

The Effect of Physical Activity on Symptoms of Depression in the Elderly in Indonesia: The Indonesian Family Life Survey Data Analysis

El efecto de la actividad física en los síntomas de depresión en los ancianos en Indonesia: el análisis de datos de la encuesta de vida familiar de Indonesia

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SUMMARY

Introduction: *Depression in the elderly is often considered a normal mental development and usually undetected, which causes unformed nursing. The lack of physical activity causes depression on one side. This study aimed to find out the relationship between physical activity and depressive symptoms in the elderly in Indonesia.*

Methods: *The design of this study was cross-sectional by using secondary data from Indonesia Family Life Survey 5 (IFLS5) in 2014 on the elderly population aged 60-90 years with a total sample of 2 912 respondents. The Center for Epidemiologic Studies of Depression (CES-D 10) was used to determine the level of depressive symptoms.*

Results: *The results showed that elderly with depressive symptoms was 24.2 % (11.1 % for men and 13.1 for*

women). Inactive elderly was 73.6 %. Multivariate analysis found that physical activity (OR = 1.5; 95 % CI = 1 219-1 892) affected the level of depressive symptoms after being controlled by the employment factor and the interaction between employment and physical activity.

Conclusion: *The government is suggested to plan a program increasing the physical activity of the elderly with depression symptoms in the integrated service posts for the elderly. In addition, the government or community development is also suggested to guide the elderly to be produced economically.*

Keywords: *Depression symptoms, elderly, employment, physical activity, IFLS*

RESUMEN

Introducción: *La depresión en el adulto mayor suele ser considerada un desarrollo psíquico normal y suele pasar desapercibido, lo que provoca una enfermería no formada. La falta de actividad física provoca depresión por un lado. Este estudio tuvo como objetivo averiguar la relación entre la actividad física y los síntomas depresivos en los ancianos en Indonesia.*

Métodos: *El diseño de este estudio fue transversal utilizando datos secundarios de la Encuesta de vida familiar de Indonesia 5 (IFLS5) en 2014 sobre la población de ancianos de 60 a 90 años con una muestra total de 2912 encuestados. Se adquirió el Centro de Estudios Epidemiológicos de la Depresión (CES-D 10) para determinar el nivel de síntomas depresivos.*

Resultados: *Los resultados mostraron que los adultos*

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mayores con síntomas depresivos fue del 24,2% (11,1 % para hombres y 13,1 % para mujeres). El anciano inactivo fue del 73,6 %. El análisis multivariado encontró que la actividad física (OR = 1,5; IC 95 % = 1219-1892) afectó el nivel de síntomas depresivos después de ser controlado por el factor de empleo y la interacción entre el empleo y la actividad física.

Conclusión: *Se sugiere atención al gobierno en planificar un programa de aumento de la actividad física de los adultos mayores con síntomas depresivos en los puestos deservicio integral al adulto mayor. Además, también se sugiere que el gobierno o el desarrollo comunitario guíen a los ancianos para que se produzcan económicamente.*

Palabras clave: *Síntomas Depresivos, Adulto Mayor, Empleo, Actividad Física, IFLS.*

INTRODUCTION

Depression is a global common problem, and more than 300 million people are affected. Depression is one of the mental health challenges (1,2). A common symptom of depression is lack of or loss of attention to individual self, family, or environment (3,4). Depression is increasingly recognized as a significant health problem for the elderly (5). If it is not adequately nursed, it can lead to a severe threat to human health. Depression is associated with several chronic diseases such as diabetes, cancer, and coronary heart disease. It is also associated with increased functional impairment, morbidity, mortality, and the use of health services (6,7). World Health Organization (WHO) estimates the worldwide prevalence of geriatric depression varies between 10 % and 20 %. In the United States, this condition affects nearly 7 million older people over 65 years. A landmark report on mental health by the US Surgeon General estimates that 8-20 % of the elderly living in the community suffer from depressive symptoms (6). Recently in China, these figures have been very high. As many as 27 % of the urban elderly (age 60) and 30.8 % of the rural elderly (age 65) have reported experiencing the symptoms of depression (8). According to the 2018 Basic Health Research (Riskasdas) report in Indonesia, there were around 15.9 % of the population aged more than 75 years and approximately 37.5 % at the age of 65-74 years experiencing depression (9). In addition,

Bandung stated that around 62.82 older people experienced depression with the criteria of mild depression (26.92 %), moderate depression (21.80 %), and severe depression (14.10 %) (10).

Depression is associated with a slight risk of inactivity (11). Physical activity is defined as voluntary body movement produced by skeletal muscles. Physical activity results in increased energy consumption (12-16) due to the poor conduction of physical activities. Meanwhile, a high level of physical activity positively affects the quality of life. However, irrespective of the numerous studies reported on the correlation between age, weight, and physical activity, there is limited study on the differences of physical activities in the geriatric and adult groups of obese and non-obese people. This study, therefore, aims to investigate the effect of age and weight on physical activity in geriatric and adult groups. Design and methods: The purposive sampling technique was used to obtain data from 154 respondents from community-integrated health care in Surabaya, East Java, Indonesia. These respondents were equally divided into two groups of adult (21-60 years). This includes activities performed as parts of daily life, such as walking to a shopping center and climbing stairs. Physical activity was also defined as a modifiable behavioural risk factor related to the quality of life and health in the elderly. It is a healthy behaviour that is effective in the rehabilitation, treatment, and prevention of chronic diseases. Furthermore, physical activity is considered to have a positive effect on reducing anxiety, stress, and depression, maintaining mental health, and ensuring psychological vitality. Besides, it improves the quality of life (17,18).

According to Naufal, physical activity can reduce depression and should be continued constantly. It was also noted that physical activity and exercise in yoga, aerobics, and light exercise had a beneficial effect on mental health in mature adolescents. In addition, it was stated that exercise and physical activity are non-pharmacological therapies for depressed patients. Furthermore, the benefits of this physical activity can also last until the end of treatment, unlike using antidepressants (19). Therefore, this study aimed to determine the effect of physical activity on the symptoms of depression in the elderly in Indonesia.

METHODS

The design in this study was cross-sectional one by using secondary data from the fifth wave of the Indonesian Family Life Survey (IFLS5) in 2014. IFLS is a sustainable socio-economic and health longitudinal survey running for five waves, namely 1993, 1997, 2000, 2007, and 2014. This survey represents about 83 % of the Indonesian population living in 13 of the 27 provinces in Indonesia in 1993, which include four provinces in Sumatra (North Sumatra, West Sumatra, South Sumatra, and Lampung), five provinces in Java (DKI Jakarta, West Java, Central Java, DI Yogyakarta, and East Java), and the four provinces covering the remaining the large islands (Bali, West Nusa Tenggara, South Kalimantan, and South Sulawesi) (20-22).

The population in this study were all the older people (≥ 60 years) who were registered as samples in IFLS5 and had completed the measurement data for all study variables. The number of the elderly that is recorded in IFLS5 was 3976 of the elderly. The elderly who had completed the data for all research variables were 2912 respondents, and all of the samples that had completed the data were taken for the analysis.

IFLS data taken is mental health/depression data which are collected by asking the respondent's feelings using the ten short items version of the Center for Epidemiological Studies of Depression (the short CES-D scale), which is one of the main international scales in determining symptoms of depression. Symptoms of depression were assessed on a CES-D-10 scale consisting of 10 question items with four answer choices (1-4) and were given a 0-3. The total score for depression is a maximum of 30. A score equal to 10 or more is expressed as depression (23). Physical activity is the physical intensity associated with heavy and moderate physical activity for 30 minutes per day. Subjects are said to be active if they do a minimum of 150 minutes of moderate activity or 75 minutes of strenuous activity in a week. The IFLS questionnaire was asked whether the respondent had carried out activities (heavy and moderate) for ten consecutive minutes in the last seven days. If they never did, then the score was 0 minutes. If they have in 30 minutes or more, the score was 30 minutes, and if less than 30 minutes,

the score was 10 minutes. Next, the minutes of the carried out activity is multiplied by the day of the activity in a week so that a score in minutes is obtained. Smoking behaviour was categorized as 'smoker and non-smoker'. If the respondent states that he has stopped smoking but has not reached one year, his smoking status is still classified as a 'smoker'. One year after smoking cessation, the risk of heart attack falls in half from the smoker risk (24). The definition of elderly is to refer to an individual's age ≥ 60 years (25,26). The age is categorized as '60-69 years', referred to as elderly, and ' ≥ 70 years' is called the high-risk elderly (26). Employment is the condition of the elderly who still have a job until now or still earn income from their work. The job categories are 'employee' and 'un-employment'. Marital status is the respondent's condition who still has a life partner. The static category of marriage is 'unmarried' if the respondent never married, separated from a partner, lived divorced, or died divorced, and 'married' if they still have a partner and live together. Domicile is the area where the elderly live. Domicile is categorized into 'city' and 'village'.

The data analysis was carried out using univariate analysis, bivariate analysis with Chi-Square Test, and multivariate analysis of risk factor models with Multiple Regression Logistic Test with Stata IC16.

The IFLS data is provided to be accessed publicly by the registration on the IFLS website. Ethic clearance in the IFLS survey has been reviewed and approved by the Institutional Review Boards in the United States (at Rand Corporation, Santa Monica, California) and Indonesia (University of Gadjah Mada Ethics Committee Yogyakarta for IFLS5). Written informed consent was obtained from all participants. Written consent was also obtained from the family and relatives, the cares, and the guardians of the children enrolled in the survey.

RESULTS

The results of the univariate analysis of 2912 elderly, as many as 704 (24.2 %) elderly experienced the symptoms of depression. In addition, the univariate results on the independent

variables are also showed that the inactive elderly was more than the active elderly number 73.6 %; elderly who smoke is about 33.3 %; elderly aged more than 75 years is about 13.2 %; elderly who do not work is around 38.8 %; elderly who are not married or do not have a partner is around 35.2 %; the elderly who live in the city is around 54.5 %, and male elderly is about 48.3 % (Table 1).

The results of the bivariate analysis with Chi-Square (Table 2), with the primary variable (physical activity) and six covariate variables (smoking behaviour, age, employment, marital status, domicile, and gender) with the Chi-Square test showed that the physical activity was associated with symptoms of depression ($p < 0.05$) and two covariate variables are also associated with the depressive symptoms, namely age and employment ($p < 0.05$).

Table 1

The Result of Univariate Analysis (n=2,912)

Variable	n	%
Depression symptoms		
Symptomized	704	24.2
Un-symptomized	2 208	75.8
Physical Activity		
In-Active	2 142	73.6
Active	770	26.4
Smoking Behavior		
Smoker	969	33.3
Non-smoker	1 943	66.7
Age		
≥ 75 years	383	13.2
60-74 years	2 529	86.8
Employment		
Unemployment	1 130	38.8
Employee	1 782	61.2
Marital Status		
Un-Married	1 025	35.2
Married	1 887	64.8
Domicile		
City	1 588	54.5
Village	1 324	45.5
Gender		
Male	1 407	48.3
Female	1 505	51.7

From the results of bivariate selection (Table 2), the main independent variable (physical activity) was entered as a candidate, while for the covariate variables, from 6 variables, there were four variables entered as candidates ($p < 0.25$), namely smoking behaviour, age, employment, and gender. Among the main independent variables with covariates, one variable interacts, namely the employment variable and physical activity. The gold standard model in the Multiple Logistic Regression analysis is shown in Table 3.

The confounder was then assessed by gradually eliminating the covariate variables starting from the most significant p-value, namely work interaction with physical activity, employment, age, smoking behaviour, and gender. If the change in the OR value was $> 10\%$, the variable was a confounder and was still included in the modelling.

The results of the confounder assessment obtained the employment and employment interactions with the physical activity as a confounder, as shown in Table 4.

In the final multivariate model, it can be explained that physical activity affects depressive symptoms ($p < 0.05$). The elderly who are inactive have 1.5 times the risk of experiencing symptoms of depression compared to the elderly who are active after being controlled by employment and the interaction of work with physical activity. This relationship can only be explained by 1.0 % (the value of Nagelkerke R Square = 0.010), while 99.0 % is explained by other factors which are not examined.

DISCUSSION

Depression is increasingly recognized as a significant health problem for the elderly. As a result of depression, people may become unable to perform basic physical tasks, including cooking and eating, and their taste to eat may change (5). The results showed that the elderly who suffered from depression was around 24.2 %. This incident is almost the same as the incidence of depression in the elderly at the Petang I Public Health Center, Badung Regency, Bali, which is 24.4 % (27). However, it is lower than the incidence of depression in the elderly at the

Table 2
The Result of Bivariate Analysis

Variable	Depression Symptoms				p-value	OR value (95% CI)
	Symptomize		Un-Symptomized			
	n	%	n	%		
Physical Activity						
In-Active	480	22.4	1 662	77.6	<0.001	0.704 (0.585–0.848)
Active	224	29.1	546	70.9		
Smoking Behavior						
Smoker	250	25.8	719	74.2	0.162	1.140 (0.954–1.363)
Non-smoker	454	23.4	1 489	76.6		
Age						
≥75 years	71	18.5	312	81.5	0.007	0.682 (0.519–0.896)
60-74 years	633	25.0	1 896	75.0		
Employment						
Unemployment	247	21.9	883	78.1	0.023	0.811 (0.680–0.968)
Employee	457	25.6	1 325	74.4		
Marital Status						
Un-Married	241	23.5	784	76.5	0.568	0.945 (0.791–1.130)
Married	463	24.5	1 424	75.5		
Domicile						
City	385	24.2	1 203	75.8	0.959	1.008 (0.850–1.196)
Village	319	24.1	1 005	75.9		
Gender						
Male	322	22.9	1 085	77.1	0.126	0.872 (0.736–1.034)
Female	382	25.4	1 123	74.6		

Table 3
Multivariate Preliminary Model (Gold Standard Model) The Effect of Physical Activity and Covariate Variables on Depression Symptoms

Variable	p-value	OR value (95% CI)
Physical Activity	<0.0001	1.538 (1.233–1.919)
Smoking Behavior	0.009	0.745 (0.597–0.929)
Age	0.011	1.435 (1.088–1.892)
Employment	0.014	1.673 (1.112–2.519)
Gender	0.001	1.441 (1.166–1.782)
Employment*Physical Activity	0.044	0.627 (0.398–0.988)

Table 4
Multivariate Final Model The Effect of Physical Activity and Covariate Variables on Depression Symptoms

Variable	p-value	OR value (95%CI)
Physical Activity	<0.0001	1.519 (1.219–1.892)
Employment	0.023	1.595 (1.065–2.389)
Employment*Physical Activity	0.078	0.666 (0.424–1.047)

Guguak Public Health Center, District 50, West Sumatra Province, around 33.3 % (28). This is understandable because the incidence rate of 24.2 % describes the incidence of depressive symptoms in 13 provinces in Indonesia based on IFLS5 data.

The IFLS cohort data for seven years, 2007-2014, shows that the older a person gets, the higher the incidence of experiencing symptoms of depression. Depressive symptoms increased from 7.4 % to 28.6 % (29). Based on the 2018 Riskesdas data, it is also proven that the older you get, the higher the incidence of depression, and the highest incidence is in the elderly (9). Depression among the elderly was a public health problem. If it is not properly nursed, depression will be a serious threat to human health (6).

Depression was also related to a lack of physical activity. Physical activity will make a person able to deal with stress. However, the ability of the elderly to carry out the activities cannot be separated from the adequacy of the nervous and musculoskeletal systems (30). This study shows that there is an influence of physical activity on the incidence of depressive symptoms in the elderly, where the elderly who lack physical activity will be 1.5 times at risk of experiencing symptoms of depression compared to the elderly who are active after being controlled by work factors and also the interaction of work with physical activity. The elderly who are inactive and experience symptoms of depression are around 22.4 %. This is also in line with the previous research that many less active elderly experience stress (57.3 %). It is also stated that the elderly who experience a decrease in physical function and body and psychological functions will experience limitations in carrying out daily activities. Another thing that causes a lack of other physical activity is due to reduced muscle mass and also a lack of media in the activities to support the abilities and hobbies (31). Physical activity can be strenuous, moderate, and walking activities that can be done at least 30 minutes every day. Physical activity is considered sufficient if a person does physical exercise or sports for 30 minutes every day or at least 3-5 days a week (32,33).

This study also found an interaction between work and physical activity. This could also be due

to the assessment of moderate and heavy physical activity being asked more about the form of work being carried out, which requires moderate or heavy physical strength. Physical activity that describes the state of energy expenditure that is large and regular may be described with sports activities. The value of physical activity may be following the description of a person's activity. Daily physical activities need to be maintained to reduce complaints that arise from sitting too much, standing too long, or working in the same position for a long time. One example is physical activity in stretching during work which can help restore tension and fatigue (34).

In the current study, most respondents' answers to depressive symptoms were 'I can't start something. This could also be because old age is a time when many individuals are no longer productive or are in retirement, so it is challenging to start something and causes a lack of hope for the future. According to Rahardjo, et al, there will be setbacks and losses for someone who retires, including financial setbacks, loss of social status, loss of friends, loss of work, and setbacks in social activities. This condition often results in depression (33). This study also proved that work plays an important role or as a confounding factor for depressive symptoms.

At the age of over 60 years, many individuals are unemployed. This could be due to job loss due to retirement age or something else. There is an increased risk of death after unemployment, and poor psychological health is found among the unemployed. Unemployment can cause stress (35). In this study, among the elderly who did not work, which can be described as having retired, 21.9 % experienced symptoms of depression. Individuals who experience stress due to unemployment or lack of work can engage in social activities and cope with stress management. One form of stress coping is watching television (36). In addition, creating activities that have economic value for the elderly can also be done in dealing with stress due to not working and feeling a burden on the family. Activities that can make money will be able to eliminate the feeling of not being able to start something again will be avoided.

CONCLUSION

The lack of physical activity impacts the symptoms of depression in the elderly after being controlled by work and the interaction of work and physical activity. Physical activity includes the work in their employment. Therefore, it is suggested that the government needs to plan a proper program to increase physical activity for the elderly who experience depressive symptoms. This program can be integrated into the Posyandu program for the elderly through the Elderly Gymnastics every week. The government or community development can also guide the elderly who are unemployed so that they can be economically productive, such as by increasing the skills of the elderly in making handicrafts or plant cultivation.

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