefore, it can be concluded that age, education, employment status, marital status, and history of chronic diseases could influence the association between depression and physical disability. Our study may need more assessment to determine the role of non-communicable diseases since it was based on self-report data. The present study only includes depression as the main predictor instead

of other psychological health problems. This is due to the limitation of variables in the secondary data. Our study did not include some important variables such as smoking behavior and accident history. The clinical implications of this study are that physical disability might also influence other chronic and acute diseases. Future research might include the mediator of the association between depression and physical disability to obtain a clearer result. The recommendation for future study includes the role of other independent variables, mediators, and confounding factors to build the fixed model. The variable of depression was assessed by self-report and needs to be checked by the researcher. This study has included mental and physical health; the next study could add the social aspects in assessing the health status of the elderly.

CONCLUSION

This study confirms the role of depression as the risk factor of physical disability and female gender is the effect modifier rather than the risk factor. Female elderly with depression had a lower risk of physical disabilities.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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AUTHOR CONTRIBUTIONS

AS and Y contributed to writing the draft of the manuscript. AS, Y, and M contributed to data analysis and interpretation. HK and LS contributed to the introduction and discussion sections. HA and AYA contributed to critical revision of the manuscript. All authors have read and approved the final manuscript. ✚

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