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Sleep Quality and Associated Factors during Pregnancy

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ABSTRACT

Objectives: To assess the prevalence of poor sleep quality among Thai pregnant women and associated factors.

Materials and Methods: A multicenter cross-sectional study was conducted between October 2021 and June 2022. The sleep quality was evaluated using the Thai version of the Pittsburgh sleep quality index (T-PSQI). Factors associated with poor sleep quality (T-PSQI score > 5) were determined using logistic regression analyses.

Results: This study included 414 participants. The prevalence of poor sleep quality was 43.2% (95% confidence interval 38.4% - 48.2%). Prevalence of poor sleep quality was the highest among pregnant women in the third trimester (37.6%, 35.3%, and 51.0% for women in the first, second, and third trimesters, respectively). In multivariate analyses, only gestational trimesters were independently associated with poor sleep quality. There were no significant associations between poor sleep quality and maternal age, pre-pregnancy body mass index, or the number of prior conceptions.

Conclusion: Approximately 43% of Thai pregnant women in this study encountered poor sleep quality. The prevalence of poor sleep quality was the highest among pregnant women in the third trimester.

Keywords: sleep quality, pregnancy, associated factors, pittsburgh sleep quality index .

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คุณภาพการนอนหลับและปัจจัยที่เกี่ยวข้องในระหว่างตั้งครรภ์

พรศิริ คำภูแสน, ยุวดี อิฐรัตน์, พิรชา ตั้งตรงไพโรจน์, กนกพร บุตรมารศรี, วิรัชนี สุขวัฒนานนท์, น้ำเพชร จำปาทอง

บทคัดย่อ

วัตถุประสงค์: *เพื่อประเมินคุณภาพการนอนหลับของสตรีตั้งครรภ์แต่ละไตรมาสและปัจจัยที่มีความสัมพันธ์กับคุณภาพการนอนของสตรีตั้งครรภ์แต่ละไตรมาส*

วัสดุและวิธีการ: *การศึกษาแบบพหุสถาบัน เชิงพรรณนาแบบตัดขวาง ระหว่างเดือนตุลาคม พ.ศ.2563 ถึง เดือนมิถุนายน พ.ศ.2564 โดยการใช้แบบประเมินคุณภาพการนอนหลับแบบพิตส์เบอร์ก ฉบับภาษาไทย (Thai version of the Pittsburgh sleep quality index; T-PSQI) ในการประเมินคุณภาพการนอนหลับ รวมทั้งได้ศึกษาปัจจัยที่สัมพันธ์กับคุณภาพการนอนหลับที่ไม่ดี (T-PSQI score > 5) โดยใช้สถิติวิเคราะห์การถดถอยโลจิสติค (logistic regression analyses)*

ผลการศึกษา: *ในสตรีตั้งครรภ์ 414 คน พบว่า ความชุกของคุณภาพการนอนหลับที่ไม่ดี คือ ร้อยละ 43.2 (ช่วงเชื่อมั่นร้อยละ 95, 38.4 - 48.2) ซึ่งความชุกของคุณภาพการนอนหลับที่ไม่ดีนั้นพบสูงที่สุดในหญิงตั้งครรภ์ไตรมาสที่สาม (ร้อยละ 37.6, 35.3, 51.0 ในสตรีตั้งครรภ์ไตรมาสที่ 1, ไตรมาสที่ 2 และไตรมาสที่ 3 ตามลำดับ) และในการวิเคราะห์พหุตัวแปรพบว่าปัจจัยที่มีความสัมพันธ์กับคุณภาพการนอนหลับที่ไม่ดีคือ ช่วงอายุครรภ์แต่ละไตรมาส และปัจจัยที่ไม่มีความสัมพันธ์ทางสถิติกับคุณภาพการนอนหลับที่ไม่ดี ได้แก่ อายุ ดัชนีมวลกายก่อนตั้งครรภ์ และจำนวนการตั้งครรภ์ก่อนหน้า*

สรุป: *ประมาณร้อยละ 43 ของสตรีตั้งครรภ์ไทย พบว่ามีคุณภาพการนอนหลับที่ไม่ดี ซึ่งความชุกของคุณภาพการนอนหลับที่ไม่ดีนั้นพบสูงที่สุดในหญิงตั้งครรภ์ไตรมาสที่สาม*

คำสำคัญ: *คุณภาพการนอนหลับ, การตั้งครรภ์, ปัจจัยที่เกี่ยวข้อง, แบบประเมินคุณภาพการนอนหลับแบบพิตส์เบอร์ก*

Introduction

During pregnancy, there are significant anatomical and physiological adaptations to allow fetal growth and preparation for childbirth[1]. These changes sometimes may lead to common complaints, such as constipation, low back pain, palpitations, lessened exercise tolerance, and dizziness[1].

Sleep complaints are not uncommon among pregnant women[2]. Although sleep disturbances occurring during pregnancy are generally secondary to pregnancy-related anatomical and physiological changes, they can be due to certain pathological causes such as maternal obesity, cardiometabolic disorders, and preexisting respiratory tract disease[2]. Evidence suggests that suboptimal maternal sleep during pregnancy is related to maternal depression, hypertensive disorders, gestational diabetes mellitus, fetal growth impairment, and preterm birth[2-5]. Meticulous assessment and appropriate management of sleep disorders during pregnancy may prevent adverse perinatal outcomes.

Sleep characteristics vary across the population assessed[6]. This may be due to the differences in the prevalence of conditions constituting links to sleep disorders such as obesity, cardiometabolic disorders, and psychological illness[6]. Sleep patterns also can be mediated by various sociocultural factors[6]. Assessments of sleep quality that focus on certain populations are therefore mandatory. Gathering information relevant to a particular group helps tailor appropriate management. Accordingly, this study was conducted to assess the prevalence of poor sleep quality and associated factors among Thai pregnant women.

Materials and Methods

Settings and participants

This multicenter cross-sectional study was conducted in four hospitals (two provincial hospitals and two tertiary hospitals) in Thailand from October 2021 to June 2022 and was approved by the review boards of the individual participating hospital. Participants were consecutive Thai pregnant women who attended antenatal care department during the study period. This study recruited only singleton pregnant women.

As the tool for assessing the quality of sleep in this study was a self-administered questionnaire, we, therefore, excluded pregnant women with limited reading ability. The research assistant provided study information to all potential participants. Only women who provided written consent were enrolled.

Data and measurements

Baseline demographic characteristics were extracted from medical records. To assess the sleep quality among the participants, this study applied the Thai version of the Pittsburgh sleep quality index (T-PSQI) developed by Sitasuwan et al[7] with permission obtained from the authors. The Pittsburgh sleep quality index (PSQI) is a tool to measure sleep quality during the previous month. The PSQI has been originally published by Buysse et al[8] in 1989. The PSQI is a self-rating questionnaire comprised of seven component scores, each rated from zero (no difficulty) to 3 (severe difficulty). The component scores are summed, resulting in a global score between 0 and 21, with higher scores implying greater sleep difficulty[8]. The PSQI global score greater than 5 indicates poor sleep quality[8].

Data analysis

Sample size was calculated based on an anticipated rate of poor sleep quality across trimesters of pregnancy of 40% with an absolute error of 10%, a type I error of 5%, and 10% of incomplete data. Overall, each participating hospital required at least 103 participants[9-11]. This multicenter cross-sectional study was undertaken in different level of participating hospitals to ensure that the sample of this study was representative for Thai pregnant women.

Descriptive statistics were used to present the background demographic characteristics of the participants. Factors potentially associated with an increased risk of poor sleep quality were identified by reviewing the existing literature. The subsets of participants that had no such potential factors were applied as reference groups during analysis.

The purposeful selection method was used for variable selection process. Variables that were noted to

have p value < 0.25 in simple logistic regression analysis were included for a multiple logistic regression analysis. Collinearity between the covariates in a multiple logistic regression model was assessed to ensure the exclusion of a significant degree of relationship among these variables. Adjusted odds ratio (aOR) and 95% confidence interval (CI) were computed to represent the magnitude of the association. Statistical analyses were performed with STATA version 14.

Results

This study recruited 414 women. The mean age was 29.02 years with a standard deviation (SD) of 5.83 years. One hundred and fifty-nine women (38.4%) were primigravida. Eighty-five pregnant women were in the first trimester. The remaining 133 and 196 pregnant women were in the second and third trimesters, respectively. Table 1 displays the baseline characteristics of the participants.

Table 1. Baseline characteristics of the participants.

Characteristics	All participants (n = 414)	Participants by gestational trimester		
		1st trimester (n = 85)	2nd trimester (n = 133)	3rd trimester (n = 196)
Maternal age mean ± SD (years)	29.02 ± 5.83	29.05 ± 5.59	29.40 ± 5.85	28.77 ± 5.94
Educational level				
No formal education	13 (3.14)	3 (3.53)	4 (3.01)	6 (3.06)
Primary education	24 (5.80)	4 (4.71)	12 (9.02)	8 (4.08)
Secondary education	200 (48.31)	34 (40.00)	63 (47.37)	103 (52.55)
Bachelor's degree or higher	177 (42.75)	44 (51.76)	54 (40.60)	79 (40.31)
Marital status				
Single	40 (9.66)	8 (9.41)	10 (7.52)	22 (11.22)
Married	371 (89.61)	77 (90.59)	122 (91.73)	172 (87.76)
Widowed, divorced, separated	3 (0.72)	0 (0.00)	1 (0.75)	2 (1.02)
Occupation				
None	86 (20.77)	14 (16.47)	28 (21.05)	44 (22.45)
Agriculturist	25 (6.04)	6 (7.06)	14 (10.53)	5 (2.55)
Employee/shop owner	220 (53.14)	47 (55.29)	63 (47.37)	122 (62.24)
Civil servant	55 (13.29)	16 (18.82)	21 (15.78)	19 (9.69)
Others	28 (6.76)	2 (2.35)	7 (5.26)	6 (3.06)
Adequacy of income[a]				
Adequate	305 (73.67)	65 (76.47)	98 (73.68)	142 (72.45)
Inadequate	109 (26.33)	20 (23.53)	35 (26.32)	54 (27.55)
Pre-pregnancy BMI mean ± SD (kg/m^2)	23.04 ± 5.03	23.04 ± 4.39	23.89 ± 5.22	22.46 ± 5.11
Primigravida	159 (38.41)	34 (40.00)	42 (31.58)	83 (42.35)
Complications				
Gestational diabetes mellitus	37 (8.94)	4 (4.71)	8 (6.02)	25 (12.76)
Anemia	27 (6.52)	6 (7.06)	8 (6.02)	13 (6.63)
Hypertensive disorders	9 (2.17)	0 (0.00)	2 (1.50)	7 (3.57)
Others	8 (1.93)	2 (2.35)	3 (2.26)	3 (1.53)

Data are presented as number (percentage) unless stated otherwise. SD: standard deviation, BMI: body mass index

Table 2 shows the global score of sleep quality assessed by using T-PSQI. The mean global score of the entire cohort was 5.62 with an SD of 2.91. The mean global score of sleep quality was the highest among pregnant women in the third trimester. A PSQI global score greater than 5 which indicated poor sleep quality was noted in 179 women (43.24%, 95% CI 38.41% - 48.16%). Of 179 women experiencing poor sleep quality, 83 (20.05%) reported that disturbed sleep led to dysfunction in daily life.

The changing trend in the rate of poor sleep quality throughout pregnancy was similar to the PSQI mean score. The prevalence of poor sleep quality in the third trimester was the highest of the three gestational trimesters (51.02%, 95% CI 43.80% - 58.21%). The prevalence of poor sleep quality in the first trimester (37.6%, 95% CI 27.36% - 48.16%) was comparable to that noted in the second trimester (35.3%, 95% CI 27.25% - 44.09%) (Table 2).

Table 2. Global score of sleep quality by T-PSQI.

Sleep quality score	All participants (n = 414)	Participants by gestational trimester		
		1st trimester (n = 85)	2nd trimester (n = 133)	3rd trimester (n = 196)
Mean global score, SD	5.62 (2.91)	5.53 (2.91)	4.91 (2.63)	6.14 (2.99)
Median global score, IQR	5 (4 - 7)	5 (4 - 7)	5 (3 - 7)	6 (4 - 8)
Number of women with global score > 5 (%, 95% CI)	179 (43.24%, 95% CI 38.41 - 48.16)	32 (37.65; 95% CI 27.36 - 48.82)	47 (35.34, 95% CI 27.25 - 44.09)	100 (51.02; 95% CI 43.80 - 58.21)

T-PSQI: Thai- Pittsburgh Sleep Quality Index, SD: standard deviation, IQR: interquartile range, CI: confidence interval

Table 3 displays the factors associated with poor sleep quality among pregnant women. Multivariate analysis showed that the gestational trimester was independently associated with poor sleep quality. Women in the third trimester carried a higher risk of poor sleep quality compared to those in the first trimester (aOR 1.70, 95% CI 10.1 - 2.87). The risk of encountering poor quality of sleep among women in the second trimester was not significantly different from that reported among women in the first trimester (aOR 0.91, 95% CI 0.52 - 1.61).

There were no significant associations between poor sleep quality during pregnancy and maternal age, adequacy of household income, educational attainment, pre-pregnancy body mass index (BMI), and the number of prior conceptions (Table 3).

Table 3. Factors associated with poor sleep quality during pregnancy.

Factors	Poor sleep quality (%) n = 179	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
Gestational trimesters			
First trimester (<14 weeks) (n = 85)	32 (37.65)	Reference	Reference
Second trimester (14-28 weeks) (n = 133)	47 (35.34)	0.91 (0.51 – 1.59)	0.91 (0.52 – 1.61)
Third trimester (>28 weeks) (n = 196)	100 (51.02)	1.73 (1.03 - 2.90)	1.70 (1.01 – 2.87)
Gravidity			
Multigravida (n = 255)	104 (40.78)	Reference	Reference
Primigravida (n = 159)	75 (47.17)	1.30 (0.87 – 1.93)	1.26 (0.84 – 1.90)
Adequacy of household income by self-rating			
Adequate (n = 305)	125 (40.98)	Reference	Reference
Inadequate (n = 109)	54 (49.54)	1.41 (0.91 – 2.19)	1.42 (0.91 - 2.22)
Educational attainment			
Lower than bachelor's degree (n = 237)	97 (40.93)	Reference	Reference
Bachelor's degree or higher (n = 177)	82 (46.34)	1.25 (0.84 – 1.85)	Variable removed
Maternal age			
< 35 years (n = 345)	151 (43.77)	Reference	Reference
≥ 35 years (n = 69)	28 (40.58)	0.88 (0.52 - 1.48)	Variable removed
Maternal pre-pregnancy BMI			
Underweight (< 18.5 kg/m^2) (n = 69)	30 (43.48)	Reference	Reference
Normal weight (18.5-23.0 kg/m^2) (n = 178)	76 (42.70)	0.97 (0.55 – 1.70)	Variable removed
Overweight (23.0-27.5 kg/m^2) (n = 92)	34 (36.96)	0.76 (0.40 – 1.44)	
Obesity (≥ 27.5 kg/m^2) (n = 75)	39 (52.00)	1.41 (0.73 – 2.72)	

OR: odds ratio, CI: confidence interval, BMI: body mass index
a Variance inflation factor =1 indicated no evidence of multicollinearity existed in a regression model

Discussion

This study assessed subjective sleep quality using the T-PSQI questionnaire. The prevalence of poor sleep quality among Thai pregnant women was 43.2% (95% CI 38.4% - 48.2%). Prevalence of poor sleep quality was the highest among women in the third trimester (37.6%, 35.3%, and 51.0% in the first, second, and third trimesters, respectively). Approximately 20% of women with poor sleep quality reported dysfunction in daily life. Multivariate analysis showed that the gestational trimester was independently associated with poor sleep quality. There were no significant associations between maternal age, pre-pregnancy BMI, number of prior conceptions, and poor sleep quality.

In a previous systematic review published in 2018 which included 24 studies assessing poor sleep quality among pregnant women using PSQI, with a total of 11,002 women contributing data, the prevalence of poor sleep quality varied from 20.8% to 76.3% with a pooled rate of 45.7% (95% CI 36.5% - 55.2%)[10]. In the subsequent systematic review published in 2020 which included 42 studies, the pooled prevalence of poor sleep quality during pregnancy captured by PSQI was 44.5% (95% CI: 37.6–51.6%)[11]. Our finding was consistent with previous studies. Poor sleep quality was also prevalent among Thai pregnant women with a rate of 43.2% (95% CI 38.4% - 48.2%).

The prevalence of poor sleep was different among the three gestational trimesters. In this study, the prevalence of poor sleep quality was found to be highest among women in the third trimester (51.0%). Women in the third trimester were 1.7 times more likely to encounter poor sleep quality compared to those in the first trimester (aOR 1.70, 95% CI 1.01 - 2.87). The finding of the highest rate of poor sleep quality in the last trimester noted in our study was in line with previously reported findings[10-13]. Sleep quality that worsens in the third trimester appears to be partly associated with the increased strength of perceived fetal movements and backache secondary to a rapid increase in the size of the uterus during the third trimester[12].

In the existing literature, various maternal characteristics have been noted to be potentially related to sleep quality during pregnancy i.e., socioeconomic status, level of educational attainment, maternal age, parity status, and maternal BMI[10-16]. This study, however, found no significant impact of these factors on the quality of sleep among our participants.

Sleep disturbance can be assessed by either objective measures (i.e., actigraphy, in-laboratory and in-home polysomnography, and the multiple sleep latency test) or subjective measures (i.e., PSQI, Epworth Sleepiness Scale, Functional Outcomes of Sleep Questionnaire)[17]. For screening purposes, subjective assessment is more practical because of less time-consuming and less expensive[17]. PSQI was applied in this study because it can measure a broad range of subjective sleep quality indicators including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, daytime sleep dysfunction, sleep disturbance, and use of sleeping medications. The PSQI has been primarily developed by Buysse et al[8]. Nowadays, it is widely utilized in both clinical practice and research settings. The PSQI has been translated into several languages[18-20]. This questionnaire has been translated into the Thai language by Sitasuwan et al[7]. The validity and reliability of the Thai version of PSQI are noted to be comparable to the original English version[7].

Findings from this study should be interpreted in light of some limitations. Firstly, this study was a cross-sectional design. Change in PSQI scores over time therefore cannot be determined. The highest rate of mean PSQI score in the last trimester noted in this study however was congruent with previous longitudinal studies[10-12]. Secondly, although the PSQI enables us to identify pregnant women experiencing poor quality of sleep with high sensitivity and specificity, this tool only designates good or poor sleep quality thus precluding our ability to differentiate the severity of disturbed sleep[21]. As a result, further studies determining the severity of sleep disturbance

among pregnant women who reported having poor sleep quality are warranted. However, approximately one-fifth of women with poor sleep quality in this study reported dysfunction in daily life which might represent a group of women suffering from severe sleep disturbances.

Conclusion

In conclusion, approximately 43% of Thai pregnant women in this study reported having poor sleep quality. Prevalence of poor sleep quality was the highest (51.0%) among those who were in the third trimester. These findings underlined poor sleep quality as one of the common problems among pregnant women in our setting. Screening for poor sleep quality by using T-PSQI may be crucial to lessen the risks of adverse perinatal outcomes related to sleep

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Potential conflicts of interest

The authors declare no conflicts of interest.

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