Factors Related to Depression Among the Elderly: A Case Study in Lampang Province, Thailand

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Abstract— The purposes of this study were 1) to assess the depressive symptoms among the elderly in Lampang province, Thailand. 2) to examine the factors associated with depression. This study was a cross-sectional study conducted included 87 elderly aged greater than or equal to 60 years. Study instruments included the Suan Prung stress test-20 (SPST-20), the generalized anxiety disorder questionnaire (GAD-7), the patient health questionnaire-9 (PHQ-9), and the Pittsburgh sleep quality index (PSQI). Data collection was by face-to-face interviews. Descriptive statistics and Spearman's correlation coefficient were used to determine the association between variables, and P-value < 0.05 was considered statistically significant. The mean (standard deviation) for depressive symptoms was 3.79 ± 2.61. Psychological factors are significantly associated with depressive symptoms all variables, including anxiety, stress, and sleep quality. This emphasized the need for more mental health care and care services for the elderly.

Keywords— Depressive symptoms, Elderly, Anxiety, Stress, Sleep quality.

I. INTRODUCTION

An estimated 3.8% of the world's population suffers from depression, with 5.0% of adults and 5.7% of elders over 60 years. Around 280 million individuals worldwide suffer from depression. Depression is a mental illness characterized by chronic sadness and loss of interest in the previously enjoyed activity and inability to do the daily activities for at least two weeks. Depression may develop into a significant medical illness, especially if it is recurring and getting moderate to severe degree. Suicide can result from depression at its worst. Every year, around 700,000 individuals die by suicide [1]. In Thailand, depression was the number one cause of years of life lost due to disability (YLD) for female (12.6% of the burden). It is estimated that 1.5 million Thai people suffer from depression [2]. Depression has a relatively high prevalence in the elderly. It is the first psychiatric disorder found in this age group [3].

Thailand is currently ranked as the third most rapidly aging population in the world. The number of people aged 60 and over in Thailand now stands at about 13 million, accounting for 20% of the population. Population aging is a relatively new occurrence in Thailand; it was just in 2001 that Thailand became an aging population with more than 7% of the population over 65. By 2050, Thailand's aging population is expected to increase to 20 million, accounting for 35.8% of the population. This means that out of every three Thai, one will be a senior citizen [4]. Age-related physical changes and social changes would impact the mental health of older adults. Approximately 15% of older adults suffer from mental disorders. Depression is the most common mental disorder, affecting 7% of the world's elder population [5]. According to the Thailand national health survey 2010, depression was prevalent among 9.3% of the population aged 60 years and above. Depression results from a complex interaction of social, psychological, and biological factors, and the effect of depression can be long-lasting or recurrent. The elderly population survey in Thailand showed that the northern region of Thailand has the highest percentage of senior citizens (above 25.2%) and Lampang is one of the provinces listed in the top 5 for the largest number of aged people [6]. Most older persons suffer from a decline in physical and mental health, social segregation, poor economic conditions, poor access to resources, communication difficulties, and a lack of access to information. These experiences may increase levels of pessimism, loneliness, sleep disturbance, and depression. Some studies have been conducted on the prevalence of depression and risk factors among the elderly. They found that depressive symptoms seen in the elder age are related to the advancing of age, being a female, living alone, divorcement, low education level, functionality disorder, comorbid physical illness, low-level cognitive dysfunction, cigarette, and alcohol use [7]. As physical diseases can directly cause depressive symptoms, limitation of a person's physical activity, reduction in life quality and require another person's support can also trigger depression. Medicines such as antihypertensive and corticosteroids which block, increase their emissions, cause up/down-regulation, and modify catecholamine can cause depression [8]. However, they did not report the association between other psychological factors, stress, anxiety, and sleep quality. Therefore, this present study aimed to determine the associated factors of depression among Thai older adults.

II. METHODOLOGY

A. Research participants

This cross-sectional study included 87 elderly aged greater than or equal to 60 years. All participants were from three sub-districts near the power plant: Mae Moh, Ban Dong, and Sob Pad. Those living in the study area for at least five years, being free of mental health problems such as dementia, Alzheimer's disease, or depression were recruited.

B. Study site

The Mae Moh district of Lampang province, Thailand was the study site where the world's largest lignite-mine power plant with a capacity of 2,625 megawatts of electricity exists and this area is one of Thailand's top five cities for high $PM_{2.5}$ [9].
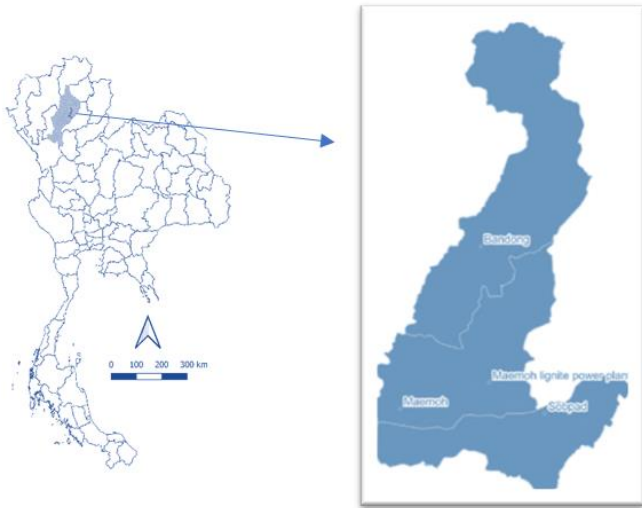

Fig. 1. Map of Thailand and Mae Moh district including three areas of air monitoring station; Ban Dong, Sob Pad, and Mae Moh subdistrict

C. Reserch Instrument

The trained research assistant conducted face-to-face interviews with the participants using a structured questionnaire, which covered general characteristics of the elderly, anxiety, stress, depression, and sleep quality. Participants provided details including gender, age, estimated residential proximity to the lignite-fire power plant (≤15 km, >15 km), marital status, educational level, current job, income, underlying diseases, regular exercise, current alcohol drinking, and current smoking status. The questionnaire instruction considered the last 30 days' existence of Stress, anxiety, depression, and sleep. February was chosen. This study was approved by the Chulalongkorn University Health Science Group's ethical review board for research involving human subjects (COA No.189.1-62). Written consent from all participants were taken.

The Suan Prung Stress Test-20 (SPST-20) was a 20-statements questionnaire developed by Thailand's Department of Mental Health, Ministry of Public Health to assess stress levels. On a five-point Likert scale, participants were asked to rate their degree of stress as follows: 5 (very severe), 4 (severe), 3 (moderate), 2 (somewhat), and 1 (not at all). The overall score ranged from 20 to 100, with higher numbers indicating higher levels of stress. It divided stress into four categories: mild (0-24), moderate (25-42), high (43-62), and severe (63-100) [10].

The Generalized Anxiety Disorder Questionnaire (GAD-7) was created to diagnose and measure anxiety. It is a 7-item questionnaire. The participants were asked to rate their access frequency on a 4-Likert scale, with 0 (no access), 1 (many days), 2 (more than half of the days), and 3 (almost every day). A sum score ranges from 0 to 35. For mild, moderate, and severe anxiety, the cut-off points are 5, 10, and 15. A score of 10 is considered to have an 89% sensitivity and 82% specificity [11].

The Patient Health Questionnaire 9 (PHQ-9) is a depression screening instrument used in primary care. A 9-item depressive subscale was included in the PHQ-9. A 4-Likert scale was used to measure the frequency of depressive symptoms during the past two weeks, with 0 (no symptoms), 1 (several days), 2 (more than half of the days), and 3 (nearly every day). A total score is a number that ranges from 0 to 27. The overall score has been converted into one of the following depression levels: minimum (1–4), mild (5–9), moderate (10–14), moderate to severe (15–19), and severe (20–27) depression. In this study, the total PHQ-9 score was divided into two categories: yes (Total PHQ-9≥9) and no (Total PHQ-9<9). The PHQ-9 showed strong domestic reliability with a Cronbach's alpha of 0.89 [12].

The Pittsburgh Sleep Quality Index (PSQI) assesses the elderly's sleep quality over the previous months. The PSQI is a 19-item self-reported questionnaire used to evaluate sleep quality and disruption in clinical populations during the previous month. Sleep duration, sleep disturbance, sleep latency, daytime dysfunction induced by tiredness, sleep efficiency, overall sleep quality, and use of sleep medicine are among the 19 elements divided into seven categories. Each sleep component is given a score ranging from 0 to 3, with 3 denoting the most severe disruption. The total score, which ranges from 0 to 21, is calculated by adding the sleep component scores together, with a higher total score indicating poorer sleep quality. In this research was used the original Thai-PSQI. The Thai version of the PSQI has a strong level of internal consistency (Cronbach's alpha of 0.84), as well as test-retest reliability (correlation coefficient of 0.89) [13].

D. Statistical analysis

The data were analyzed using the statistical program SPSS version 22.0 (licensed for Chulalongkorn University). The overall characteristics of the aged, and their anxiety, stress, sleep quality, and depression, were reported using counts (%) for categorical data and means (standard deviation) for continuous data. For the non-normally distributed variable, the median (interquartile range) was reported. Spearman's correlation coefficient was used to test the association between depression and psychological variables. A p-value of less than 0.05 was considered statistically significant.

III. RESULT

The demographic characteristics of the elders were represented in Table I. Most of them were female (81.6%). The median and IQR age of the participants was 67 (62, 75). Half of them (50.6%) lived more than 15 km from the lignite-fired power plant. The percentage of participants who married was 55.4%. Having underlying diseases and doing the current job accounted for 79.3% and 58.6%, respectively. Most of them were non-smokers (86.2%) and non-drinkers (92%).

TABLE I. General characteristics among elderly in Lampang, Thailand

	Total (N=87)	
	n	(%)
Age (years), median (IQR) 67 (62, 75)		
Gender		
Male	16	18.4
Female	71	81.6
Residential proximity to lignite power plant		
≤ 15 km	43	49.4
> 15 km	44	50.6
Marital status		
Single/Separates	41	47.1
Married	46	52.9
Living arrangement		
Alone	35	40.2
With family	52	59.8
Educational level		
Primary school	63	72.4
High school or higher	24	27.6
Income (THB)		
≤5,000 Baht	73	83.9
> 5,000 Baht	14	16.1
Current job status		
Employed	51	58.6
Unemployed	36	41.4
Underlying Diseases		
Yes	69	79.3
No	18	20.7
Regular exercise		
Non exercise	3	3.5
1-2 times/week	29	33.3
>2 times/week	55	63.2
Current alcohol drinking		
Yes	12	13.8
No	75	86.2
Current smoking status		
Yes	7	8
No	80	92

A total of 87 participants (26.4%) had depression symptoms. Half of them had trouble sleeping and feeling tired (51.7 %, and 50.6% respectively). The mean score of PHQ-9 was 3.79 ± 2.61. The results are shown in Table II.

In table III, 36 of 87 (41.4%) participants reported poor sleep quality. Most of them presented minimal anxiety (73.6%) and mild to moderate stress (97.7%). The median and IQR scores of sleep quality, anxiety, and stress were 4 (3,6), 1(1, 5), and 30(26,43) respectively.

TABLE II. PHQ-9 components and depression of the elderly

		Total (N=87)	
		n	%
PHQ-9 Component 1	Anhedonia	25	28.7
PHQ-9 Component 2	Depressed mood	21	24.1
PHQ-9 Component 3	Trouble sleeping	45	51.7
PHQ-9 Component 4	Feeling tired	44	50.6
PHQ-9 Component 5	Change in appetite	29	33.3
PHQ-9 Component 6	Guilt/worthlessness	14	16.4
PHQ-9 Component 7	Trouble concentrating	14	16.4
PHQ-9 Component 8	Feeling slowed down or restless	19	21.8
PHQ-9 Component 9	Suicidality/thoughts of death	9	10.3
Total score of PHQ-9	mean ± SD	3.79 ± 2.61	
Depression	Yes (PHQ-9 ≥ 9)	23	26.4
	No (PHQ-9 < 9)	64	73.6

TABLE III. Sleep quality, anxiety, and sleep quality among elderly

Variable	Total (N=87)	
	n	%
Sleep quality		
Good sleep (PSQI < 5)	51	58.6
Poor sleep (PSQI ≥ 5)	36	41.4
median (IQR)	4	(3,6)
Anxiety (GAD-7 score)		
minimal (0 - 4)	64	73.6
mild to moderate (5 - 14)	23	26.4
median (IQR)	1	(1,5)
Stress (SPST score)		
mild to moderate (0 - 41)	85	97.7
high to severe (> 41)	2	2.3
median (IQR)	30	(26,42)

TABLE IV. Correlation between psychological factor and depression.

	r	p-value
Anxiety	0.479	<0.001**
Stress	0.209	0.04*
Sleep Quality	0.237	0.02*

Table IV. showed results from Spearman's correlation coefficient analysis assessing the association of depression and other psychological factors. It consists of anxiety, stress, and sleep quality. The results showed a significant correlation between anxiety (Spearman rho=0.479; p<0.001), stress (Spearman rho=0.209; p=0.04), and sleep quality (Spearman rho=0.237; p=0.02).

IV. DISCUSSION

Most of the features of elders in this study were found to be like prior findings. The average age of the Korean seniors studied was 71 years old. The percentage of people who reported regular alcohol consumption at least once a week was 23%, whereas 63% reported moderate activity at least once a week. Hypertension was the most common pre-existing condition [14]. Furthermore, according to the Taiwan Longitudinal Study on Aging, the average participant age was 73.4 years, and more than 63 % had a spouse. Approximately half of those surveyed had primary and secondary education, and 43% considered their financial status fair. A high proportion of the individuals who exercised on a routine basis did not drink alcohol and did not smoke [15]. Hicran et al. also found that most women (47.7 %) had ten years of education and that the majority of them had never smoked (80 %) [16].

The elders in this study were generally older and more physical than in other studies. For example, more than half were still working. However, 1 in 4 reported depressive symptoms. Depression affects older people differently than younger people. In older, depression often goes along with other medical illnesses and disabilities. Cappeliez determined after a thorough review of the literature that around 5% to 8% of elderly citizens (over 65 years of age) had clinically significant depression, but accurate studies in the oldest age groups are limited. Clinically evident depression is more common among the elderly [17].

In the present study, we found that poor sleep quality was associated with depressive symptoms. Poor sleep quality has been linked to a higher prevalence of depressed symptoms in the elderly, according to earlier studies. For instance,

depression was observed to worsen poor sleep quality in a study of 208 elderly people in Thailand [18]. The observed correlations between the frequency of depressed symptoms and poor sleep quality are supported by a number of processes. First, immune cells' production of pro-inflammatory cytokines, which are markers of systemic inflammation, is correlated with sleep disturbance [19]. In those who are more susceptible, immune signals to the brain can exacerbate the onset of depression symptoms [20]. Second, serotonergic neurotransmission can collaborate with other parts of the brain that control sleep and circadian rhythm [21]. In the meantime, serotonin neurotransmission dysfunction is closely related to the pathophysiology of depression [22]. Third, prior studies have indicated that the relationship between sleep and depression may be significantly influenced by circadian preferences [23].

It was found that anxiety is associated with more severe depressive symptoms. Concurrent or comorbid anxiety signifies a more severe psychiatric illness in depressed older adults. Often, such patients will describe themselves as anxious or nervous, but are found to be depressed upon a comprehensive evaluation. Similarly, some depressed elderly patients will appear extremely anxious upon examination by the clinician, even if the patient denies or downplays their anxiety. While worry, tension or anxiety (as is seen in GAD) are common presentations of anxiety in depression, comorbid panic attacks can also be seen in elderly patients with depression. [24]. Sensory nerve systems translate signals from external stressors such imminent risk to life, social stressors, and reactions to physical injuries before the subsequent information is processed by emotional circuits in the brain [25]. The variety of depressive symptoms suggests that many brain areas may be implicated in the affective disorders. Amygdala, striatum, hippocampus, prefrontal and cingulate cortex, among other brain regions, have shown altered hemorheology and associated parameters in human brain imaging studies, and research on the brains of depressive individuals has revealed several abnormalities in those regions [26].

V. LIMITATION

The study design was a cross-sectional study. It could not conclude association, and measurement tool bias could exist. Recall bias may influence one's ability to respond to a questionnaire. we relied on self-reports of psychological symptoms by using a questionnaire. Therefore, it may be information bias. Inadequate control of possible confounders (e.g.) might affect results. Furthermore, there is a lack of further diagnosis for depression or objective assessment for sleep, such as an Actigraphy watch.

VI. RECOMMENDATION

A larger sample size should be used in future studies to increase the power of finding potentially significant associations. Nonetheless, this study suggests that public health efforts to reduce mental illness should consider addressing not only personal characteristics and social environment factors but also underexplored aspects of the psychological factor such as sleep quality.

VII. CONCLUSION

This study investigated the factors associated with depression among the elderly in Lampang province, Thailand in February 2020. Depression was found to be negatively linked to sleep quality, anxiety, and stress among our survey participants. To our best knowledge, this is the first study to reveal that other psychological factors are associated with depression among the elderly.

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