

Menstrual Health Status and Associated Factors among Female University Students in Xindu District, Chengdu: A Cross-Sectional Study

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Abstract

Background: Menstrual discomfort among university students is not only a reproductive health concern but also a preventable campus health issue when associated with modifiable lifestyle, psychological, and knowledge-related factors. For university health promotion, identifying actionable risk factors may be more useful than documenting symptom prevalence alone. However, localized evidence on menstrual health and its determinants among female university students in Southwest China remains limited. **Objective:** This study investigated menstrual health status and factors associated with moderate-to-severe menstrual discomfort among female university students in Xindu District, Chengdu, China. **Methods:** A cross-sectional questionnaire survey was conducted from February to April 2026 among female students from three universities in Xindu District. Stratified random sampling was used, and 272 valid questionnaires were included. Descriptive statistics, χ^2 tests, and binary logistic regression were performed using SPSS. **Results:** Dysmenorrhea and premenstrual symptoms were common in the population, with more than 90% of respondents reporting dysmenorrhea at least occasionally. Menstrual discomfort affected learning efficiency, social activities, and emotional state. Logistic regression identified six independent risk factors for moderate-to-severe menstrual discomfort: maternal history of dysmenorrhea, high academic pressure, sleeping less than six hours per day, lack of regular exercise, frequent intake of raw, cold, or spicy foods during menstruation, and insufficient menstrual health-care knowledge. The odds ratios ranged from 2.024 to 2.785, and all associations were statistically significant. **Conclusion:** Menstrual discomfort among female university students is influenced by hereditary, psychological, behavioral, and cognitive factors. Campus-based preventive interventions should integrate health education, lifestyle guidance, psychological support, and accessible women's

health services.

Keywords

Menstrual Health, Dysmenorrhea, Premenstrual Symptoms, Female University Students, Health Education, Preventive Medicine

1. Introduction

Menstrual health is a core component of reproductive health and overall well-being among young female university students. Menstrual symptoms may interfere with academic performance, emotional regulation, social participation, and daily functioning [1] [2]. Dysmenorrhea, irregular menstrual cycles, and premenstrual symptoms are frequently reported in young women [3]-[5], yet many students normalize symptoms, delay professional consultation, or rely on informal self-management.

Recent evidence syntheses further confirm the high burden of menstrual health problems among university student populations. A systematic review and meta-analysis of primary dysmenorrhea among female college students reported a high pooled prevalence and identified family history of dysmenorrhea, stress, cold dietary intake, insufficient sleep, and related lifestyle factors as important associated factors [6]. Another recent systematic review and meta-analysis focusing on nursing students reported that premenstrual syndrome, premenstrual dysphoric disorder, and dysmenorrhea were common and were associated with academic, psychological, and social consequences [7]. These findings suggest that menstrual health problems among university students should be understood not only as reproductive symptoms but also as student health and campus health-promotion issues.

Previous studies have suggested that menstrual discomfort is associated with multiple biological, psychological, behavioral, and knowledge-related factors [3] [8] [9]. Psychological stress and anxiety may aggravate menstrual symptoms and affect students' daily functioning [1] [2] [8] [10]. Lifestyle behaviors, including insufficient sleep, low physical activity, and inappropriate dietary habits during menstruation, have also been linked to more severe menstrual symptoms [5] [11]-[13]. In addition, insufficient menstrual health knowledge may limit students' ability to adopt effective self-care strategies or seek timely medical support [4].

Although menstrual health among university students has received increasing research attention in both China and other countries [3]-[7] [10], localized evidence from Southwest China remains limited. Existing Chinese studies have often focused on specific cities or single institutions, while relatively few have examined menstrual health among female university students in Xindu District, Chengdu [3] [12] [13].

Therefore, this study aimed to investigate menstrual health status among female university students in three universities in Xindu District, Chengdu, and to identify factors associated with moderate-to-severe menstrual discomfort. The findings may provide evidence for menstrual health education, lifestyle guidance, psychological support, and campus-based preventive health services.

2. Materials and Methods

2.1. Study Design and Participants

A cross-sectional questionnaire survey was conducted from February to April 2026. Female undergraduate students were recruited from three universities in Xindu District, Chengdu, China. A stratified random sampling method was used, with the sampling process aiming to include students from different universities and grade levels. A total of 300 female students were invited to participate, and 272 valid questionnaires were included in the final analysis, giving an effective response rate of 90.7%.

The inclusion criteria were as follows: age 18 years or older, current enrollment as a female university student, ability to understand written Chinese, access to and ability to use a smartphone, and willingness to complete the questionnaire according to personal circumstances. According to the original survey protocol, questionnaires were excluded if participants were unwilling to complete the questionnaire, were unable to submit it, did not meet the inclusion criteria, or provided incomplete responses. Detailed invitation numbers by individual stratum were not retained after anonymized data collection.

2.2. Questionnaire and Measurement of Key Variables

Data were collected using a self-designed structured questionnaire distributed online through Wenjuanxing (a specialized online questionnaire platform). The questionnaire included four domains: 1) demographic characteristics, including age, grade, academic major, place of origin, Household economic status and only-child status; 2) menstrual health status, including age at menarche, cycle regularity, menstrual duration, dysmenorrhea, premenstrual symptoms and the effect of menstrual discomfort on learning and daily life; 3) potential influencing factors, including diet, intake of raw/cold/spicy foods, sleep duration, exercise frequency, academic pressure, anxiety before menstruation, family history of dysmenorrhea and menstrual health-care knowledge; 4) health-service needs and use. The questionnaire showed acceptable reliability and validity with Cronbach's $\alpha = 0.82$, KMO = 0.78, and a significant Bartlett's test of sphericity ($\chi^2 = 1583.26$, $df = 210$, $P < 0.001$). The key variables used in the analysis were measured using self-reported single questionnaire items rather than multi-item scale scores. Dysmenorrhea occurrence was assessed by asking whether participants experienced dysmenorrhea, with response options of never, occasionally, and often. Dysmenorrhea severity was assessed using a separate single item with three response categories: mild, defined as not affecting daily life or study; moderate, defined as par-

tially affecting daily life or study; and severe, defined as seriously affecting daily life or study. Premenstrual symptoms were assessed by a single item asking whether participants experienced premenstrual symptoms, with response options of never, occasionally, and often. Academic pressure was measured by a self-rated pressure item and categorized as low, moderate, or high. Premenstrual anxiety was measured by a single yes/no item asking whether participants often experienced anxiety, irritability, or other negative emotions before menstruation. Menstrual health-care knowledge was measured by a single item asking participants about their understanding of menstrual physiological hygiene knowledge, with responses categorized as sufficient, partial, or insufficient knowledge.

2.3. Outcome Variable

The primary outcome was moderate-to-severe menstrual discomfort. This outcome was treated as a composite endpoint because dysmenorrhea and premenstrual symptoms are both common and functionally relevant menstrual health problems among university students. Both symptom domains may affect study efficiency, emotional status, daily activities, and health-service needs. Therefore, the composite endpoint was used to capture participants with substantial menstrual-related discomfort rather than focusing on dysmenorrhea alone.

Participants were classified into the moderate-to-severe discomfort group if they reported moderate or severe dysmenorrhea and/or moderate or severe premenstrual symptoms. Participants reporting no symptoms or only mild symptoms were classified into the none-to-mild discomfort group. Dysmenorrhea severity and premenstrual symptom severity were based on self-reported questionnaire items, with moderate or severe symptoms used as the cutoff for analysis. Because only anonymized aggregate data were available for manuscript revision, the participant-level overlap between moderate-to-severe dysmenorrhea and moderate-to-severe premenstrual symptoms could not be reconstructed.

2.4. Statistical Analysis

Descriptive statistics were used to summarize demographic characteristics, menstrual health status, health-related behaviors, psychological factors, and menstrual health-care knowledge. Categorical variables were expressed as frequencies and percentages. The main outcome variable was moderate-to-severe menstrual discomfort, which was coded as 1 for participants reporting moderate or severe dysmenorrhea and/or moderate or severe premenstrual symptoms, and 0 for participants reporting no symptoms or only mild symptoms.

χ^2 tests were used to examine differences in moderate-to-severe menstrual discomfort across demographic, behavioral, psychological, familial, and knowledge-related variables. Variables with $P < 0.10$ in univariate analysis were entered into a forward stepwise binary logistic regression model to identify independent factors associated with moderate-to-severe menstrual discomfort. Forward stepwise logistic regression was used because the study was exploratory and included sev-

eral potentially related behavioral, psychological, familial, and knowledge-related variables. This approach allowed variables showing potential univariate associations to be screened while reducing the number of predictors retained in the final model.

Categorical variables were entered into the model according to the predefined coding scheme. For ordinal variables, higher values indicated a higher exposure or risk level, including higher academic pressure, shorter sleep duration, less regular exercise, more frequent intake of raw, cold, or spicy foods during menstruation, and poorer menstrual health-care knowledge. Odds ratios (ORs), 95% confidence intervals (CIs), regression coefficients, standard errors, and P values were reported. A two-sided P value < 0.05 was considered statistically significant. All statistical analyses were performed using SPSS software.

Because only anonymized aggregate results were available for final manuscript revision, participant-level model diagnostics, such as variance inflation factors or the Hosmer-Lemeshow goodness-of-fit test, could not be recalculated.

2.5. Ethical Considerations

This questionnaire-based study was conducted with permission from the participating universities. Formal written ethics approval and an approval number were not available because the study was an anonymous, voluntary, minimal-risk educational survey, and no personally identifiable information was collected. The survey was distributed through Wenjuanxing, an online questionnaire platform. Before accessing the questionnaire items, participants were presented with an electronic informed consent statement explaining the study purpose, voluntary participation, anonymity, confidentiality, approximate completion time, and academic use of the data. Participants who chose to proceed with the questionnaire were considered to have provided electronic informed consent. All responses were anonymous, and the data were analyzed only in aggregate form.

3. Results

3.1. Demographic Characteristics

A total of 300 female students were invited to participate; 272 valid questionnaires were included in the final analysis, giving an effective response rate of 90.7%. The remaining 28 questionnaires were not included because participants were unwilling to complete the questionnaire, were unable to submit the questionnaire, did not meet the inclusion criteria, or provided incomplete responses. Most participants were aged 19 - 22 years, accounting for 78.7% of the sample. Sophomore students represented the largest grade group (34.9%). The sample included students from humanities, science/engineering, medical, and arts/sports majors. Urban students accounted for the 58.1%, and 68.8% reported an average Household economic status. Participant demographic characteristics are summarized in **Table 1**.

Table 1. Demographic characteristics of participants (N = 272).

Characteristic	Category	n	%
Age	≤18 Years	45	16.5
	19 - 20 Years	128	47.1
	21 - 22 Years	86	31.6
	≥23 Years	13	4.8
Grade	Freshman	78	28.7
	Sophomore	95	34.9
	Junior	72	26.5
	Senior and Above	27	9.9
Major	Humanities	102	37.5
	Science/Engineering	98	36.0
	Medicine	52	19.1
	Arts/Sports	20	7.4
Place of Origin	Urban	158	58.1
	Rural	114	41.9
Household Economic Status	Good	35	12.9
	Average	187	68.8
	Poor	50	18.4
Only Child	Yes	112	41.2
	No	160	58.8

Note: percentages are calculated using N = 272 unless otherwise stated. Some percentages may not total 100% because of rounding.

3.2. Menstrual Health Status

Table 2. Menstrual characteristics.

Variable	Category	n	%
Menarche Age	≤12 Years	68	25.0
	13 - 14 Years	145	53.3
	≥15 Years	59	21.7
Cycle Regularity	Very Regular	87	32.0
	Generally Regular	132	48.5
	Irregular	53	19.5
Menstrual Duration	≤3 Days	31	11.4
	4 - 5 Days	168	61.8
	6 - 7 Days	62	22.8
	≥8 Days	11	4.0

More than half of the respondents experienced their first menstruation between the ages of 13 and 14. In terms of cycle regularity, approximately 80 percent of the students had menstrual cycles that were generally or very regular, although

around 20 percent experienced irregular cycles. The most common duration of menstruation was 4 to 5 days, accounting for over 60 percent of cases, which falls within the normal range. Detailed menstrual characteristics are presented in **Table 2**.

3.3. Frequency and Reported Severity of Dysmenorrhea and Premenstrual Symptoms

Dysmenorrhea and premenstrual symptoms were common among the participants. A total of 247 participants (90.8%) reported dysmenorrhea at least occasionally, whereas 25 participants (9.2%) reported never experiencing dysmenorrhea. Premenstrual symptoms were also common, with 248 participants (91.2%) reporting symptoms at least occasionally and 24 participants (8.8%) reporting no premenstrual symptoms.

In the original aggregate tables, frequency categories and severity categories could not be reconciled at the participant level. Therefore, to avoid presenting internally inconsistent descriptive statistics, **Table 3** was revised to report symptom frequency only.

Table 3. Frequency and reported severity of dysmenorrhea and premenstrual symptoms.

Symptom	Frequency	n	%
Dysmenorrhea	Every/almost every period	95	34.9
	Often	87	32.0
	Occasionally	65	23.9
	Never	25	9.2
Premenstrual Symptoms	Every/almost every period	82	30.1
	Often	93	34.2
	Occasionally	73	26.8
	Never	24	8.8

Note: 1) percentages are calculated using N = 272 unless otherwise stated. Some percentages may not total 100% because of rounding.

3.4. Effects on Study, Daily Life, and Health Behaviors

Menstrual discomfort affected multiple aspects of student life. A total of 51.5% reported that menstrual discomfort had a large or very large effect on learning efficiency, and 58.8% reported a large or very large effect on emotional state. Social activities were relatively less affected, but 37.9% of participants still reported a large or very large impact, indicating that menstrual discomfort extended beyond physical symptoms and influenced students' academic performance, emotional well-being, and social participation.

Menstrual health knowledge was incomplete despite generally positive attitudes. Only 56.3% of participants correctly identified the main causes of dysmenorrhea, and 31.3% did not know what types of exercise were suitable during menstruation. However, most students considered menstrual health care either very

important or relatively important.

Several health-related behaviors also showed room for improvement. Only 46.0% of participants actively adjusted their diet during menstruation, 17.6% slept less than six hours per day, and 29.0% reported no regular exercise.

Table 4. Menstrual impact, health knowledge, lifestyle behaviors, and health service utilization.

Domain	Category	n	%
Impact on Learning Efficiency	Very Large	38	14.0
	Large	102	37.5
	Moderate	85	31.3
	Small/Nonee	47	17.3
Impact on Social Activity	Very Large	25	9.2
	Large	78	28.7
	Moderate	98	36.0
	Small/Nonee	71	26.1
Impact on Emotional State	Very Large	45	16.5
	Large	115	42.3
	Moderate	75	27.6
	Small/Nonee	37	13.6
Knowledge of Causes of Dysmenorrhea	Correct	153	56.3
	Incorrect/Unknown	119	43.8
Knowledge of Suitable Menstrual Exercise	Know	187	68.8
	Do Not Know	85	31.3
Dietary Adjustment during Menstruation	Active Adjustment	125	46.0
	Occasional Adjustment	102	37.5
	No Adjustment	45	16.5
Daily Sleep Duration	<6 Hours	48	17.6
	6 - 8 Hours	158	58.1
	≥8 Hours	66	24.3
Regular Exercise Frequency	≥3 Times/Week	58	21.3
	1 - 2 Times/Week	135	49.6
	Never	79	29.0
First Response to Dysmenorrhea	Tolerate/Rest	165	60.7
	Self-Medication	85	31.3
	Medical Consultation	22	8.1
Medical Consultation for Menstrual Problems	Yes	78	28.7
	No	194	71.3
Awareness of Campus Gynecological Services	Used Services	45	16.5
	Aware but Never Used	102	37.5
	Unaware	125	46.0

Health service utilization was limited. When experiencing dysmenorrhea, 60.7% of participants chose to tolerate the symptoms or rest, whereas only 8.1% selected medical consultation as their first response. In addition, 71.3% had never sought medical care for menstrual problems, and 46.0% were unaware of the gynecological services provided by the university clinic. These findings are summarized in **Table 4**.

3.5. Factors Associated with Moderate-to-Severe Menstrual Discomfort

Univariate analysis showed that demographic characteristics, including age, grade, academic major, place of origin, and only-child status, were not significantly associated with moderate-to-severe menstrual discomfort. In contrast, several behavioral, psychological, familial, and knowledge-related variables showed statistically significant associations, including menstrual dietary adjustment, sleep duration, regular exercise frequency, frequent intake of raw, cold, or spicy foods during menstruation, self-reported academic pressure, anxiety before menstruation, maternal history of dysmenorrhea, and menstrual health-care knowledge.

These variables were further entered into a binary logistic regression model. After adjustment, six variables remained independently associated with moderate-to-severe menstrual discomfort: maternal history of dysmenorrhea, high academic pressure, sleeping less than six hours per day, lack of regular exercise, frequent intake of raw, cold, or spicy food during menstruation, and insufficient menstrual health-care knowledge. Menstrual dietary adjustment and premenstrual anxiety were not statistically significant in the final model, as their confidence intervals included 1.0. The final regression results are presented in **Table 5**.

Table 5. Binary logistic regression analysis of factors associated with moderate-to-severe menstrual discomfort.

Variable	Comparison	β	S.E.	P	OR	95% CI
Maternal history of dysmenorrhea	Yes vs. no	0.892	0.301	0.003	2.440	1.354 - 4.396
Academic pressure	High vs. low	1.024	0.412	0.013	2.785	1.241 - 6.251
Daily sleep duration	<6 h vs. sufficient sleep	0.856	0.388	0.027	2.354	1.100 - 5.037
Regular exercise	Irregular/no exercise vs. regular	0.743	0.336	0.027	2.102	1.089 - 4.058
Raw/cold/spicy food during menstruation	Frequent vs. never/occasional	0.812	0.371	0.029	2.252	1.088 - 4.661
Menstrual health-care knowledge	Insufficient vs. sufficient	0.705	0.322	0.029	2.024	1.076 - 3.806
Dietary adjustment	Irregular vs. regular	0.312	0.254	0.219	1.366	0.830 - 2.248
Premenstrual anxiety	Yes vs. no	0.458	0.289	0.113	1.581	0.898 - 2.784

4. Discussion

4.1. Main Findings

The study found a high burden of dysmenorrhea and premenstrual symptoms among female university students in Xindu District, Chengdu. This is consistent with previous studies reporting that dysmenorrhea and premenstrual symptoms are common among female university students in China and other countries [2]-[5]. More than half of the participants reported that menstrual discomfort substantially affected learning efficiency or emotional state. Similar academic and psychological impacts have been reported in studies of international and female university students, suggesting that menstrual symptoms may interfere with both mental well-being and academic engagement [1] [2]. These findings suggest that menstrual health should be treated as a routine component of student health promotion rather than an individual or private problem only.

4.2. Behavioral and Psychosocial Risk Factors

Menstrual discomfort among female university students is associated with both non-modifiable and modifiable factors. Maternal history of dysmenorrhea was independently associated with moderate-to-severe menstrual discomfort. Although the present study did not examine biological mechanisms directly, previous studies have shown that primary dysmenorrhea is influenced by multiple individual and physiological factors [3] [9]. This association may reflect inherited biological sensitivity, shared pain-related perceptions, or family-based health behaviors. Although this factor cannot be modified directly, it can help identify students who may require earlier menstrual health education and symptom monitoring.

Among modifiable factors, academic pressure showed the strongest association with moderate-to-severe menstrual discomfort. This finding is consistent with previous research linking psychological stress, mental well-being, and menstrual disturbances among university students [1] [2] [8] [10]. University students often face academic competition, examinations, career planning, and social adjustment, all of which may contribute to psychological stress. The association between high academic pressure and menstrual discomfort indicates that menstrual health promotion should not be limited to gynecological education, but should also include stress management and psychological support.

Lifestyle behaviors were also important. Sleeping less than six hours per day, lack of regular exercise, and frequent intake of raw, cold, or spicy foods during menstruation were independently associated with higher odds of moderate-to-severe menstrual discomfort. This result is consistent with previous studies showing associations between sleep insufficiency or poor sleep quality and premenstrual symptoms or menstrual disorders [11] [13]. These findings support the need for practical lifestyle guidance focusing on sleep hygiene, regular physical activity, and dietary self-management during menstruation. In addition, insufficient menstrual health-care knowledge was an independent risk factor, suggesting that knowledge gaps may limit students' ability to adopt effective self-care behaviors

or seek timely health services.

4.3. Preventive Medicine and Campus Health Implications

From the perspective of preventive medicine, the findings highlight several intervention points for university health promotion. First, menstrual health education should be integrated into routine campus health programs rather than provided only when students experience symptoms. Previous research has highlighted the importance of menstrual health knowledge, practices, and culturally appropriate education among university students [4] [14]. Educational content should include the physiological basis of menstruation, warning signs that require medical consultation, appropriate exercise during menstruation, dietary self-management, sleep hygiene, and safe medication use. Peer education, freshman orientation, elective courses, and official campus media may help normalize menstrual health communication.

In addition, universities should also improve the accessibility and visibility of women's health services. The low proportion of students choosing medical consultation as their first response suggests a gap between menstrual health needs and formal care-seeking behaviors, a problem that may be related to limited knowledge, stigma, or normalization of symptoms [1] [4].

Finally, menstrual health promotion should be linked with psychological and academic support. Because academic pressure was the strongest independent risk factor in the regression model, stress reduction, counseling services, and academic support systems may contribute indirectly to menstrual health improvement. Universities can strengthen supportive environments by providing emergency menstrual products, warm-water access, and temporary rest spaces for students with severe symptoms. Family and social support may also help reduce stigma and encourage students to discuss menstrual health needs more openly.

4.4. Limitations

The study has several limitations. First, the survey was limited to three universities in Xindu District, and the findings may not be generalizable to all female university students in China. Second, the cross-sectional design cannot establish causal relationships. Third, menstrual symptoms, lifestyle behaviors, and psychological status were self-reported, which may introduce recall bias or social desirability bias. Fourth, several clinical confounders that may influence menstrual symptom severity were not measured or not included in the final analysis, including previously diagnosed gynecological conditions, hormonal medication use, analgesic use, and body mass index. These factors may affect the occurrence and severity of dysmenorrhea or premenstrual symptoms; therefore, the observed associations should be interpreted with caution. Fifth, although the questionnaire showed acceptable internal consistency and sampling adequacy, it was self-designed and was not externally validated in an independent population. Finally, biological indicators such as hormone levels, inflammatory markers, and genetic factors were not

measured. Future studies should include larger multi-center samples, longitudinal designs, validated measurement tools, clinical and medication-related variables, and objective health indicators.

5. Conclusion

Dysmenorrhea and premenstrual symptoms were common among female university students in Xindu District, Chengdu, and menstrual discomfort affected study efficiency, emotional status, and daily life. Moderate-to-severe menstrual discomfort was independently associated with maternal history of dysmenorrhea, high academic pressure, insufficient sleep, lack of regular exercise, frequent intake of raw, cold, or spicy foods during menstruation, and insufficient menstrual health-care knowledge. University-based menstrual health promotion should prioritize modifiable risk factors through health education, stress management, sleep and exercise guidance, dietary counseling, and improved access to women's health services.

Author Contributions

Fangfei Liu: The first author was primarily responsible for drafting the main manuscript, submitting the paper, and conducting data collection and analysis. **Xinmei Wei:** The second author was responsible for literature review and organization, questionnaire distribution and collection, and field investigations. **Fang Liu:** The third author collected research materials and assisted with manuscript drafting and revision. **Miaojing Li:** The corresponding author was responsible for the study design, quality control of the field investigation, and supervision of manuscript preparation and submission.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request, subject to privacy and ethical restrictions.

Conflicts of Interest

The authors declare no conflicts of interest.

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