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Knowledge, Attitudes, and Practices Regarding Menstrual Health among Female Pharmacy Students in Bangladesh: A Cross-Sectional Study

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Abstract

Background

Menstrual health is an essential component of women's reproductive health, yet misconceptions and stigma remain widespread, particularly in low- and middle-income countries. As future healthcare professionals, pharmacy students should possess adequate menstrual health knowledge; however, evidence among female pharmacy students in Bangladesh remains limited.

Objective

This study aimed to assess the knowledge, attitudes, and practices regarding menstrual health among female pharmacy students in Bangladesh and identify associated sociodemographic factors.

Methods

A descriptive cross-sectional study was conducted among 452 female pharmacy students from public and private universities in Bangladesh using a structured, self-administered online questionnaire distributed between January and March, 2026. Data were analyzed using descriptive statistics, chi-square tests, and multivariable logistic regression.

Results

Participants exhibited varying levels of knowledge, with 55.1% classified as having poor knowledge, 26.1% moderate knowledge, and 18.8% good knowledge. Attitudes were predominantly neutral (53.3%), with 36.3% positive and 10.4% negative, while practices were predominantly good (77.7%). Significant knowledge gaps were identified regarding the causes of dysmenorrhea (46.5%) and ovulation prediction (45.4%). Academic progression was positively associated with knowledge (third-year: AOR = 3.03, 95% CI: 1.41–6.49, $p = 0.005$; fourth-year: AOR = 15.8, 95% CI: 5.11–33.4, $p < 0.001$) and attitudes (third-year: AOR = 3.43, 95% CI: 1.85–6.73, $p < 0.001$; fourth-year: AOR = 4.49, 95% CI: 1.96–11.2, $p < 0.001$). Single students showed higher odds of good knowledge and positive attitudes than married students.

Conclusion

Despite favorable attitudes and practices, substantial menstrual health knowledge gaps persist among female pharmacy students in Bangladesh. Integrating comprehensive menstrual health education into pharmacy curricula is essential to prepare future pharmacists for effective reproductive health promotion and patient counseling.

Introduction

Menstruation is a fundamental biological and physiological process experienced by approximately 1.8 billion individuals worldwide each month and constitutes an essential component of women's sexual and reproductive health [1]. Despite being a normal aspect of the reproductive life cycle, menstruation remains surrounded by misconceptions, cultural taboos, and social stigma that limit open discussion and access to accurate information [2]. Consequently, menstrual health has become an important global public health concern. The World Health Organization recognizes sexual and reproductive health as a major public health priority, with menstrual health representing a frequently neglected component [3]. Poor menstrual health management can adversely affect physical, psychological, educational, and social well-being [4].

Globally, millions of women and girls continue to experience inadequate menstrual health education, poor access to affordable menstrual products, and insufficient water, sanitation, and hygiene (WASH) facilities [5]. Many girls reach menarche without adequate knowledge of the menstrual cycle and often rely on inaccurate information from family members or peers [6]. Poor menstrual hygiene practices have been associated with reproductive and urinary tract infections, psychological distress, school absenteeism, reduced academic performance, and decreased workplace productivity [7]. Although governments and international organizations have increasingly prioritized menstrual health, substantial inequalities persist, particularly in low- and middle-income countries where socioeconomic barriers and cultural beliefs hinder effective menstrual hygiene management [8].

Across Asia, menstrual health remains strongly influenced by sociocultural norms and gender-related stigma [9]. Studies from India, Pakistan, Nepal, Bhutan, Saudi Arabia, and Iran consistently report that adolescent girls primarily receive information about menstruation from mothers or other female family members [10]. However, this information is often incomplete and influenced by traditional beliefs rather than scientific evidence. Misconceptions regarding menstruation and restrictions on religious practices, food intake, and social participation remain common [11]. Although educational interventions have improved menstrual knowledge and hygiene practices, important knowledge gaps continue to exist even among university students.

Bangladesh has made substantial progress in maternal and reproductive health; however, menstrual health continues to receive limited attention. Menstruation remains a sensitive subject in many families and communities, where stigma discourages open communication [12]. Consequently, many girls experience menarche with inadequate preparation and depend primarily on mothers, sisters, relatives, friends, or social media for menstrual information [13]. Previous studies among schoolgirls, university students, and women of reproductive age have reported varying levels of menstrual knowledge, attitudes, and hygiene practices [4, 11, 13]. Although higher educational attainment has been associated with better menstrual health knowledge, misconceptions regarding menstrual physiology and hygiene remain prevalent, while financial barriers and inadequate disposal facilities continue to challenge effective menstrual management [14].

Knowledge, attitudes, and practices (KAP) are closely interconnected determinants of menstrual health. Adequate knowledge enables women to understand menstruation, recognize abnormal symptoms, and adopt appropriate hygiene practices [15]. Positive attitudes reduce stigma and promote healthcare-seeking behavior, while appropriate hygiene practices are essential for preventing infections and maintaining reproductive health [16]. Assessing these three domains together provides a comprehensive understanding of menstrual health behaviors and helps identify areas requiring targeted educational interventions.

Pharmacists are increasingly recognized as accessible healthcare professionals who contribute to reproductive health promotion and patient education. They are well positioned to provide evidence-based information regarding menstrual physiology, menstrual hygiene, menstrual products, and common menstrual disorders [17]. Consequently, pharmacy students should possess accurate knowledge and positive attitudes toward menstrual health before entering professional practice. However, gaps may still exist in applying their scientific knowledge to reproductive health issues, including menstruation.

Despite the growing body of menstrual health research in Bangladesh, evidence specifically focusing on female pharmacy students remains limited. Most previous studies have examined schoolgirls or students from mixed academic disciplines, with little attention given to pharmacy students who will become future healthcare professionals. Evaluating their knowledge, attitudes, and practices is important because their understanding may influence the quality of counseling and health education they provide in their future careers.

Therefore, this cross-sectional study aimed to assess the knowledge, attitudes, and practices regarding menstrual health among female pharmacy students in Bangladesh and to identify sociodemographic factors associated with these outcomes. The findings are expected to support curriculum-based educational interventions, strengthen menstrual health promotion within pharmacy education, and improve menstrual health literacy among young women in Bangladesh.

Materials and Methods

Study Design and Setting

A descriptive cross-sectional study was conducted to assess the knowledge, attitudes, and practices (KAP) regarding menstrual health among female pharmacy students in Bangladesh. Data were collected using a structured, self-administered online questionnaire distributed between January 2026 and March 2026. The survey was disseminated through academic networks, university student forums, Facebook groups, WhatsApp groups, and other social media platforms to recruit participants from public and private universities across Bangladesh. Participation was voluntary, anonymous, and based on electronic informed consent.

Study Population and Sampling

The study population comprised female undergraduate and postgraduate pharmacy students enrolled in accredited public and private universities in Bangladesh. A non-probability convenience sampling technique was employed because of the nationwide online survey design and the absence of a comprehensive sampling frame.

Participants were eligible if they were: (1) currently enrolled in a Bachelor of Pharmacy (B.Pharm) or Master of Pharmacy (M.Pharm) program at a Bangladeshi university, (2) female, (3) aged 18 years or older, and (4) willing to participate by providing informed consent. Responses with incomplete questionnaires or duplicate submissions were excluded from the final analysis.

The minimum sample size was determined using the single population proportion formula:

$$\varvec{n} = \frac{\varvec{Z}^2.\ \varvec{P}\left(1 - \varvec{P}\right)}{\varvec{d}^2}$$

Assuming a 50% prevalence of adequate menstrual health knowledge (P = 0.50), a 95% confidence level (Z = 1.96), and a 5% margin of error (d = 0.05), the minimum required sample size was 384 participants [18]. To compensate for possible incomplete responses and non-response, the target sample size was increased to 420 participants.

Although the online survey enabled recruitment from geographically diverse institutions, the non-probability sampling approach may have introduced selection bias and limited the generalizability of the findings. Additionally, students with limited internet access or lower engagement with online platforms may have been underrepresented.

Questionnaire Development

A structured questionnaire was developed following an extensive review of published literature on menstrual health, menstrual hygiene management, and KAP studies among university students [9, 16, 19, 20]. The questionnaire was further refined through consultation with experts in pharmacy, gynecology, public health, and epidemiology to ensure content validity.

A pilot study was conducted to evaluate the clarity, relevance, and comprehensibility of the questionnaire. Internal consistency was assessed using Cronbach's alpha. The knowledge scale demonstrated good reliability (α = 0.85), the attitude scale showed good internal consistency (α = 0.80), and the practice scale demonstrated acceptable reliability (α = 0.73). The questionnaire consisted of four sections addressing socio-demographic characteristics, knowledge, attitudes, and practices related to menstrual health, and included multiple-choice and Likert-scale questions to capture respondents' perspectives systematically. The study tool is provided as **Supplementary file 1**.

Data Collection Procedure

The finalized questionnaire was converted into Google Forms and distributed electronically through pharmacy department representatives, faculty members, student organizations, and social media platforms. Before accessing the questionnaire, participants were provided with an information sheet describing the study objectives, confidentiality measures, voluntary participation, and estimated completion time. Electronic informed consent was obtained before participants proceeded to the survey. No personally identifiable information was collected, ensuring complete anonymity.

Data Analysis

Completed responses were exported into Microsoft Excel for data cleaning and subsequently analyzed using IBM SPSS Statistics version 27. Descriptive statistics, including frequencies and percentages, were used to summarize participant characteristics and KAP responses. The scoring system for knowledge, attitude, and practice (KAP) was predefined based on percentage scores derived from the total items in each domain. Knowledge scores were categorized as **poor (< 50%)**, **moderate (50–74%)**, and **good (≥ 75%)**. Attitude scores were classified as **negative (< 60%)**, **neutral (60–79%)**, and **positive (≥ 80%)**. Practice level was assessed using a summed score, with scores above 50% classified as good practice and scores of 50% or below classified as poor practice. These classification criteria were adapted from previously published KAP studies using Bloom's cut-off points and modified percentage-based scoring methods [18, 21, 22]. Associations between participant characteristics and KAP levels were initially evaluated using Pearson's chi-square test. Variables that demonstrated statistical significance in the bivariate analysis or were considered theoretically relevant were subsequently included in ordinal logistic regression models to identify independent factors associated with higher levels of knowledge and attitudes. Because practice was classified into two categories (good and poor), binary logistic regression was used to identify factors associated with good menstrual health practices. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported, and statistical significance was established at **$p < 0.05$**.

Ethical Considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Department of Pharmacy Ethical Committee, University of Information Technology and Sciences (UITS), Bangladesh (Approval No. **UITS/PHARM/PEC/2025/23**) before commencement of data collection. Participation was entirely voluntary. Before completing the questionnaire, participants received detailed information regarding the purpose of the study, potential benefits and risks, confidentiality, and their right to withdraw at any stage before submission without consequence. Electronic informed consent was obtained from all participants. No identifying information was collected, and all responses were stored securely and used exclusively for research purposes.

Results

Socio-demographic Characteristics of Participants

A total of 452 female pharmacy students participated in the study. Most respondents were enrolled in private universities (71.9%), while 28.1% were from public universities. Most participants were in the early years of their academic program, with the highest proportion studying in the second year (38.7%), followed by the first year (31.9%). The majority of participants were single (69.0%), and nearly half lived with their families (49.1%). Slightly more than half of the respondents (54.9%) reported having received formal training in gynecological or reproductive health, indicating moderate exposure to reproductive health education (Table 1).

Table 1
Socio-demographic characteristics of female pharmacy students participating in the study

Questions	Frequency, n (%)
University type	
o Private	325 (71.9%)
o Public	127 (28.1%)
Currently studying in	
o 1st	144 (31.9%)
o 2nd	175 (38.7%)
o 3rd	72 (15.9%)
o 4th	38 (8.2%)
o 5th	5 (1.1%)
o Postgrad	18 (4.0%)
Marital status	
o Single	312 (69.0%)
o Married	104 (23.0%)
o Prefer not to say	36 (8.0%)
Residence type	
o Hall/Hostel	153 (33.8%)
o With family	222 (49.1%)
o Shared rental	55 (12.2%)
o Others	22 (4.9%)
Received formal training in gynecological or reproductive health	
o Yes	248 (54.9%)
o No	204 (45.1%)

Knowledge Regarding Menstrual Health

Participants demonstrated varying levels of knowledge regarding menstrual health (Table 2). More than half correctly identified that the menstrual cycle is regulated by estrogen and progesterone, recognized the normal menstrual cycle length (21–35 days), understood that excessive menstrual bleeding may lead to iron deficiency anemia, knew that sanitary pads should be changed every 4–6 hours, and

identified a gynecologist as the appropriate healthcare professional for menstrual problems. Similar proportions recognized menstruation as a physiological process, were aware that prolonged use of a sanitary pad may increase the risk of urinary tract infection, and acknowledged that menstrual irregularities can affect fertility.

Table 2
Distribution of responses assessing knowledge regarding menstrual health

Questions	Frequency, n (%)
1. The menstrual cycle is primarily regulated by which hormones?	
o Estrogen and Progesterone	277 (61.3%)
o Insulin and Glucagon	110 (24.3%)
o Thyroxine and Calcitonin	35 (7.7%)
o Don't know	30 (6.6%)
2. A normal menstrual cycle length typically ranges from:	
o 21 to 35 days	255 (56.4%)
o 14 to 20 days	103 (22.8%)
o 40 to 45 days	83 (18.4%)
o Don’t know	11 (2.4%)
3. Common symptoms of premenstrual syndrome (PMS) include: (tick all that apply)	
o Mood swings	179 (39.6%)
o Bloating	194 (42.9%)
o Fatigue	238 (52.7%)
o Headaches	52 (11.5%)
o Don’t know	50 (11.1%)
4. Which of the following can cause irregular menstruation? (tick all that apply)	
o Stress	240 (53.1%)
o Polycystic ovary syndrome (PCOS)	219 (48.5%)
o Thyroid disorders	134 (29.6%)
o None	22 (4.9%)
o Don’t know	49 (10.8%)
5. Menstrual pain (dysmenorrhea) is most commonly caused by:	
o Prostaglandins	210 (46.5%)
o Bacterial infection	78 (17.3%)
o Iron deficiency	56 (12.4%)
o Don’t know	108 (23.9%)

Questions	Frequency, n (%)
1. The menstrual cycle is primarily regulated by which hormones?	
6. Excessive menstrual bleeding (menorrhagia) can lead to:	
o Iron deficiency anemia	282 (62.4%)
o Hypertension	58 (12.8%)
o Weight gain	60 (13.3%)
o Don’t know	52 (11.5%)
7. What is the standard hygiene practice recommended during menstruation?	
o Change pads/tampons every 4–6 hours	282 (62.4%)
o Change once a day	73 (16.2%)
o Wash only with cold water	59 (13.1%)
o Don’t know	38 (8.4%)
8. Is it safe to perform normal physical activities (e.g., walking, light exercise) during menstruation?	
o Yes	221 (49.0%)
o No	126 (27.9%)
o Don’t know	105 (23.2%)
9. Prolonged use of a single sanitary pad can increase the risk of:	
o Urinary tract infection	287 (63.5%)
o Toxic shock syndrome	101 (22.3%)
o Influenza	25 (5.5%)
o Don’t know	39 (8.6%)
10. Amenorrhea refers to:	
o Absence of menstruation	248 (54.9%)
o Painful menstruation	98 (21.7%)
o Heavy bleeding	23 (5.1%)
o Don’t know	83 (18.4%)
11. Which specialist should be consulted for menstrual problems?	
o Gynecologist	299 (66.2%)
o Pharmacist	68 (15.0%)

Questions	Frequency, n (%)
1. The menstrual cycle is primarily regulated by which hormones?	
o General physician	38 (8.4%)
o Don’t know	47 (10.4%)
12. Can menstrual irregularities affect a woman's fertility?	
o Yes	279 (61.7%)
o No	105 (23.2%)
o Don’t know	68 (15.0%)
13. Tracking the menstrual cycle can help:	
o Predict ovulation	205 (45.4%)
o Prevent all STIs	132 (29.2%)
o Cure PCOS	29 (6.4%)
o Don’t know	86 (19.0%)
14. Menstruation is considered a:	
o Physiological process	304 (67.3%)
o Disease	91 (20.1%)
o Curse	16 (3.5%)
o Don’t know	41 (9.1%)
15. Which lifestyle factors may help manage menstrual symptoms? (tick all that apply)	
o Healthy diet	257 (56.9%)
o Regular exercise	223 (49.3%)
o Stress management	174 (38.5%)
o None	34 (7.5%)
o Don’t know	53 (11.7%)

Knowledge gaps remained in several important areas. Less than half of the participants correctly recognized prostaglandins as the primary cause of dysmenorrhea or understood that menstrual cycle tracking can help predict ovulation. Awareness of common premenstrual syndrome symptoms and causes of irregular menstruation also varied, with stress and polycystic ovary syndrome being more frequently identified than thyroid disorders. Overall, although participants demonstrated reasonable

awareness of basic menstrual health concepts, deficiencies remained regarding menstrual disorders and evidence-based menstrual health management.

Factors Associated with Knowledge Level

Knowledge level was significantly associated with university type, academic year, marital status, and residence type (all $p < 0.001$), suggesting that educational progression and sociodemographic characteristics influenced menstrual health knowledge. Students enrolled in public universities and those in senior academic years generally demonstrated higher proportions of good knowledge than their counterparts. Single participants and those living with their families also exhibited relatively higher knowledge levels. In contrast, previous formal training in gynecological or reproductive health was not significantly associated with knowledge level ($p = 0.700$), suggesting that existing training programs may not adequately improve menstrual health knowledge (Table 3).

Table 3
Association between socio-demographic characteristics and knowledge levels among female pharmacy students

Characteristic	Overall N = 452	Good N = 85	Moderate N = 118	Poor N = 249	p-value
University type					**< 0.001**
Private	325 (71.9%)	56 (17.2%)	72 (22.2%)	197 (60.6%)	
Public	127 (28.1%)	29 (22.8%)	46 (36.2%)	52 (41.0%)	
Currently studying in					**< 0.001**
1st	144 (31.9%)	18 (12.5%)	53 (36.8%)	73 (50.7%)	
2nd	175 (38.7%)	22 (12.6%)	26 (14.9%)	127 (72.6%)	
3rd	72 (15.9%)	19 (26.4%)	27 (37.5%)	26 (36.1%)	
4th	38 (8.4%)	18 (47.4%)	9 (23.7%)	11 (28.9%)	
5th	5 (1.1%)	1 (20.0%)	1 (20.0%)	3 (60.0%)	
Postgrad	18 (4.0%)	7 (38.9%)	2 (11.1%)	9 (50.0%)	
Marital Status					**< 0.001**
Married	104 (23.0%)	11 (10.6%)	19 (18.3%)	74 (71.2%)	
Prefer not to say	36 (8.0%)	0 (0%)	2 (5.6%)	34 (94.4%)	
Single	312 (69.0%)	74 (23.7%)	97 (31.1%)	141 (45.2%)	
Residence type					**< 0.001**
Hall/Hostel	153 (33.8%)	31 (20.3%)	40 (26.1%)	82 (53.6%)	
Other	22 (4.9%)	0 (0%)	0 (0%)	22 (100%)	
Shared rental	55 (12.2%)	4 (7.3%)	8 (14.5%)	43 (78.2%)	
With family	222 (49.1%)	50 (22.5%)	70 (31.5%)	102 (45.9%)	
Received formal training in gynecological or reproductive health					0.700
No	204 (45.1%)	43 (21.1%)	54 (26.5%)	107 (52.5%)	
Yes	248 (54.9%)	42 (16.9%)	64 (25.8%)	142 (57.3%)	

Attitudes Toward Menstrual Health

Participants generally demonstrated positive attitudes toward menstrual health. More than 80% agreed that menstrual health is an important component of women's overall health and believed that menstrual health knowledge would benefit their future pharmacy practice. Nearly four-fifths agreed that women

experiencing persistent menstrual problems should consult healthcare professionals, while over three-quarters acknowledged that family and social stigma may discourage women from seeking appropriate care. Most respondents also believed that lifestyle modification could help manage menstrual symptoms and recognized the importance of emotional support alongside medical treatment. Furthermore, participants acknowledged the important role of media in promoting menstrual health awareness. These findings indicate generally favorable attitudes toward menstrual health and its importance for future healthcare practice (Table 4).

Table 4
Attitudes of participants toward menstrual health issues

Questions	Frequency, n (%)
1. Menstrual health is an important part of women's overall health.	
o Strongly Agree	151 (33.4%)
o Agree	226 (50.0%)
o Neutral	57 (12.6%)
o Disagree	18 (4.0%)
o Strongly Disagree	0 (0%)
2. I am concerned about developing menstrual disorders in the future.	
o Strongly Agree	109 (24.1%)
o Agree	242 (53.5%)
o Neutral	51 (11.3%)
o Disagree	35 (7.7%)
o Strongly Disagree	15 (3.3%)
3. It is important for women to consult a doctor for persistent menstrual problems.	
o Strongly Agree	153 (33.8%)
o Agree	204 (45.2%)
o Neutral	52 (11.5%)
o Disagree	19 (4.2%)
o Strongly Disagree	24 (5.3%)
4. I feel comfortable discussing menstrual issues with doctors and family members.	
o Strongly Agree	97 (21.5%)
o Agree	217 (48.0%)
o Neutral	97 (21.5%)
o Disagree	20 (4.4%)
o Strongly Disagree	21 (4.6%)
5. Family/social stigma prevents women from seeking care for menstrual problems.	
o Strongly Agree	121 (26.8%)
o Agree	225 (49.8%)

Questions	Frequency, n (%)
1. Menstrual health is an important part of women's overall health.	
o Neutral	57 (12.6%)
o Disagree	33 (7.3%)
o Strongly Disagree	16 (3.5%)
6. Menstrual pain is something women should just tolerate without medical help.	
o Strongly Agree	116 (25.7%)
o Agree	236 (52.2%)
o Neutral	54 (11.9%)
o Disagree	32 (7.1%)
o Strongly Disagree	14 (3.1%)
7. I believe that emotional support is as important as medical treatment for menstrual issues.	
o Strongly Agree	113 (25.0%)
o Agree	208 (46.0%)
o Neutral	57 (12.6%)
o Disagree	45 (10.0%)
o Strongly Disagree	29 (6.4%)
8. Media (TV, social media, etc.) can play a key role in spreading awareness about menstrual health.	
o Strongly Agree	109 (24.2%)
o Agree	221 (48.9%)
o Neutral	71 (15.7%)
o Disagree	40 (8.8%)
o Strongly Disagree	11 (2.4%)
9. Knowledge about menstrual health will help me advise patients in my future pharmacy practice.	
o Strongly Agree	113 (25.0%)
o Agree	258 (57.1%)
o Neutral	50 (11.1%)
o Disagree	13 (2.9%)
o Strongly Disagree	18 (4.0%)

Questions	Frequency, n (%)
1. Menstrual health is an important part of women's overall health.	
10. I believe lifestyle modification can help manage menstrual symptoms.	
o Strongly Agree	159 (35.2%)
o Agree	194 (42.9%)
o Neutral	52 (11.5%)
o Disagree	24 (5.3%)
o Strongly Disagree	23 (5.1%)

Factors Associated with Attitude Level

Attitude level showed significant associations with university type, academic year, marital status, residence type, and prior formal reproductive health training (all $p < 0.001$). Positive attitudes were more common among students from public universities, those in higher academic years, single participants, and students residing with their families. Prior formal training also showed a significant association with attitude level, indicating that educational exposure may influence perceptions and beliefs regarding menstrual health (Table 5).

Table 5
Relationship between socio-demographic characteristics and attitude levels toward menstrual health among female pharmacy students

Characteristic	Overall N = 452	Negative N = 47	Neutral N = 241	Positive N = 164	p-value
University type					**< 0.001**
Private	325 (71.9%)	45 (13.8%)	167 (51.4%)	113 (34.8%)	
Public	127 (28.1%)	2 (1.6%)	74 (58.3%)	51 (40.2%)	
Currently studying in					**< 0.001**
1st	144 (31.9%)	7 (4.9%)	83 (57.6%)	54 (37.5%)	
2nd	175 (38.7%)	34 (19.4%)	107 (61.1%)	34 (19.4%)	
3rd	72 (15.9%)	2 (2.8%)	27 (37.5%)	43 (59.7%)	
4th	38 (8.4%)	0 (0%)	13 (34.2%)	25 (65.8%)	
5th	5 (1.1%)	1 (20.0%)	2 (40.0%)	2 (40.0%)	
Postgrad	18 (4.0%)	3 (16.7%)	9 (50.0%)	6 (33.3%)	
Marital Status					**< 0.001**
Married	104 (23.0%)	14 (13.5%)	70 (67.3%)	20 (19.2%)	
Prefer not to say	36 (8.0%)	11 (30.6%)	21 (58.3%)	4 (11.1%)	
Single	312 (69.0%)	22 (7.1%)	150 (48.1%)	140 (44.9%)	
Residence type					**< 0.001**
Hall/Hostel	153 (33.8%)	19 (12.4%)	80 (52.3%)	54 (35.3%)	
Other	22 (4.9%)	7 (31.8%)	16 (72.7%)	0 (0%)	
Shared rental	55 (12.2%)	11 (20.0%)	36 (65.5%)	8 (14.5%)	
With family	222 (49.1%)	10 (4.5%)	109 (49.1%)	103 (46.4%)	
Received formal training in gynecological or reproductive health					**< 0.001**
No	204 (45.1%)	28 (13.7%)	87 (42.6%)	89 (43.6%)	
Yes	248 (54.9%)	19 (7.7%)	154 (62.1%)	75 (30.2%)	

Menstrual Health Practices and Health-Seeking Behavior

Despite generally favorable attitudes, menstrual health practices showed several areas requiring improvement. Nearly two-thirds of participants (63.7%) reported experiencing severe menstrual pain (dysmenorrhea). Approximately half (49.3%) had undergone pelvic ultrasonography at least once.

Regular gynecological check-ups were relatively uncommon, with only 8.8% reporting annual visits, whereas 42.3% sought medical care only when symptoms occurred, indicating a predominantly reactive healthcare-seeking pattern. Hospitals or clinics were the preferred source of care (61.3%), followed by internet resources and pharmacies. Self-medication for menstrual pain was common, being reported by 60.6% of participants. Encouragingly, the majority (81.4%) expressed interest in university-organized awareness programs on menstrual and reproductive health. Overall, these findings reveal a discrepancy between awareness and preventive health-seeking behaviors (Table 6).

Table 6
Reported practices and health-seeking behaviors related to menstrual health

Questions	Frequency, n (%)
1. Have you ever experienced severe menstrual pain (dysmenorrhea)?	
o Yes	288 (63.7%)
o No	164 (36.3%)
2. Have you ever undergone a pelvic ultrasound?	
o Yes	223 (49.3%)
o No	229 (50.7%)
3. How often do you attend gynecological checkups?	
o Never	118 (26.1%)
o Only when symptomatic	191 (42.3%)
o Once every 1–2 years	103 (22.8%)
o Annually	40 (8.8%)
4. Where would you first seek help if you had persistent menstrual problems?	
o Hospital/Clinic	277 (61.3%)
o Pharmacy	56 (12.4%)
o Internet	57 (12.6%)
o Friends/Family	39 (8.6%)
o Traditional healer	23 (5.1%)
5. Have you ever used self-medication (e.g., painkillers without prescription) for menstrual pain?	
o Yes	274 (60.6%)
o No	178 (39.4%)
6. Would you like your university to organize awareness sessions on menstrual and reproductive health?	
o Yes	368 (81.4%)
o No	84 (18.6%)

Factors Associated with Practice Level

Practice level was significantly associated only with university type (p = 0.013), with students from public universities demonstrating comparatively better menstrual health practices than those from private universities. No statistically significant associations were observed with academic year, marital status,

residence type, or previous formal reproductive health training, suggesting that improvements in menstrual health practices may require behavioral interventions that extend beyond demographic characteristics or educational background (Table 7).

Table 7
Association between socio-demographic characteristics and practice levels among female pharmacy students

Characteristic	Overall N = 452	Good N = 351	Poor N = 101	p-value
University type				**0.013**
Private	325 (71.9%)	249 (76.6%)	76 (23.4%)	
Public	127 (28.1%)	102 (80.3%)	25 (19.7%)	
Currently studying in				0.056
1st	144 (31.9%)	115 (79.9%)	29 (20.1%)	
2nd	175 (38.7%)	145 (82.9%)	30 (17.1%)	
3rd	72 (15.9%)	53 (73.6%)	19 (26.4%)	
4th	38 (8.4%)	21 (55.3%)	17 (44.7%)	
5th	5 (1.1%)	4 (80.0%)	1 (20.0%)	
Postgrad	18 (4.0%)	13 (72.2%)	5 (27.8%)	
Marital Status				0.100
Married	104 (23.0%)	81 (77.9%)	23 (22.1%)	
Prefer not to say	36 (8.0%)	26 (72.2%)	10 (27.8%)	
Single	312 (69.0%)	244 (78.2%)	68 (21.8%)	
Residence type				0.200
Hall/Hostel	153 (33.8%)	121 (79.1%)	32 (20.9%)	
Other	22 (4.9%)	15 (68.2%)	7 (31.8%)	
Shared rental	55 (12.2%)	43 (78.2%)	12 (21.8%)	
With family	222 (49.1%)	172 (77.5%)	50 (22.5%)	
Received formal training in gynecological or reproductive health				0.200
No	204 (45.1%)	159 (77.9%)	45 (22.1%)	
Yes	248 (54.9%)	192 (77.4%)	56 (22.6%)	

Distribution of Knowledge, Attitude, and Practice Levels

Figure 1 illustrates the distribution of participants according to knowledge, attitude, and practice (KAP) levels regarding menstrual health. More than half of the participants demonstrated poor knowledge (n = 249), whereas 118 exhibited moderate knowledge and only 85 achieved good knowledge, indicating substantial knowledge gaps. In contrast, attitudes were comparatively more favorable, with 164 participants demonstrating positive attitudes, although the majority (241) remained neutral and only 47 exhibited negative attitudes. Regarding practices, most participants (351) demonstrated good menstrual health practices, while 101 showed poor practices. Overall, the findings reveal a clear discrepancy between knowledge and practice, suggesting that relatively favorable attitudes and practices are not fully supported by adequate menstrual health knowledge, thereby emphasizing the need for targeted educational interventions among female pharmacy students.

Multivariable Logistic Regression Analysis of Factors Associated with Good Knowledge, Positive Attitude, and Good Practice Regarding Menstrual Health (N = 452)

The results of the multivariable logistic regression analysis for factors associated with good knowledge regarding menstrual health are presented in **Supplementary Table S1A**. Academic year was a significant predictor of knowledge, with third-year (AOR = 3.03, 95% CI: 1.41–6.49, p = 0.005), fourth-year (AOR = 15.8, 95% CI: 5.11–33.4, p < 0.001), and postgraduate students (AOR = 12.8, 95% CI: 3.41–49.7, p < 0.001) showing significantly greater odds of possessing good knowledge than first-year students. Single students were also more likely to have good knowledge than married students (AOR = 3.63, 95% CI: 1.78–7.94, p = 0.001), whereas students living in shared rental accommodation had significantly lower odds of good knowledge (AOR = 0.19, 95% CI: 0.06–0.63, p = 0.005). University type and previous reproductive health training were not significantly associated with knowledge.

The factors associated with positive attitudes are presented in **Supplementary Table S1B**. Third-year (AOR = 3.43, 95% CI: 1.85–6.73, p < 0.001) and fourth-year students (AOR = 4.49, 95% CI: 1.96–11.2, p < 0.001) were significantly more likely to demonstrate positive attitudes than first-year students. Single participants also showed higher odds of positive attitudes than married participants (AOR = 2.48, 95% CI: 1.32–4.53, p = 0.003). Students residing in shared rental accommodation (AOR = 0.52, 95% CI: 0.28–0.96, p = 0.039) and those who had received formal reproductive health training (AOR = 0.39, 95% CI: 0.22–0.76, p < 0.001) demonstrated significantly lower odds of positive attitudes.

The multivariable logistic regression analysis for good menstrual health practices is presented in **Supplementary Table S1C**. Most sociodemographic variables were not significantly associated with practice level. However, fourth-year students were significantly less likely to demonstrate good menstrual health practices than first-year students (AOR = 0.26, 95% CI: 0.12–0.56, p = 0.006). University type was significantly associated with good menstrual health practices (AOR = 1.97, 95% CI: 1.21–3.88, p = 0.030), whereas marital status, residence type, and previous reproductive health training were not significantly associated. Overall, these findings suggest that although knowledge and attitudes varied according to several demographic characteristics, menstrual health practices remained relatively consistent across participant subgroups.

Discussion

This study assessed the knowledge, attitudes, and practices regarding menstrual health among female pharmacy students in Bangladesh. The findings revealed a notable discrepancy between knowledge and behavioral outcomes. Although participants generally demonstrated favorable attitudes and relatively appropriate menstrual health practices, substantial gaps in knowledge persisted. These findings suggest that positive behaviors and perceptions do not necessarily reflect a comprehensive understanding of menstrual physiology, menstrual disorders, and evidence-based menstrual health management. Given that pharmacy students are future healthcare professionals, these knowledge deficiencies warrant particular attention.

The overall level of menstrual health knowledge observed in this study indicates that important misconceptions and information gaps remain even among students enrolled in health-related academic programs. Consistent with previous studies from India, Pakistan, Nepal, and Saudi Arabia, where university students demonstrated awareness of basic menstrual concepts but lacked adequate understanding of menstrual physiology, ovulation, menstrual disorders, and symptom management [23–25]. These findings suggest that higher education alone may not guarantee comprehensive menstrual health literacy. Cultural beliefs, inadequate reproductive health education, and limited opportunities for open discussion about menstruation may continue to influence knowledge levels despite academic advancement.

In contrast to the relatively limited knowledge observed, participants generally expressed favorable attitudes toward menstrual health. Most recognized the importance of menstrual health as a component of overall well-being and acknowledged the value of professional healthcare consultation for menstrual problems. Comparable positive attitudes have been documented among university students in Bangladesh, India, and Malaysia, where increased educational exposure was associated with greater acceptance of menstruation as a normal biological process [26, 27]. Nevertheless, menstrual stigma remains deeply embedded in many Asian societies, often restricting open communication and reinforcing misconceptions [11]. The generally positive attitudes identified in the present study may reflect gradual improvements in menstrual health awareness and increasing public discourse on reproductive health issues.

The findings also indicated that menstrual health practices were comparatively better than knowledge levels. Comparable findings have been observed in studies from Bangladesh, India, and Sri Lanka, where young women frequently adopted recommended hygiene practices despite possessing incomplete scientific knowledge regarding menstruation [28, 29]. Increased availability of commercial menstrual products, improved access to digital health information, and growing awareness campaigns may have contributed to this pattern. However, the persistence of self-medication and symptom-based healthcare seeking suggests that good hygiene practices alone do not necessarily translate into optimal menstrual health management. Such behaviors may delay professional consultation and contribute to the underdiagnosis of menstrual disorders.

A notable finding of this study was the high prevalence of menstrual pain and related symptoms among participants. Dysmenorrhea is one of the most common menstrual complaints among young women globally and has been widely reported among university students throughout Asia. Studies conducted in India, Pakistan, Nepal, China, and Bangladesh have consistently identified menstrual pain as a major factor affecting academic performance, concentration, emotional well-being, and daily activities [30–32]. Despite its high prevalence, many young women continue to regard menstrual pain as a normal condition that does not require medical attention, which may partly explain the tendency toward self-management and delayed healthcare utilization observed in many settings.

Academic progression emerged as an important determinant of menstrual health knowledge and attitudes. Students in higher academic years generally demonstrated a better understanding of menstrual health and more positive perceptions toward menstruation. Similar trends have been reported among health science students in India, Pakistan, and other South Asian countries, where increased exposure to biomedical education contributed to improved reproductive health literacy [33, 34]. These findings support the view that educational experiences accumulated throughout university training can positively influence menstrual health awareness. However, the persistence of knowledge gaps among senior students suggests that existing curricula may not provide sufficient emphasis on menstrual health education.

Interestingly, prior formal training in reproductive or gynecological health did not consistently translate into improved knowledge or practices. This finding may indicate that current educational approaches focus predominantly on theoretical concepts while providing limited opportunities to address practical menstrual health concerns, stigma, and health-seeking behaviors. Comparable observations have been reported among healthcare students in several Asian countries, highlighting the need for more comprehensive and applied reproductive health education [4]. Integrating menstrual health into pharmacy curricula through interactive learning, case-based discussions, and patient counseling exercises may help bridge this gap.

The findings of this study have important implications for pharmacy education and public health. Pharmacists are increasingly recognized as accessible healthcare professionals who play a key role in health promotion, patient counseling, and community education. Adequate menstrual health literacy among pharmacy students is therefore essential not only for their personal well-being but also for their future professional responsibilities. Strengthening menstrual health education during undergraduate training may enhance students' confidence and competence in addressing menstrual health concerns among patients and the wider community.

Several interventions may help improve menstrual health literacy among female pharmacy students. Universities should consider incorporating comprehensive menstrual and reproductive health topics into existing curricula, promoting evidence-based educational programs, and creating supportive environments that encourage open discussion of menstrual health issues. Awareness campaigns, workshops, and student-led initiatives may further contribute to reducing stigma and improving

knowledge. Such efforts are particularly important in Bangladesh and other Asian countries, where sociocultural barriers continue to influence menstrual health perceptions and behaviors.

Overall, the findings indicate that although female pharmacy students demonstrate positive attitudes and appropriate menstrual health practices, important knowledge gaps remain. Targeted educational interventions may improve menstrual health literacy, reduce misconceptions, and strengthen their role in promoting reproductive health.

Limitations of the study

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design precludes the establishment of causal relationships between participants' sociodemographic characteristics and their knowledge, attitudes, and practices regarding menstrual health. Second, the use of a non-probability convenience sampling approach and an online survey may have introduced selection bias, as students with greater internet access or a stronger interest in menstrual health may have been more likely to participate. Consequently, the findings may not be fully generalizable to all female pharmacy students in Bangladesh. Third, the data were based on self-reported responses, which are subject to recall bias and social desirability bias, potentially leading participants to overreport favorable attitudes or practices. Fourth, although participants were recruited from both public and private universities, students from other academic disciplines were not included; therefore, the findings may not be applicable to the broader university student population. Finally, while the questionnaire demonstrated satisfactory internal consistency and was developed through literature review and expert consultation, some responses may still have been influenced by individual interpretation of the survey items. Despite these limitations, the study provides valuable baseline evidence on menstrual health knowledge, attitudes, and practices among female pharmacy students in Bangladesh and offers important insights for future research and educational interventions.

Conclusion

This study provides important insights into the knowledge, attitudes, and practices regarding menstrual health among female pharmacy students in Bangladesh. Although participants generally demonstrated favorable attitudes and appropriate menstrual health practices, important knowledge gaps remained, particularly regarding menstrual physiology, menstrual disorders, and evidence-based menstrual health management. Academic progression was associated with better knowledge and attitudes, suggesting that pharmacy education contributes to improving menstrual health literacy; however, the persistence of these gaps among future healthcare professionals highlights the need to strengthen menstrual health education within the pharmacy curriculum. Integrating comprehensive menstrual health education, regular awareness programs, and evidence-based reproductive health training into undergraduate pharmacy education may enhance students' knowledge and better prepare them to provide accurate counseling and health education in their future professional practice. Such initiatives may also help

reduce menstrual stigma, promote healthy menstrual practices, and improve reproductive health outcomes among young women in Bangladesh.

Declarations

Ethics approval and consent to participate: This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Department of Pharmacy Ethical Committee, University of Information Technology and Sciences (UITS), Bangladesh (Approval No. UITS/PHARM/PEC/2025/23). Electronic informed consent was obtained from all participants prior to their participation in the study.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: MAA: Conceptualization, project administration, methodology, investigation, formal analysis, data curation, writing—original draft, correspondence. **MAM**, **SAT, NJM**, **IJT**, **SA**, **MN**: Investigation, validation, writing—review and editing. All authors read and approved the final manuscript.

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Figures

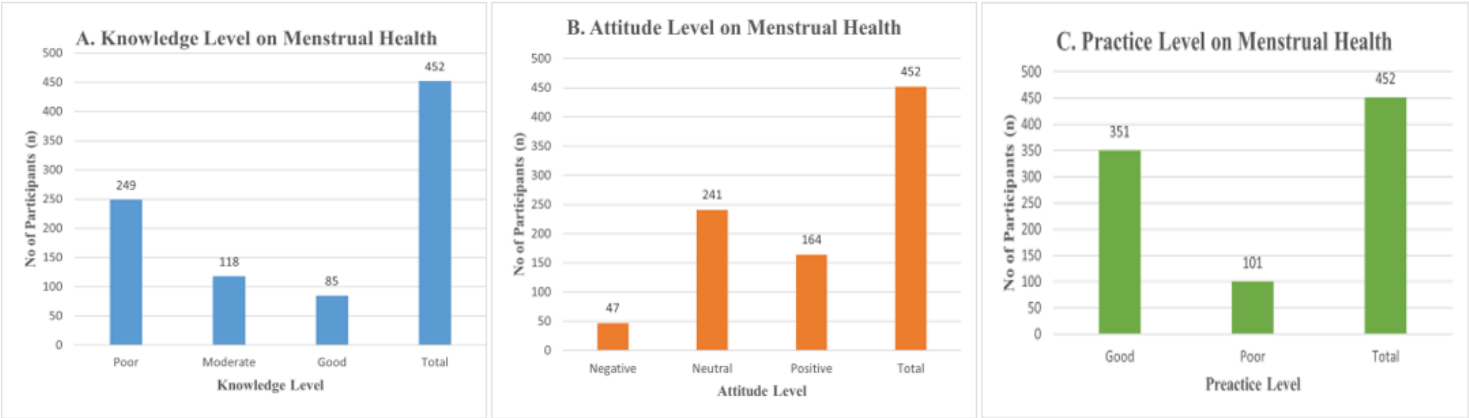


Figure 1

Distribution of participants according to knowledge (A), attitude (B), and practice (C) levels regarding menstrual health among female pharmacy students (N = 452).

Supplementary Files

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- Supplementaryfile1.docx
- Supplementaryfile2.docx