

Original Article

The Impact of Menstrual Pain on Sleep Quality in Nursing Students

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Abstract

Background: Menstruation, a natural physiological process in women, can significantly impact various aspects of daily life, including sleep quality, due to accompanying symptoms such as menstrual pain and dysmenorrhea.

Aims: This study aims to evaluate the impact of menstrual pain experienced by nursing students during their menstrual periods on sleep quality.

Methods: This study involved 158 female nursing students aged 18 to 35 from the Nursing Department of a university in Central Anatolia, Turkiye. The sample was selected using simple random sampling, ensuring representation across all academic years (first to fourth year). Data collection occurred between May and June 2024.

Collection Tools: To measure menstrual pain intensity, a Visual Analog Scale was employed. The Menstrual Symptom Scale assessed both menstrual pain and associated symptoms. The Pittsburgh Sleep Quality Index was used to evaluate the sleep quality of students during their menstrual periods. Independent samples t-tests were used for comparisons between groups with two variables. In contrast, one-way ANOVA was applied for comparisons involving three variables, all at a significance level of $p < 0.05$. Pearson correlation coefficients were employed to examine relationships among the Pittsburgh Sleep Quality Index, Menstrual Symptom Scale, and Visual Analog Scale. Multiple linear regression analysis was utilized to further investigate these relationships comprehensively.

Results: In the study, higher PSQI scores are associated with factors such as family type, household income, academic achievement, menarche age, and severity of menstrual symptoms, all showing statistically significant impacts on sleep quality. Moreover, multiple linear regression analysis confirms that poorer sleep quality and increased pain severity correlate with heightened menstrual symptoms.

Conclusion: This study highlights the significant impact of menstrual symptoms and poor sleep quality on the health of female college students. The findings underscore the need for specific interventions to improve sleep quality and manage menstrual symptoms.

Key Words: Menstrual pain, nursing student, sleep quality

Introduction

Menstruation is a natural phenomenon occurring monthly in a woman's life, generally regarded as an indicator of overall health (Ozer & Guvenc, 2023). It is a physiological process characterized by the shedding of the uterine lining and hormone release among women. Despite being a normal part of the reproductive cycle, menstruation often accompanies various physical and psychological symptoms such as menstrual pain or dysmenorrhea (Asci,

Gokdemir, Sut, & Payam, 2015). These symptoms, encompassing both physical and emotional indicators, can disrupt various aspects of daily life including social interactions, academic performance, and professional productivity. Among these symptoms, sleep disturbances emerge as a significant concern, as they not only impair cognitive and psychomotor functions but also contribute to challenges like academic achievement and emotional instability (Ozer & Guvenc, 2023).

The impact of menstrual pain on the sleep quality of nursing students is a significant issue concerning the health and well-being of young women. These pains can affect students' abilities to study, participate in internships, and engage in clinical practices, thereby potentially undermining both their academic achievements and clinical skills (Erbil & Yucesoy, 2022). Dysmenorrhea is a common condition affecting a substantial number of women worldwide, with estimates suggesting that up to 90% of menstruating women experience some degree of menstrual pain (Unver, Guney, Ucar, & Derya, 2021).

The intensity of menstrual pain can range from mild discomfort to severe cramping, significantly impacting a woman's overall well-being and quality of life. One area particularly affected by menstrual pain is sleep quality. Sleep is a fundamental aspect of human health, playing a vital role in maintaining both physical and mental well-being. However, several studies have indicated that menstrual pain can disrupt sleep patterns and lead to sleep disorders in women (Erbil & Yucesoy, 2022; Supatm, Yusliana, Wulandari, & Fathiya, 2019; Xing, Xue, Li, Zhou, & Tang, 2020).

Understanding the relationship between menstrual pain and sleep quality is especially crucial in populations like nursing students. Nursing students often face high levels of stress and challenging academic programs, which can exacerbate the impact of menstrual pain on their sleep. Sleep disturbances in this population can have harmful effects on cognitive function, academic performance, and overall quality of life (El Desouky & Awed, 2015). Notably, the relationship between premenstrual symptoms and sleep disorders is well-established (Gurkan, Potur, Komurcu, & Ogun, 2017). Research focusing on university students experiencing premenstrual symptoms has highlighted significant issues with life quality and coping mechanisms. For instance, a study found that 27.1% of students experienced sleep problems related to premenstrual symptoms, with 86.6% of those reporting difficulties in coping with these issues (Topatan & Kahraman, 2020). These findings underscore the need for targeted interventions and

support mechanisms to address the impact of menstrual pain on sleep and overall well-being, particularly in vulnerable populations such as nursing students.

The aim of this study is to evaluate the impact of menstrual pain experienced by nursing students during their menstrual periods on sleep quality. Specifically, the goal is to understand the relationship between pain intensity, accompanying symptoms, and sleep quality. This research will provide a crucial foundation for developing and implementing interventions aimed at improving the quality of life for nursing students during their menstrual periods. Additionally, this study may contribute to the development of educational programs and counseling services to support the health and well-being of nursing students.

Research Questions:

1. What is the impact of menstrual pain experienced by nursing students during their menstrual periods on sleep quality?
2. Is there a relationship between the severity of menstrual pain and sleep quality in nursing students?
3. How do symptoms of menstrual pain and their severity affect the sleep patterns of nursing students?

Materials and Methods

Design: This descriptive, cross-sectional study was conducted with female students enrolled in the Nursing Department of a Health Sciences School at a university located in the Central Anatolia region of Türkiye, between May and June 2024.

Participants: The study population consisted of female students enrolled in the Nursing Department of a university in the Central Anatolia region of Türkiye. At the time of the study, there were 207 female students in the nursing department. Using G Power 3.1.9.2 software, a power analysis was conducted with an effect size of 0.5, standard error of 0.05 (99% confidence interval), and study power of 0.80, resulting in a calculated sample size of 158. The final recruitment met this target, concluding with a total of 158 participants enrolled in the study.

Population and Sample: This study was conducted by collecting face-to-face data from female nursing students aged 18 to 35 who were currently menstruating at the time of the study. Simple random sampling was used for participant selection. The research took place between May and June 2024 with a total of 158 female students from all academic years (first to fourth year) enrolled in the Nursing Department of a university in the Central Anatolia region of Türkiye.

Inclusion Criteria: Female nursing students aged 18 to 35 who were currently menstruating during the study period.

Exclusion Criteria: Students who were absent during data collection, those unwilling to participate for any reason, individuals with known sleep disorders, chronic pain conditions unrelated to menstruation, and those regularly taking medications known to affect sleep or menstrual pain.

Data collection tools: The data were collected using a student information form prepared by the researchers in accordance with the literature (Devi et al., 2023; Rathod, Rathi, Tiwari, & Borgaonkar, 2023; Vilšinskaitė, Vaidokaitė, Mačys, & Bumbulienė, 2019), Visual Analog Scale, Menstrual Symptom Scale, and Pittsburgh Sleep Quality Index. Prior to the study, a pilot study was conducted with 15 students from the same sample. These students were not included in the main study.

The Student Information Form: The Student Information Form consists of a total of 17 questions, addressing students' socio-demographic characteristics with the first six questions (age, family type, income level, academic achievement status, place of residence, and marital status), and 11 questions related to their menstrual cycles and sleep experiences. To assess the degree of menstrual pain, a Visual Analog Scale was used. The Menstrual Symptom Scale was employed to evaluate students' menstrual pain and symptoms. The Pittsburgh Sleep Quality Index was utilized to assess students' sleep quality during menstruation.

Visual Analog Scale (VAS): Visual Analog Scale (VAS) is a pain assessment method developed by Albersnagel in 1988 to evaluate the intensity of pain levels that cannot be numerically measured (Albersnagel, 1988). It converts non-numerical values into numerical

form. A 100 mm line is drawn with two endpoint descriptions of the parameter to be evaluated. The patient is then asked to mark or place a dot on the line to indicate their current condition. For example, one end might represent "no pain at all" and the other end "worst possible pain," and the patient marks where their pain level falls on this line. The length from the end representing no pain to the patient's mark indicates the intensity of their pain. Its language-free nature and ease of application are significant advantages. In Türkiye, the validity and reliability studies of VAS were conducted by Aydın et al. in 2011 (Aydın, Araz, & Aslan, 2011). The scale operates within a range of 0 to 10 cm on a ruler. In this range, 0 signifies "no pain," while 10 signifies "worst possible pain." It is accepted that as patients' scores increase, the level of pain also increases (Aydın et al., 2011). VAS has been widely used and accepted in the global literature for a long time. It is considered safe and easy to administer (Clarke, 1964; Downie et al., 1978; Freyd, 1923; Jensen, 2003; Wewers & Lowe, 1990). VAS is recognized as a valid and reliable measurement tool and has been noted for its use in clinical practice to measure pain (Begum & Hossain, 2019).

Menstrual Symptom Scale (MSS): The scale was developed by Chesney and Tasto in 1975 to assess menstrual pain and symptoms (Chesney & Tasto, 1975). In 2009, it was updated by Negriff et al., reevaluating its factor structure and usability among adolescents (Negriff, Dorn, Hillman, & Huang, 2009). Its Turkish validity and reliability were established by Guvenc et al. in 2014 (Guvenc, Seven, & Akyuz, 2014). MSS consists of twenty-two items rated on a five-point Likert scale. Participants are asked to indicate the frequency of their experienced menstrual symptoms, ranging from 1 (never) to 5 (always). The scale comprises three subscales: 'Negative Effects/Somatic Complaints' (Items 1-13), 'Menstrual Pain Symptoms' (Items 14-19), and 'Coping Methods' (Items 20-22). The total score ranges from 22 to 110, with higher scores indicating greater severity of menstrual symptoms. Subscale scores are calculated by averaging the scores of items within each subscale. An increase in subscale averages

indicates higher severity of symptoms within that subscale. The original scale demonstrates a Cronbach's alpha of 0.86, indicating good internal consistency. Results from test-retest reliability, exploratory factor analysis, and criterion-related validity analyses confirm sufficient validity and reliability of MSS in Turkish, suitable for evaluating menstrual symptoms among Turkish adolescents. The study's Cronbach's alpha for internal consistency is 0.92.

Pittsburgh Sleep Quality Index (PSQI): PSQI was used to assess sleep quality. PSQI is a widely used and validated tool that evaluates various dimensions of sleep quality, including sleep duration, sleep disturbances, sleep latency, daytime dysfunction, sleep efficiency, and subjective sleep quality over a one-month time frame. Developed by Buysse et al. in 1989, PSQI has demonstrated adequate internal consistency, test-retest reliability, and validity (Buysse, Reynolds III, Monk, Berman, & Kupfer, 1989). Its validity and reliability for the Turkish population were established by Agargun, Kara, and Anlar in 1996, confirming its suitability for use in Turkish society (Agargun et al., 1996). PSQI comprises 18 items rated on a self-report scale. It assesses subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction as its seven components. Some components are represented by single items, while others are derived from groupings of multiple items. Each item is scored from 0 to 3, and the sum of the scores for the seven components forms the total PSQI score. The total score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A total PSQI score ≤ 5 indicates "good sleep quality," while > 5 indicates "poor sleep quality" (Agargun et al., 1996). The original scale has a Cronbach's alpha of 0.80, indicating good internal consistency (Agargun et al., 1996). The study's Cronbach's alpha for internal consistency is also 0.80.

Data collection: The data were collected from students through a survey administered by researchers outside of class hours. Students were approached face-to-face for data collection using the survey method. Before administering the forms, the purpose of the

research was explained to the students, and information about the study was provided. Informed consent was obtained from students who agreed to participate. Students who consented to participate were given forms to fill out. It took an average of 15-20 minutes for each student to complete the forms.

Ethical consideration: To complete the study, permissions were obtained from the scale owners, as well as from the Health School (28.03.2024-E. 729881) and the ethics committee (19.04.2024-E. 737420). Informed verbal and written consent was obtained from students who agreed to participate. This study was conducted in accordance with the World Medical Association (WMA) Helsinki Declaration (and/or the World Psychiatric Association HAWAII Declaration) and adheres to Good Clinical Practice guidelines.

Data Analysis: The data obtained from the data collection forms were analyzed using the SPSS for Windows 22.0 statistical package. Descriptive statistics including frequencies, percentages, means, standard deviations, minimum, and maximum values were used for data analysis. For comparisons between groups involving two variables, independent samples t-tests were employed. One-way ANOVA was used to compare groups involving three variables. A significance level of $p < 0.05$ was considered statistically significant. Reliability analyses of the scales were conducted using Cronbach's alpha coefficients. Pearson correlation coefficient tests and multiple linear regression analysis were used to assess the relationship between PSQI, MSS, and VAS. These analytical methods were chosen to comprehensively evaluate the data and relationships among the variables in the study.

Results

The findings regarding the demographic characteristics of the students participating in the study are presented in Table 1. 77.2% of students reported living in nuclear families, and 67.1% indicated that their income matched their expenses. When examining academic achievement, 86.1% of students reported having a good level of success. Regarding marital status, 98.7% of

participants were single, while 1.3% were married.

Regarding the distribution of menarche age among participants, it was found that 53.2% experienced menarche at age 13, and 18.4% at age 14. When examining menstrual cycle length, 78.5% had cycles ranging from 22 to 35 days. In terms of irregular menstrual patterns, 34.2% experienced irregular menstruation, while 65.8% had regular menstruation. Regarding menstrual flow duration, 71.5% reported a flow duration of 4-6 days.

85.4% of participants reported experiencing pain during menstruation, while 14.6% did not. Distribution based on the severity of menstrual pain showed that 41.8% experienced severe pain. When examining the frequency of menstrual pain, 62.0% reported experiencing pain during every menstrual cycle.

Regarding the impact of menstrual pain on sleep quality, 38.6% indicated a mild impact. Regarding the effect of menstrual pain on sleep disruption, 40.5% reported experiencing disrupted or interrupted sleep.

According to Table 2, the majority of students (97.5%) exhibit poor sleep quality ($PSQI \geq 6$). The average PSQI score is 16.46, indicating significantly poor sleep quality. The total PSQI score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A total PSQI score ≤ 5 indicates "good sleep quality," while > 5 indicates "poor sleep quality."

The average VAS score is 5.85, indicating a moderate level. In this range, 0 signifies "no pain," and 10 signifies "the worst possible pain." It is accepted that as scores given by students increase, the level of pain also increases.

The average MSS score is 66.32. The highest score achievable on the scale is 110, and the lowest is 22. The MSS score is calculated by averaging the total scores of items on the scale. An increase in the score average indicates an increase in the severity of menstrual symptoms.

In Table 3, statistically significant differences were found in PSQI scores among variables such as family type, household income level,

academic achievement, menarche age, irregular menstruation, pain during menstruation, menstrual pain intensity, frequency of menstrual pain, and its impact on sleep quality. However, no statistically significant differences were observed in PSQI scores among variables such as marital status, menstrual cycle length, and menstrual flow length.

Students from extended families had significantly lower PSQI scores compared to those from broken families, indicating better sleep quality among those raised in extended families. These results underscore the significant impact of family type on sleep quality, generally showing better sleep quality among those raised in extended families compared to those in nuclear or broken families. There was no significant difference in sleep quality observed between students raised in nuclear families versus those from broken families.

Significant differences were found between income levels and sleep quality, with higher income levels associated with better sleep quality. Students from lower income households exhibited lower sleep quality compared to those from higher income households, emphasizing the socioeconomic influence on sleep quality.

Students with higher academic achievement demonstrated better sleep quality compared to those with moderate achievement. Additionally, students who experienced menarche at age 13 reported better sleep quality than those who experienced it at age 14.

Better sleep quality was also observed among students who had regular menstrual cycles, did not experience pain during menstruation, reported mild pain intensity, and rarely experienced menstrual pain. Those who reported that menstrual pain had no effect on their sleep quality also exhibited better overall sleep quality.

MSS subscales have shown significant positive correlations with various aspects of PSQI and VAS scores (mostly at $p < 0.001$ level). Remarkably high correlations were observed between MSS total score and PSQI total score, as well as between MSS subscales

and PSQI components (such as sleep disorders, sleep latency, and subjective sleep quality). The results indicate that more severe menstrual symptoms are associated with poorer sleep quality and higher levels of sleep disorders. This table highlights the impact of menstrual symptoms on sleep quality and demonstrates significant relationships between these variables (Table 4).

Table 5 presents the results of multiple linear regression analysis showing the impact of sleep quality and VAS total scores on MSS

total scores. The total PSQI score has a significant and positive effect on MSS total scores, indicating that as sleep quality worsens, menstrual symptoms increase. The VAS total score also has a significant and positive effect on MSS total scores, suggesting that as pain severity increases, menstrual symptoms also increase. Together, the independent variables in the model (PSQI total score and VAS total score) explain 25% of the variance in MSS total scores. This indicates that the model moderately succeeds in explaining the dependent variable.

Table 1: Findings Related to Some Variables of The Students

Variables	n	%
Family Type		
Nuclear family	122	77.2
Extended family	32	20.3
Disrupted family	4	2.5
Family Income Level		
Income is less than expenses	39	24.7
Income matches expenses	106	67.1
Income exceeds expenses	13	8.2
Academic Achievement		
Good level	136	86.1
Moderate level	22	13.9
Marital Status		
Married	2	1.3
Single	156	98.7
Menarche Age		
11	7	4.4
12	38	24.1
13	84	53.2
14	29	18.4
Menstrual Cycle		
≤21 days	10	6.3
22-35 days	124	78.5
≥ 36 days	24	15.2
Irregular Menstruation		
Yes	54	34.2
No	104	65.8

Menstrual Flow Duration		
≤ 3 days	8	5.1
4-6 days	113	71.5
≥ 7 days	37	23.4
Presence of Menstrual Pain		
Yes	135	85.4
No	23	14.6
Severity of Menstrual Pain		
Mild	14	8.9
Moderate	54	34.2
Severe	66	41.8
Very severe	20	12.7
None	4	2.5
Frequency of Menstrual Pain		
Rarely	28	17.7
Several times a week	23	14.6
Several times a month	9	5.7
Every menstrual cycle	98	62.0
Impact of Menstrual Pain on Sleep Quality		
Not affecting at all	17	10.8
Has a mild effect	61	38.6
Has a moderate effect	50	31.6
Has a significant effect	30	19.0
Condition of Menstrual Pain Impacting Sleep		
Difficulty falling asleep	54	34.2
Sleep is fragmented and interrupted	64	40.5
Wake up frequently during sleep	19	12.0
Unable to achieve deep and restful sleep	21	13.3
Days of Disrupted Sleep Due to Menstrual Pain		
At the beginning of menstruation	137	86.7
In the middle of menstruation	15	9.5
Equally throughout the menstrual period	6	3.8
Coping Techniques Used for Menstrual Pain		
Taking a warm shower	56	35.4
Exercising	26	16.5
Consuming herbal tea	57	36.1
Applying stress management techniques	8	5.1
Eating sweets	7	4.4
Applying a hot water bottle	4	2.5
Age	Mean± SD	20.41± 1.60

Table 2: Sleep Quality Levels of Students Based on Pittsburgh Sleep Quality Index Scores, VAS Scores, and MSS Scores

Pittsburgh sleep quality index	n	%	
5 Points and ↓ (good sleep)	4	(%2.5)	
6 Points and ↑ (poor sleep)	154	(%97.5)	
Scales	n (%)	mean ± SD	Marked min–max scores
Total PSQI	158 (%100)	16.46±5.95	2-21
Total VAS	158 (%100)	5.85±1.98	1-10
Total MSS	158 (%100)	66.32±19.04	22-110

Table 3: Sleep Quality Levels by Sociodemographic and Menstrual Variables

Variables	n	%	PSQI mean ± SD	t/F	p-value
Family Type					
Nuclear family	122	77.2	17.09±5.66	6.302	0.002
Extended family	32	20.3	13.46±6.39		
Disrupted family	4	2.5	21.00±0.00		
Family Income Level					
Income is less than expenses	39	24.7	20.05±2.41	15.091	0.000
Income matches expenses	106	67.1	15.78±6.13		
Income exceeds expenses	13	8.2	11.23±6.37		
Academic Achievement					
Good level	136	86.1	15.81±6.15	12.322	0.001
Moderate level	22	13.9	20.45±1.50		
Marital Status					
Married	2	1.3	16.40±5.96	1.178	0.279
Single	156	98.7	21.00±0.00		
Menarche Age					
11	7	4.4	20.71±0.75	4.806	0.003
12	38	24.1	16.34±5.87		
13	84	53.2	15.21±6.39		
14	29	18.4	19.20±3.84		
Menstrual Cycle					
≤21 days	10	6.3	20.10±1.91	2.095	0.127
22-35 days	124	78.5	16.29±6.16		

≥ 36 days	24	15.2	15.79±5.57		
Irregular Menstruation					
Yes	54	34.2	18.18±4.89	7.141	0.008
No	104	65.8	15.56±6.27		
Menstrual Flow Duration					
≤ 3 days	8	5.1	15.62±6.73	0.191	0.826
4-6 days	113	71.5	16.63±5.91		
≥ 7 days	37	23.4	16.10±6.04		
Presence of Menstrual Pain					
Yes	135	85.4	16.89±5.52	5.062	0.026
No	23	14.6	13.91±7.68		
Severity of Menstrual Pain					
Mild	14	8.9	11.78±7.15	12.206	0.000
Moderate	54	34.2	15.44±5.78		
Severe	66	41.8	17.87±5.01		
Very severe	20	12.7	20.20±2.54		
None	4	2.5	4.50±2.64		
Frequency of Menstrual Pain					
Rarely	28	17.7	14.07±7.61	5.189	0.002
Several times a week	23	14.6	14.30±4.98		
Several times a month	9	5.7	21.00±0.00		
Every menstrual cycle	98	62.0	17.23±5.50		
Impact of Menstrual Pain on Sleep Quality					
Not affecting at all	17	10.8	11.17±7.27	12.751	0.000
Has a mild effect	61	38.6	14.96±6.13		
Has a moderate effect	50	31.6	17.92±4.56		
Has a significant effect	30	19.0	20.06±3.39		
Condition of Menstrual Pain Impacting Sleep					
Difficulty falling asleep	54	34.2	15.53±6.53	3.844	0.011
Sleep is fragmented and interrupted	64	40.5	15.62±5.99		
Wake up frequently during sleep	19	12.0	18.15±4.62		
Unable to achieve deep and restful sleep	21	13.3	19.85±3.66		
Days of Disrupted Sleep Due to Menstrual Pain					
At the beginning of menstruation	137	86.7	16.51±6.06	1.383	0.149
In the middle of menstruation	15	9.5	16.46±5.52		
Equally throughout the menstrual period	6	3.8	15.16±4.83		
Coping Techniques Used for Menstrual Pain					
Taking a warm shower	56	35.4	16.62±6.27	1.027	0.434
Exercising	26	16.5	12.84±5.72		

Consuming herbal tea	57	36.1	16.92±5.63
Applying stress management techniques	8	5.1	18.00±5.78
Eating sweets	7	4.4	20.42±0.97
Applying a hot water bottle	4	2.5	21.00±0.00

One-way ANOVA, Independent sample t test, SD, standard deviation.

Table 4: Results of the Pearson correlation analysis between MSS and PSQI and VAS (n=158)

		Total and Subscale scores of MSS			
		Negative Effects/Somatic Complaints	Menstrual Pain Symptoms	Coping Methods	Total
PSQI total	r	0.546 ^a	0.423 ^a	0.174 ^a	0.511 ^a
Subjective quality	sleep r	0.462 ^a	0.339 ^a	0.245 ^b	0.444 ^a
Sleep latency	r	0.422 ^a	0.286 ^a	0.244 ^b	0.401 ^a
Sleep duration	r	0.477 ^a	0.350 ^a	0.128 ^b	0.436 ^a
Habitual efficiency	sleep r	0.099 ^b	0.015 ^b	-0.094 ^b	0.051 ^b
Sleep disturbance	r	0.507 ^a	0.376 ^a	0.236 ^a	0.482 ^a
Use of sleep medication	r	-	-	-	-
Daytime dysfunction	r	0.481 ^a	0.455 ^a	0.267 ^a	0.496 ^a
VAS total	r	0.420 ^a	0.464 ^a	0.596 ^a	0.519 ^a

Note. ^ap<0.001, ^bp<0.01

Table 5: Effect of sleep quality and VAS on total scores of MSS

	Unstandardized Beta	Coefficients Std. Error	t	P
PSQI total score	0.160	0.022	7.420	<0.001
VAS total score	1.081	0.225	4.813	<0.001
Adjusted R2	%25			

Discussion

This study aimed to evaluate the effect of menstrual pain experienced by nursing students during their menstrual periods on their sleep quality. This study focused on determining the relationship between menstrual pain, accompanying symptoms and sleep quality. Among the students participating in the study, the frequency of irregular menstruation was determined to be 34.2%. Previous studies have also found a high prevalence of irregular menstruation among female students. Mittiku (2022) reported a similar prevalence of 33.4% among university students in Ethiopia and noted significant associations of irregular menstruation with factors such as age, early menarche, and stress (Mittiku, Mekonen, Wogie, Tizazu, & Wake, 2022). Baig (2021) similarly reported a high prevalence of menstrual abnormalities, including irregular cycles, among university students in Pakistan (Baig et al., 2021). Our study's findings regarding the frequency of irregular menstruation align with these studies in the literature.

Participants in the study experience menstrual pain at a rate of 85.4%. Among them, 41.8% report severe menstrual pain. When examining the frequency of menstrual pain, 62.0% experience pain during every menstrual cycle. Analysis of the distribution of menarche age among participants shows that 53.2% experience menarche at age 13. Regarding menstrual cycle length, 78.5% have cycles lasting between 22-35 days. Menstrual pain or dysmenorrhea is a common experience among women, both adolescents and adults (Devi et al., 2023; Vilšinskaitė et al., 2019). The intensity of this pain can vary significantly, with a significant portion of women experiencing severe pain (Franjić, 2019). Menstrual pain is a condition that diminishes women's quality of life, influenced by factors such as age, menstrual cycle regularity, and parity (Vilšinskaitė et al., 2019). Rathod (2023) found a prevalence of dysmenorrhea at 82.6% and severe pain at 30% among 420 students in their study (Rathod et al., 2023). Joseph (2021) identified dysmenorrhea as the most common menstrual disorder among medical students, followed by

irregular cycles (Joseph et al., 2022). Sakar (2019) determined that menstruation symptoms increase with age, age at menarche, and menstrual cycle length (Sakar, Capik, & Akkas, 2019). These findings suggest that factors contributing to high prevalence of menstrual pain among working students underscore the importance of personalized management approaches and awareness initiatives in managing dysmenorrhea.

When examining the impact of menstrual pain on sleep quality, 38.6% reported a mild effect. Regarding the influence of menstrual pain on sleep quality, 40.5% experience disrupted or interrupted sleep. Research on the effect of menstrual pain on sleep quality underscores its significant impact as a concern. Yalcin (2023) found that menstrual pain can affect sleep quality and anaerobic performance in women (Yalcin, 2023). Demir (2017) observed a significant relationship between menstrual cycle characteristics and sleep quality among female university students (Demir, Cakin, & Can, 2017). These findings highlight that menstrual pain not only affects daily life but also disrupts sleep patterns, thereby potentially impacting overall health and performance negatively. Further research and the development of individual management strategies in this area are warranted.

In the study, 97.5% of students were found to have poor sleep quality, confirmed by an average PSQI score of 16.46; a PSQI score >5 indicates poor sleep quality. The average VAS score was 5.85, indicating a moderate level of pain. Additionally, the mean MSS score was determined to be 66.32. These findings highlight that students experience both high levels of sleep disturbance and menstrual pain and symptom severity, potentially impacting their overall health and quality of life significantly. Research consistently shows a significant relationship between poor sleep quality and menstrual issues among female university students (Xing et al., 2020). Given that a significant portion of nursing students experience below-standard sleep quality, this is particularly concerning (Nisa & Mulyadi, 2024). Indeed, a study focusing on nursing students revealed a high prevalence of menstrual issues, with

dysmenorrhea and premenstrual syndrome being the most common (Kothapalli & Bathula, 2023). Furthermore, another study found a correlation between sleep duration and menstrual cycle, suggesting that shorter sleep durations are associated with menstrual cycle irregularities (Supatm et al., 2019). Similar findings were observed in our study. These findings underscore the need for interventions aimed at improving sleep quality and addressing menstrual issues among nursing students.

In the study, individuals raised in extended families have significantly lower PSQI scores compared to those raised in fragmented families, suggesting better sleep quality among those raised in extended families. An improvement in sleep quality has been observed with increasing income levels. It has been found that individuals with good academic performance exhibit better sleep quality compared to those with moderate academic performance. A study consistently demonstrates a high prevalence of menstrual pain and disorders among nursing students, which can significantly impact their academic and personal lives (Ali, Khalafala, & Fadlalmola, 2020). This finding may particularly apply in the context of extended families, higher income levels, and good academic achievement, as familial support and understanding, financial aspects of solutions for sleep problems and menstrual pain, and good academic performance can play a crucial role in managing these issues. Furthermore, the relationship between menstrual pain and sleep quality among nursing students is an important area for further research, as poor sleep quality may exacerbate the impact of menstrual pain on these students (Kesgin & Caglar, 2020).

Research has found that individuals who experience regular menstruation, report no menstrual pain, have mild pain intensity, or rarely experience pain during menstruation tend to have better sleep quality. Studies indicate that women who have regular menstruation, experience no or mild menstrual pain, and have good sleep quality exhibit better anaerobic performance (Yalcin, 2023). It is understood that pain during menstruation and sleep quality can affect

women's physical performance, highlighting the importance of considering these factors. Additionally, good sleep hygiene and quality are associated with better menstrual health (Shuster et al., 2023). Good sleep hygiene may play a significant role in regulating the menstrual cycle and reducing menstrual pain. In this context, implementing measures to improve sleep quality could enhance both women's overall health and physical performance. Generally, good sleep quality is characterized by shorter sleep latency, fewer awakenings, and less wake time after sleep onset (Nadkar, 2021). Therefore, it is recommended that women pay attention to sleep hygiene practices to enhance their sleep quality.

The study demonstrates that more severe menstrual symptoms are associated with poorer sleep quality and higher sleep disorders. Consistent with previous research such as Komada et al., (2019) and Xing et al., (2020), individuals experiencing severe menstrual symptoms, including irregular menstrual cycles, heavy bleeding, and menstrual pain, are found to have negatively impacted sleep quality. Factors like hormonal fluctuations, pain, and discomfort are noted to disrupt sleep patterns. This relationship underscores the importance of managing menstrual symptoms for both sleep health and overall quality of life.

The study found a significant and positive impact of PSQI total score on MSS total score. This finding indicates that as sleep quality deteriorates, menstrual symptoms increase. Various studies have demonstrated a noticeable increase in menstrual symptoms as sleep quality worsens. A study found that healthy women experience lower sleep quality during menstruation (Alzueta et al., 2022). Additionally, a systematic review highlighted that poor sleep quality increases the risk of abnormal menstrual cycle changes such as shortened, prolonged, or missed periods (Jeon & Baek, 2023). Furthermore, linking poor sleep quality to the frequency and severity of menstrual symptoms supports this, indicating a potential role of circadian rhythms in the pathophysiology (Alkhatib et al., 2022). Another study reported a relationship between poor sleep quality and

primary dysmenorrhea in adolescents (Shin, Jeon, & Cho, 2022). These findings are consistent with the idea that sleep disorders, including poor sleep quality, may exacerbate menstrual symptoms. Studies have shown that severe sleep deprivation and irregular sleep patterns can worsen dysmenorrhea and premenstrual syndrome (Jeong, Lee, & Kim, 2023). Moreover, women experiencing severe premenstrual symptoms are more likely to have poor sleep compared to those without these symptoms (Arafa, Mahmoud, Abu Salem, & Mohamed, 2020). In conclusion, the research suggests a clear link between deteriorating sleep quality and worsening menstrual symptoms. Poor sleep quality can impact various aspects of menstrual health and potentially exacerbate conditions such as dysmenorrhea and premenstrual syndrome. Understanding and addressing sleep disorders may be crucial in effectively managing menstrual symptoms.

The study found a significant and positive impact of VAS total score on MSS total score. As pain intensity increases, menstrual symptoms tend to worsen, a relationship supported by various studies. It has been reported that pain intensity peaks towards the end of the menstrual cycle and reaches its highest levels in the first three days of menstruation (Iacovides, Avidon, & Baker, 2015). Additionally, women with higher menstrual pain intensity have been observed to experience lower quality of life and more frequent menstrual symptoms (Celenay et al., 2021). Furthermore, central sensitivity symptoms have been highlighted to be associated with pain intensity related to dysmenorrhea (de Arruda et al., 2022). The impact of menstrual pain on daily life is significant. A study reported that a significant percentage of individuals with menstrual pain require medication to manage their symptoms, indicating the disruptive nature of menstrual pain on daily activities (Leon-Larios et al., 2024). Moreover, it has been emphasized that symptoms such as pain and heavy bleeding during menstruation can lead to school absenteeism and potentially affect educational success (Sawyer, Fraser, Lawlor, Sharp, & Howe, 2024). In conclusion, evidence from various studies supports the notion that as pain intensity increases,

menstrual symptoms also tend to worsen, impacting various aspects of individuals' lives including daily activities, school attendance, and overall quality of life.

Conclusions: This study highlights that menstrual symptoms and sleep quality constitute a significant health issue among female university students. The findings reveal that a majority of students experience irregular menstruation, menstrual pain, and poor sleep quality. Moreover, significant relationships and interactions among the severity of these symptoms have been identified. Irregular menstruation among students is a commonly reported issue in the literature. Similarly, the prevalence and intensity of menstrual pain are noteworthy, potentially negatively impacting overall quality of life and significantly affecting sleep quality. The study's findings indicate a strong relationship between sleep quality and menstrual symptoms. Worse sleep quality is associated with exacerbation of menstrual symptoms, which can adversely affect students' overall health and academic performance. In conclusion, this study provides an in-depth examination of the relationship between menstrual symptoms and sleep quality among female university students. These findings underscore the importance of research on women's health and health policies. Developing personalized approaches to improve sleep quality and manage menstrual symptoms emerges as a crucial need for this student population. Based on this study, recommendations can be made to enhance the health and quality of life of female university students. Educational and awareness programs on sleep hygiene can be organized within universities. Special units should be established in university health centers for menstrual health services and counseling. Psychological support and counseling services should be available to help students cope with menstrual symptoms. Universities should encourage and support research on menstrual health to generate new findings in this area. Communities, families, and social circles should play supportive roles in raising awareness about menstrual health issues. Implementing these recommendations can potentially enhance the quality of life, support academic performance, and improve

overall health among female university students.

Limitations: This study's sampling method limits its generalizability to the broader population. It is a cross-sectional study conducted exclusively among students at a single university, relying solely on participants' verbal accounts. Data were gathered through survey administration.

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