

Factors Predicting Depressive Symptoms among Older People in Community in Bali, Indonesia*

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Abstract

Purpose: To examine the rate of depressive symptoms and factors predicting depressive symptoms among older people in community.

Design: Correlational predictive study.

Methods: The study is descriptive and cross-sectional. Simple random sampling was used to select 177 older people living in Bali, Indonesia. A cognitive assessment was carried out prior to selection. The instruments were self-reported non-communicable diseases, behavioral risk questionnaires, adverse life event scale, and depression scale. Descriptive statistics and logistic regression were employed for statistical analysis.

Main findings: The findings revealed that 41.8% of respondents had depressive symptoms. Adverse life events (OR = 1.30, 95%CI = 1.15, 1.46, $p < .001$), having more than three non-communicable diseases (OR = 4.41, 95%CI = 1.61, 12.02, $p < .01$), and low physical activity (OR = 4.60, 95%CI = 1.83, 11.57, $p < .01$) were found as significant predictors of depressive symptoms. Sex, body mass index, smoking, and alcohol consumption were not found to be significant predictors of depressive symptoms.

Conclusion and recommendations: The findings support the fact that the older people living in community are at risk of depression. Depressive symptoms could be predicted by adverse life events, non-communicable diseases and low physical activities. Community nurses should develop an intervention aiming to prevent depression of older people, through the promotion of physical activity in accordance with their health conditions, and enhancing their coping skills.

Keywords: aging, depression, health risk behaviors, life change events, non-communicable diseases

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ปัจจัยทำนายอาการซึมเศร้าในผู้สูงอายุที่อยู่ในชุมชน จังหวัดบาหลี ประเทศอินโดนีเซีย*

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บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาอัตราการเกิดภาวะซึมเศร้าและอำนาจในการทำนายอาการซึมเศร้าในผู้สูงอายุที่อยู่ในชุมชน

รูปแบบการวิจัย: การศึกษาความสัมพันธ์เชิงทำนาย

วิธีดำเนินการวิจัย: กลุ่มตัวอย่างเป็นผู้สูงอายุที่อาศัยอยู่ในจังหวัดบาหลี ประเทศอินโดนีเซีย จำนวน 177 คน คัดเลือกกลุ่มตัวอย่างโดยการสุ่มอย่างง่าย กลุ่มตัวอย่างทุกคนจะถูกคัดกรองโดยแบบทดสอบระดับการรู้คิด เก็บข้อมูลโดยใช้แบบสอบถามโรคไม่ติดต่อเรื้อรัง แบบประเมินพฤติกรรมเสี่ยงต่อสุขภาพ แบบวัดเหตุการณ์ไม่พึงประสงค์ และแบบวัดอาการซึมเศร้า วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา และสถิติถดถอยพหุโลจิสติก

ผลการวิจัย: พบอัตราการมีภาวะซึมเศร้าในผู้สูงอายุที่อยู่ในชุมชนถึงร้อยละ 41.8 และพบว่าเหตุการณ์ไม่พึงประสงค์ (OR = 1.30, 95%CI = 1.15, 1.46, $p < .001$) การมีโรคไม่ติดต่อเรื้อรังมากกว่า 3 โรค (OR = 4.41, 95%CI = 1.61, 12.02, $p < .01$) และกิจกรรมทางกายต่ำ (OR = 4.60, 95%CI = 1.83, 11.57, $p < .01$) สามารถทำนายอาการซึมเศร้าได้อย่างมีนัยสำคัญทางสถิติ แต่เพศ ดัชนีมวลกาย การสูบบุหรี่ การดื่มแอลกอฮอล์ไม่สามารถทำนายอาการซึมเศร้าในผู้สูงอายุที่อยู่ในชุมชนได้

สรุปและข้อเสนอแนะ: การศึกษานี้พบว่าผู้สูงอายุในชุมชนมีความเสี่ยงต่อการเกิดภาวะซึมเศร้า และปัจจัยทำนายภาวะซึมเศร้า ได้แก่ การเผชิญกับเหตุการณ์เปลี่ยนแปลงในชีวิต มีโรคไม่ติดต่อเรื้อรัง และมีกิจกรรมทางกายต่ำ พยาบาลชุมชนควรจัดกิจกรรมส่งเสริมสุขภาพทางจิตเพื่อป้องกันการเกิดอาการซึมเศร้าของผู้สูงอายุด้วยการส่งเสริมการมีกิจกรรมทางกายที่มีความเหมาะสมกับสถานภาพทางสุขภาพ และการฝึกทักษะการจัดการกับปัญหา

คำสำคัญ: ผู้สูงอายุ ภาวะซึมเศร้า พฤติกรรมเสี่ยงต่อสุขภาพ เหตุการณ์เปลี่ยนแปลงในชีวิต โรคไม่ติดต่อเรื้อรัง

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Background and Significance

There are 703 million people aged 65 years or over worldwide in 2019¹. The number is projected to rise to 1.5 billion in 2050¹. In South-Eastern Asia, the number of older people was around 45 million or 6.9% in 2019 and projected to reach 74 million or 10.3% in 2030¹. In Indonesia, there are 6.1% or 16 million older people in 2019 and projected to be 9.2% or 27 million in 2030¹. The Statistics of Bali Province 2019² has shown that there are 486,800 or 11.2% older people among 4.3 million population in Bali. An increasing number of older people will be an opportunity or challenge, depending on the care given to older people in the future³. Depressive disorder commonly occurs among older people as a significant mental health problem, which has been known as Late-Life Depression (LLD)⁴⁻⁵. Undetected and underdiagnosed LLD may cause adverse effects, such as functional and cognitive decline, increase the risk of morbidity, additional medical cost, and may lead to suicide⁴⁻⁵. Screening of depressive symptoms and also the health history of patients is needed to prevent LLD⁴. Statistical data has shown that the rate of depressive symptoms among older people in ASEAN countries varied, although quite high. The rate of depressive symptoms was 43.8% in Indonesia⁶, 32.9% in Thailand⁷, and 39.6% in Vietnam⁸. World Health Organization (WHO) has paid attention to programs for strengthening and promoting mental health in older people, one of the programs aimed at preventing depression in older people³. The key strategy in the prevention and control of depression in older people is the promotion of health and care at the community level³. LLD is often undetected and underdiagnosed by health care providers in the community setting. The symptoms often unexplained by older people are thought to be part of the aging process^{3,5}.

Evidence support that major risk factors

predicting depressive symptoms in older people includes adverse events in life, having Non-Communicable Diseases (NCDs), Behavioral Risk Factors (BRFs), and the demographic characteristics such as age, sex, marital status, socioeconomic status, employment status, and educational level. In an adverse social environment, older people suffer loneliness, experience death of spouse, sedentary life after retirement, detachment from children and/or relatives, illnesses. Older people who faced any unfavorable life events past one year was predicted to have depressive symptoms⁹. If someone does not have enough resources to cope up with an adverse event, they will experience stress¹⁰, which invariably produces negative outcomes such as depressed mood. Older people who are living in the community have a higher risk of NCDs including hypertension, diabetes mellitus, chronic obstructive pulmonary disease, cataract, and arthritis, which need long-term care and support^{9,11}. Older people with decreased visual acuity such as blurred vision and cataracts, have an increased risk of developing depressive symptoms¹². Studies have reported that older people with three or more NCDs at the same time were found to have a higher degree of depressive symptoms than those with less or no NCD^{9,13}.

Attempts have been made to examine some characteristics, such as factors associated with depressive symptoms in older people. Findings of many studies support that age is associated with depressive symptoms in older people^{6,11,14}. Sex (female) could also predict depressive symptoms^{11,13}. Marital status^{6,15} and economic status^{9,11} are also associated with depressive symptoms. Employment status has influence on depressive symptoms¹⁵. Educational status is found to be associated with depressive symptoms in older people¹³⁻¹⁴. According to WHO, four behavioral risk factors (BRFs)

including smoking, alcohol consumption, unhealthy body mass index (BMI), and inadequate physical activity are priority targets for international health promotion programs on healthy living³. WHO reported that a healthy diet, regular physical activity, and staying away from alcohol and tobacco, can help raise the mood³. It was found that physical activity could predict depressive symptoms^{11,13,16}. Unhealthy BMI predicts depressive symptoms¹⁶. Smoking could predict depressive symptoms^{7,11,16}. Alcohol consumption is found associated with depressive symptoms in older people^{11,16}. However, studies in Asia found that smoking and alcohol consumption could not be a predictor of depressive symptoms in older people⁹. In Asian culture, smoking and drinking alcohol plays a role in social gatherings, and was associated with low risk for depressive symptoms¹¹. The cultural and social environment might influence the findings of the study across countries. Therefore, the results from western countries might not necessarily apply to Bali population due to different characteristics and culture. Though several studies focused on rate and predicting factors of older people across countries, there are very few published studies from Bali, particularly, studies exploring adverse life events and behavioral risk factors on depressive symptoms in older people. One study in Bali reported that unmarried and unemployed males aged ≥ 70 years with low education level, and having more than 2 diseases are at risk of having depressive symptoms¹⁷. One authentic culture in Bali related to the social role of older people supports the fact that they still have an important role in society as long as they are able to known as "*Menyama Braya*"¹⁸. Therefore, this study aimed to examine the rate of depressive symptoms in the at-risk population and the predictive power of sex, number of NCDs, adverse life events, BMI, smoking, alcohol consumption, and

physical activity on depressive symptoms among older people living in community in Bali. The results of this study should be beneficial in planning interventions for promoting health and helping older people to maintain good physical and mental health.

Objectives

1. To determine the rate of depressive symptoms among older people;
2. To examine whether sex, number of NCDs, behavioral risk factors, and adverse life events could predict depressive symptoms among older people in the community in Bali, Indonesia.

Methodology

This study was a correlational predictive study.

Population and Sample

The respondents included older people who lived in community setting around four Public Health Centers (PHCs) in Bali, Indonesia. Data were collected from the respondents once during February-April 2019. Sample size was estimated using the G*Power version 3.1.9.2 analyses¹⁹. The significance level (α) and power ($1-\beta$) were determined at .05 and .80, respectively. According to the findings of a previous study, having > 3 NCDs could predict depressive symptoms in older people, with the Odds Ratio (OR) found to be 2.75¹³. Thus, an OR of 2.75 was applied to find an appropriate sample size for the study. Then, other parameters were set for two-tailed probability ($Y = 1, X = 1$) $H_0 = .273$, $\alpha = .05$, power ($1-\beta$) = .80, x distribution = binomial, x parm $\pi = .25$, and a sample size of 177 samples was determined based on the formula of logistic regression.

Simple random sampling was used to select the respondents according to the following inclusion criteria: being 60 years of age or older; being screened for cognitive impairment using

the 6-item Cognitive Impairment Test (6 CIT)²⁰ and receiving score ≤ 7 indicating no cognitive impairment; and being able to verbally communicate in Bahasa Indonesia and Balinese. Older people diagnosed with severe mental illnesses (e.g., MDD, Bipolar disorder II, Schizophrenia, and other mental illness) by a psychiatrist were excluded.

The researcher selected respondents from the record data based on inclusion criteria by using computer generated simple random sampling. The number of samples in each PHC was obtained in accordance with an average number of older people who visited each PHC. Finally, the number of respondents recruited from PHC I, PHC II, PHC III, and PHC IV was 59, 55, 30, and 33, respectively.

Research Instruments

1. Screening tool for sample recruitment.

The 6-item Cognitive Impairment Test (6 CIT) was developed by Brooke and Bullock²⁰ for universal practitioners to screen cognitive impairment with questions based on six items. Possible scores range from 0-28; a cut-off point at 8 or higher is used to identify cognitive impairment. For non-profit organizations, 6-CIT is free to use.

2. Questionnaires for data collection were used with relevant permissions, except for those available in public domain. The reliability of the questionnaires was tested with 30 respondents who were similar to the study subjects.

2.1 Demographic questionnaires including age, sex, marital status, education, religion, income, occupation, living arrangement, and type of insurance related to the personal information of the respondents.

2.2 Self-reported NCDs, developed by researchers, consists of a question asked: "Have you ever been diagnosed with any disease (NCD) by a doctor in your lifetime?", then followed by a list of NCDs provided by the first researcher.

2.3 Behavioral Risk Questionnaires consisted of items based on BMI, smoking status, alcohol consumption, and physical activity:

1) *Body Mass Index* (BMI) was measured by body weight and height using calibrated scales. Then, BMI was calculated as (kg/m^2) weight in kilograms divided by the square of height in meters. The BMI classification was based on the recommendation by WHO guidelines for the Asia-Pacific population in 2000²¹. BMI was categorized into four groups: "underweight" ($\text{BMI} < 18.5 \text{ kg}/\text{m}^2$), "normal" (BMI between $18.5\text{--}22.9 \text{ kg}/\text{m}^2$), "overweight" (BMI between $23.0\text{--}24.9 \text{ kg}/\text{m}^2$) and "obese" ($\text{BMI} \geq 25.0 \text{ kg}/\text{m}^2$).

2) *Smoking Status* was investigated by two questions developed by researchers: "Have you ever smoked cigarettes, e-cigarettes, cigars, pipes, etc.?" and, if 'yes,' the following question "Do you currently smoke?" was asked. The results were categorized as "smoker", "ex-smoker", and "non-/never-smoker".

3) *AUDIT-C* is used for screening of harmful drinkers from the scale developed by World Health Organization²², with sensitivity and specificity of 79% and 59%. The instrument is available in public domain. It has 3 items with a five-point rating scale (0-4 points). Scores were 0 for "never/non-drinker", 1-3 points for men or 1-2 points for women as "drinker", and ≥ 4 points for men or ≥ 3 points for women as "hazardous drinker". In this study, a Cronbach's alpha coefficient was .93. In addition, those with a history of smoking and drinking were asked "How long have you been smoking and drinking?" with the answer recorded in years and months.

4) *IPAQ-E* describes the intensity of the physical activity²³. The IPAQ-E was modified for the elderly by using four out of seven items of the IPAQ short form, which was a standardized instrument in the public domain.

The results were reported as “low physical activity”, “moderate physical activity” or “high physical activity” which were counted by the Metabolic Equivalent of Task (MET)-minutes per week. The three stages of physical activity can be reported as: low physical activity with total physical activity METs < 600, moderate physical activity with total physical activity METs $\geq$ 600, and high physical activity with total physical activity METs $\geq$ 3000. The total score of METs was calculated from the score of walking, moderate, and vigorous activity per minute/week. MET minutes denote the total energy used for carrying out the physical activity²³. In this study, the researchers translated content into Bahasa Indonesia with back-translation to verify accuracy. In this study, Cronbach’s alpha coefficient was .75.

2.4 *GALES* is a 26-item checklist with dichotomous Yes/No answers designed to assess the existence of major adverse life events in the past year in older people²⁴. There are 26 events listed in the questionnaire, from which the respondents choose. It was divided into six subscales, including interpersonal loss, physical illness/accident, interpersonal conflict, financial/work difficulties, disruption in living situation, and other adverse events (e.g., difficulty in getting adequate services, being a victim of crime, or becoming a caretaker). There are two additional questions to measure the degree of stress and how the event affected their mood. For the current study, researchers analyzed the number of adverse life events only. For each confirmed event, they were asked which event affected the most. Then, that reported event can be considered as the event that may impact their life. The more adverse life events can be seen from the total events reported by respondents from 26 events listed in questionnaires. Mean and standard deviation were used to report the data of adverse life events. In this study, the researcher obtained

permission to use *GALES* from the authors, then translated content into Indonesian with back-translation to verify accuracy. The researchers examined the 26-item list using Kuder-Richardson (KR-20) special case of Cronbach’s alpha for dichotomous data, with a Cronbach’s alpha coefficient of .80.

2.5 *GDS-15*, developed by Sheikh and Yesavage²⁵, was used to assess depressive symptoms. The sensitivity and specificity were 92% and 89%, respectively²⁵. The *GDS-15* is a standardized instrument and has been translated into several languages including Bahasa Indonesia, and is available in the public domain. All respondents were asked to answer the 15-item questions by responding Yes/presence of symptoms and No/absence of symptoms evident over the past week. Each answer corresponded to 1 point. The score ranged from 0-15 points. The symptoms can be categorized into four groups including 0-4 (normal), 5-8 (mild), 9-11 (moderate), and > 11 (severe) depressive symptoms²⁵. A study in Indonesia reported that the reliability of the Indonesian version of *GDS-15* yielded a value of Cronbach’s alpha coefficient at .84⁶. In this study, KR-20 special case of Cronbach’s alpha was .82.

Ethical Considerations

This study was approved by the Institutional Review Board of Faculty of Nursing, Mahidol University (COA No.IRB-NS2018/467.1312) and the Ethical Commission of Faculty of Medicine, Udayana University Bali, Indonesia at Sanglah Hospital (No. 08/UN14.2.2.VII.14/ LP/2019). Approval was obtained from the Regional Agency for Investment and License; National Political Unity Board; Office of Health; and Public Health Centers (PHCs) in Bali, Indonesia. The written consent form was gained from all respondents.

Data Collection

Data were collected from February to April

2019 after getting permission from IRB and other sectors. At first, researcher coordinated with the geriatric nurses working at each PHCs to explain the research objectives and process. These nurses helped the researcher with the recruitment of participants in accordance with the inclusion criteria. The nurses and staffs from PHCs who worked at the geriatric department introduced the researcher to the respondents. Then, the researcher informed the respondents about the objectives of the study and the right to refuse to participation, withdraw from, or discontinue the study at any time without any negative impact to their treatments. The information provided by the respondents was used only for the objectives of this study and remained confidential. Two hundred participants were approached to participate in the study. Twelve participants were excluded as the 6 CIT score was > 7 ; and 11 potential participants refused to participate in this study due to reasons of being too busy, and feeling uncomfortable with answering the questions. Then, data were collected from 177 respondents. This study used personal interviews with a structured questionnaire asked by the researcher. Then, the researcher filled the questionnaires with answers from the respondents. The respondents were asked about 70 items, and the questionnaires took 35-40 minutes to complete.

Data Analysis

The SPSS software version 18 Windows provided by Mahidol University was used for data analysis. Descriptive statistics including percentage, frequency, Standard Deviation, and Mean were calculated to present the demographic characteristics and describe the

study variables. Logistic regression was used to identify the statistical significance of risk factors as predictors of depressive symptoms in older people in community. Significance level was set at .05. The assumptions for logistic regression were tested before the main analysis.

Findings

Demographic characteristics of the respondents

The results showed that the mean age of the 177 respondents was 68.2 (SD = 6.14), ranging from 60-89 years. Almost two-thirds (61.6%, $n = 109$) were female and around seventy percent (69.5%, $n = 123$) were married. Around two-thirds (68.3%, $n = 121$) have low educational level and 122 respondents (68.9%) were unemployed. Majority of the respondents (81.4%, $n = 144$) had health insurance and 88.1% ($n = 156$) have sufficient monthly income. Almost all the respondents (93.80%, $n = 166$) lived with their family and 95.5% ($n = 169$) were Hindus.

Health history

Health history including number of NCDs, BMI, smoking status, alcohol consumption, and physical activity. More than one-third of the respondents (67.2%, $n = 119$) were never/non-smokers, (79.7%, $n = 141$) never/non-drinkers, (49.1%, $n = 87$) overweight or obese, and (52%, $n = 92$) reported low physical activity (see Table 2). Many of the respondents (86.5%, $n = 153$) had one or more NCDs. The top three reported diseases were rheumatoid arthritis rheumatoid (39%), hypertension (37.9%), and eye problems (32.8%), as shown in Table 1.

Table 1: Health history of the respondents (N = 177)

Health history	n (%)	$\bar{X}$ (SD)	min-max
Number of reported NCDs		2.5 (1.68)	0-7
None	24 (13.6)		
1-3	86 (48.6)		
> 3	67 (37.9)		
Self-reported NCDs (n = 153)			
Rheumatoid arthritis	69 (39.0)		
Hypertension	67 (37.9)		
Eye problems (e.g., Cataract, Blurred vision)	58 (32.8)		
Gout arthritis	44 (25.0)		
Skin problems (e.g., Dermatitis, Psoriasis)	36 (20.3)		
Dental problems (e.g., Gingivitis, Toothache)	34 (19.2)		
Diabetes Mellitus	28 (15.8)		
Hearing problem	19 (10.7)		
Chronic respiratory diseases	18 (10.2)		
Other diseases (e.g., Stroke, Cancer)	4 (2.3)		
Duration of smoking (years)		20.4 (6.91)	8-35
Duration of drinking alcohol (years)		18.4 (6.02)	5-30
BMI		23.2 (3.95)	14.9-32.8
Number of adverse life events		4.10 (3.86)	0-13

Adverse life events

The average of adverse life events was 4.1 (SD = 3.86), 32 respondents (18.1%) did not report any adverse life events during the past year and 145 respondents (81.9%) reported having at least one or more adverse life events (see Table 2). In this study, the three major reported events that affected the most were interpersonal loss (29.4%), physical illness/accident (23.2%), and interpersonal conflict (13%).

Depressive symptoms

According to GDS-15²⁵, the respondents were categorized into 2 groups; that is, without depressive symptoms (n = 103) and with depressive symptoms (n = 74). The mean scores of depressive symptoms were 3.3 ± 3.16 for the entire subjects. For those with depressive symptoms, the mean scores were 6.6 ± 1.75 .

When categorized into normal, mild, moderate, and severe symptoms, we found 58.2%, 36.1%, 5.1%, and 0.6% respectively.

Predicting factors of depressive symptoms

The results as shown in Table 2 revealed that variables that predicted depressive symptoms statistically were number of NCDs (> 3 NCDs) (OR = 4.41; 95%CI = 1.61, 12.02; p = .004), low physical activity (OR = 4.60; 95%CI = 1.83, 11.57; p = .001), and adverse life events (OR = 1.30; 95%CI = 1.15, 1.46; p < .001). Those older people who had more than three NCDs, low physical activity, and had one or more adverse life events in the past year are vulnerable to depressive symptoms. However, sex, BMI, smoking, and alcohol consumption were not found to be significant predictors of depressive symptoms in this study group.

Table 2: Factors predicting depressive symptoms (N = 177)

Variables	n (%)	Depressive No (%)	Symptoms Yes (%)	Adjusted Odd Ratio (95%CI)	p-value
Sex					
Male	68 (38.4)	36 (52.9)	32 (47.1)	Reference	
Female	109 (61.6)	67 (61.5)	42 (42.0)	0.91 (0.29, 2.82)	.882
Number of NCDs					
0-1	60 (33.9)	47 (78.3)	13 (21.7)	Reference	
2-3	50 (28.2)	29 (58.0)	21 (42.0)	2.73 (0.97, 7.69)	.057
>3	67 (37.9)	27 (40.3)	40 (59.7)	4.41 (1.61, 12.02)	.004
Smoking					
Never	119 (67.2)	77 (64.7)	42 (35.3)	Reference	
Smoker	32 (18.1)	14 (43.8)	18 (56.3)	1.83 (0.39, 8.53)	.438
Ex-smoker	26 (14.7)	12 (46.2)	14 (53.8)	0.96 (0.25, 3.66)	.966
Alcohol consumption					
Never	141 (79.7)	88 (62.4)	53 (37.6)	Reference	
Drinker	36 (20.3)	15 (41.7)	21 (58.3)	1.31 (0.34, 5.08)	.690
BMI					
Normal	69 (39.0)	40 (58.0)	29 (42.0)	Reference	
Underweight	21 (11.9)	12 (57.1)	9 (42.9)	1.31 (0.36, 4.73)	.673
Overweight	36 (20.3)	21 (58.3)	15 (41.7)	1.28 (0.43, 3.81)	.654
Obese	51 (28.8)	30 (58.8)	21 (41.2)	1.36 (0.54, 3.43)	.507
Physical activity					
Moderate	55 (31.1)	44 (80.0)	11 (20.0)	Reference	
Low	92 (52.0)	36 (39.1)	56 (60.9)	4.60 (1.83, 11.57)	.001
High	30 (16.9)	23 (76.7)	7 (23.3)	1.78 (0.51, 6.17)	.364
Adverse life events					
No (0)	32 (18.1)	31 (96.9)	1 (3.1)	Reference	
Yes (1-13)	145 (81.9)	72 (49.7)	73 (50.3)	1.30 (1.15, 1.46)	< .001

Nagelkerke R Square (Pseudo R²) = .449; Hosmer-Lemeshow goodness-of-fit p = .653; Overall Percentage of Correct Classification = 74.6%

Discussion

In this study, the rate of depressive symptoms was 41.8%, which was similar to the findings in West Java, Indonesia (43.8%)⁶. When compared to previous studies in ASEAN countries, the rate was quite different. One study in Thailand reported the rate of depressive symptoms was 32.9%⁷, whereas in Vietnamese older people was 39.6%⁸. Even though these studies used the same instrument

to measure the depressive symptoms in older people, the variations in cut off points of the instrument may lead to a difference in examining the rates of depression in older people. A study in Indonesia and Vietnam used score ≥ 5 , while another study in Thailand used score ≥ 6 for indicating depressive symptoms. This factor might lead to a difference in the rates of depressive symptoms. Moreover, the variation in findings might be related to

someone's perceptions of utilizing health services or other sources, such as attitude, awareness, and knowledge about mental health.

Another possible explanation may be due to the characteristics of respondents in this study. Firstly, 68.9% of the respondents were unemployed, and one third did not complete their formal education. A study reported that older workers who had quit their full-time jobs and going through an inactive, retired life endures adverse mental health²⁶. Retirement or pension is an adaptable period that has resulted in a change in a social role, especially if they previously been in a high position. When retired, loss of high position may lead to post power syndrome, which may affect their psychological well-being. It is characterized by feeling irritable, moody, and worthless which are some of the depressive symptoms. Moreover, a study found that early life education may protect older people from memory impairment, which is related to depressive symptoms. Compared to having elementary school education, receiving more formal education significantly reduced the negative symptoms associated with mental health problem in older people¹⁴.

Having more than three NCDs was found to be a predictor of depressive symptoms. This finding was consistent with previous studies which found that older people who have more than three NCDs are at risk for developing LLD^{9,13}. In this study, many of the respondents reportedly had rheumatoid arthritis, hypertension, and eye problems. More than one-third of the respondents in this study have more than three diseases (37.9%), such as arthritis, eye problems, hypertension, and skin problems. Arthritis can cause long-term inflammation to cartilages in the joints, causing degenerative changes, including joint instability, and loss of function²⁷, thus it is a

major risk factor for depression. The development of depressive symptoms could be related to hypertension that induces changes in some areas of brain that may control emotion, memory, and executive function²⁸. Furthermore, as people age, they tend to have higher risk of developing age-related eye problems, which increases the risk of depressive symptoms¹². In addition, persons with several diseases typically have to deal with several medication prescriptions. Medications may obstruct self-care regimens such as prescribed diet, physical and social activity, and becomes a burden to the family with an increasing health care cost and utilization²⁹. It also may be true that there are interactions of diseases, which might produce an increased disease burden which could cause depressive symptoms.

Adverse life events were found to predict depressive symptoms in older people. This finding was consistent with a previous study⁹. Adverse life events are stressful factors for older people with interpersonal loss, physical illness, and interpersonal conflict, the most affected events in their lives. The possible explanation is that older people seem to experience the loss of a loved one who had shared with them the ups and downs of life, activities, memories, and emotions. Older people, they may become easily moody or irritable, and sensitive, under uncomfortable situations, which they may present as anger or aggression. If older people have limited coping resources, including physical health, social support, and low self-esteem, they could not adequately cope with an adverse event, and they will feel more stressed and become depressed. According to the Transactional Theory of Stress and Coping by Lazarus and Folkman¹⁰, an important factor related to the impact of an adverse event is whether the person perceives the event exceeding their

resources to cope and as something that endangers their well-being. It is crucial to understand whether older people view these adverse events as a challenge, threat, harm or loss, since that determines how they may choose to try and cope¹⁰. Inability to cope invariably leads to negative consequences such as depressive symptoms. Thus, adverse life events experienced by older people can predict the presence of depressive symptoms.

Low physical activity was found to be a predictor of depressive symptoms. This finding indicated that older people who had low physical activity are at the risk of developing depressive symptoms than those with more active lifestyles. Older people with low physical activity probably might have less energy to perform any form of physical activity such as gardening, cleaning, and other household chores, or could not participate in social activities. These conditions may lead to the development of symptoms of depression, including feeling bored, helpless, social isolation, and unsatisfied life. Literature supported that physical activity can protect older people from developing depressive symptoms, as exercise can increase physical ability resulting in higher levels of self-esteem and eventually preventing stressful feelings³⁰. Simply put, those who are physically active are usually full of energy, happy, satisfied with life, and also have a positive outlook on life. Increased physical activity in older people predicted better physical function in later life, and has a beneficial impact on the mental health status of these people, especially in prevention of depressive symptoms³⁰. Having more than three diseases, such as arthritis, eye problems, and hypertension, made it difficult for older people difficult to perform any form of physical activity, resulting in being socially isolated. This situation may lead to experiencing symptoms of depression.

The following independent variables, including sex, BMI, smoking, and alcohol consumption, were not predictors of depressive symptoms. In contrary to the current study, studies have reported that sex and BMI could not predict depressive symptoms⁷, as well as smoking and alcohol consumption⁹. Firstly, the possible explanation for sex as a non-predictor of depressive symptoms is that most of the respondents in this study were married Hindu living with their own family, including spouse, children, grandchildren, and children-in-law. In the Balinese culture, both men and women must carry out activities related to social events and religion. Bali culture implies equality or brotherhood. Local wisdom is part of Bali's culture which manifests fundamental concepts, thereby maintaining and building strong social relations called "*Menyama Braya*"¹⁸. Older people are still active in community activities called "*Metulung*", a form of social interaction in the Balinese community. For example, they assist families in the preparation of customary rituals and participate in the prayer ceremony led by a Hindu Priest called "*Pemangku*". This activity may keep them active and make them feel close to God through religious activities, and that factor may be protecting them from having depressive symptoms. A study in Indonesia, though many of the respondents were Muslims, found that being religious and spiritually-connected protects older people against depressive symptoms, which can also shield them from the negative psychological sequelae associated with stressful life events¹⁵. Strongly religious individuals have a hopeful and positive outlook on life, and that might provide them extraordinary mental strength and support in the face of a problem¹⁵.

Secondly, the relatively equal number of respondents with depressive symptoms were reported in sex and BMI categories, which did not allow accurate statistical analysis. A study

in a western country reported unhealthy BMI or obesity could predict depressive symptoms¹⁶. The different findings in this current study might be due to the different categories of BMI used. In this study, the researcher used the Asia-Pacific's BMI categories²¹. Lastly, this different finding might be due to an insufficient number of smoking and drinking respondents which may reduce the statistical precision when performing logistic analysis. As found in this current study, only one-fifth of the respondents were reported as being smokers and drinkers. Moreover, older people may smoke and drink only socially or recreationally. In Asian culture, smoking and drinking alcohol plays a role in social gatherings and was associated with low risk for depressive symptoms¹¹. Another possible explanation for this study's findings may be related to the frequency and amount of alcohol consumed and tobacco used. In this study, only one-fifth of the respondents reported that they drink less than monthly. The average duration of being smokers and drinkers were 20 and 18 years, respectively. Older people may become habitual smokers and drinkers if they continue these activities for a long time, with no negative impact on their mood. Smoking was not a predictor of depressive symptoms, and it could be that the respondents were ex-smokers who smoke for 20 years, and thus, were not likely to be nicotine addicts. The low number of smokers may be due to the smoking ban in public areas by the Indonesian government, which forced older people to stop smoking.

Conclusion and Recommendations

The findings of this study provided important information for prevention of LLD among older people in community. The findings showed that older persons who have a number of NCDs (> 3 NCDs), have

experienced one or more adverse life events in the past year, and have low physical activity are at risk of having or developing depressive symptoms. Thus, health care professionals at all levels of the health system need to be alert for these warning signs. It is also an evidence supporting the fact that creating positive living conditions such as a comfortable and safe environment support the well-being of older people which allow them to lead healthy lifestyles³.

Based on the findings, firstly, prevention interventions should include periodic screening in order to detect early depressive symptoms and assist older people to take actions of preventing depressive symptoms. Health programs should use selective prevention among older people with risk for depression by providing the appropriate management remedies and maintaining psychological well-being among the risk groups. Secondly, the PHC nurses need to inform older people to stay connected with family and neighbors, talk to someone they trust, and seek professional help if they think they have symptoms of clinical depression. As a person ages, he or she may face late-life transition period such as aging-related changes in social roles. Therefore, nurses and family should help older people to adapt and adjust to the late-life transition period, by providing psychoeducation or activities that can divert their negative feelings. Lastly, developing age-friendly services and settings by creating good living conditions and environment can support psychological well-being of older people. A program should help older people cope with adverse life events, increase physical activity in accordance with health status, and address health problems and infirmities. Furthermore, the intervention should encourage older people to be active by doing light physical activity such as walking at

a slow pace. The support program can be in the form of “Senior Citizens” club that prioritizes social communication and empowers the older people based on creativity. Also, programs can be tailored to address physical conditions associated with diseases so that older people can live their lives as normal as possible. Nurses in concert with other health professionals and local authority, can assist in preparing the necessary facilities and infrastructure to prevent depression and promote mental health of older people living in community.

Limitations of this study are that these results might not necessarily apply to populations of different settings that may have different background. In other words, there are probably a significant number of older people in a community that do not visit the local public health facilities, either because of attitude or limitations of support or transportation.

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