PREMENSTRUAL SYNDROME AND SLEEP QUALITY AMONG PRIVATE HOSPITAL NURSES IN BANGKOK, THAILAND

Irada Winyuchakrit, Nutta Taneepanichskul*

College of Public Health Sciences, Chulalongkorn University, Bangkok, 10330, Thailand

ABSTRACT:

Background: Premenstrual syndrome is a recurrent disorder in the luteal phase of the menstrual cycle. The common sleep problems associated with premenstrual syndrome are insomnia, night time awakenings, and non-restoration of sleep. A nurse is a profession that tends to have more circadian rhythms disturbance because of shift working patterns. This study aimed to explore whether premenstrual syndrome associated with sleep quality among private hospital nurses in Bangkok, Thailand.

Method: A cross-sectional study design was used in this study. The participants of 209 female nurses who classified as a regular menstruation in one private hospital were recruited. The self-reported standard questionnaire was distributed to the participants. Sleep quality and premenstrual syndrome was accessed by Pittsburgh Sleep Quality Index (PSQI) – Thai version and Premenstrual Symptoms Screening Tool (PSST) – Thai version respectively. The associations of factors and sleep quality were analyzed by Chi-square test. Binary logistic regression was used to identify the adjusted odd ratio of PMS on poor sleep quality.

Results: The mean age of registered nurses were 31.38 (±5.35) years. Most of them were single (78.9%) and had normal stress level (82.9%). More than half of the nurses (66.5%) had been working on rotating shift included night shift. Prevalence of poor sleep quality (PSQI > 5) was found in 66.5% of nurses. Small group of nurses (7.7%) had premenstrual syndrome. Physical symptoms (48.30%) and overeating/ food craving symptom (41.60%) were the highest reported symptoms of premenstrual syndrome. There was no significant associated between premenstrual syndrome and poor sleep quality. Binary logistic regression showed almost symptoms of premenstrual syndrome were a risk to poor sleep quality (OR adjusted >1) even though statistical significance was not achieved.

Conclusion: More than half of private hospital nurses had poor sleep quality and small group of them had premenstrual syndrome. Premenstrual syndrome was not significant associated with poor sleep quality. The results suggested that a management of nurses' working schedule should consider their physical activities during their luteal phase of the menstrual cycle.

Keywords: Sleep quality; Premenstrual syndrome; Nurses; Private hospital

DOI: 10.14456/jhr.2017.87 *Received: June 2017; Accepted: September 2017*

INTRODUCTION

Premenstrual syndrome (PMS) is a common problem for women that occurs before a woman's period starts (luteal phase) [1]. The report from 2010 by using America College of Obstetricians and Gynecologists (ACOG) criteria found that 58% of Thai women experienced PMS [2]. Female hospital nurses who have PMS experience negative impacts on their professional life, social and economic aspect, and family life issue.

Nursing is a profession of which is important for providing health care service. Owing to the characteristic of nursing work pattern, nurses have

* *Correspondence to: Nutta Taneepanichskul*
E-mail: nutta.t@chula.ac.th

Cite this article as: Winyuchakrit I, Taneepanichskul N. Premenstrual syndrome and sleep quality among private hospital nurses in Bangkok, Thailand. J Health Res. 2017; 31(Suppl.2): S217-24. DOI: 10.14456/jhr.2017.87

to perform their work as a rotating shift including morning, evening, and night shift. Nurses who work at some hospital department have a duty as rotating shift turnover for 24 consecutive hours, this working pattern may influence their patterns of everyday life, including their sleep pattern, causing sleep disturbance. Previous study that conducted in nurses had reported a large prevalence of sleep disturbance including 57% of them had poor sleep quality [3].

Several previous studies showed that women suffering from PMS has poor quality of sleep than the those without PMS [4, 5]. The study of sleep and the Menstrual Cycle reveals that the severity of the PMS is significantly correlated with a luteal phase and increases daytime sleepiness [6]. Also study of Nocturnal polysomnographic sleep across the menstrual cycle in premenstrual dysphoric disorder PMDD showed significantly relates with menstrual phase change, with elevations during luteal phase (LP) compared to the follicular phase (FP). The menstrual phase mostly influences stage 2 and Rapid Eye Movement REM sleep. Nevertheless, women who have severe PMS influence REM sleep decreasing whereas the NREM stage 2 increasing, during mid-luteal phase, in comparison to the early follicular phase. However, melatonin reduction increases the slow wave sleep [7]. In kind of literature published earlier put a common opinion or thought that PMS could be associated with sleep quality [4, 5]. To the best of our knowledge, there is a limited knowledge that describes the PMS that may be associated with sleep quality among nurses. This study aimed to explore whether PMS associated with sleep quality among private hospital nurses in Bangkok, Thailand.

METHODS

Study area and study population

A cross-sectional study was conducted to investigate an association between PMS and sleep quality among private hospital nurses in Bangkok during March to June 2017. All full-time nurses in a private hospital were included in this study. Nurses who used contraceptive, had irregular menstrual period, used sleeping pill, were pregnant, and were the postpartum mothers within six months were excluded. A total of 209 nurses who met the criteria and agreed to participate were recruited in this study.

Data collection and instrument

A self-administer questionnaire was used to collect the data from the nurse participants. The questionnaire composed of general demographics, working characteristics and sleep quality. Stress level was measured by using the Depression Anxiety Stress Scales (DASS) [8]. An internal reliability test for DASS among Thai was 0.71 and a total score of DASS was classified into normal stress (0-7), mild stress (8-9) and moderate stress (10-12) [9]. Sleep habit and sleep quality was assessed using the validated Thai Pittsburgh Sleep Quality Index (PSQI) [10, 11] and the overall sleep quality was classified into 2 levels of which the score greater than 5 was classified as a poor sleeper.

Premenstrual Symptoms Screening Tool (PSST), developed by McMaster University was applied to access PMS in this study. The PSST has 3 domains consists of 19 items [12] which can classify PMS including emotional, behavior, and physical symptoms . PSST was used in Thai context and modified into Thai version and was validated on Thai nurses with high value of internal consistency (Cronbach's alpha > 0.9) [13]. In this study, participants were categorized into two groups, PMS and No PMS. The PMS group represents "Moderate-to-Severe PMS" while the No PMS group represents "No/Mild PMS." Moderate-to-Severe PMS group was classified by the participant who reported at least one out of four core symptoms as moderate (irritability, anxiety, sensitive to denial, depressed mood), and at least four additional symptoms as moderate, and at least one out of five activities of daily living as moderately interfered. 'No/Mild PMS group' is the rest who did not meet the criteria for the diagnosis.

All questionnaires that were used in this study were tested for reliability in a pilot study on 30 nurses who meet the criteria including work as a full time nurse in other private hospital. The values of internal consistency reliability of the instruments in this study were tested; the Cronbach's alpha was 0.93.

Statistical analysis

The data were analyzed by using the Statistical Package for the Social Sciences (SPSS) version 16. Descriptive statistics (frequency and percentage) were used to characterize the demographic characteristics of the participant e.g. age, education, and working characteristics (see Table 1). Range, mean ($\bar{X}$), and standard deviation (SD) was used to analyze the scores of sleep quality. In bivariate analysis, chi-square test (χ^2) was performed to examine an association between symptoms of PMS and sleep quality (good/poor). χ^2 did not meet the assumption, a fisher's exact test was then reported.

Table 1 Descriptive socio-demographic, personal behavior and working characteristic of nurses

Socio-demographic	Frequency	Percent
Age (years)		
20-30	95	45.4
31-40	103	49.3
>40	11	5.3
Mean ± SD (Min-Max)	31.38±5.35	(22-43)
Education		
Bachelor's degree	193	92.3
Master's degree	1	7.7
Marital status		
Single	165	78.9
Married	44	21.1
Exercise		
Do not exercise	122	58.4
Do exercise	87	41.6
Caffeine consumption		
No	122	58.4
Yes	87	41.6
Stress		
Normal (0-7)	173	82.8
Mild (8-9)	27	12.9
Moderate (10-12)	9	4.3
Working characteristic		
Department characteristic		
Non shift Department	63	30.1
Shift Department	146	69.9
Number of year work as a registered nurse		
Mean±SD (Min-Max)	8.94±5.27	(1-22)
Average working hours (per week)		
Mean±SD (Min-Max)	52.43±2.27	(40-100)
Night shift work		
No	70	33.5
Yes	139	66.5
Average the night shifts (per month)		
≤10	104	74.8
>10	35	25.2
Mean±SD (Min-Max)	9.37±4.01	(2-24)

For multivariate analysis, binary logistic regression was performed to find the effect of PMS on sleep quality by adjusting some covariate of factors including age, average working hours, night shift work, stress, illuminant disturbing and air temperature disturbing.

Ethical consideration

This study was ethically approved by Chulalongkorn University Ethical Review Committees (COA no.120/2017). All participants received written information about the study including objective, methods, confidentiality, and the right to withdraw from the study at any time. Informed consents were obtained before distributing the questionnaires.

RESULTS

Socio-demographic information, personal behavior and working characteristics

The data was collected from 209 nurses in the private hospital in Bangkok, Thailand. Mean of age was 31.38 years and the age group between 31-40 years represented the largest group, which was about 49.3% of total respondents. Majority of respondents in this study were single (78.9%) and 21.1% of them were married. Almost of respondents in this study earned a Bachelor's degree (92.3 %,) 7.7% of them graduated with a Master's degree. For personal behavior, coffee consumption of the respondents was 99%, 47.4%. 57.6% of respondents consumed coffee more than five days per week. The percentage

Table 2 Pittsburgh sleep quality index of nurses

Sleep quality	Frequency	Percent
Good (PSQI ≤ 5)	70	33.5
Poor (PSQI >5)	139	66.5

Table 3 Bedroom environment influenced sleep quality of 209 nurses

Bedroom environment	Frequency	Percent
Illuminant disturbing in bed room		
No	198	94.7
Yes	11	5.3
Noise disturbing in bed room		
No	169	80.9
Yes	40	19.1
Air temperature disturbing in bed room		
No	157	75.1
Yes	52	24.9

of respondents who did exercise and did not exercise was rather equal, which was 41.6% and58.4% respectively. 82.8% of the respondents of this study had normal situation and 12.9% and 4.3% experienced mild and moderate of stress respectively. The respondents who work in shift departments were 69.9%. The mean of the respondents'' working experience was 8.94 years. Average working hours per week was 52.43 hours. The respondents who work as a night shift workers were 66.5% and the mean of night shift work per month in last six months was 9.37. The respondents who work at night shift less than or equal 10 shifts per month was 74.8%.

Sleep quality of nurses

Eighty percent of respondents had less than thirty minutes of sleep latency, while 89% of them had sleep duration less than seven hours. The mean of sleep duration was 6.23 hours. Almost of the respondents had a good sleep efficiency (> 85) were 92.8%. The results from the Pittsburgh sleep quality index showed score for sleep quality, which was 66.5%. This represented the poor sleep quality (PSQI > 5) of the respondents (Table 2).

Perception of bedroom environment disturbing sleep quality of nurses

The perceptions of bedroom environment disturbing sleep in this study were illuminant, noise and air temperature. The air temperature was perceived as the most important factor that disturbing in a bed room (24.9%), noise and illuminant was also perceived as the disturbing factor in a bed room (Table 3).

Bivariate analysis of selected factors associated with sleep quality of nurses

Table 4 demonstrates factors influenced sleep quality. About 58.6% of good sleep quality was a group of age between 31 – 40 years. For poor sleep quality, 51.8% were in group of age between 20-30 years more than another age groups with statistically significant (*p*-value = 0.021). 61.2% of the respondents who had poor sleep quality were those who did not exercise, while 54.5% of respondents who had good sleep quality were in group of doing exercise more than two days (*p*-value = 0.033). 97.1% of the respondents who had good sleep quality were in group of had no stress (DASS score ≤ 7) with statistically significant associated (*p*-value = 0.000). This study found the association between working characteristic and sleep quality, as department characteristic. 78.4% of the respondents who had poor sleep quality worked in a shift department (*p*-value = 0.000). Similarly, the respondents who worked in a night shift work had 75.5% of poor sleep quality (*p*-value = 0.000). As a result of association between average of working in night shifts per month and sleep quality, the result showed there was a statically significant with *p*-value = 0.030. Moreover, the work experience had significantly association with sleep quality (*p*-value = 0.021). The highest group of respondent who had poor sleep quality was those who had work experiences less than 6 years (43.2%). For bedroom environment, there was no statistically significant association between illuminant and noise disturbing in bedroom, while air temperature disturbing had significantly association with sleep quality (*p*-value = 0.004).

Table 4 Association between selected factors and sleep quality of nurses

Factors	Sleep quality				Chi-square	*p*-value
	Good n = 70 (%)		Poor n = 139 (%)			
Age(years)						
20-30	23	32.9	72	51.8	7.71[a]	0.021
31-40	41	58.6	62	44.6		
>40	6	8.6	5	3.6		
Exercise						
Do not exercise	37	52.9	85	61.2	1.32	0.251
Do exercise	33	47.1	54	38.8		
Average exercise (Time per week)						
1-2	15	45.5	37	68.5	4.53	0.033
≥3	18	54.5	17	31.5		
Stress severity						
Normal	68	97.1	105	75.5	15.24[a]	0.000
Mild/ Moderate	2	2.9	34	24.5		
Working characteristic						
Department characteristic						
Non shift department	33	47.1	30	21.6	14.44	0.000
Shift department	37	52.9	109	78.4		
Number of year work as a registered nurse						
< 6	17	24.3	60	43.2	7.70	0.021
6-10	20	28.6	25	18.0		
>10	33	47.1	54	38.8		
Average working hours (per week)						
40-50	45	64.3	75	54.0	8.25	0.016
51-60	11	15.7	47	33.8		
>60	14	20.0	17	12.2		
Night shift work						
No	36	51.4	34	24.5	15.20	0.000
Yes	34	48.6	105	75.5		
Average the night shifts (per month)						
≤10	30	88.2	73	69.5	4.69[a]	0.030
>10	4	11.8	32	30.5		
Bedroom environment						
Illuminant disturb						
No	69	98.6	129	92.8	3.10[a]	0.078
Yes	1	1.4	10	7.2		
Noise disturb						
No	56	80.0	113	81.3	0.05	0.822
Yes	14	20.0	26	18.7		
Air temperature disturb						
No	61	87.1	96	69.1	8.14	0.004
Yes	9	12.9	43	30.9		

[a] Fisher's exact test

Association between sleep quality and premenstrual syndrome and symptoms

Table 5 presents PMS against sleep quality of participants. The most five symptoms of PMS in poor sleep group were overeating/food craving (46%), anger/irritability (35.3%), hypersomnia (30.9%), anxiety/tension (30.9%), and fatigue/lack of energy (20.9%) with not significant associated. Only Physical symptoms (such as breast tenderness, headaches, joint/muscle pain, bloating, weight gain) was associated with sleep, significantly with *p*-value = 0.001. 94.3% of the respondents who had good sleep quality experienced no PMS with no statically significant.

Table 6 demonstrates the multiple logistic regression analysis in this study that shows only a significant value of the associated between physical symptoms and sleep quality among nurses. A PMS

Table 5 Association between sleep quality and premenstrual syndrome and symptoms

PMS and symptoms	Sleep quality				Chi-square	*p*-value
	Good		Poor			
	n = 70 (%)		n = 139 (%)			
Anger/irritability						
Not at all/mild	51	72.9	90	64.7	1.39	0.238
Moderate/severe	19	27.1	49	35.3		
Anxiety/tension						
Not at all/mild	50	71.4	96	69.1	0.12	0.725
Moderate/severe	20	28.6	43	30.9		
Fatigue/lack of energy						
Not at all/mild	62	88.6	110	79.1	2.84	0.092
Moderate/severe	8	11.4	29	20.9		
Overeating/food craving						
Not at all/mild	47	67.1	75	54.0	3.33	0.068
Moderate/severe	23	32.9	64	46.0		
Hypersomnia						
Not at all/mild	51	72.9	96	69.1	0.32	0.571
Moderate/severe	19	27.1	43	30.9		
Physical symptoms: breast tenderness headaches, joint/muscle pain, bloating, weight gain						
Not at all/mild	47	67.1	61	43.9	10.08	0.001
Moderate/severe	23	32.9	78	56.1		
PMS						
Not at all / mild	66	94.3	127	91.4	0.56	0.454
Moderate / severe	4	5.7	12	8.6		

Table 6 Multiple logistic regression analysis association between sleep quality and symptom of premenstrual syndrome

The symptoms premenstrual syndrome	OR $_{adjusted}$	95% CI	
		Lower	Upper
Anger/ irritability	1.212	.572	2.569
Anxiety/ tension	.579	.267	1.258
Tearful/ increase sensitivity to rejection	1.806	.646	5.051
Depressed mood/ hopelessness	.856	.275	2.665
Decreased interest in work activities	1.402	.368	5.341
Decreased interest in home activities	2.226	.456	10.866
Decreased interest in social activities	2.671	.384	18.573
Difficulty concentrating	1.613	.380	6.844
Fatigue/ lack of energy	2.399	.903	6.372
Overeating/ food craving	1.496	.737	3.038
Insomnia	1.109	.400	3.076
Hypersomnia	.691	.317	1.507
Feeling overwhelmed or out of control	1.426	.320	6.357
Physical symptoms	2.150	1.073	4.305

Remark: All symptoms were adjusted for age, average working hours, night shift, stress, illuminant disturb and air temperature disturb

was not considered as a risk of poor sleep quality among nurses. On the other hand, a physical symptom was a risk of poor sleep quality after adjustment for age, average working hours, night shift, stress, illuminant disturb and air temperature disturb ($OR_{adjusted}$ = 2.150, 95% CI: 1.073 - 4.305). Furthermore, almost all of symptoms were the risk of poor sleep quality. Considering symptoms that risky to poor sleep quality, for instance, the anger or irritability symptoms ($OR_{adjusted}$ = 1.212), the tearful or increase sensitivity to rejection symptoms ($OR_{adjusted}$ = 1.806), the decreased interest in work activities symptom ($OR_{adjusted}$ = 1.402), the decreased interest in home activities symptom ($OR_{adjusted}$ = 2.226), and insomnia symptom ($OR_{adjusted}$ = 1.109) were potentially affected poor

sleep quality of nurses. However, statistical significances were not achieved.

DISCUSSION

In this study, after summarized from The Pittsburgh Sleep Quality Index prevalence of sleep quality among 209 private hospital nurses in Bangkok, Thailand, 33.5% reported good sleep quality and 66.5% reported poor sleep quality. However, only sixteen respondents who met PMS criteria accounted for 7.7% of total respondents. Thus, our study could not be concluded that PMS was associated with sleep quality because statistical significant was not achieved. Only physical symptoms of premenstrual syndrome had a significant association with sleep quality. Prevalence of sleep quality in this study was lower than previous study among Thai nurses which showed 81.9% of ICU nurses in a public hospital had poor sleep quality, and this was a large prevalence. The possible explanation is that schedule of shift between public and private hospitals was difference. Therefore, it might affect sleep quality of nurses. The previous studies reported the similar results regarding a rotating shift work [11, 12]. A study from Taiwan reported that 57% of female shift workers indicated poor sleep which was lower than our study [3]. A study of nurse in Hong Kong also noted that more than 70% of nurses reported their perception on sleep problem due to the rotating shift work [14].

Sixteen respondents who met PMS criteria were 7.7% of total respondents which was lesser than a previous study. A study in Thai nurse reveals the prevalence PMS accounted for 25.1% [13]. Considering in other country, PMS is a multifactorial syndrome and has a high prevalence in Turkish adolescent group, accounted for 61.4% [15]. In concordance with other study [14], there is a high prevalence among medical students, the study found 51% of respondents who met the criteria for PMS recording to ICD – 10 [16]. Our study found a lower prevalence of PMS because of average age of study population (31.38 years). With this reason, adulthood group had more controlled ability in kind of mood swings due to their maturity. This may be because adult people were likely to be higher in emotional intelligence more than younger age.

The result from our study showed no significant association between PMS and sleep quality. In contrast, a study of sleep quality with the electroencephalogram and severe premenstrual symptom women found a significant subjective sleep quality during the luteal phase ($p = 0.02$) [17]. Obviously, a physical symptom had strongly significant relationship with sleep quality and it can be a risk for poor sleep quality. Approximating the physical symptoms cannot be managed same as emotional symptoms. There are multiple symptoms for physical symptoms such as disturbing sleep quality as uncomfortable enough of body sleeps, such as joint and muscle pain can be a reason that disturb sleep pattern. This can also cause a person to toss and turn, and keeping awake. The other possible mechanism to support our finding is that the luteal phase increase in circulating progesterone is accompanied by an increase in the excitability of the output cells of the motor cortex [18]. Therefore, this excitability causing a person awake and can be related to poor sleep equality.

There are several limitations in this study. First, the findings in this study could not be applied to a broader population of private hospital nurses. Second, the diagnosis of PMS in this study was done by using standard questionnaire which was not a clinical diagnosis.

CONCLUSION

More than half of private hospital nurses had poor sleep quality and less of them had PMS. PMS itself is not significantly associated with poor sleep quality. On the other hand, the physical symptom can disturb the sleep pattern among nurses, resulting in poor sleep quality. Further research should consider on rotating of shift nurse and sleep quality of nurses who had PMS between, before, and after menstruation period.

ACKNOWLEDGEMENTS

This study was supported by Chulalongkorn Academic Advancement into its 2nd Century Project (CUAASC). We also gratefully acknowledge the private hospital nurses who participated in this study.

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