GYNAECOLOGY

Prevalence of Depression and Associated Factors in Postmenopausal Thai Women during the COVID-19 Pandemic

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ABSTRACT

Objectives: To determine the prevalence of and factors associated with depression in postmenopausal Thai women during the COVID-19 pandemic.

Materials and Methods: The study was conducted from April to December 2022. Depression was diagnosed using the Thai Depression Inventory. Self-questionnaires assessed sociodemographic data; COVID-19 knowledge, attitudes, and preventive practices; and Thai Depression Inventory scores.

Results: The study assessed 271 women (175 natural postmenopausal; 96 surgical postmenopausal). The depression prevalence was 9.6% overall, 8.6% in natural menopause, and 11.5% in surgical menopause. No severe major depression was observed. The prevalence of mild depression was significantly higher in the surgical postmenopausal group (11.5%) than in the natural postmenopausal group (4.0%, p = 0.022). In the natural postmenopausal group, the prevalence of less than major depression and major depression were 4% and 0.6%, respectively, whereas it was not present in the surgical postmenopausal group. Women with superior knowledge or attitudes had a lower prevalence. Those with high levels of preventive behavior had a higher prevalence but without significance. Prevalence significantly increased with low household income and medical disease, especially chronic kidney disease.

Conclusion: The prevalence of depression in postmenopausal Thai women during COVID-19 was 9.6%. Low household income and chronic kidney disease were significant predictors.

Keywords: COVID-19, depression, natural menopause, surgical menopause, chronic kidney disease.

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ความชุกและปัจจัยที่เกี่ยวข้องของภาวะซึมเศร้าในสตรีไทยวัยหมดระดูในช่วงการแพร่ระบาดโรคติดเชื้อโคโรนาสายพันธุ์ใหม่ 2019

ณัฐสุดา พันธ์บุญมี, สุชาดา อินทวิวัฒน์

บทคัดย่อ

วัตถุประสงค์: *เพื่อสำรวจความชุกการเกิดภาวะซึมเศร้าในสตรีวัยหมดระดูในช่วงการแพร่ระบาดโรคติดเชื้อไวรัสโคโรนา 2019*

วัสดุและวิธีการ: *ผู้ที่มารับการรักษาในคลินิกต่อมไร้ท่อสตรีและวัยทองโรงพยาบาลศิริราชและมีคุณสมบัติเข้าเกณฑ์ จำนวน 271 คน ทำแบบสอบถามด้วยตนเอง แบบสอบถามประกอบด้วย 3 ส่วน ได้แก่ ข้อมูลพื้นฐาน ความรู้ ทัศนคติ และ พฤติกรรมการป้องกันตนเองจากการติดเชื้อไวรัสโควิท-19 จำนวน 16 ข้อ และ แบบสอบถามเพื่อประเมินความรุนแรงของ ภาวะซึมเศร้าชนิดให้ผู้ป่วยตอบแบบสอบถามเอง จำนวน 20 ข้อ จากนั้นทำการหาความชุกของการเกิดภาวะซึมเศร้าของ สตรีวัยหมดประจำเดือน เปรียบเทียบความชุกของภาวะซึมเศร้าในสตรีหมดระดูตามธรรมชาติ และสตรีที่หมดระดูเนื่องจาก ได้รับการผ่าตัดรังไข่ออกทั้งสองข้าง และหาปัจจัยต่างๆ ที่เกี่ยวข้อง*

ผลการศึกษา: *ความชุกของการเกิดภาวะซึมเศร้าในสตรีวัยหมดระดูในช่วงการแพร่ระบาดโรคติดเชื้อไวรัสโคโรนา 2019 ร้อยละ 9.6 โดยในสตรีหมดระดูตามธรรมชาติร้อยละ 8.6 และร้อยละ 11.5 ในสตรีที่หมดระดูเนื่องจากได้รับการผ่าตัดรังไข่ ออกทั้งสองข้าง ทั้งหมดไม่มีภาวะซึมเศร้าแบบรุนแรง เมื่อเปรียบเทียบ ภาวะซึมเศร้าแบบไม่รุนแรงพบความชุกมากกว่าใน สตรีที่หมดระดูเนื่องจากได้รับการผ่าตัดรังไข่ออกทั้งสองข้าง (ร้อยละ 11.5) เมื่อเทียบกับสตรีหมดระดูตามธรรมชาติ (ร้อยละ 4.0, p = 0.022) อย่างมีนัยสำคัญทางสถิติ พบภาวะซึมเศร้าแบบปานกลางและแบบรุนแรงในสตรีหมดระดูตามธรรมชาติ ร้อยละ 4 และร้อยละ 0.6 ตามลำดับ ซึ่งไม่พบในสตรีที่หมดระดูเนื่องจากได้รับการผ่าตัดรังไข่ออกทั้งสองข้าง ผู้ที่มีความ รู้ และทัศนคติเกี่ยวกับโรคติดเชื้อไวรัสโควิด-19 ดีกว่า มีความชุกของการเกิดภาวะซึมเศร้าน้อยกว่า และผู้ที่มีพฤติกรรม พฤติกรรมการป้องกันตนเองจากการติดเชื้อไวรัสโควิด-19 ดีกว่า มีความชุกของภาวะซึมเศร้ามากกว่า แต่ไม่มีนัยสำคัญ ทางสถิติ ปัจจัยที่มีความสำคัญทางสถิติที่เกี่ยวข้องกับการเกิดภาวะซึมเศร้าคือ การที่มีรายได้ในครัวเรือนน้อย การมีโรค ประจำตัวโดยเฉพาะอย่างยิ่ง โรคไตเรื้อรัง*

สรุป: *ความชุกการเกิดภาวะซึมเศร้าในสตรีวัยหมดระดูในช่วงการแพร่ระบาดโรคติดเชื้อไวรัสโคโรนา 2019 ร้อยละ 9.6 ราย ได้ในครัวเรือน และการเป็นโรคไตเรื้อรังเป็นปัจจัยที่เกี่ยวข้องกับการเกิดภาวะซึมเศร้า*

คำสำคัญ: *โรคติดเชื้อไวรัสโคโรนา 2019, ภาวะซึมเศร้า, สตรีหมดระดูตามธรรมชาติ, สตรีที่หมดระดูเนื่องจากได้รับการ ผ่าตัดรังไข่ออกทั้งสองข้าง*

Introduction

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is a member of the Orthocoronavirinae subfamily, which includes positive single-stranded ribonucleic acid (RNA) viruses. The natural origin and reservoir of the virus are still unknown. The virus spreads through respiratory droplets and aerosols and can cause symptoms ranging from asymptomatic to severe pneumonia and death[1, 2]. Elderly individuals are particularly susceptible to severe clinical outcomes from SARS-CoV-2 infections[3].

SARS-CoV-2 infection was confirmed as the cause of COVID-19 in Wuhan, China, in December 2019. The disease quickly spread worldwide, and the World Health Organization (WHO) declared a pandemic in March 2020. Thailand's first COVID-19 case was detected on January 13, 2020, leading to a government-issued emergency decree on March 26, 2020. The decree included a 'stay home' policy, the cancellation of national holidays, school closures, restricted access to public areas, face mask requirements, and social distancing measures[4]. We hypothesized that COVID-19 might significantly affect people's lives, causing stress due to sudden changes in plans and health concerns. During the early phase of the epidemic in China, the reported rate of depression in the general population was 16.5%, with female sex, student status, chronic illness, and poor health status linked to higher levels of stress, anxiety, and depression[5].

Depression is characterized by at least 2 weeks of persistent sadness, loss of interest, and inability to perform daily activities. The condition can affect job, school, and family performance. In Thailand, 1.5 million people suffer from depression, with 2.4% experiencing major depressive episodes[6]. Although several studies have suggested an association between women and depression during the COVID-19 pandemic, the results have been inconclusive, as demonstrated in Table 1. Most of these studies investigated a wide range of ages and did not specifically focus on women in the menopausal stage[7-10]. Depression is more common among females than males, and the prevalence increases with age[6, 11]. The menopausal transition, a hypoestrogenic stage, is a stressful event. It can lead to depression due to a decline in estrogen levels, which negatively impacts the metabolism of neurotransmitters such as dopamine, norepinephrine, β-endorphin, and serotonin. Menopausal symptoms such as hot flashes, sleep disturbances, and sexual dysfunction are associated with decreased estrogen levels. Risk factors for depression include medical disease and employment, marital and economic issues[12, 13]. We hypothesized that COVID-19-related stress could exacerbate depression prevalence in postmenopausal women with these risk factors. Early detection and treatment of depression can improve the quality of life of affected individuals.

Currently, there is a lack of research examining the prevalence of depression among postmenopausal Thai women during the COVID-19 pandemic. Therefore, this study aimed to investigate the prevalence and related factors of depression in postmenopausal Thai women during the pandemic. Our results could provide valuable insights for diagnosing, treating, and preventing depression in this population.

Table 1. Summary of cross-sectional studies surveying women with depression and its components during COVID-19 pandemic.

Authors	Year of study	Age (yr)	Diagnostic criteria for depression	Sample size	Country	Depression prevalence	Result of depression factors
Kullak-Bejda et al, 2022	2006 vs. 2021.	At least 40	Three questionnaires: 1. The menopause rating scale (MRS) 2. The Blatt–Kupperman menopausal index (BKMI) 3. The Beck depression inventory (BDI)	Menopausal women 2006 (N=241) vs. 2021 (N=350)	Poland	Mild depression: - 36.3% in 2006 - 59.3% in 2021 Moderate depression: - 36.3% in 2006 - 59.3% in 2021 Severe depression: - 3.0% in 2006 - 5.2% in 2021	Menopausal complaints, as evaluated by the BKMI and MRS; increase in depressive moods.
Khatak et al, 2022	May–June 2021	40-60	Four questionnaires: 1. Background Information and Fear of COVID-19 Scale 2. Patient Health Questionnaire (PHQ-9) 3. Generalized anxiety disorder 7 (GAD-7) 4. EuroQol-5D (mobility, self-care, usual activities pain/discomfort and anxiety/depression)	200 menopausal women	India	Minimal depression: 61% Mild depression: 38.5% Moderate depression: 0.5%	Infection; being afraid of losing life; become nervous or anxious while watching COVID-19 news on social media; sleeplessness; and restlessness
Afshari et al, 2022	August–December 2021	-	Three questionnaires: 1. A demographic questionnaire 2. COVID-19 infection information 3. DASS-21 (level of depression, anxiety, and stress)	190 infertile women	Iran	Half of the women reported moderate and severe depression and anxiety	Lower in women with good and moderate economic statuses
Cybulska et al, 2022	August–October 2021	41–75	4 questionnaires 1. Beck Depression Inventory (BDI) 2. Spielberg State-Trait Anxiety Scale (STAI: assesses both trait and state anxiety) 3. Blatt–Kupperman Index (BKMI: evaluates climacteric symptoms) 4. Inventory of Social Supportive Behaviors (ISSB)	295 menopausal women	Poland	Mild depression: 13.8% Moderate depression: 7.3% Severe depression: 3.7%	Sociodemographic and medical variables had no significant effects on depression.

Materials and Methods

The study adhered to the ethical principles of the Declaration of Helsinki, and its protocol was authorized by the Siriraj Institutional Review Board (approval number 1039/2564–IRB4). This cross-sectional study recruited postmenopausal women who visited the Gynecologic Endocrinology Clinic, Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital.

Study population and data collection

This study included postmenopausal women aged at least 40 who attended the Gynecologic Endocrinology Clinic between April and December 2022. Patients with mental disorders, individuals taking antidepressants, or those with incomplete data for depression evaluation were excluded. All participants provided signed informed consent. Self-reported data consisted of 3 main sections: sociodemographic information; knowledge, attitudes, and preventive practices (KAPs) related to COVID-19; and the Thai Depression Inventory questionnaire.

The sociodemographic data collected in this study comprised age, age at menopause, menopausal status, marital status, parity, education, occupation, household income, postmenopausal hormone therapy, medical history of metabolic diseases (diabetes mellitus, hypertension, dyslipidemia, and chronic kidney disease), COVID-19 vaccination status, and previous COVID-19 infection in the family. Physical examinations were performed to measure the participants' height (in cm) and weight (in kg), and body mass index was calculated.

Definitions of menopausal status

The study participants were categorized into 2 groups based on their menopausal status: natural postmenopausal women and surgical postmenopausal women. Natural postmenopausal women were defined as those who had experienced 12 consecutive months of amenorrhea or had follicle-stimulating hormone levels over 40 IU/L without any apparent pathological or physiological causes for amenorrhea. Surgical postmenopausal women were defined as those who had undergone surgical removal of both ovaries, with or without hysterectomy[14].

KAPs related to COVID-19

To evaluate public awareness of COVID-19, it is necessary to assess the KAPs related to the disease. The COVID-19 KAP questionnaire developed by Zhong et al in 2020[15] was translated into Thai by Khumsaen in 2021[16], and it was found to have a Cronbach's alpha score of 0.81. The COVID-19 KAP questionnaire has 16 questions related to COVID-19. Twelve of the questions assess knowledge, 2 questions evaluate attitudes, and 2 questions examine COVID-19-related practices. Participants were asked to answer with 'true,' 'false,' or 'unsure' responses.

The rating scale for the 12 knowledge questions is divided into 3 levels. Low scores range from 0.00 to 4.00, moderate scores span from 4.01 to 8.00, and high scores extend from 8.01 to 12.00. In the case of the 2 attitude questions, participants are given 1 point for answering 'true' and zero points for answering 'false' or 'unsure.' The rating scale for attitudes has 2 levels: low scores range from 0.00 to 1.00, and high scores range from 1.01 to 2.00. Regarding the 2 preventive practices questions, participants are asked about their habits of going to crowded locations and using a mask. Participants receive 1 point for answering 'false' and zero points for answering 'true' or 'unsure.' The rating scale for preventive practices also has 2 levels, with low scores ranging from 0.00 to 1.00 and high scores ranging from 1.01 to 2.00.

Criteria for the diagnosis of depression

In 1999, Lotrakul et al developed a self-rating instrument called the Thai Depression Inventory to measure the severity of depression[17]. It was published in the Journal of the Psychiatrist Association of Thailand. The instrument comprises 20 questions divided into 6 factors: anxiety syndrome, depression factor, hypochondriacal factor, somatic symptoms of anxiety, somatic symptoms of depression, and psychomotor retardation. Each item is scored on a

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scale of 0 to 3, with a maximum total score of 60. Total scores are classified into 5 groups: no depression (≤ 20), mild depression (21–25), less than major depression (26–34), major depression (35–40), and severe major depression (≥ 40). The gold standard used to evaluate the Thai Depression Inventory was the Hamilton Depression Rating Scale, and the instrument was found to have a Cronbach's alpha score of 0.86.

Statistical analysis

The sample size for this study was calculated using the formula for descriptive studies, and the sampling method was convenience sampling. An investigation by Wang and colleagues in 2020 reported that the prevalence of depression among the general population in China during the early phase of the COVID-19 outbreak was 16.5%[5]. However, earlier research indicated that the prevalence was higher among elderly and female individuals[11]. Therefore, we hypothesized a prevalence of 20% among menopausal women, with a precision error of estimation (d) of 0.05 (or 5% of P), alpha of 0.05, and a margin of error of 10%. The required sample size for prevalence estimation was at least 271 cases.

The data were analyzed using IBM SPSS Statistics for Windows, version 23 (IBM Corp, Armonk, NY, USA). Descriptive statistics were presented as the mean ± standard deviation, number (%), or percentage (95% CI), as appropriate. Data were analyzed using univariate analysis. Statistical differences were identified using student's t-test for normally distributed continuous data and the chi-squared test for categorical data. Nonnormally distributed variables were compared using the Mann–Whitney U test and reported as medians with interquartile ranges. Odds ratios and their 95% confidence interval (CI) were calculated for each risk factor. A p value less than 0.05 were considered statistically significant.

Results

Table 2 presents the sociodemographic characteristics of 271 participants, comprising 175 natural postmenopausal women and 96 surgical postmenopausal women. The overall mean age was 56.4 ± 8.2 years (ranging from 36 to 83 years), and the mean age at menopause was 49.8 ± 5.8 years. The majority (64.6%) of participants were postmenopausal, with an average age at menopause of 48.8 ± 4.9 years. Most participants were married, multiparous, and highly educated. The monthly household income ranged from 20,001 to 50,000 Baht, with over 40% of the participants employed by private or governmental organizations. Current hormone therapy usage was 24.5%, and surgical postmenopausal women had a significantly higher usage rate than natural postmenopausal women (42.7% vs 14.9%, p < 0.001). Among all participants, 65.3% had pre-existing medical conditions, with 21.8% having two or more diseases. The prevalence of pre-existing medical conditions was significantly higher among natural postmenopausal women than in surgical postmenopausal women (74.9% vs 47.9%, p = 0.001). The overall COVID-19 vaccination rate was 97.4%, and 26.9% of participants reported having been infected with COVID-19. Additionally, 38.4% of households had experienced a COVID-19 infection, but there were no significant differences in the rates for the natural and surgical postmenopausal groups.

Table 3 details the prevalence of depression as measured by the Thai Depression Inventory. The study found an overall prevalence of 9.6% among menopausal women during the COVID-19 pandemic, with surgical postmenopausal women having a higher rate (11.5%) than natural postmenopausal women (8.6%). However, there was no significant difference in the depression prevalence of the 2 subgroups. In contrast, the severity of depression in the surgical and natural menopausal groups differed significantly, with a higher prevalence of mild depression among surgical menopausal women (11.5%) than among natural menopausal women (4.0%, p = 0.022).

Table 2. Characteristics of 271 postmenopausal Thai women.

	All subjects (n = 271)	Menopausal status	
		Natural (n = 175)	Surgical (n = 96)
	mean ± SD or n (%)	mean ± SD or n (%)	mean ± SD or n (%)
Age, years (a)	56.4 ± 8.2	58.4 ± 7.4	52.7 ± 8.2
Age at menopause, years (a)	49.8 ± 5.8	48.8 ± 4.9	
BMI, kg/m²	24.2 ± 4.5	24.3 ± 4.5	24 ± 4.6
Marital status, single	75 (27.7)	47 (26.9)	28 (29.2)
Nulliparity	101 (37.3)	58 (33.1)	43 (44.8)
Education			
None	2 (0.7)	2 (1.1)	0 (0)
Primary school	49 (18.1)	34 (19.4)	15 (15.6)
Secondary school	53 (19.6)	32 (18.3)	21 (21.9)
Associate's degree	27 (10.0)	19 (10.9)	8 (8.3)
Bachelor's degree and above	140 (51.7)	88 (50.3)	52 (54.2)
Occupation			
Unemployed	65 (24.0)	45 (25.7)	20 (20.8)
Farmers	2 (0.7)	1 (0.6)	1 (1.0)
Retired	44 (16.2)	35 (20.0)	9 (9.4)
Employee in an organization	122 (45.0)	74 (42.3)	48 (50.0)
Merchant	38 (14.0)	20 (11.4)	18 (18.8)
Household income, Baht/month			
≤ 20,000	90 (33.2)	60 (34.3)	30 (31.3)
20,001 - 50,000	111 (41.0)	66 (37.7)	45 (46.9)
> 50,000	70 (25.8)	49 (28.0)	21 (21.9)
Hormone therapy status (a)			
Never used	204 (75.3)	149 (85.1)	55 (57.3)
Current user	67 (24.7)	26 (14.9)	41 (42.7)
Duration of hormone therapy			
< 1 yr	20 (7.4)	8 (4.6)	12 (12.5)
≥ 1 yr	47 (17.3)	18 (10.3)	29 (30.2)
Medical diseases (b)			
No	94 (34.7)	44 (25.1)	50 (52.1)
Diabetes mellitus	7 (2.6)	4 (2.3)	3 (3.1)
Hypertension	24 (8.9)	19 (10.9)	5 (5.2)
Dyslipidemia	29 (10.7)	23 (13.1)	6 (6.3)
Chronic kidney disease	2 (0.7)	2 (1.1)	0 (0)
Others	56 (20.7)	40 (22.9)	16 (16.7)
At least 2 diseases	59 (21.8)	43 (24.6)	16 (16.7)
COVID-19 vaccination, yes	264 (97.4)	170 (97.1)	94 (97.9)
Previous COVID-19 infection, yes	73 (26.9)	50 (28.6)	23 (24)
Family history of COVID-19 infection, yes	104 (38.4)	74 (42.3)	30 (31.3)

Comparison among the 2 menopausal groups were performed using student's t-test for continuous data, and the chi-squared test for categorical data; variables with statistical significance are labeled as (a) $p < 0.001$ or (b) $p = 0.001$.
SD: standard deviation, BMI: body mass index, NA: not applicable, Others: cancer, neurological disorders, respiratory disorders, gastrointestinal disorders, musculoskeletal disorders.

Table 3. Prevalence of depression using Thai depression inventory for 271 postmenopausal Thai women.

	Overall (n = 271)	Menopausal status	
		Natural menopause (n = 175)	Surgical menopause (n = 96)
	n (%) or median	n (%) or median	n (%) or median
Prevalence of depression	26 (9.6)	15 (8.6)	11 (11.5)
Factors of Thai depression inventory			
1	2.0 (1.0–5.0)	2.0 (1.0–4.0)	2.0 (1.0–5.0)
2	3.0 (1.0–3.0)	3.0 (1.0–3.0)	2.0 (1.25–3.0)
3	1.0 (1.0–2.0)	1.0 (1.0–1.0)	1.0 (1.0–2.0)
4	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.25–2.0)
5	1.0 (0.0–3.0)	1.0 (0.0–3.0)	1.0 (0.0–3.0)
6	0.0 (0.0–1.0)	0.0 (0.0–1.0)	0.0 (0.0–1.0)
Severity			
No	245 (90.4)	160 (91.4)	85 (88.5)
Mild depression(a)	18 (6.6)	7 (4.0)	11 (11.5)
Less than major depression	7 (2.6)	7 (4.0)	0 (0)
Major depression	1 (0.4)	1 (0.6)	0 (0)
Sever major depression	0 (0)	0 (0)	0 (0)

Data were analyzed using the chi-squared test for categorical data and the Mann–Whitney U test for nonnormally distributed data.
Data are n (%), median (interquartile range, IQR) otherwise indicated. Variables with statistical significance are labeled (a) p = 0.022.
Six factors from 20 items
Factor 1, anxiety syndrome (items 5, 7, 8, 10, 15 and 17); factor 2, depression factor (items 1, 2, 6 and 14); factor 3, hypochondriacal factor (items 16 and 18); factor 4, somatic symptoms of anxiety (items 9, 13 and 19); factor 5, somatic symptoms of depression (items 3, 11, 12 and 20); factor 6, psychomotor retardation (item 4).

Table 4 lists the KAPs related to COVID-19 and their associations with depression. Individuals with superior knowledge or attitudes toward COVID-19 had a lower prevalence of depression. Conversely, participants with high levels of preventive behavior had a higher prevalence of depression. However, these differences were not statistically significant.

Table 4. Knowledge, attitudes, and preventive practices of COVID -19 related to depression using the Thai Depression Inventory for 271 postmenopausal Thai women.

Factors	Non-depression n = 245, n (%)	Depression n = 26, n (%)	OR (95% CI)	p value
Knowledge				
Low	3 (1.2)	0 (0)	NA	
Middle	50 (20.4)	8 (30.8)	1.7 (0.7–4.2)	0.2
High	192 (78.4)	18 (69.2)		
Attitude			1.1 (0.5–2.5)	0.8
Low	116 (47.3)	13 (50)		
High	129 (52.7)	13 (50)		
Preventive behavior			0.9 (0.4–2.1)	0.9
Low	154 (62.9)	16 (61.5)		
High	91 (37.1)	10 (38.5)		

Data were analyzed using the chi-squared test for categorical data.
CI: confidence interval, NA: not applicable, OR: odds ratio.

Table 5 presents the factors associated with depression based on the Thai Depression Inventory. There was a significant difference in the prevalence of depression among menopausal women with monthly household incomes ≤ 20,000 Baht. However, there was no statistically significant difference in the prevalence of depression among women aged 50 and above, those who were married, or those with a body mass index < 23 kg/m².

Table 5. Factors associated with depression using the Thai Depression Inventory for 271 postmenopausal Thai women.

Factors	Non-depression n (%)	Depression n (%)	OR (95% CI)	p value
Age, yr			0.6 (0.2–1.5)	0.3
< 50 yr	44 (18.0)	7 (26.9)		
≥ 50 yr	201 (82.0)	19 (73.1)		
Marital status				
Single	65 (26.5)	10 (38.5)	2.1 (0.9–5.2)	0.1
Married	151 (61.6)	11 (42.3)		
Others	29 (11.8)	1 (3.8)	2.4 (0.8–7.3)	0.1
Household income, Baht/month				
≤ 20,000	75 (29.4)	15 (57.7)	3.3 (1.0–10.4)	0.04
20,001–50,000	104 (42.4)	7 (26.9)	1.1 (0.3–3.9)	0.9
> 50,000	66 (55.5)	4 (15.4)		
BMI, kg/m2			1.3 (0.6–2.9)	0.6
≤ 23 kg/m²	109 (44.5)	10 (38.5)		
> 23 kg/m²	136 (55.5)	16 (61.5)		
Medical diseases, CKD			20.3 (1.8–232.5)	0.02
No	244 (99.6)	24 (92.3)		
Yes	1 (0.4)	2 (7.7)		

Data were analyzed using chi-squared test for categorical data.
Others = divorce/separated/widowed.
BMI: body mass index, CI: confidence interval, CKD: chronic kidney disease, OR: odds ratio

Discussion

The first case of COVID-19 in Thailand was identified on January 13, 2020. By the end of 2021, the country had confirmed its first case of the Omicron variant. From early 2022, the rapidly increasing Omicron strain infections supplanted the Delta strain, leading to daily case numbers in the tens of thousands. As of September 2022, there were approximately 4.7 million cumulative cases and 30,000 deaths[18, 19]. Nevertheless, the severity of the disease also steadily decreased due to widespread vaccination and the attainment of sufficient immunity levels in the general population. The daily case numbers gradually fell to less than 100, indicating that the situation was being controlled. On October 1, 2022, the Thai government reclassified COVID-19 as a communicable disease under surveillance. Since then, the economy and society have been steadily recovering.

During the COVID-19 pandemic, the prevalence of depression among postmenopausal Thai women was 9.6%, as measured by the Thai Depression Inventory. This screening instrument, which measures the severity of depression, demonstrated satisfactory validity and reliability when evaluated with the Hamilton Rating Scale[20]. Six factors are assessed by the TDI: anxiety syndrome, depression factor,

hypochondriacal factor, somatic symptoms of anxiety, somatic symptoms of depression, and psychomotor retardation. The construction of each factor was founded not only on theoretical concepts of symptomatology, but also on the common manifestations of distress among Thai depressed subjects. This instrument was developed using data from the Thai population, so cultural differences are not a concern. Therefore, it is helpful to identify which component of the survey participants scored the highest to help distinguish postmenopausal symptoms and improve treatment outcomes.

The prevalence of depression observed in the current investigation (9.6%) was lower than the previously reported depression prevalence in the general Chinese population during the initial phase of the COVID-19 epidemic (16.5%). The differing results can be attributed to the timing of data collection. In the present study, data were collected 3 years after the pandemic outbreak, as opposed to early in the pandemic. By this later time point, individuals had adapted to a 'new normal' way of life, making adjustments in their careers, schools, and businesses. In other words, the situation was being managed, allowing individuals to resume a semblance of normalcy in their lives. Our research also indicated that participants with higher levels of knowledge or attitudes had a lower prevalence of depression, whereas those with high levels of preventative practices had a higher prevalence of depression. However, no statistically significant differences were found.

Compared to other studies, the prevalence of depression among postmenopausal Thai women during the COVID-19 pandemic was lower. Before the pandemic, Ahlawat et al[21] reported a prevalence of 38.3% among women with mild depression and 3.3% among women with moderate depression in Delhi. An et al[22] reported a prevalence of 2.8% in postmenopausal women in Korea prior to the pandemic. Differences in tools, cultural factors, and sociodemographic data may account for these varying results. There was no significant difference in the prevalence of depression among postmenopausal women between the pre-pandemic and the late-pandemic periods. Nonetheless, our findings contributed to a better understanding of the prevalence of depression in postmenopausal Thai women during the pandemic, which is crucial for implementing appropriate treatment and prevention measures.

During the initial phase of the COVID-19 outbreak in China[5], higher psychological impact was associated with female gender, lack of education, special physical symptoms, and a history of chronic illness. The present study found a higher prevalence of depression among low-income women. Additionally, women with chronic kidney disease were more likely to experience depression. However, adjusting for these factors through multiple logistic regression did not significantly alter these associations. Diabetes mellitus, hypertension, and dyslipidemia, as well as the presence of two or more underlying diseases, were not statistically associated with depression. This could be the participants whose conditions were stable. Similar to the study conducted in Delhi by Ahlawat et al[21], which suggested that depression was more common in postmenopausal women with lower socioeconomic status. Depression was more prevalent among those with chronic kidney disease (CKD) compared to the general population. In a prior study conducted in Taiwan, Chiang et al[23] reported a prevalence of depression of 22.6% among CKD patients who were not receiving dialysis treatment.

The prevalence of mild depression was 11.5% greater in women who underwent surgical menopause. A similar study conducted in Taiwan by Lin et al[24] also found that oophorectomy increased the overall risk of depression. However, Gibson et al[25] in the United States demonstrated that hysterectomy with or without ovarian conservation did not have a lasting negative effect on the mood of middle-aged women when compared to natural menopause. Although hormone therapy was found to be concurrently related to decreased anxiety and depression, there is uncertainty about its effect on depression symptoms in older women. It is possible that the decrease in depression

scores resulted from reduced vasomotor symptoms or estrogen's direct effects. Estrogen may function as an antidepressant by influencing neurotransmitter activity in the central nervous system, such as that of norepinephrine, serotonin, and dopamine. The differences in findings may be attributed to the use of hormone therapy and menopausal symptoms. Therefore, menopausal symptoms should be assessed in future research.

Our study has several limitations that must be taken into account. First, since the data were collected after the outbreak, participants may have responded differently to the questionnaire and interview items than they would have during the pandemic. Second, the COVID-19 situation was constantly evolving, and participants may have experienced varying degrees of stress. Third, the information surrounding the quarantine period for COVID-19 has changed, which may have affected the validity of the 12th knowledge question, which asks about the duration of quarantine. Nevertheless, this study adheres to the original information. Fourth, the study did not consider menopausal symptoms, such as vasomotor symptoms, pre-existing neurocognitive illnesses, such as dementia, which may be associated with an increased risk of depression. Fifth, the participants in our study were postmenopausal women who visited the Gynecologic Endocrinology Clinic at Siriraj Hospital, which may constrain the applicability of the results to rural populations and other healthcare systems. Last, an oversampling of a subgroup of peers (e.g., employed, retired) resulted in selection bias.

Conclusion

The prevalence of depression in postmenopausal Thai women during COVID-19 was 9.6%. Low household income and chronic kidney disease were significant predictors.

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Potential conflicts of interest

The authors declare no conflicts of interest.

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