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Factors predicting menstrual irregularity among university students in Ho Chi Minh City, Vietnam: A cross-sectional study

Nhan Thi Nguyen* and **Trinh Thi My Le**

Department of Midwifery, Faculty of Nursing and Medical Technology, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam

Abstract

Background: University students often face menstrual irregularities, particularly among healthcare students, due to rigorous study environments, such as night duties resembling professional staff responsibilities.

Objective: This study aimed to examine the prevalence of and factors predicting menstrual irregularities among female students in Ho Chi Minh City, Vietnam.

Methods: A cross-sectional study was conducted from April to July 2023 at the University of Medicine and Pharmacy at Ho Chi Minh City (UMP). Data were collected using self-administered questionnaires comprising sections on personal background, menstrual cycles, sleep duration, and academic stress. Descriptive statistics and multiple logistic regression were employed for data analysis.

Results: Approximately 48.3% of participants experienced menstrual irregularities. Overweight or obese students were more likely to experience irregularities compared to those of normal weight (AOR = 7.56, 95% CI = 1.34, 80.8). Nursing majors (including nursing, midwifery, and anesthesia resuscitation nursing) showed a higher likelihood of irregularities compared to other majors (AOR = 2.5, 95% CI = 1.35, 4.13).

Conclusion: This study highlights a significant prevalence of menstrual irregularities among female students. Interventions in nursing education should focus on promoting healthy lifestyles and regular physical activity to manage weight and mitigate menstrual irregularities.

Keywords

Vietnam; menstrual cycle; female; menstrual disturbance; overweight; body mass index; nursing education; healthy lifestyle

*Corresponding author:
Dr. Nhan Thi Nguyen
Department of Midwifery, Faculty of Nursing and Medical Technology, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam
Email: nguyennhan@ump.edu.vn

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Background

Menstruation significantly affects women's physical, mental, and social health. Menstrual health is defined as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in relation to the menstrual cycle" (Hennegan et al., 2021). According to the International Federation of Gynecology and Obstetrics (FIGO), a normal menstrual cycle lasts between 24 and 38 days, with menstruation lasting no more than eight days and a volume of monthly blood loss between 5 and 80 ml (Fraser et al., 2011; Munro et al., 2018). The length of a menstrual period is measured from the first day of menstrual bleeding in one cycle to the onset of menses in the next cycle. The rhythmic coordination of the hypothalamic-pituitary-ovarian (HPO) axis ensures the normal functioning of the female reproductive system; therefore, any abnormal condition of the HPO axis can cause an irregular menstrual cycle (Holesh et al., 2023).

Menstrual irregularity refers to a menstrual cycle that is longer than 38 days or shorter than 24 days, has an abnormal duration of flow, or involves a volume of monthly blood loss that is more or less than usual (Fraser et al., 2011; Munro et al., 2018). The frequency of menstrual irregularity is rapidly increasing among university students. Previous research has reported that women under 23 years old commonly suffer from menstrual irregularity (Aber, 2018), which leads to decreased study engagement, difficulty concentrating, and increased absenteeism in class, consequently resulting in poor examination scores (Demeke et al., 2023; Munro et al., 2021). The prevalence of menstrual irregularity varies from 20.54% to 66.9% among different countries (Aber, 2018; Ali et al., 2020; Fernández-Martínez et al., 2020), and it is 46.80% in Vietnam (Thuc et al., 2022). Female students in health science schools are a high-risk group for irregular menstruation due to lifestyle, eating habits, lack of exercise, educational stress, and examination stress (Alhammadi et al., 2022; Shantha et al., 2020). Menstrual irregularity sometimes causes health problems such as polycystic ovary syndrome, endometriosis, or thyroid disease (Brown et al., 2023; Smolarz et al., 2021; Witchel et al., 2019).

Previous studies have identified factors associated with menstrual irregularity, including smoking, examination stress, abnormal body mass index, sleep duration, physical activity, and alcohol intake levels (Bae et al., 2018; Mittiku et al., 2022; Zeru et al., 2021). Unfortunately, to our knowledge, no study in Vietnam has revealed the factors related to menstrual

irregularity in the medical literature. Only one study has described the menstrual cycle of students (Thuc et al., 2022), and another has described dysmenorrhea during the menstrual cycle in Ha Noi City, Vietnam (Do & Nguyen, 2022); however, neither study provided the criteria for menstrual irregularity used. Therefore, this study aimed to assess the magnitude of and factors predicting menstrual irregularity among female students in one of the largest universities focusing on health care sciences in Ho Chi Minh City, Vietnam, using the definition of menstrual irregularity specified by the FIGO guidelines for normal and abnormal bleeding (Munro et al., 2018).

Methods

Study Design

A cross-sectional design was employed in this study.

Samples/Participants

The samples for this study were female students studying at the Faculty of Nursing and Medical Technology (FNMT), University of Medicine and Pharmacy at Ho Chi Minh City (UMP), one of the largest universities for healthcare education in the South of Vietnam, from April to July 2023. Convenience sampling was used to select the participants. Inclusion criteria were female students in their third or fourth year who volunteered to participate in the study. Students with a history of gynecological issues, who had used hormonal contraceptives within the past three months, were pregnant, breastfeeding, or had health problems that disrupted their natural menstrual periods (such as thyroid disease or polycystic ovary syndrome) were excluded from the study.

The sample size was calculated using Cochran's formula for small populations (Cochran, 1977) as follows: $n = \frac{n0}{1+(n0-1)/N}$ $n0$ was the sample size with the prevalence of menstrual irregularity at 46.8%, based on a previous study (Thuc et al., 2022), with a 95% confidence interval and a 5% margin of error. After calculating, $n0$ was 383. The population size (N) in this study was 840 female students. Therefore, the final sample size was estimated to be 263 female students.

Instruments

The instrument for this study was a self-administered questionnaire that included four sections as follows:

Part 1: A personal background information questionnaire was developed by the researchers and consisted of five questions about the student's academic year, major, residence, weight, and height. The variable BMI (body mass index) was then calculated by the researcher (TTML) based on the weight and height of female students and classified into four groups: underweight (BMI <18.5), normal weight (BMI 18.5-24.9), and overweight (BMI 25-29.9), and obesity (BMI ≥30) (World Health Organization, 2010).

Part 2: A menstrual cycle questionnaire comprised of four questions about the menstrual cycle of the student was developed by the researchers based on the FIGO guidelines for normal and abnormal bleeding (Munro et al., 2018). It included questions on the length of the menstrual cycle, menstrual blood flow duration, regularity of onset/inter-menstrual difference, and the volume of menstrual blood per day. Menstrual irregularity was considered present when any criterion of normal menstruation was violated. The content validity of the scale was tested with three content experts, and the item-level content validity index (I-CVI) of this scale was one. These questions were translated into Vietnamese using the back-translation technique (Brislin, 1970).

Part 3: The sleep duration questionnaire was a single question developed by the researchers to determine the sleep duration based on recommendations from the National Sleep Foundation for young adults (18-25 years) (Hirshkowitz et al., 2015). It was classified into three categories: short sleep (<7 hours/day), normal sleep (7-9 hours/day), and long sleep (>9 hours/day). The scale's content validity was tested with three content experts, and the item-level content validity index (I-CVI) was one. This question was translated into Vietnamese using the back-translation technique (Brislin, 1970).

Part 4: The academic stress questionnaire was originally developed by Tuyen (2022), and the researchers obtained permission to use it in this study. The scale measured the students' perception of academic stress and consisted of 16 questions with a 5-point rating scale, ranging from 1 (totally disagree) to 5 (strongly agree). Higher scores indicate higher levels of perceived academic stress. The reliability of the academic stress scale was tested, and the value of Cronbach's alpha coefficient was 0.93.

Data Collection

The data were collected via an online survey between April and July of 2023 using the following steps: Step 1: The researchers created the link for the online survey using Microsoft Forms. Step 2: The researchers approached the potential participants and sent the questionnaire link via email once consent was obtained. Step 3: After tabulating the data in an Excel spreadsheet, the researchers imported the data into an application for statistical data analysis.

Data Analysis

Data were entered and analyzed using IBM's Statistical Package for the Social Sciences (SPSS) version 20.0. The significance level of the statistical test was set at 0.05. Assumptions were checked and met before conducting the analysis. Descriptive statistics were used to describe background information, menstrual cycle, sleep duration, and academic stress. The relationship between study factors and the menstrual cycle was assessed using the t-test and chi-squared test. Multiple logistic regressions were used to determine the strength of the association between significant factors and the menstrual cycle.

Ethical Considerations

The study was approved by the Ethics Committee of UMP with No. 457/HĐĐĐ-ĐHYD, issued on April 12, 2023. Participation in this study was completely voluntary, and participants signed and acknowledged consent forms when they clicked "accept" in the online survey before starting data collection.

Results

Among the 263 female students, 128 (49%) were third-year students, and 135 (51%) were fourth-year students. The majority of participants, 76.6%, were in nursing majors

(nursing, midwifery, anesthesia resuscitation nursing), while the remaining 22.4% were in medical technology majors (laboratory testing, medical imaging, rehabilitation). Most female students were renting dormitories/houses (63.1%), while the next most prevalent type of housing was students living with their families (36.1%). The mean weight of participants was 50.4 ± 8.8 kg, and the mean height was 157.5 ± 5.4 cm. There were 174 female students with normal weight (66.2%), 74 students who were underweight (28.1%), 14 (5.3%) students who were overweight, and one student who was obese (0.4%). The mean score of academic stress among female students was 50.3 ± 12.1 (Min = 16, Max = 80). More than half of the participants had a normal sleep duration (54.4%), short sleep durations were the next most common (41.8%), and long sleep durations were rare (3.8%) (**Table 1**).

Table 1 Background information of the study participants (*N* = 263)

Variable	Frequency (%)	Mean (SD)
Academic year		
Third-year	128 (49.0)	
Fourth-year	135 (51.0)	
Major		
Nursing majors (nursing, midwifery, anesthesia resuscitation nursing)	204 (77.6)	
Medical technology majors (laboratory testing, medical imaging, rehabilitation)	59 (22.4)	
Residence		
Living with family	95 (36.1)	
Renting dormitories/houses	168 (63.9)	
Weight (kg)		50.4 (8.8)
Height (cm)		157.5 (5.4)
Body mass index (BMI)		
Underweight	74 (28.1)	
Normal weight	174 (66.2)	
Overweight	14 (5.3)	
Obese	1 (0.4)	
Academic stress		50.3 (12.1)
Sleep duration		
<7 hours/day	110 (41.8)	
7-9 hours/day	143 (54.4)	
>9 hours/day	10 (3.8)	

In this study, nearly half of the female students (48.3%) experienced irregular menstruation. The most common issues of menstrual irregularity were an irregular onset/inter-menstrual difference of ≥10 days (22.1%) and a menstrual cycle lasting more than 38 days (24.0%) (**Table 2**).

Table 2 Characteristics of menstrual cycle among female university students (*N* = 263)

Characteristics of the Menstrual Cycle	Frequency (%)
Regular	136 (51.7)
Irregular	127 (48.3)
Length of the menstrual cycle	
24-38 days (Normal)	174 (66.2)
<24 days (Short)	26 (9.9)
>38 days (Long)	63 (24.0)
Duration of menstrual blood flow	
≤8 days (Normal)	255 (97.0)
>8 days (Prolonged)	8 (3.0)
Regularity of onset/intermenstrual difference	
<10 days (Regular)	205 (77.9)
≥10 days (Irregular)	58 (22.1)
Perception of menstrual blood flow	
Normal	208 (79.1)
Light	29 (11.0)
Heavy	26 (9.9)

The preliminary analysis was conducted by examining the relationship between academic year, major, residence, BMI, academic stress, sleep duration, and menstrual irregularity using chi-squared and *t*-tests. Assumptions were checked before running the tests. It is noted that, due to having only one sample in the obese category, it was reasonable to combine the overweight and obese categories into a single category for further analysis. This decision was made to ensure sufficient sample size for statistical validity, meet the assumptions of the chi-squared test, *t*-test, and regression analysis regarding expected cell frequencies, and enhance the power and reliability of the statistical tests. The findings indicated significant differences between the groups of female students in terms of major, BMI, and academic stress (p <0.05) (**Table 3**).

Table 3 The study variables in relation to menstrual irregularity (*N* = 263)

Variables	Menstrual Irregularity		X^2/t	*p*-value
	Yes	No		
	n / Mean (SD)	*n* / Mean (SD)		
Academic year			0.09	0.81
Third-year	63	65		
Fourth-year	64	71		
Major			11.59	0.001
Nursing majors	87	117		
Medical technology majors	40	19		
Residence			1.14	0.45
Living with family	53	42		
Renting dormitories/houses	74	94		
BMI			13.99	0.001
Normal weight	83	91		
Underweight	30	44		
Overweight/obese	14	1		
Academic stress	127 / 52.3 (12.1)	136 / 48.4 (11.8)	-2.6	0.04
Sleep duration			2.48	0.29
<7 hours/day	65	78		
7-9 hours/day	55	55		
>9 hours/day	7	3		

The multivariate logistic regression indicated that the variables major and BMI made a significant contribution to menstrual irregularity, while academic year, residence, academic stress, and sleep duration did not. Female students in nursing majors had significantly higher odds of menstrual irregularity, 2.5 times that of students in medical technology majors (AOR = 2.5, 95% CI = 1.35, 4.13). Additionally, students who were overweight/obese were 7.56 times more likely to have menstrual irregularity compared to students with normal weight (AOR = 7.56, 95% CI = 1.34, 80.8). This suggests a strong association between higher weight status and the occurrence of irregularities, although the wide confidence interval indicates some uncertainty in the estimate, likely due to the small sample size (**Table 4)**.

Table 4 Multivariate logistic regression of factors predicting menstrual irregularity among female students (*N* = 263)

Variables	Multivariate Logistic Regression	
	Adjusted OR [95% CI]	*p*-value
Academic year		
Third-year	Reference	
Fourth-year	0.62 [0.35, 1.67]	0.64
Major		
Medical technology majors	Reference	
Nursing majors	2.5 [1.35, 4.13]	0.02
Residence		
Living with family	Reference	
Renting dormitories/houses	0.75 [0.44, 1.48]	0.24
BMI		
Normal weight	Reference	
Underweight	0.84 [0.56, 1.89]	0.38
Overweight/obese	7.56 [1.34, 80.8]	0.03
Academic stress	0.89 [0.95, 1.05]	0.06
Sleep duration		
7-9 hours/day	Reference	
<7 hours/day	0.78 [0.67, 2.01]	0.86
>9 hours/day	1.43 [0.67, 2.15]	0.35

Discussion

Summary of the Findings

The study revealed a high rate of menstrual irregularity among female students, reaching 48.3%, consistent with findings from previous studies (Alhammadi et al., 2022; Thuc et al., 2022). This high prevalence could be attributed to the clinical practice demands placed on healthcare students in their third and fourth years. These practices often involve night shifts at hospitals, which may disrupt sleep patterns and contribute to menstrual irregularities among female students (Mittiku et al., 2022). Given these findings, it is recommended that schools and educators pay closer attention to the menstrual health of female nursing and medical technology students to safeguard their well-being during their studies.

According to the multivariate logistic regression results, overweight/obese participants were approximately 7.56 times more likely to experience menstrual irregularities compared to those of normal weight. This association has been documented in previous studies in India, Ethiopia, and Egypt concerning overweight and obese individuals (Hossam et al., 2016; Mittiku et al., 2022; Sherly et al., 2017). The underlying

mechanism may involve hormonal changes associated with increased adipose tissue. Excess adipose tissue leads to elevated estrogen levels, which disrupts the feedback mechanisms of the hypothalamic-pituitary-ovarian (HPO) axis, thereby causing menstrual irregularities. Additionally, being overweight or obese can increase insulin levels, which decreases the production of sex hormone-binding globulin (SHBG) in the liver. This protein is crucial for regulating testosterone and estrogen levels in the blood; its reduced production can further disrupt the hormonal balance and contribute to menstrual irregularities (Bohler Jr et al., 2010).

Female students majoring in nursing were found to have a higher risk of irregular menstruation compared to those in medical technology majors, consistent with previous research in Korea that highlighted the occupational differences among females (Nam et al., 2017). This disparity is likely due to the nursing curriculum's emphasis on extensive clinical practice compared to medical technology programs.

Initial analysis suggested a link between educational stress and menstrual irregularity, but multivariate analysis indicated that educational stress was not a significant predictor of menstrual irregularity. This finding aligns with a previous study in Malaysia (Sood et al., 2017) and may be explained by the moderate stress levels reported by female students (mean score of 50.3 out of 80 points). Additionally, students were regularly reminded during orientation about the challenges they might face during their four years of study.

Furthermore, this study found no association between menstrual irregularity and sleep duration, academic year, or residence. These findings contrast with a previous study that reported a relationship between sleep quality and menstrual irregularity (Jeon & Baek, 2023).

Implications of the Study

The findings of this study hold significant implications for nursing, midwifery practice, and educational policy. The study suggests several avenues for intervention and support in nursing and midwifery practice. Nurse-midwives can utilize these findings to develop targeted interventions aimed at supporting students who are at risk of or experiencing menstrual disorders. These interventions might include educational programs focusing on promoting healthy eating, lifestyle adjustments, and the maintenance of a normal BMI to enhance reproductive health. Moreover, emphasizing the role of health education within nursing and midwifery training programs can help students grasp the impact of lifestyle factors on menstrual health and encourage the adoption of healthier habits.

From an educational policy perspective, adjusting the timing of clinical and theory classes could mitigate sleep deprivation effects, potentially reducing menstrual irregularities linked to disrupted sleep patterns. While stress wasn't a significant predictor, integrating stress management techniques and support resources for academic stress could still benefit students.

Limitations and Recommendations for Future Research

Using convenience sampling due to time constraints limited the generalizability of the findings beyond the study sample. Another limitation was the combination of the overweight and obese categories into a single category for analysis. This was necessary due to the small number of obese participants, which would have compromised the statistical power and validity of the analyses. However, this approach limited the ability to differentiate between the specific impacts of being overweight versus obese on menstrual irregularities. Future research with larger sample sizes should aim to analyze these categories separately to provide more nuanced insights.

Additionally, longitudinal studies would provide insights into how menstrual irregularities develop over time, capturing both short-term fluctuations and long-term trends. Also, future research should consider incorporating variables such as diet, exercise habits, and mental health factors to better understand the complex nature of menstrual irregularities. Furthermore, intervention studies that evaluate the effectiveness of specific interventions—such as stress management programs, dietary modifications, and physical activity routines—can offer valuable guidance for developing targeted strategies to improve menstrual health among female students in higher education settings.

Conclusion

The study revealed that 48.3% of participants experienced menstrual irregularities. Major and BMI were identified as significant contributors to menstrual irregularity. The investigations suggest that adopting healthier lifestyle practices, including weight control and stress management, are important factors in controlling and preventing menstrual irregularity. Future research should explore these factors in larger, diverse samples to validate interventions to improve menstrual health among university students.

Declaration of Conflicting Interest

The authors declared no conflicts of interest in this study.

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Authors' Contributions

NTN made significant contributions to the literature review (review of theory which can be applied in the study, recommendation from FIGO about menstrual irregularity, current situation of menstrual irregularity among students in Vietnam), design of the study, data acquisition, analysis/interpretation of the study, discussion, and conclusion. TTML made significant contributions to the literature review (review of the factors related to menstrual irregularity), study design, data acquisition, and interpretation of the study findings. All authors drafted the manuscript, revised it critically for important intellectual content, approved the final version of the paper, and agreed to its submission for publication.

Authors' Biographies

Dr. Nhan Thi Nguyen is a Vice Dean of the Faculty of Nursing and Medical Technology, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam.

Trinh Thi My Le is a former Bachelor's student at the Department of Midwifery, Faculty of Nursing and Medical Technology, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam. Currently, she works at My Duc Hospital.

Data Availability

The datasets generated/analyzed in this study are available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to disclose.

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