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Original Research

Knowledge, Attitudes, and Practices Regarding Ovarian Cysts among Female Pharmacy Students in Bangladesh

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Abstract

Background Ovarian cysts are a prevalent gynecological condition that may affect women's reproductive health. In Bangladesh, limited awareness and sociocultural barriers often delay timely care. Female pharmacy students, as future healthcare professionals, are an important group for assessing baseline reproductive health knowledge and practices. This study evaluated the knowledge, attitudes, and practices (KAP) regarding ovarian cysts among female pharmacy students in Bangladesh.

Methods A descriptive cross-sectional survey was conducted from 1 September to 30 September 2025 using a structured, online self-administered questionnaire. A total of 474 female undergraduate and postgraduate pharmacy students from public and private universities participated; of these, 448 with complete KAP responses were included in the categorical classification, subgroup, and regression analyses, while item-level frequencies are reported for all 474. Data were analyzed using descriptive statistics and chi-square tests in IBM SPSS Statistics. Proportions were reported with 95% confidence intervals (CI), and a p-value < 0.05 was considered statistically significant.

Results Overall, 54.7% (95% CI: 50.0–59.3) of participants had poor knowledge of ovarian cysts, 26.3% (95% CI: 22.3–30.6) demonstrated moderate knowledge, and only 19.0% (95% CI: 15.5–22.9) had good knowledge. Nearly half of the respondents (46.4%, 95% CI: 41.7–51.1) incorrectly identified the uterus as the site of ovarian cyst development, while 34.2% (95% CI: 29.8–38.8) correctly reported that most ovarian cysts are benign. Awareness of symptoms and management was inconsistent, with fewer than half recognizing spontaneous resolution of functional cysts. Attitudes toward ovarian cysts were predominantly neutral (53.8%), while 35.7% showed positive attitudes and 10.5% reported negative attitudes. Preventive and health-seeking practices were generally favorable; however, routine gynecological check-ups were uncommon, and a high proportion of participants reported self-medication for menstrual or pelvic pain (60.5%). Knowledge and attitude levels were significantly associated with academic year, university type, marital status, and residence type ($p < 0.001$).

Conclusion Although attitudes and self-reported practices toward ovarian cysts were relatively positive, substantial knowledge gaps and inconsistent preventive behaviors were identified. These findings highlight the need for strengthened reproductive health education and targeted awareness programs within pharmacy curricula in Bangladesh.

Keywords Ovarian Cysts · Knowledge Attitude Practice (KAP) · Pharmacy Students · Reproductive Health · Bangladesh · Cross-sectional Study

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Introduction

Ovarian cysts, fluid-filled sacs within or on the surface of an ovary, represent one of the most prevalent gynecological conditions among women of reproductive age worldwide. Most cysts are benign and asymptomatic; however, complications such as torsion, rupture, or hemorrhage may lead to significant clinical consequences, including pelvic pain, menstrual irregularities, and abdominal discomfort (Abdulrahman et al., 2025). Furthermore, the persistent diagnostic challenge lies in differentiating benign cysts from malignant neoplasms, a critical distinction for patient prognosis and management (Afdanil and N, 2025). Globally, ovarian cysts are remarkably common. Epidemiological studies suggest that most women will develop at least one ovarian cyst during their lifetime, with a prevalence estimated to affect approximately 7-18% of women at some point (Afroz, Islam and Akter, 2023). The incidence peaks during the reproductive years, and while most resolve spontaneously, a significant proportion requires clinical monitoring or intervention (Azhar et al., 2014). In low- and middle-income countries (LMICs), including those in South Asia, the burden is compounded by limited access to healthcare services, delayed diagnosis, and inadequate reproductive health education (Bando et al., 2025).

In South Asian societies, where patriarchal norms and social taboos often limit open discussion of reproductive health, awareness of conditions such as ovarian cysts remains low. Studies from neighboring India and Pakistan indicate a concerning pattern: while prevalence rates align with global estimates, knowledge about symptoms, risk factors, and long-term implications among young women and students is frequently inadequate, often riddled with misconceptions (Charel, Shah and Goswami, 2020; Indrati, 2022). This knowledge gap fosters anxiety, promotes reliance on non-evidence-based information, and can lead to either neglect of symptoms or unnecessary distress over typically benign findings (John et al., 2025).

In Bangladesh, women's health initiatives have historically focused primarily on maternal and communicable diseases, with comparatively less attention given to gynecological conditions such as ovarian cysts (Kaur, 2024). Although limited hospital-based evidence suggests that ovarian cysts are a common reason for gynecological consultations, comprehensive population-based data remain scarce (Akhter, 2025). Sociocultural barriers, modesty, and economic constraints continue to delay timely healthcare-seeking behavior (McCammon et al., 2020). For future healthcare professionals, particularly women, this landscape presents both a personal and professional imperative to be well-informed (Lotfy et al., 2024).

Despite several KAP studies conducted globally and particularly in South Asia, research focusing specifically on pharmacy students in Bangladesh remains limited. As future healthcare professionals, pharmacy students play a crucial role in patient counseling, rational medication use, and community health education. Therefore, assessing their knowledge, attitudes, and practices not only reflects their personal health awareness but also their preparedness to contribute to reproductive health promotion in professional settings. This context-specific and profession-oriented perspective highlights an important gap in the existing literature.

Based on the Knowledge–Attitude–Practice (KAP) framework, this study assumes that knowledge influences attitudes and, in turn, shapes health-related practices; however, this relationship is often non-linear and influenced by sociocultural and structural factors. Accordingly, the study aims to evaluate knowledge, attitudes, and practices regarding ovarian cysts among female pharmacy students in Bangladesh and identify associated socio-demographic factors.

Materials and Methods

Study Design and Setting

A descriptive, cross-sectional survey was conducted to evaluate the knowledge, attitudes, and practices (KAP) regarding ovarian cysts among female students enrolled in pharmacy degree programs in Bangladesh. The study was carried out using an online self-administered questionnaire distributed through academic and social media platforms, including university student forums, Facebook groups, and WhatsApp, between 1 September and 30 September 2025. Participation was voluntary, and respondents were recruited from various public and private universities across the country.

Study Population and Sampling

The target population included female undergraduate and postgraduate pharmacy students in Bangladesh. A convenience sampling technique was employed to recruit participants. Inclusion criteria were: (1) currently enrolled in a Bachelor of Pharmacy (B. Pharm) and Master of Pharmacy (M. Pharm) program in Bangladesh, and (2) willingness to participate. Responses with incomplete data were excluded from the final analysis.

A non-probability convenience sampling technique was employed to recruit participants from accessible institutions. The minimum sample size was calculated using the single population proportion formula:

$$n=Z^2 \times P \times (1-P)d^2$$

Assuming a 50% proportion (P) of adequate knowledge (to ensure maximum sample size), a 95% confidence level (Z = 1.96), and a 5% margin of error (d = 0.05), the calculated sample size was 384. To account for potential non-response and incomplete questionnaires, the target sample size was increased to 420.

Due to the online nature of data collection and the absence of a centralized sampling frame, a non-probability sampling approach was considered appropriate; however, this may have introduced selection bias and limited the generalizability of the findings. Furthermore, reliance on an online survey may have led to the underrepresentation of students with limited internet access or lower digital engagement, thereby introducing potential coverage bias.

Questionnaire Development

A structured, self-administered questionnaire was developed following a comprehensive review of relevant literature (Potdar, 2020; Afroz, Islam and Akter, 2023; Kaur, 2024; Afdanil and N, 2025), and in consultation with experts in pharmacy, gynecology, and public health. The internal consistency of the questionnaire was assessed using Cronbach's alpha. The knowledge scale demonstrated good reliability (α = 0.856), while the attitude scale also showed good internal consistency (α = 0.802). The practice scale exhibited acceptable reliability (α = 0.71), indicating moderate internal consistency. The questionnaire consisted of four sections addressing socio-demographic characteristics, knowledge, attitudes, and practices related to ovarian cysts, and included multiple-choice and Likert-scale questions to capture respondents' perspectives systematically.

Data Collection Procedure

The finalized questionnaire was converted into an online format using Google Forms, and the survey link was shared via pharmacy department coordinators, student associations, and relevant social media groups. Participants were informed about the study objectives, confidentiality, and voluntary nature of participation before providing electronic consent. No personally identifiable information was collected to ensure anonymity.

Data Analysis

Collected responses were exported to Microsoft Excel for initial data cleaning and subsequently analyzed using IBM SPSS Statistics (version 27). Descriptive statistics, including frequencies and percentages, were used to summarize demographic characteristics and response patterns. 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 was assessed using a summed score, where a score of ≥2 (≥50%) was considered good practice and <2 as poor practice. These cut-offs were selected to ensure meaningful differentiation between levels of KAP and to facilitate subsequent statistical analysis. Similar categorization approaches have been widely used in previous KAP studies, where Bloom's cut-off points or modified percentage-based thresholds are applied to classify respondent performance into meaningful groups (Banu et al., 2021; Sweity et al., 2022; Wang et al., 2022; Juttla et al., 2024). Inferential analyses, including chi-square tests, were performed where appropriate to examine associations between demographic variables (e.g., academic year, type of institution, marital status or residence type) and levels of knowledge, attitude, or practice. Variables that demonstrated statistical significance or theoretical relevance were subsequently included in multivariable logistic regression models to identify independent predictors of favorable KAP outcomes. Results are reported as adjusted odds ratios with corresponding 95% confidence intervals. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study adhered to the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Department of Pharmacy Ethical Committee of the University of Information Technology and Sciences (UITS) before data collection [*UITS/PHARM/PEC/2025/23*]. Before accessing the survey, participants were presented with an online information sheet explaining the study objectives, procedures, potential risks, and benefits. They provided electronic informed consent by agreeing to participate. Participation was entirely voluntary, participants could withdraw at any time before submitting their responses, and all data were collected anonymously. Survey responses were securely stored and used only for research purposes, in compliance with data protection standards.

Results

Socio-demographic Characteristics of Participants

A total of 474 female pharmacy students participated in the study. Of these, 448 provided complete responses across all knowledge, attitude, and practice items and were included in the categorical KAP classification, subgroup, and multivariable regression analyses; item-level response frequencies are reported for all 474 respondents. Most respondents were enrolled in private universities (71.9%), while 28.1% were from public universities. Most

participants were in their early academic years, with the highest proportion in the second year (38.8%), followed by first-year students (31.9%). A large proportion of respondents were single (69.0%) and nearly half resided with their families (49.2%). Notably, slightly more than half of the participants (54.9%) reported prior formal training in gynecological or reproductive health, indicating moderate exposure to relevant educational content (**Table 1**).

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

Questions	Frequency, n (%)
University type	University type
Private	341(71.9)
Public	133(28.1)
Currently studying in	Currently studying in
1st	151(31.9)
2nd	184(38.8)
3rd	76(16)
4th	39(8.2)
5th	5(1.1)
Postgrad	19(4)
Marital status	Marital status
Single	327(69)
Married	109(23)
Prefer not to say	38(8)
Residence type	Residence type
Hall/Hostel	160(33.8)
With family	233(49.2)
Shared rental	58(12.2)
Others	23(4.9)
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health
Yes	260(54.9)
No	214(45.1)

Knowledge Regarding Ovarian Cysts

Overall, participants demonstrated a suboptimal understanding of ovarian cysts, with several notable misconceptions. Only 39.2% correctly identified the ovary as the organ affected, while a larger proportion (46.4%) incorrectly selected the uterus, indicating a fundamental gap in anatomical understanding. Similarly, only 34.2% correctly recognized that most ovarian cysts are benign, whereas a considerable proportion (24.7%) remained uncertain.

Awareness of symptoms varied, with irregular menstruation (52.7%) and bloating (42.8%) being the most frequently identified symptoms, suggesting partial recognition of clinical manifestations. Hormonal imbalance (53.2%) and polycystic ovary syndrome (48.5%) were commonly recognized risk factors. However, knowledge regarding disease progression and management remained inconsistent; less than half (46.4%) were aware that small functional cysts may resolve spontaneously, and only 49.8% identified pelvic ultrasound as a key diagnostic tool. Furthermore, understanding of hormonal influences was limited, as responses regarding the role of contraceptives and hormone imbalance were widely distributed, reflecting uncertainty. Although 61.6% acknowledged the potential impact of ovarian cysts on fertility and 66.2% correctly identified gynecologists as the appropriate specialists, overall findings indicate important gaps in foundational and clinical knowledge (**Table 2**).

Table 2. Distribution of responses assessing knowledge regarding ovarian cysts.

Questions	Frequency, n (%)
1. Ovarian cysts develop in which organ?	1. Ovarian cysts develop in which organ?
Ovary	186 (39.2)
Uterus	220 (46.4)
Fallopian tube	37 (7.8)
Cervix	31 (6.5)
2. Most ovarian cysts are-	2. Most ovarian cysts are-
Benign	162 (34.2)
Cancerous	108 (22.8)

Questions	Frequency, n (%)
Always cause infertility	87 (18.4)
Don't know	117 (24.7)
3. Common symptoms of ovarian cysts include: (tick all that apply)	3. Common symptoms of ovarian cysts include: (tick all that apply)
Abdominal pain	187 (39.5)
Bloating	203 (42.8)
Irregular periods	250 (52.7)
Nausea	55 (11.6)
Don't know	52 (11)
4. Which factors increase the risk of ovarian cysts?	4. Which factors increase the risk of ovarian cysts?
Hormonal imbalance	252 (53.2)
Polycystic ovary syndrome (PCOS)	230 (48.5)
Pregnancy	141 (29.7)
None	23 (4.9)
Don't know	51 (10.8)
5. Small functional cysts usually:	5. Small functional cysts usually:
Resolve on their own	220 (46.4)
Require surgery	82 (17.3)
Always cause infertility	59 (12.4)
Don't know	113 (23.8)
6. Ovarian cysts can be detected using:	6. Ovarian cysts can be detected using:
Pelvic ultrasound	236 (49.8)
X-ray	61 (12.9)
Blood test	63 (13.3)
MRI	60 (12.7)
Don't know	54 (11.4)
7. Hormonal contraceptives can:	7. Hormonal contraceptives can:
Reduce risk of ovarian cysts	149 (31.4)
Increase risk	141 (29.7)
No effect	62 (13.1)
Don't know	122 (25.7)
8. Which hormone imbalance is commonly associated with ovarian cysts?	8. Which hormone imbalance is commonly associated with ovarian cysts?
Estrogen	168 (35.4)
Progesterone	143 (30.2)
Insulin	53 (11.2)
Don't know	110 (23.2)
9. Multiple ovarian cysts are associated with which condition?	9. Multiple ovarian cysts are associated with which condition?
PCOS	250 (52.7)
Fibroids	106 (22.4)
Endometriosis	79 (16.7)
Don't know	91 (19.2)
10. Untreated ovarian cysts may cause:	10. Untreated ovarian cysts may cause:
Internal bleeding	260 (54.9)
Kidney failure	103 (21.7)
No effect	24 (5.1)
Don't know	87 (18.4)
11. Which specialist should be consulted for ovarian cysts?	11. Which specialist should be consulted for ovarian cysts?
Gynecologist	314 (66.2)
Pharmacist	71 (15)
General physician	40 (8.4)
Don't know	49 (10.3)
12. Can ovarian cysts affect fertility?	12. Can ovarian cysts affect fertility?
Yes	292 (61.6)
No	110 (23.2)
Don't know	72 (15.2)
13. Regular gynecological check-ups can:	13. Regular gynecological check-ups can:
Help detect ovarian cysts early	215 (45.4)

Questions	Frequency, n (%)
Prevent cyst formation	139 (29.3)
Have no effect	30 (6.3)
Don't know	90 (19)
14. Most ovarian cysts in young women are:	14. Most ovarian cysts in young women are:
Benign	182 (38.4)
Malignant	90 (19)
Always recurrent	86 (18.1)
Don't know	116 (24.5)
15. Which lifestyle factors may help reduce the risk of ovarian cysts? (tick all that apply)	15. Which lifestyle factors may help reduce the risk of ovarian cysts? (tick all that apply)
Healthy diet	269 (56.8)
Regular exercise	234 (49.4)
Stress management	183 (38.6)
None	36 (7.6)
Don't know	56 (11.8)

Factors Associated with Knowledge Level

Knowledge level was significantly associated with university type, academic year, marital status, and residence type (all $p < 0.001$), indicating that both educational and socio-demographic factors influence awareness. Students from public universities and those in higher academic years demonstrated a higher proportion of good knowledge compared to their counterparts. Additionally, married participants and those residing with their families showed relatively higher knowledge levels. In contrast, prior formal training in gynecological or reproductive health was not significantly associated with knowledge level ($p = 0.7$), highlighting a potential gap in the effectiveness or depth of such training programs (**Table 3**).

Table 3. Factors associated with knowledge level.

Characteristic	Overall N = 448	Good N = 85	Moderate N = 118	Poor N = 245	p-value
University type					<0.001
Private	330 (74%)	56 (66%)	72 (61%)	202 (82%)	
Public	118 (26%)	29 (34%)	46 (39%)	43 (18%)	
Currently studying in					<0.001
1st	135 (30%)	18 (21%)	53 (45%)	64 (26%)	
2nd	184 (41%)	22 (26%)	26 (22%)	136 (56%)	
3rd	72 (16%)	19 (22%)	27 (23%)	26 (11%)	
4th	33 (7.4%)	18 (21%)	9 (7.6%)	6 (2.4%)	
5th	5 (1.1%)	1 (1.2%)	1 (0.8%)	3 (1.2%)	
Postgrad	19 (4.2%)	7 (8.2%)	2 (1.7%)	10 (4.1%)	
Marital Status					<0.001
Married	109 (24%)	11 (13%)	19 (16%)	79 (32%)	
Prefer not to say	38 (8.5%)	0 (0%)	2 (1.7%)	36 (15%)	
Single	301 (67%)	74 (87%)	97 (82%)	130 (53%)	
Residence type					<0.001
Hall/Hostel	147 (33%)	31 (36%)	40 (34%)	76 (31%)	
Other	23 (5.1%)	0 (0%)	0 (0%)	23 (9.4%)	
Shared rental	58 (13%)	4 (4.7%)	8 (6.8%)	46 (19%)	
With family	220 (49%)	50 (59%)	70 (59%)	100 (41%)	
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	0.700
No	211 (47%)	43 (51%)	54 (46%)	114 (47%)	
Yes	237 (53%)	42 (49%)	64 (54%)	131 (53%)	

Attitudes Toward Ovarian Cysts

Participants generally demonstrated favorable attitudes toward ovarian cyst-related health issues. A substantial majority (>80%) agreed that ovarian cysts represent a serious women's health concern and emphasized the importance of regular gynecological check-ups. Additionally, 77.7% expressed concern about developing ovarian cysts in the future, reflecting heightened perceived susceptibility.

Perceived social and family stigma was identified as a major barrier, with more than three-quarters of respondents acknowledging its impact on healthcare-seeking behavior. Encouragingly, most participants believed that early detection could reduce the need for surgical intervention and

recognized the importance of emotional support in disease management.

Moreover, respondents acknowledged the role of the media in disseminating awareness and recognized the relevance of ovarian cyst knowledge for their future pharmacy practice. These findings suggest strong attitudinal readiness for preventive and educational interventions (**Table 4**).

Table 4. Distribution of responses assessing attitudes toward ovarian cysts.

Questions	Frequency, n (%)
1. Ovarian Cysts are a serious women's health problem.	1. Ovarian Cysts are a serious women's health problem.
Strongly Agree	156 (32.9)
Agree	237 (50)
Neutral	60 (12.7)
Disagree	19 (4)
Strongly Disagree	0
2. I am concerned about developing Ovarian Cysts in the future.	2. I am concerned about developing Ovarian Cysts in the future.
Strongly Agree	114 (24.1)
Agree	254 (53.6)
Neutral	53 (11.2)
Disagree	37 (7.8)
Strongly Disagree	16 (3.4)
3. It is important for women to undergo regular gynecological check-ups.	3. It is important for women to undergo regular gynecological check-ups.
Strongly Agree	160 (33.8)
Agree	215 (45.4)
Neutral	54 (11.4)
Disagree	20 (4.2)
Strongly Disagree	25 (5.3)
4. I feel comfortable discussing menstrual or pelvic issues with doctors.	4. I feel comfortable discussing menstrual or pelvic issues with doctors.
Strongly Agree	102 (21.5)
Agree	227 (47.9)
Neutral	102 (21.5)
Disagree	21 (4.4)
Strongly Disagree	22 (4.6)
5. Family/ social stigma prevents women from seeking gynecological care.	5. Family/ social stigma prevents women from seeking gynecological care.
Strongly Agree	127 (26.8)
Agree	235 (49.6)
Neutral	60 (12.7)
Disagree	35 (7.4)
Strongly Disagree	17 (3.6)
6. Surgery for ovarian cysts is avoidable if detected early.	6. Surgery for ovarian cysts is avoidable if detected early.
Strongly Agree	120 (25.3)
Agree	248 (52.3)
Neutral	57 (12)
Disagree	34 (7.2)
Strongly Disagree	15 (3.2)
7. I believe that emotional support is as important as medical treatment for women with ovarian cysts?	7. I believe that emotional support is as important as medical treatment for women with ovarian cysts?
Strongly Agree	118 (24.9)
Agree	218 (46)
Neutral	61 (12.9)
Disagree	47 (9.9)
Strongly Disagree	30 (6.3)
8. Media (Tv, social media, etc.) can play a key role in spreading awareness about ovarian cysts.	8. Media (Tv, social media, etc.) can play a key role in spreading awareness about ovarian cysts.
Strongly Agree	113 (23.8)
Agree	232 (48.9)
Neutral	75 (15.8)

Questions	Frequency, n (%)
Disagree	42 (8.9)
Strongly Disagree	12 (2.5)
9. Knowledge about ovarian cysts will help me advise patients in my future pharmacy practice.	9. Knowledge about ovarian cysts will help me advise patients in my future pharmacy practice.
Strongly Agree	118 (24.9)
Agree	270 (57)
Neutral	53 (11.2)
Disagree	14 (3)
Strongly Disagree	19 (4)
10. I believe lifestyle modification can reduce the risk of ovarian cysts.	10. I believe lifestyle modification can reduce the risk of ovarian cysts.
Strongly Agree	166 (35)
Agree	204 (43)
Neutral	55 (11.6)
Disagree	25 (5.3)
Strongly Disagree	24 (5.1)

Factors Associated with Attitude Level

Attitude level showed significant associations with university type, academic year, marital status, residence type, and prior training (all $p < 0.001$). Positive attitudes were more frequently observed among students from private universities, senior academic years, single participants, and those living with family. Notably, participants who had received prior training demonstrated significantly more positive attitudes, suggesting that educational exposure may play a more effective role in shaping attitudes than knowledge alone (**Table 5**).

Table 5. Factors associated with attitude level.

Characteristic	Overall N = 448	Negative N = 47	Neutral N = 241	Positive N = 160	p-value
University type					<0.001
Private	330 (74%)	45 (96%)	167 (69%)	118 (74%)	
Public	118 (26%)	2 (4.3%)	74 (31%)	42 (26%)	
Currently studying in					<0.001
1st	135 (30%)	7 (15%)	83 (34%)	45 (28%)	
2nd	184 (41%)	34 (72%)	107 (44%)	43 (27%)	
3rd	72 (16%)	2 (4.3%)	27 (11%)	43 (27%)	
4th	33 (7.4%)	0 (0%)	13 (5.4%)	20 (13%)	
5th	5 (1.1%)	1 (2.1%)	2 (0.8%)	2 (1.3%)	
Postgrad	19 (4.2%)	3 (6.4%)	9 (3.7%)	7 (4.4%)	
Marital Status					<0.001
Married	109 (24%)	14 (30%)	70 (29%)	25 (16%)	
Prefer not to say	38 (8.5%)	11 (23%)	21 (8.7%)	6 (3.8%)	
Single	301 (67%)	22 (47%)	150 (62%)	129 (81%)	
Residence type					<0.001
Hall/Hostel	147 (33%)	19 (40%)	80 (33%)	48 (30%)	
Other	23 (5.1%)	7 (15%)	16 (6.6%)	0 (0%)	
Shared rental	58 (13%)	11 (23%)	36 (15%)	11 (6.9%)	
With family	220 (49%)	10 (21%)	109 (45%)	101 (63%)	
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	<0.001
No	211 (47%)	28 (60%)	87 (36%)	96 (60%)	
Yes	237 (53%)	19 (40%)	154 (64%)	64 (40%)	

Practices and Health-Seeking Behavior

Despite relatively positive attitudes, preventive and health-seeking practices were inconsistent. A majority of participants (63.7%) reported experiencing lower abdominal or pelvic pain, yet only 49.4% had undergone pelvic ultrasound at least once, indicating potential underutilization of diagnostic services. Regular gynecological check-ups were uncommon, with only 8.9% attending annually, while 42.2% sought care only when symptomatic, reflecting a reactive rather than preventive approach to health. Hospitals or clinics were the most common first point of care (61.2%), followed by pharmacies and internet sources. Self-medication was highly prevalent (60.5%), raising concerns regarding inappropriate management of symptoms. However, a strong willingness to engage in health promotion was evident, as 81.4% expressed interest in university-

organized awareness programs. These findings highlight a gap between awareness and actual health-seeking behavior (**Table 6**).

Table 6. Distribution of responses assessing practices and health-seeking behavior.

Questions	Frequency, n (%)
Have you ever experienced lower abdominal or pelvic pain?	Have you ever experienced lower abdominal or pelvic pain?
Yes	302 (63.7)
No	172 (36.3)
2. Have you ever undergone a pelvic ultrasound?	
Yes	234 (49.4)
No	240 (50.6)
3. How often do you attend gynecological checkups?	3. How often do you attend gynecological checkups?
Never	124 (26.2)
Only when symptomatic	200 (42.2)
Once every 1-2 years	108 (22.8)
Annually	42 (8.9)
4. Where would you first seek help if you had symptoms of an Ovarian Cyst?	4. Where would you first seek help if you had symptoms of an Ovarian Cyst?
Hospital/Clinic	290 (61.2)
Pharmacy	59 (12.4)
Internet	60 (12.7)
Friends/Family	41 (8.6)
Traditional healer	24 (5.1)
5. Have you ever used self-medication for menstrual or pelvic pain?	5. Have you ever used self-medication for menstrual or pelvic pain?
Yes	287 (60.5)
No	187 (39.5)
6. Would you like your university to organize awareness sessions on Ovarian and reproductive health?	6. Would you like your university to organize awareness sessions on Ovarian and reproductive health?
Yes	386 (81.4)
No	88 (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 practices. No significant associations were observed with academic year, marital status, residence type, or prior training, suggesting that improvements in practice may require more targeted behavioral interventions beyond demographic or educational factors (**Table 7**).

Table 7. Factors associated with practice level.

Characteristic	Overall N = 448	Good N = 351	Poor N = 97	p-value
University type				0.013
Private	330 (74%)	249 (71%)	81 (84%)	
Public	118 (26%)	102 (29%)	16 (16%)	
Currently studying in				0.056
1st	135 (30%)	115 (33%)	20 (21%)	
2nd	184 (41%)	145 (41%)	39 (40%)	
3rd	72 (16%)	53 (15%)	19 (20%)	
4th	33 (7.4%)	21 (6.0%)	12 (12%)	
5th	5 (1.1%)	4 (1.1%)	1 (1.0%)	
Postgrad	19 (4.2%)	13 (3.7%)	6 (6.2%)	
Marital Status				0.100
Married	109 (24%)	81 (23%)	28 (29%)	
Prefer not to say	38 (8.5%)	26 (7.4%)	12 (12%)	
Single	301 (67%)	244 (70%)	57 (59%)	
Residence type				0.200
Hall/Hostel	147 (33%)	121 (34%)	26 (27%)	
Other	23 (5.1%)	15 (4.3%)	8 (8.2%)	
Shared rental	58 (13%)	43 (12%)	15 (15%)	
With family	220 (49%)	172 (49%)	48 (49%)	
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	0.200

Characteristic	Overall N = 448	Good N = 351	Poor N = 97	p-value
No	211 (47%)	159 (45%)	52 (54%)	
Yes	237 (53%)	192 (55%)	45 (46%)	

Distribution of KAP levels among the participants

Figure 1 illustrates the distribution of knowledge, attitude, and practice (KAP) levels among the participants. A substantial proportion of students demonstrated poor knowledge (n = 245), while only a limited number achieved good knowledge (n = 85), emphasizing a pronounced gap in awareness. In contrast, attitudes were comparatively more favorable, with a considerable proportion exhibiting positive attitudes (n = 160), although the majority remained neutral (n = 241) and a smaller fraction expressed negative attitudes (n = 47). Regarding practices, most participants reported good preventive and health-seeking behaviors (n = 351), while a notable proportion still demonstrated poor practices (n = 97). Overall, the figure highlights a clear discrepancy between knowledge and behavioral outcomes, suggesting that relatively positive attitudes and practices are not fully supported by adequate knowledge, thereby indicating the need for targeted educational strategies to improve understanding and encourage more informed health behaviors among female pharmacy students in Bangladesh.

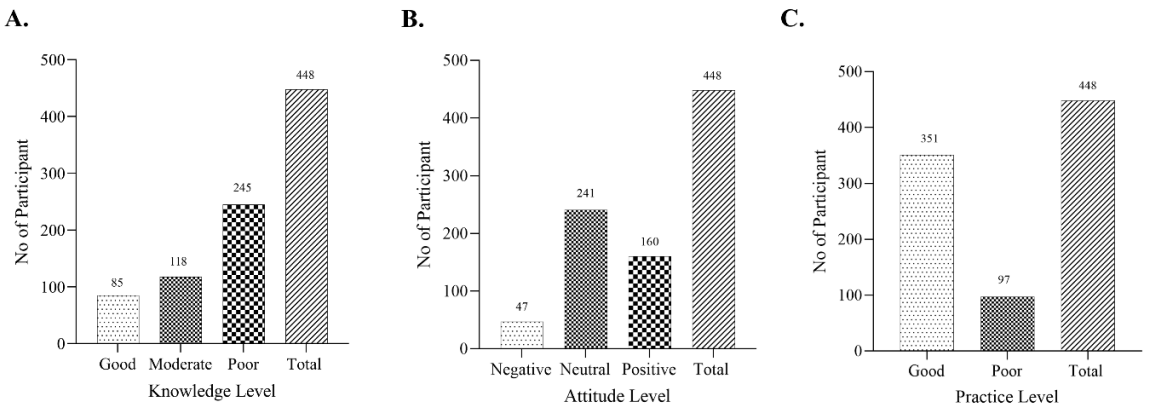

Figure 1. Distribution of knowledge, attitude, and practice (KAP) levels among the participants. (A) Knowledge level, (B) attitude level, and (C) practice level.

Multivariable logistic regression analysis of factors associated with good knowledge, positive attitude and good practice toward ovarian cysts (N = 448)

The results of the multivariable logistic regression analysis for factors associated with good knowledge about ovarian cysts among female pharmacy students are shown in the **supplementary material**, **Table S1A**. Academic year emerged as a strong predictor, with students in higher years demonstrating significantly greater knowledge compared to 1st-year students. Specifically, 3rd-year (OR = 2.98, 95% CI: 1.38–6.47, p = 0.005), 4th-year (OR = 12.6, 95% CI: 5.07–33.1, p < 0.001), and postgraduate students (OR = 12.5, 95% CI: 3.38–48.6, p < 0.001) were significantly more likely to have good knowledge, indicating a clear trend of knowledge improvement with academic progression. Marital status was also significant, as single students had higher odds of good knowledge compared to married students (OR = 3.53, 95% CI: 1.72–7.89, p = 0.001). In contrast, university type and prior training did not show significant associations, while students living in shared rentals were less likely to have good knowledge than those in halls/hostels (OR = 0.17, 95% CI: 0.04–0.53, p = 0.005).

Table 8. Table S1A. Multivariable logistic regression analysis of factors associated with good knowledge toward ovarian cysts (N = 448).

Characteristic	OR	95% CI	p-value
University type			
Private	—	—	

Characteristic	OR	95% CI	p-value
Public	1.10	0.59, 2.03	0.800
Currently studying in			
1st	—	—	
2nd	1.69	0.83, 3.46	0.150
3rd	2.98	1.38, 6.47	0.005
4th	12.6	5.07, 33.1	<0.001
5th	3.07	0.14, 30.2	0.400
Postgrad	12.5	3.38, 48.6	<0.001
Marital Status			
Married	—	—	
Prefer not to say	0.00	0.00, 0.00	>0.900
Single	3.53	1.72, 7.89	0.001
Residence type			
Hall/Hostel	—	—	
Shared rental	0.17	0.04, 0.53	0.005
With family	0.92	0.51, 1.69	0.800
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health
No	—	—	
Yes	0.81	0.46, 1.43	0.500
Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.

Supplementary material, **Table S1B** presents the factors associated with a positive attitude toward ovarian cysts. Similar to knowledge, academic year played a significant role, with 3rd-year (OR = 3.36, 95% CI: 1.75–6.59, $p < 0.001$) and 4th-year students (OR = 4.29, 95% CI: 1.88–10.2, $p < 0.001$) showing significantly higher odds of having a positive attitude compared to 1st-year students. Marital status remained a significant factor, as single students were more likely to exhibit a positive attitude than married students (OR = 2.39, 95% CI: 1.37–4.30, $p = 0.003$). Residence also influenced attitude, with students living in shared rentals showing lower likelihood of positive attitudes (OR = 0.42, 95% CI: 0.18–0.93, $p = 0.039$). Notably, prior training was inversely associated with positive attitude (OR = 0.41, 95% CI: 0.26–0.66, $p < 0.001$), suggesting a complex relationship between formal exposure and perception. University type did not have a significant effect.

Table 9. Table S1B. Multivariable logistic regression analysis of factors associated with positive attitude toward ovarian cysts (N = 448).

Characteristic	OR	95% CI	p-value
University type			
Private	—	—	
Public	0.87	0.51, 1.49	0.600
Currently studying in			
1st	—	—	
2nd	0.82	0.47, 1.44	0.500
3rd	3.36	1.75, 6.59	<0.001
4th	4.29	1.88, 10.2	<0.001
5th	2.59	0.28, 24.0	0.400
Postgrad	2.49	0.74, 8.33	0.130
Marital Status			
Married	—	—	
Prefer not to say	0.65	0.21, 1.80	0.400
Single	2.39	1.37, 4.30	0.003
Residence type			
Hall/Hostel	—	—	
Other	0.00		>0.900
Shared rental	0.42	0.18, 0.93	0.039
With family	1.21	0.74, 1.99	0.400

Characteristic	OR	95% CI	p-value
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health
No	—	—	
Yes	0.41	0.26, 0.66	<0.001
Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.

Supplementary material, **Table S1C** summarizes the logistic regression findings for good practice related to ovarian cysts. Unlike knowledge and attitude, most socio-demographic variables were not significantly associated with practice ($p > 0.05$). However, 4th-year students were significantly less likely to demonstrate good practices compared to 1st-year students (OR = 0.29, 95% CI: 0.12–0.71, p = 0.006). University type showed a borderline association, with public university students having higher odds of good practice than private university students (OR = 1.89, 95% CI: 1.01–3.68, p = 0.053). Other variables, including marital status, residence, and prior training, did not show statistically significant relationships. Overall, these findings indicate that while knowledge and attitude vary with academic and personal factors, good practices remain relatively uniform, suggesting the need for broader behavioral interventions rather than subgroup-specific strategies.

Table 10. Table S1C. Multivariable logistic regression analysis of factors associated with good practice toward ovarian cysts (N = 448).

Characteristic	OR	95% CI	p-value
University type			
Private	—	—	
Public	1.89	1.01, 3.68	0.053
Currently studying in			
1st	—	—	
2nd	0.92	0.48, 1.77	0.800
3rd	0.55	0.27, 1.16	0.120
4th	0.29	0.12, 0.71	0.006
5th	0.83	0.11, 17.3	0.900
Postgrad	0.48	0.16, 1.61	0.200
Marital Status			
Married	—	—	
Prefer not to say	0.73	0.31, 1.75	0.500
Single	1.35	0.77, 2.35	0.300
Residence type			
Hall/Hostel	—	—	
Other	0.52	0.19, 1.48	0.200
Shared rental	0.80	0.37, 1.75	0.600
With family	0.95	0.53, 1.68	0.900
Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health	Received formal training in gynecological or reproductive health
No	—	—	
Yes	1.29	0.78, 2.12	0.300
Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.	Abbreviations: CI = Confidence Interval, OR = Odds Ratio. Analysis based on the 448 participants with complete KAP classification data.

Discussion

This study identified substantial gaps in knowledge regarding ovarian cysts among female pharmacy students in Bangladesh, despite relatively positive attitudes and moderately favorable practices. These findings are consistent with South Asian and international evidence suggesting that reproductive health literacy among young women, even in higher education settings, remains suboptimal. For instance, studies conducted in the United States and Europe have demonstrated that university students often possess fragmented knowledge about

gynecological conditions, particularly regarding disease etiology and natural progression (Harlow and Campbell, 2004; Velez et al., 2021). Unlike high-income settings, however, the magnitude of misconceptions observed in this study appears greater, which may reflect differences in curriculum integration, access to reproductive health education, and sociocultural openness.

A particularly concerning finding was the high prevalence of misconceptions regarding basic anatomy and disease characteristics. Nearly half of the participants incorrectly identified the uterus as the site of ovarian cyst development. While similar misunderstandings have been reported in neighboring South Asian countries such as India, Pakistan, and Nepal (Azhar et al., 2014; Charel, Shah and Goswami, 2020; Shakya, Shrestha and Lama, 2024), studies from high-income countries indicate relatively better baseline anatomical knowledge among health-related students (Rowlands, Dobson and Mishra, 2015). This discrepancy may be attributed to differences in pedagogical approaches, where problem-based and clinically integrated learning are more widely implemented in Western curricula. Moreover, the persistence of such fundamental gaps among pharmacy students suggests that existing educational strategies in Bangladesh may prioritize theoretical knowledge over applied clinical understanding, limiting students' ability to translate knowledge into practice.

The association between higher academic standing and better knowledge observed in this study aligns with findings from South Asia and other low- and middle-income regions, where exposure to clinical coursework and health-related content increases progressively over time (Abdulrahman et al., 2025). However, the lack of a strong association between prior formal training and knowledge level suggests that existing educational interventions may be insufficient in depth or practical relevance. This highlights the need to revisit how reproductive health topics are integrated into pharmacy curricula, with greater emphasis on applied clinical understanding.

Although participants showed positive attitudes toward ovarian cysts, this did not consistently translate into appropriate health-seeking behavior, highlighting a gap that challenges the linear KAP model. Global evidence, including reports from the World Health Organization, suggests that sociocultural and structural barriers often outweigh knowledge and attitudes in shaping healthcare utilization (Ibitoye, Akadiri and Ibitoye, 2023). Similarly, South Asian studies report high perceived severity but delayed care-seeking due to stigma and cultural norms (Azhar et al., 2014; Siddiqui et al., 2020; Bando et al., 2025; Shah et al., 2025). These findings emphasize the need for context-specific, behavior-focused interventions.

Health-seeking practices revealed a clear gap between awareness and action, with low uptake of preventive care and a tendency to seek treatment only after symptom onset. This reactive pattern aligns with findings from South Asia, where stigma, cost, privacy concerns, and normalization of symptoms delay professional care (Mohammadi et al., 2016; McCammon et al., 2020). Notably, the high prevalence of self-medication (60.5%), even among pharmacy students, is concerning, as it suggests normalization of informal care practices. While self-medication is reported globally, it is typically lower in high-income settings due to stricter regulation and better healthcare access (James et al., 2006). These findings raise concerns about future professional behavior and highlight the need for interventions promoting rational drug use and preventive care.

Prior formal training in reproductive health was not significantly associated with better knowledge, suggesting limitations in its content, delivery, or practical relevance. This contrasts with evidence from Europe and North America, where structured, interactive programs improve knowledge and clinical decision-making (Kirby, Laris and Rolleri, 2007). However, the strong interest in institutional awareness programs indicates high receptiveness to improved interventions. Studies from South Asia show that campus-based initiatives, peer education, and curriculum integration can effectively enhance both knowledge and health-seeking behavior (Siddiqui et al., 2020; Indrati, 2022), highlighting the need for more practical, engaging, and context-specific educational approaches.

Overall, these findings partially support the Knowledge–Attitude–Practice (KAP) framework, as positive attitudes were observed despite inadequate knowledge; however, the lack of translation into practice highlights the limitations of the model in contexts where sociocultural and systemic barriers play a significant role. Our study highlights a critical gap between knowledge, perception, and behavior among future healthcare professionals in a low-resource setting. While similar patterns have been reported globally, the extent of knowledge deficits and reliance on informal practices observed here underscore the need for context-specific interventions. Strengthening curriculum design, promoting open discussions around reproductive health, and integrating behavioral change frameworks are essential to bridge this gap. Given the influential role of pharmacists in community health education, addressing these deficiencies at the training level may have far-reaching implications for improving women's reproductive health outcomes both locally and globally.

Strengths, Limitations, and Future Directions

A key strength of this study is its focus on pharmacy

students, a group whose competency directly impacts community health outcomes. However, several limitations should be considered. The use of non-probability convenience sampling may have introduced selection bias, as participants with greater access to online platforms or a higher interest in reproductive health may have been more likely to participate. Additionally, the online nature of data collection may have excluded individuals with limited internet access or lower digital engagement, potentially introducing coverage bias. These factors may limit the generalizability of the findings to the broader population of female students and other professional groups in Bangladesh. Furthermore, the reliance on self-reported data may be subject to response bias, and the cross-sectional design precludes causal inference.

Despite these limitations, the findings provide important insights for targeted interventions. Integration of comprehensive and culturally sensitive reproductive health modules into the core pharmacy curriculum is recommended. Furthermore, campus-based awareness campaigns and partnerships with clinical gynecologists for workshops could help translate knowledge into positive attitudes and proactive health-seeking behaviors. Future research should explore the effectiveness of such educational interventions and extend KAP assessments to community pharmacists and the general public to develop a multi-pronged national strategy for improving ovarian health awareness in Bangladesh and similar settings.

Conclusion

This study highlights important gaps in knowledge and health-seeking practices related to ovarian cysts among female pharmacy students in Bangladesh, despite generally positive attitudes toward reproductive health. Misconceptions regarding disease characteristics and management, along with inconsistent preventive behaviors, indicate a disconnect between awareness and action. While these findings provide valuable insight into a key group of future healthcare professionals, they should be interpreted with caution due to the use of non-probability sampling and the focus on a specific student population. Strengthening reproductive health education within pharmacy curricula and implementing targeted, context-specific awareness programs may help improve both personal health behaviors and future professional practice. Further studies involving more diverse populations are warranted to enhance generalizability.

Statements and Declarations

Ethics Approval

The study adhered to the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Department of Pharmacy Ethical Committee of the University of Information Technology and Sciences (UITS) before data collection (approval code: UITS/PHARM/PEC/2025/23; dated 21 August 2025). All participants provided electronic informed consent, participation was voluntary, and all data were collected anonymously.

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Declaration of Competing Interest

The authors declare no conflict of interest.

Data Availability

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

CRediT Authorship Contribution Statement

Md. Al Amin: Project administration (lead); Conceptualization (lead); Methodology (lead); Writing – original draft (lead); Writing – review and editing (equal); Investigation (equal); Data curation (equal); Validation (equal).

Tasfia Tabassum, Tania Akter Ripa, Suriya Akter Shrity and Md. Nayeem Chowdhury: Investigation (equal); Data collection (equal); Data analysis (equal); Manuscript editing (equal).

Joy Sarker: Writing – review and editing (equal); Visualization (lead); Supervision (lead); Resources (lead); Investigation (equal); Formal analysis (equal).

Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this work, the author(s) used ChatGPT to improve the readability of the article. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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