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RESEARCH ARTICLE **OPEN ACCESS**

Analysis of Demographics Characteristics on Depression in Perimenopausal Staff at a Central General Hospital in Medan, Indonesia

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Abstract:

Introduction/Objective: Perimenopause is a period where the ovary gradually starts to produce less estrogen. One of the impacts that could happen during perimenopause is the onset of depression arising from hormonal and metabolic disorders due to the significant decrease of ovarium function and secretion of endogenous estrogen. This study was conducted to assess the factors related to depression in perimenopausal women.

Methods: A multivariate linear regression analysis with a cross-sectional design was conducted at a Central General Hospital in Medan, Indonesia, from October 2023 to January 2024. Subjects were perimenopausal female staff at the hospital who met the inclusion and exclusion criteria. Symptoms of depression were assessed using the Beck Depression Inventory-II (BDI-II) score. Data analysis was conducted using bivariate and multivariate tests with linear regression.

Results: A total of 111 subjects were included in this study. The median age was 48 years, and the median Body Mass Index (BMI) was 25. The mean depression score based on BDI-II was 12.96±7.084. Bivariate analysis showed significance on age, years of education, total monthly income, BMI, and number of pregnancies. Multivariate analysis showed that total monthly income had the highest correlation amongst other variables, followed by age, while the number of pregnancies had the lowest correlation.

Conclusion: In conclusion, there was a significance between depression and age, income, and number of pregnancies in perimenopausal staff. On the other hand, there was no significance between depression and years of education, BMI, marital status, and chronic disease.

Keywords: Perimenopause, Depression, BDI-II, Age, Linear regression, Demographics.

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1. INTRODUCTION

Perimenopause is a period where ovarium starts to gradually produce less estrogen. This period is related to hormonal change and reproduction function, which usually occurs around the 40s or earlier. The decrease in estrogen levels will accelerate during the last one to two years of the perimenopause period. The change during perimenopause might cause many symptoms to develop, which pushes almost 90% of women to seek medical help on how to overcome the symptoms [1-3]. One of the impacts that could occur during the perimenopause period is the worsening of preexisting mental health, the occurrence of mental disorders such as anxiety or depression that appear due to hormonal and metabolic disorders arising

from the significant decrease of ovarium function and secretion of endogenous estrogen. [4-6]

A meta-analysis conducted by Kruif *et al.* (2016) in the Netherlands showed that there was a higher risk of depression during perimenopause than premenopausal. [7] Another study by Chu *et al.* (2022) in China using the Hamilton Rating Scale for Depression (HAM-D) in 1748 females showed that 47.43% had symptoms of depression. [8] Lin *et al.* (2012) found that 3359 females in Taiwan aged between 40-55 years had a significantly higher risk of experiencing depression symptoms during perimenopause. [9] Furthermore, Gibbs *et al.* (2013) showed that 52.6% of females in Australia had symptoms of depression measured by the Beck Depression Inventory-II (BDI-II) score. [10]

Depression occurs more in women, with a proportion of about 5.1% compared to men (3.6%). The prevalence of depression also increases proportionally with age. Up to 40% of women experienced depression symptoms during the transition of perimenopause, which has been linked to hormonal change, history of depression episodes, life events, and genetic predisposition. [4, 11, 12] The high risk of depression in women is linked to female-specific reproductive events demonstrated by intense hormone-related changes, such as menarche, perimenstrual change, pregnancy/postpartum period, and menopause. [13-15] Thus, this study was conducted to assess the factors that are related to depression in perimenopausal women.

2. MATERIALS AND METHODS

This study used multivariate linear regression analysis with a cross-sectional design at a Central General Hospital in Medan, Indonesia, from October 2023 to January 2024. Consecutive sampling was used as the sampling technique, which obtained a total of 111 subjects who were perimenopausal female staff at the hospital and fulfilled the inclusion and exclusion criteria.

The inclusion criteria were females of ≥45 years, fulfilling the perimenopause period criteria, and willing to take part in the study. Meanwhile, subjects with a history of mental disorders as assessed *via* interview based on the Mini-International Neuropsychiatric Interview – International Classification of Disease-10 (MINI-ICD-10) and history of psychoactive substances use (except nicotine and caffeine), and subjects with missing data were excluded from the study.

The independent variables in this study include marital status, number of pregnancies, chronic disease, age, years of education, total monthly income, and Body Mass Index (BMI). Meanwhile, the dependent variable was the Beck Depression Inventory-II (BDI-II) score. Perimenopause in this study is defined as the time just before menopause characterized by age ≥45 years, irregular menstrual cycles in the past 12 months, with at least one period cycle within the last three months. Years of education is defined as the duration of attending formal education. Total monthly income is defined as the total income within one household in a month. The number of pregnancies in this study refers to the number of pregnancies terminated with alive children only from one female during her lifetime. Chronic disease is defined as a disease that gradually lowers the condition of patients in years and is usually an indication of harmful disease that could result in death of the patients. These variables were assessed through an interview. Furthermore, BMI is defined as an assessment of the level of body ideality based on body weight, measured by body weight/body height.

The BDI-II scoring system was used to assess the symptoms of depression. It consists of 21 questions, with 0 as the lowest score and 63 as the highest score. Data collection was conductedusing questionnaires.

Perimenopausal female staff who fulfilled the inclusion and exclusion criteria were requested to sign an informed consent form prior to the study. Then, history-taking and structured interviews were conducted, followed by questionnaires, in which subjects had to fill in their details, and the BDI-II questionnaire.

Data analysis was conductedusing a bivariate test on the numerical variables using the Pearson test on normally distributed data and the Spearman test for non-normal distribution. Meanwhile, on the categorical variables, the t-test independent or Mann-Whitney U test was used. Variables that met the criteria of $p < 0.25$ were used in multivariate linear regression analysis for further findings. The Statistical Package for the Social Sciences (SPSS) program was used for data analysis. This study has been approved by the Health Research Ethics Committee of the University of Sumatera Utara with approval number 1066/KEPK/USU/2023. This study was conducted on humans based on the Helsinki Declaration of 1975, revised in 2013.

3. RESULTS

A total of 111 subjects were involved and participated in all stages of this study, and no subject had any missing data. The median age was 48 years, with a median BMI of 25. The mean depression score based on BDI-II was 12.96±7.084. Most subjects were married (79.3%) and had no chronic disease (70.3%). Table **1** shows the subjects' characteristics.

Bivariate analysis (Table **2**) using the Pearson test showed that age, years of education, total monthly income, and BMI variables were qualified for multivariate analysis. Furthermore, the T-independent test showed a p-value of 0.001 on the number of pregnancies, while the Mann-Whitney U test showed a p-value of 0.006 and 0.001 for marital status and chronic disease, respectively.

Three out of the seven variables (age, total monthly income, and number of pregnancies) that were included in the multivariate analysis correlated with symptoms of depression in perimenopause women. The age variable had a weak positive correlation, while the total monthly income and number of pregnancies had a moderate negative and very weak negative correlation, respectively. Multivariate analysis was performedby taking out the statistically insignificant variables, and three analysis models were conducted to obtain the fittest model with the

Table 1. Subjects' characteristics.

Variables	Mean ± SD	Median (min-max)	n (%)
Age (years)	-	48.00(45-54)	-
Years of education (years)	-	16.00(15-20)	-
Total monthly income (million rupiah)	-	9.00(6-18)	-
BMI	-	25.00(21-34)	-
Marital status -Married -Not married	-	-	88(79.3) 23(20.7)
Chronic disease -Yes -No	-	-	33(29.7) 78(70.3)
Number of pregnancies -≥2 -<2	-	-	60(54.1) 51(45.9)
Depression (BDI-II) score	12.96±7.084	-	-

Table 2. Bivariate analysis between variables.

Variables	Mean ± SD	Median (min-max)	n (%)	R	P-value
Age (years)	-	48 (45-54)	111(100)	0.560	<0.001*
Years of education (years)	-	16 (15-20)	111(100)	-0.575	<0.001*
Total monthly income (million rupiah)	-	9 (6-18)	111(100)	-0.711	<0.001*
BMI	-	25 (21-34)	111(100)	0.462	<0.001*
Marital status -Married -Not married	-	-	88(79.3) 23(20.7)	-	0.006**
Chronic disease -Yes -No	-	-	33(29.7) 78(70.3)	-	0.001**
Number of pregnancies -≥2 -<2	-	-	60(54.1) 51(45.9)	-	0.001*
Depression (BDI-II) score	12.96±7.084	-	-	-	-

Table 3. Multivariate analysis of factors related to depression in perimenopausal staff.

Variables	Correlation Coefficient	β Multivariate Regression	P-value
Constant	-	-15.341	-
Age	0.299	0.845	<0.001
Total monthly income	- 0.549	-1.102	<0.001
Number of pregnancies	-0.136	-0.1919	0.034

Note: Adjusted R^2 = 58.8%.

highest determination coefficient (58.8%). Thus, the remaining variables were age, total monthly income, and number of pregnancies. This analysis showed that total monthly income had the highest correlation compared to the other variables, followed by age and number of pregnancies (Table **3**). It indicated that a lower total monthly income and a lesser number of pregnancies could predict an increased risk of depression. Furthermore, older age could result in a higher level of depression.

4. DISCUSSION

In this study, we found a significant relationship between the variables age, total monthly income, and number of pregnancies with depression in perimenopausal staff. There was a weak positive correlation in the age variable. This agreed with the study by Chu *et al*. (2022) in China, which stated the significance between age and depression in perimenopausal women. Older women tend to have symptoms of depression [8, 16]. A study by Li *et al*. (2016) in China showed similar findings, where significance was observed between age and depression in women at perimenopausal age. It found that the prevalence of perimenopause syndromes increases with age, where mild symptoms will gradually increase the depression symptoms due to a lack of hormones [17]. Some studies stated that it might be due to the decrease in

health status in general at older age. However, the prevalence of depression in older age was primarily due to the psychological changes during the transition to menopause [8, 18-20].

There was a negative correlation with moderate strength between total income and depression. Similar results were also reported in a study by Wang *et al.* (2021), where a significance was observed between monthly income and occurrence of depression. It indicated that lower monthly income tends to increase the symptoms of perimenopausal depression [21]. These findings were also in line with the study conducted by Li *et al.* (2016) in China, which showed a significance between income and perimenopausal depression. It explained that high income and good health insurance could become protective factors for depression [17].

This study revealeda very weak negative correlation between the number of pregnancies and depression in perimenopausal women. This was in line with the study by Chu *et al.* (2022) in China, which found a significant correlation between the number of pregnancies and depression in perimenopausal women. It showed that women who have never given birth or only had once had 1.47 times higher risk of suffering from severe symptoms of depression [8]. This might be due to the presence of children, which could reduce the negative impacts of one's life events. However, when children have left home, parents tend to experience negative impacts that could increase the risk of depression [18]. Nevertheless, another study by Wang *et al.* in 2018 showed no correlation between the number of pregnancies and depression in perimenopause patients [21].

This study has several advantages and limitations. This study was based on researchers' knowledge through a literature review with methods and measurements that have never been conducted on Sumatera Island. Also, this study used the BDI-II questionnaire with Cronbach alpha 0.9 only for screening, which required a relatively short time, not to assess the diagnosis of depression. On the other hand, the limitation of this study is that it was only conductedin one hospital and was only possible using a cross-sectional design due to the limited resources. Thus, multicenter studies can be performedfor further studies with greater scope and capacity. In addition, the estrogen levels were not analyzed in this study, which could contribute to depression manifestation. This study also did not categorize samples based on the start of the perimenopausal period, which led to an interval age range of 9 years. Future studies should consider the estrogen levels and the start of the perimenopausal period, which may have a large variability.

CONCLUSION

In conclusion, there was a significance between depression and age, total monthly income, and number of pregnancies in perimenopausal women. On the other hand, there was no significance between depression and years of education, BMI, marital status, and chronic disease.

AUTHORS' CONTRIBUTION

It is hereby acknowledged that all authors have accepted responsibility for the manuscript's content and consented to its submission. They have meticulously reviewed all results and unanimously approved the final version of the manuscript.

LIST OF ABBREVIATIONS

BDI-II = Beck Depression Inventory-II

BMI = Body Mass Index

SPSS = Statistical Package for the Social Sciences

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study has been approved by the Health Research Ethics Committee of the University of Sumatera Utara, Indonesia with approval number 1066/KEPK/USU/2023.

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Perimenopausal female staff who fulfilled the inclusion and exclusion criteria were requested to sign an informed consent form prior to the study.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

All data are available within the article. However, supplementary data are available at 10.5281/zenodo. 13850560.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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