

The Relation Between Prenatal Maternal Stress and Sleep Quality of Pregnant Women in Palembang

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Abstrak

Objective: The aim of this research is to know incidence and relationship between prenatal maternal stress and sleep quality in pregnant women in Palembang City. This study also aims to determine the factors that influence prenatal maternal stress.

Method: Observational analytic study by collecting questionnaires on October 18 - November 19, 2022 in 6 puskesmas in Palembang City. This study used Pregnancy Stress Rating Scale (PSRS) and Pittsburgh Sleep Quality Index (PSQI), followed by calculating the Prevalence Risk.

Results: In this study, the results obtained were that of 56 pregnant women in Palembang City, 57.1% experienced stress (mild stress (51.8%) and moderate stress (5.3%)). There were 39.3% of pregnant women with good sleep quality and 60.7% with poor sleep quality. It was found that there was a significant relationship between prenatal maternal stress and sleep quality of pregnant women (PR=4.350; 95% CI; (1.979 – 9.564; p= 0.000). There was a significant relationship between the age of pregnant women and prenatal maternal stress (PR= 0.323; 95) % CI: (0.168 – 0.612); p=0.000) and a significant relationship between maternal work and prenatal maternal stress (PR= 0.425; 95% CI: (0.198 – 0.913); p = 0.013)

Conclusion: 57.1% of pregnant women in Palembang experienced stress and 60.7% have poor sleep quality. There was significant relationship between prenatal maternal stress and sleep quality in pregnant women in Palembang City. Factors that influence prenatal maternal stress, namely age and mother's occupation.

Key words: Pregnant women, Prenatal Maternal Stress, Sleep Quality\

Hubungan antara *Prenatal Maternal Stress* dan Kualitas Tidur Ibu Hamil di Kota Palembang

Abstract

Tujuan: Penelitian ini dilakukan dengan tujuan untuk mengetahui insidensi dan hubungan antara prenatal maternal stress dan kualitas tidur pada ibu hamil di Kota Palembang. Penelitian ini juga bertujuan untuk mengetahui faktor-faktor yang memengaruhi prenatal maternal stress.

Metode: Penelitian analitik observasional dengan mengumpulkan kuisisioner pada tanggal 18 Oktober - 19 November 2022 di 6 puskesmas di Kota Palembang. Penelitian ini menggunakan Pregnancy Stress Rating Scale (PSRS) dan Pittsburgh Sleep Quality Index (PSQI) yang kemudian dilanjutkan penghitungan Prevalence Risk .

Hasil: Pada penelitian ini diperoleh hasil, dari 56 ibu hamil di Kota Palembang sebanyak 57,1% mengalami stres (stres ringan (51,8%) dan stres sedang (5,3%)). Terdapat 39,3% ibu hamil dengan kualitas tidur baik dan 60,7% dengan kualitas tidur buruk. Ditemukan bahwa ada hubungan signifikan antara prenatal maternal stress dan kualitas tidur ibu hamil (PR=4.350; 95% CI; (1.979 – 9.564; p= 0,000). Terdapat hubungan signifikan antara usia ibu hamil dengan prenatal maternal stress (PR= 0,323; 95% CI: (0.168 – 0.612); p=0,000) dan hubungan yang signifikan antara pekerjaan ibu dengan prenatal maternal stress (PR= 0.425; 95% CI: (0.198 – 0.913); p = 0,013)

Kesimpulan: Sebanyak 57,1% ibu hamil di kota Palembang mengalami stres dan 60,7% memiliki kualitas tidur buruk. Terdapat hubungan signifikan antara prenatal maternal stress dan kualitas tidur pada ibu hamil di Kota Palembang. Faktor yang memengaruhi prenatal maternal stress, yaitu usia dan pekerjaan ibu.

Kata kunci: Ibu hamil, Prenatal Maternal Stress, Kualitas Tidur

Introduction

Sleep is a natural physiological process which is vital for the physical and mental well-being of the pregnant women and her fetus. A pregnant woman should get at least 7-8 hours of sleep at night.¹⁻⁴ it is not studied in developing countries including Ethiopia. Therefore, this study was aimed to assess the poor sleep quality and associated factors among pregnant women attending antenatal care at Jimma medical center, Jimma, Southwest Ethiopia, 2020. Methods: A cross-sectional study design was conducted among 415 pregnant women at Jimma Medical Center (JMC). A *cross-sectional* study conducted in China found that pregnant women experienced sleep disorders more often than women who were not pregnant.⁵ Insomnia is the most common sleep disorder in women during pregnancy, affecting 52% to 61% of pregnant women.⁶ A pregnant woman who sleeps less than six hours has a risk of premature birth, preeclampsia, prolonged partus, low progesterone levels, placental abruption, miscarriage, fetal death, and low birth weight.¹ As the gestational age increases, the frequency of sleep disorders also increases.⁵ The most common sleep problems observed in pregnant women are restless leg syndrome, sleep apnea, insomnia, nocturnal gastroesophageal reflux, and sleep-related breathing problems.¹

During the first trimester, the pregnant woman's sleep time will be longer, they often experience daytime sleepiness likely due to hormonal changes. During night, pregnant women will often urinate, having shortness of breath, heartburn, feeling uncomfortable in bed due to their body position, breast pain, and itching that cost decrease sleep quality.^{1,7} In the second trimester, sleep quality improves and daytime sleepiness decreases, however, there is respiratory problem during night sleep i.e. snoring. In the third trimester, many women experience restless leg syndrome and

respiratory problem during sleep including snoring and obstructive sleep apnea.⁷

The determining factors for the poor sleep quality of pregnant woman are socioeconomic status, age, divorce, body mass index, first pregnancy, history of fetal death, history of prolonged labor, zinc and fluorine deficiency, gestation period, having chronic diseases (DM, hypertension), unwanted pregnancies, lack of social support, and a history of mental illness.¹

A potential factor contributing to sleep disorders is psychosocial stress. The stress response and sleep regulation depend in part on the activity of arginine vasopressin (AVP). AVP is a hormone and neuropeptide along with oxytocin (OT), have important role in affiliated and social behavior including a specific role in pregnancy and childbirth and in circadian rhythms. There is likely a two-way relationship between stress can cause sleep disturbances, including chronic sleep deprivation and circadian discrepancy, which also can increase the stress response.⁷

This study was conducted with the aim of determining the relationship between prenatal maternal stress and sleep quality in pregnant women in Palembang City. This study also aims to determine factors affecting prenatal maternal stress, to provide scientific evidence for the development of prevention strategies and intervention to improve sleep quality and prevent stress in pregnant women.

Method

Data Collection

In this research, the collected data was primary data using total sampling from 18 October to 18 November 2022 in 6 randomly chosen Primary health care center (puskesmas) in Palembang. Data collection was carried out by distributing questionnaires to all pregnant woman regardless gestational age. This study used the Pregnancy Stress Rating Scale (PSRS) and Pittsburgh Sleep Quality Index

(PSQI) questionnaires. The grouping of PSRS values was divided into 4, namely no stress (0-35), mild stress (36-72), moderate stress (73-108), and severe stress (109-144). The grouping of PSQI values was divided into 2, namely poor sleep quality (<5) and good sleep quality (≥ 5).

Data Processing

Data was collected and processed using IBM SPSS Statistics 26 software. After the data collected, an examination and correction were carried out. Data was converted to number format (*coding*), filled to the column of variables, presented in statistical descriptive table and in the form of correlative analysis table.

Data Analysis

Bivariate analysis was performed by 2x2 Chi square test. The Prevalence Risk (PR) value was measured to see the relationship between two variables. A statistically significant result had a p-value <0.05. For the purposes of analysis, the stress category was grouped into two groups, namely no stress and mild-moderate stress.

Results

The results of this study showed the characteristics of 56 pregnant women in Palembang City. The number of pregnant women in the age range of 25 years or more was 30 (53.6%). The gestational age of mothers was more dominant in 2nd trimester, as many as 30 (53.5%) pregnant women. There are 27 (48.2%) pregnant women with normal BMI. There are 43 (76.8%) pregnant women with primary and secondary education (elementary, middle, and high school). In line with work history, more mothers were not working mom, 39 (69.6%) pregnant women. Many pregnant women experienced a history

of spontaneous childbirth compared to sectio caesarea, namely 32 (57.1%) pregnant women. Only 15 (26.8%) pregnant women had a history of abortion. (Table 1)

Based on the PSRS questionnaire from 56 pregnant women, 42.9% did not experience stress, the highest level of stress experienced by pregnant women was mild stress, which was 51.8% followed by 5.3% of pregnant women experienced moderate stress level and no pregnant women experienced severe stress. (Fig 1) The assessment of sleep quality is categorized into good sleep quality and poor sleep quality. Based on the PSQI questionnaire from 56 pregnant women, 39.3% of pregnant women have good sleep quality and 60.7% of pregnant women have poor sleep quality. (Fig 2) The maximum PSQI value of this study is 12, while the minimum value is 2.

Table 1 Demographic Characteristics of Pregnant Women

Characteristic	Number (n)	Percentage (%)
Gestational Age		
1st trimester	7	12,5
2nd trimester	30	53,6
3rd trimester	19	33,9
BMI of Pregnant Women		
<18.5	3	5,4
18,5 – 24,9	27	48,2
25,0 – 19,9	17	30,4
≥ 30	9	16,1
Labor History		
Never	18	32,1
Spontaneous	32	57,1
Caesarean Section	6	10,7

Bivariate analysis between age of pregnant women and prenatal maternal stress was statistically significant (p-value <0.05).

There was significant relationship between prenatal maternal stress and maternal working status with p-value 0.013 (<0.05).

Figure 1 Distribution of Prenatal Maternal Stress Incidence Rate

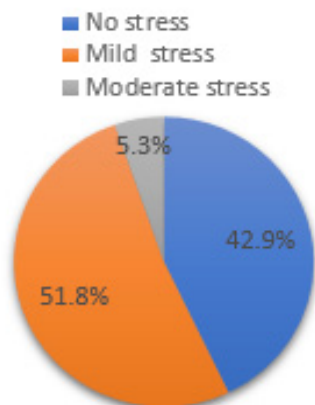


Figure 2 Distribution of Incidence Rates of Poor Sleep Quality and Good Sleep Quality



There was no significant association between gestational age ($p=1,000$), BMI of pregnant women ($p=0.616$), gravida ($p=0.901$), parity ($p=0.901$), education ($p=0.964$), maternity history ($p=0.483$), and history of abortus ($p=0.061$) with prenatal maternal stress. Results of Prevalence Risk (PR) calculation showed women with prenatal maternal stress experienced poor sleep quality 4,350 times worse compared to women who were not stressed. In relationship between age of pregnant women and prenatal maternal stress, we found $PR = 0.323$ ($95\% CI = 0.618 - 0.612$) concluded as age of mother was a protective factor

($PR < 1$). While working status also resulted as protective factor as $PR = 0.425$ ($95\% CI = 0.198 - 0.913$). (Table 2) Results of bivariate analysis showed a p -value 0.000 which indicated a significant relationship between prenatal maternal stress and sleep quality of pregnant women (p -value < 0.05). (Table 3)

Discussion

This study found 57.1% of pregnant women experienced stress with variations in mild and moderate stress. Most of pregnant women experienced mild stress (51.8%), then moderate stress (5.3%), none of the pregnant women experienced severe stress. This study is similar to a study conducted at California University that found 54% of women experienced mild to moderate stress levels during pregnancy.⁸ This study is different from some studies conducted which stated that stress in pregnant women reached 78% and 90%.⁹ there is still a lack of large-scale cohort research exploring this relationship in the second trimester. Thus, we assessed the associations of sleep quality during the second trimester with antenatal stress and antenatal and postnatal depression. Methods: We examined 1152 pregnant women from a prospective cohort study in China to assess the associations of sleep quality in the second trimester with antenatal stress, antenatal depression, and postnatal depression. We used linear regression models and logistic regression models to examine the associations of sleep quality (Pittsburgh Sleep Quality Index [PSQI]).¹⁰

There were more than half (60.7%) of pregnant women with poor sleep quality and 39.3% of pregnant women with good sleep quality found.¹¹ Pauley et al's research has a similar prevalence to this study, which is 44%-73% of pregnant women have poor sleep quality.¹⁰ The National Sleep Foundation said that nearly 80% of pregnant women have poor sleep quality, almost 40% of women have

Table 2 Relationship between Characteristics of Pregnant Women and Prenatal Maternal Stress

Characteristics of Pregnant Women	Prenatal Maternal Stress						PR	CI95%	
	Mild-moderate		No stress		P Value	Min			Max
	n	%	n	%					
Mother's Age									
	<25 years old	7	8,9	19	33,9	0,000	0,323*	0,168	0,612
	≥25 years old	25	51,8	5	5,4				
Gestational Age									
	1 st -2 nd trimester	21	37,5	16	28,6	1,000	0,980*	0,609	1,577
	3 rd trimester	11	19,6	8	14,3				
Mother's BMI									
	Abnormal	18	32,1	11	19,6	0,616	1,197*	0,754	1,899
	Normal	14	25,0	13	23,2				
Gravida									
	Primigravida	11	19,6	7	12,5	0,901	1,106*	0,694	1,763
	Multigravida	21	37,5	17	30,4				
Parity									
	Nullipara	11	19,6	7	12,5	0,901	1,106*	0,694	1,763
	Multipara	21	37,5	17	30,4				
Education									
	Primary and Secondary	24	42,9	19	33,9	0,964	0,907	0,54	1,50
	College	8	14,3	5	8,9		*	7	3
Work									
	Working	5	8,9	12	21,4	0,013	0,425*	0,198	0,913
	Not Working	27	48,2	12	21,4				
History of Labor									
	Never	12	21,4	6	10,7	0,483	0,789*	0,506	1,232
	Spontaneous or caesarean section	20	35,7	18	32,1				
History of Abortus									
	Yes	5	8,9	10	17,9	0,061	0,506*	0,239	1,070
	Not	27	48,2	14	25,0				

* : Chi square Test

Table 3 Relationship between Prenatal Maternal Stress and Sleep Quality of Pregnant Women

	Poor Sleep Quality		Good Sleep Quality		Total	<i>p value</i>	PR (CI95%)
	N	%	N	%			
Mild-Moderate Stress	29	51.8%	3	5.4%	100%	0.000	4.350 (1.979 – 9.564)
No Stress	5	8.9%	19	33.9%	100%		

poor sleep quality at the beginning of their pregnancy.¹¹ From this study, it was found that there was a relationship between prenatal maternal stress and sleep quality ($p < 0.05$). Pregnant women who experience stress are at risk 4.4 times for having poor sleep quality. A cohort study in China conducted by Gao et al, showed there was a significant association between prenatal maternal stress and sleep quality (OR= 2.60; 95% CI= 1.79-3.77); $p < 0.001$).⁹there is still a lack of large-scale cohort research exploring this relationship in the second trimester. Thus, we assessed the associations of sleep quality during the second trimester with antenatal stress and antenatal and postnatal depression. Methods: We examined 1152 pregnant women from a prospective cohort study in China to assess the associations of sleep quality in the second trimester with antenatal stress, antenatal depression, and postnatal depression. We used linear regression models and logistic regression models to examine the associations of sleep quality (Pittsburgh Sleep Quality Index [PSQI]) Similarly, research conducted by Eichler et al showed there was a significant association between prenatal maternal stress and sleep quality of pregnant women ($p < 0.001$).¹² Research also conducted by Zhang, stated there was a significant relationship between prenatal maternal stress and sleep quality in pregnant women ($p < 0.001$).¹³

Due to stressful circumstances, the hypothalamic-pituitary-adrenocortical (HPA) axis will be activated.¹⁴ The activation of HPA will activate the hypothalamic paraventricular (PVN) consisting of magnocellular subdivisions (mPVN) and parvoselulser

(pPVN). mPVN and supraoptic nucleus (SON) are the main sources of Arginine vasopressin (AVP) and oxytocin who play a role during pregnancy and in sleep-wake cycle, while pPVN is the main source of Corticotropin-releasing hormone (CRH). About 50% of CRH pPVN neurons also express AVP.^{7,15} CRH and AVP will released and reach the anterior pituitary. There are two AVP receptors, AVPR1a and AVPR1b, which are found in brain. CRH and AVP will bind to CRH receptor type 1 (Crhr1) and V1b receptor (AVPR1b) respectively, thereby stimulating the secretion of Adrenocorticotrophic Hormone (ACTH). Through circulation of peripheral ACTH, ACTH travels towards adrenal cortex to induce steroidogenesis, which effectively increases the secretion of glucocorticoid hormone (cortisol).¹⁶⁻¹⁸ In this state, there is an increase in beta waves and a decrease in delta waves that cause brain to be in a state of wakefulness or consciousness. This is the cause of the poor sleep quality in pregnant women.¹⁹ Physiologically, when gestational age increases, ACTH levels will increase and linked to sleep disorders in pregnant woman.²⁰

Results of this study show that age of pregnant women has significant relationship with maternal stress. Pregnant women with less than 25 years old was expressed as a protective factor against stress (PR= 0.323; 95% CI: (0.168 – 0.612)). This means pregnant women with less than 25 years old of age has lower risk of stress by 0.323 times. According to Mallery et al, the older the age of pregnant women, means the greater chance of pregnant women experiencing

stress, which associated with pregnancy complications such as preeclampsia which may cause stress, while the younger pregnant woman reduces the risk of stress because they have less possibility of complications such as preeclampsia.¹¹ Pregnant women with young age also tend to have simple thoughts about pregnancy and this help to reduce their stress. This study showed there was no significant association between maternal BMI and stress ($p= 0.616$). Kominiarek et al discusses the relationship between gestational weight gain (GWG) and stress ($p = 0.02$). The study states pregnant women with low GWG are associated with high stress levels.^{19,20}

In this study, no significant relationship between gestational age and stress in pregnant women ($p = 1,000$), in line with the research of Khouj et al.²¹ However, this study is not in line with the study by Nwafor et al that stated a significant association where 3rd trimester of gestational age have twice higher risk of experiencing stress compared to the 1st trimester (OR=1.9, 95% CI: 1.05–3.29, $p = 0.034$).²² In this study, it was found no significant association between maternal gravida and stress ($p = 0.901$) in line with Sanchana et al ($p = 0.5390$).²³

It was found that nulliparity mothers had a 1,106 times greater risk of stress than multiparity mothers, but no statistically significant relationship was found ($p>0.05$). The research of Keramat et al stated no significant association between maternal parity and stress.²⁴ Research by Bawahab et al stated that mothers who have more than three children have four times risk of stress. This is due to multiparity can have high levels of pregnancy-related stress, especially if the woman's childbirth experience is not as desired.^{11,25} However, it is explained that nulliparity mothers are at higher risk of experiencing stress, because they worried to have to be in maternal roles include responsibility, raising children, and educating children.^{8,25}

Results of this study found that working mothers is a protective factor (PR = 0.425; 95% CI: (0.198 – 0.913)) against prenatal maternal stress. This means that working pregnant women can reduce the risk of stress by 0.425 times. This research is in line with Xian et al who stated a significant association of working pregnant women with stress. According to this study, working mothers can reduce the risk of stress because working mothers do not have much time to overthink their pregnancy.¹¹ Working mothers also can earn money, thus reducing the risk of stress in pregnant women because the household needs can be fulfilled.

Results of this study showed no significant association between labor history and stress ($p > 0.05$). This study is not in line with Khouj et al, which in their study found a significant relationship between the history of sectio caesarea delivery and stress in pregnant women ($p < 0.05$). However, women who underwent a cesarean section on their own request had a lower level of stress compared to those due to medical indications ($p = 0.007$). It was also found no significant relationship between the preferred mode of delivery and stress levels in pregnant women ($p = 0.153$).²⁵

The study found no significant association between abortus history and stress ($p = 0.061$). Khouj et al's research also states no significant association between abortus history and stress. However, this result is in contrast to the research of Bahawab et al which stated from 119 women who had a history of abortion, 92.4% of them experienced one or more psychological problems after an abortion. Abortion history is listed as one of the risk factors for post-traumatic stress disorder in the DSM-V classification.²⁶

Conclusion

Results of this study found that out of 56 pregnant women in Palembang City as many

as 57.1% of pregnant women experienced stress, with variations: mild stress (51.8%), moderate stress (5.3%). There is a relationship between *prenatal maternal stress* and the quality of sleep for pregnant women in Palembang. The factors affecting *prenatal maternal stress* are the age of the mother and the mother's occupation (protective factors).

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