Knowledge, Attitudes, and Socio-Demographic Determinants of Menstrual Hygiene Practices among Female University Students

Abstract

Aims: This study evaluated knowledge, attitudes, and practices (KAP) regarding menstrual hygiene among female university students and identified the socio-demographic and environmental factors influencing their behaviors.

Methods: This cross-sectional descriptive-analytical study included 404 female students from Zahedan University of Medical Sciences. A total of 406 students were recruited to account for potential non-response and incomplete questionnaires. Two incomplete questionnaires were excluded, and the remaining 404 questionnaires were included in the final analysis. Data were collected using a validated, researcher-developed questionnaire. The questionnaire's validity was assessed through content validity evaluation, and its reliability was assessed using Cronbach's alpha. Statistical analyses included descriptive statistics and Pearson correlation, ANOVA, and independent t-tests, and linear regression. Significance was set at $P < 0.05$.

Findings: Participants' mean age was 21.37 ± 2.5 years, with a mean menarche age of 13.11 ± 1.51. Participants achieved mean scores of 74%, 73%, and 63% of the total scores for knowledge, attitude, and practice, respectively. Only 5% demonstrated good practices. Mothers were the most frequently reported information source (60.9. Education level (P=0.001), perceived family ability to meet menstrual hygiene needs (P=0.001), perceived environmental access for menstrual hygiene practice (P<0.001), and faculty affiliation (P<0.001) were significantly associated with practice. In multiple linear regression, attitude (β=0.344, P<0.001), environmental access for menstrual practice (β=0.210, P<0.001), and knowledge (β=0.102, P=0.030) were also significantly associated with menstrual hygiene practice.

Conclusion: Perceived access to a suitable environment for menstrual hygiene and perceived ability to meet menstrual hygiene needs were associated with practice.

Keywords: Menstruation; knowledge; attitudes; female students.

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Introduction

Adolescence is recognized as one of the most sensitive and critical periods of human life, characterized by profound physical, psychological, and social transformations(1, 2). According to available statistics, adolescents constitute more than 20% of the country's population, and the most significant event during this period is puberty, which, in girls, manifests with the onset of the first menstrual period (menarche) (1, 2). Menarche not only signifies the achievement of reproductive capacity but also serves as a pivotal milestone in reproductive health and overall quality of life, exerting substantial effects on education, health behaviors, and future well-being(2-4).

Due to recent societal changes, the mean age of menarche has declined from 16–17 years in the late nineteenth century to less than 13 years today (1), with a reported average of 12.81 years among Iranian girls(5)**.** Early menarche has been associated with an increased risk of various health problems, including type 2 diabetes, cardiovascular disease, reproductive cancers, and psychological disorders, while mothers, as the primary source of information, often provide insufficient and misconception-laden knowledge due to cultural taboos and a lack of effective communication skills (5).

Despite recent advances in adolescent reproductive health, numerous girls worldwide, particularly in low- and middle-income countries, enter this stage with insufficient knowledge and inadequate preparation, experiencing menstruation with feelings of shame, fear, and distress (3, 4, 6). Evidence indicates that less than 50% of girls are aware of menstruation before menarche, and this lack of awareness predisposes them to poor hygiene practices, increased risk of pelvic inflammatory disease, infertility, and various psychosocial problems during puberty and adulthood (1, 4). In this context, knowledge and attitudes toward menstruation play a fundamental role in shaping health behaviors and self-care practices among girls (4, 7).

Timely knowledge about menstruation has been proposed as a core indicator for monitoring menstrual health at national and global levels; girls who are informed before menarche not only demonstrate higher levels of preparedness but also exhibit more positive attitudes and better hygiene practices (4, 7). Conversely, lack of knowledge and exposure to misinformation lead to the formation of negative attitudes, misconceptions, and social stigma surrounding menstruation, which in turn restrict open dialogue and perpetuate unhealthy behaviors. In other words, accurate knowledge is an essential prerequisite for developing positive attitudes, and positive attitudes serve as the driving force behind effective health behaviors; since individual attitudes directly influence decision-making and daily practices related to self-care during menstruation (7, 8). Numerous studies have shown that girls with sufficient knowledge face pubertal changes with greater self-confidence and demonstrate better ability to manage emotions and stress related to menstruation (8, 9).

Furthermore, various individual and social factors shape girls' knowledge and attitudes toward menstruation, among which the role of family, particularly parental literacy and access to accurate information sources, is especially critical. Girls often lack formal education on menstrual health and naturally turn to their mothers for information(6). However, mothers and peers, who serve as the primary sources of information, frequently provide incomplete and untimely information, as well as misconceptions (2, 3, 10). Moreover, the literacy level of parents, especially maternal and paternal education, is a determining factor in access to accurate information and the formation of positive attitudes; more educated parents typically have a greater ability to transmit precise and timely information and can create a more open environment for discussing pubertal issues(8, 10). In addition, media and modern educational tools, such as multimedia content, can play an effective role in enhancing knowledge and modifying attitudes; however, in many societies, including Iran, due to cultural constraints and existing taboos, discussion about puberty and menstruation is rarely conducted formally and scientifically, and access to reliable information sources faces obstacles (2, 7, 8). Beyond family and media, schools and teachers also constitute important pillars of information provision, yet inadequate support from the educational system in this area adversely affects the quality of life and menstrual management among girls (3, 11).

Considering that university students are on the threshold of adulthood and assume various social, academic, and family roles, their knowledge, attitudes, and practices regarding menstrual health are of paramount importance. University students, not only as recipients of health services but also as educated women and future builders of society, can serve as role models for other girls and subsequent generations. Nonetheless, limited information exists regarding the level of knowledge, attitudes, and factors associated with menstrual health among female students at Zahedan University of Medical Sciences, and it remains unclear to what extent this group possesses the necessary preparedness for proper menstrual management and which factors exert the greatest influence on their status. Therefore, this study was designed with the aim of investigating knowledge, attitudes, and individual and social factors affecting menstrual health among female students at

Zahedan University of Medical Sciences, in order to identify the current situation and provide the groundwork for designing effective educational interventions and promoting reproductive health in this important population.

Materials & Methods

Study Design and Population

This cross-sectional, descriptive-analytical study assessed the knowledge, attitudes, and practices regarding menstrual hygiene among female students. The target population comprised all female students enrolled during the academic year under investigation. According to data from the University's Vice-Chancellery for Education, the total number of students was 4,648, of whom approximately 2,600 were female.

Sample Size and Sampling Method

The target population consisted of approximately 2,600 female students enrolled at Zahedan University of Medical Sciences. Based on the Krejcie and Morgan sample size determination approach, with a 95% confidence level and a 5% margin of error, the minimum required sample size was estimated to be approximately 338 participants. To account for potential non-response and incomplete questionnaires, approximately 20% was added to the initial sample size, resulting in a target sample of 406 participants. Of the 406 questionnaires distributed, 2 were excluded due to incomplete responses, while 404 completed questionnaires were included in the final analysis.

Inclusion criteria were providing informed consent to participate and being an active student at the university during the data collection period. Questionnaires with incomplete or missing responses were excluded from the final analysis.

Data Collection Instrument

Data were gathered using a researcher-developed, structured questionnaire. The first part comprised 23 items on environmental factors affecting students' awareness, attitudes and demographic variables, including age, field and level of study, parental education and occupation, family economic status, and student residence. The second part focused specifically on three domains. The knowledge domain included 8 items, such as "whether girls should shower in a standing position during menstruation". The attitude domain comprised 7 items, for example, "I believe menstruation is a sign of health, and I enjoy it." Finally, the practice domain consisted of 13 items, such as the use of sanitary pads during menstruation. The response options for the knowledge items were designed as "Yes," "No," and "I don't know." Correct answers received a score of 1, while incorrect and "I don't know" responses were given a score of 0. The attitude items were rated on a 5-point Likert scale consisting of "Strongly agree," "Agree," "No opinion," "Disagree," and "Strongly disagree." The practice items were scored on a 5-point frequency scale including "Always," "Most of the time," "Sometimes," "Rarely," and "Never." Accordingly, the total obtainable score ranged from 0 to 8 for the knowledge domain, from 7 to 35 for the attitude domain, and from 0 to 52 for the practice domain.

Validity and Reliability of the Instrument

Content validity was assessed by a panel of 10 experts in health education and midwifery. Validity was confirmed using the Content Validity Index (CVI) based on clarity, relevance, simplicity, and comprehensibility, and the Content Validity Ratio (CVR). The questionnaire's reliability and validity were assessed using Cronbach's alpha in SPSS for internal consistency and an expert panel review for content validity. Cronbach's alpha values were 0.671, 0.748, and 0.756 for knowledge, attitude, and behavior, respectively. Content Validity Index (CVI) scores were 0.9, 0.8, and 0.8 for knowledge, attitude, and behavior, respectively. Content Validity Ratio (CVR) scores were 0.8, 0.9, and 0.8 for knowledge, attitude, and behavior, respectively.

Statistical Analysis

Demographic characteristics were summarized using frequencies and percentages (Table 1), and knowledge, attitude and practice (KAP) scores were reported as mean ± SD across subgroups (Table 2).

For classification purposes, KAP scores were first expressed as percentages of the maximum attainable score. Using Bloom's taxonomy and predefined cut-off points, scores <60%, 60–79%, and 80–100% were categorized as weak, moderate/average, and good, respectively (Table 2).

Pearson's correlation coefficient was used to assess correlations among knowledge, attitude, practice, age, and academic semester. Statistical significance was set at $P < 0.01$ (2-tailed), with pairwise deletion applied for missing values (Table 3).

Multiple linear regression (enter method) was performed to identify predictors of menstrual hygiene practice. Knowledge, attitude, and family economic status were entered as independent variables; family economic status was dummy-coded with [reference group] as the reference category. Unstandardized coefficients (B),

standard errors (SE), standardized coefficients (Beta), t-values, P-values, and 95% confidence intervals were reported. We assessed model fit using R^2, adjusted R^2, and the standard error of the estimate. A P-value < 0.05 was considered statistically significant (Table 4).

Findings

This study presents findings as frequency distributions, mean scores, and correlation analyses. Participants' mean age was 21.37±2.571 years, and most (60.9%) identified their mother as the primary source of information about menstruation. The mean age at menarche was 13.11 years (Table 1).

As presented in Table 2, the overall mean scores were 5.85±1.51 (out of 8) for knowledge, 26.15±3.44 (out of 35) for attitude, and 34.28±5.21 (out of 52) for practice. Most participants demonstrated moderate levels of knowledge (43.3%) and practice (57.2%), as well as a moderate attitude level (60.6%). Remarkably, only 5.0% of the students exhibited good menstrual hygiene practice.

Regarding associated factors (Table 1), perceived family ability to meet menstrual hygiene needs and perceived environmental access for menstrual hygiene practice were significantly associated with both attitude (P=0.044 and P<0.001, respectively) and practice (P<0.001 for both); however, these variables did not show a significant relationship with knowledge. Menstrual pain management methods and academic faculty were significantly associated only with practice scores (P=0.008 and P=0.003, respectively). Conversely, the main source of information was only significantly associated with knowledge (P=0.046), while the level of education was significantly associated with knowledge (P<0.001) and attitude (P=0.021), but not with practice. Furthermore, having life plans interrupted by period pain was inversely and significantly correlated with attitude (P=0.026) and practice (P=0.035).

The correlation matrix revealed significant positive correlations between knowledge and attitude (r=0.287, P<0.01), knowledge and practice (r=0.228, P<0.01), and attitude and practice (r=0.438, P<0.01). Age correlated positively with knowledge (r=0.331) and practice (r=0.222), while academic semester showed no correlation with practice (r=-0.007) (Table 3). These findings clearly demonstrate that structural barriers, and not a lack of knowledge, are the fundamental obstacle to optimal menstrual hygiene practices.

In the multiple linear regression model, attitude (B = 0.580, β = 0.344, 95% CI: 0.425–0.736, P < 0.001), family economic status (B = 2.447, β = 0.210, 95% CI: 1.413–3.480, P < 0.001), and knowledge (B = 0.392, β = 0.102, 95% CI: 0.039–0.744, P = 0.030) had significant association with menstrual hygiene practice. Attitude had the strongest standardised effect, followed by family economic status and knowledge. The model explained 20.6% of the variance in practice scores (R^2 = 0.206; adjusted R^2 = 0.200; SE = 5.202) (Table 4).

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Table 1. Frequency distribution of demographic and menstrual history characteristics (n = 404)

Demographics	Category	n	%
Age mean ± SD: 21.37±2.571	18-20	160	39.6
	21-22	158	39.1
	23 and above	86	21.3
Mother's education level	Illiterate, primary	70	17.3
	Guided and diploma	148	36.6
	University degree	186	46.0
Mother's occupation	Employee	138	34.2
	Worker	42	10.4
	Housewife	224	55.4
Father's occupation	Employee	131	32.4
	Worker	41	10.1
	Self-employed	122	30.2
	Retired/not working	110	27.2
Main source of menstrual information	Mother	246	60.9
	Older sister	25	6.2
	health educator	26	6.4
	Other*	107	26.5
Having an older sister	Yes	157	38.9
	No	247	61.1
Age at menarche (years), mean ± SD = 13.11 ± 1.51	9-10	15	3.7
	11-12	136	33.7
	13-14	180	44.6
	15-17	73	18.1

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Table 2. Knowledge, attitude, and practice scores by demographic and menstrual health-related characteristics and their level distribution (n = 404).

Demographic	Characteristics	Frequency	Knowledge	Attitude	Practice
Perceived feasibility of menstrual hygiene practices	Yes	185 (45.8)	5.76±1.45	26.57±3.33	34.49±4.64
	No	219 (54.2)	5.92±1.56	25.80±3.50	31.70±6.40
	P value		0.303	**0.025**	**<0.001**
Perceived family ability to meet menstrual hygiene needs	Good	172 (42.6)	5.95±1.53	26.97±3.57	33.98±5.75
	Average	190 (47)	5.84±1.50	25.83±3.24	32.63±6.02
	Poor	42 (10.4)	5.45±1.40	24.23±2.81	30.50±4.13
	P Value		0.149	**<0. 001**	**0.001**
Menstrual pain management	Chemical pills	283 (70.2)	5.94±1.48	26.06±3.58	32.27±6.07
	Herbal pills	88 (21.8)	5.71±1.60	26.45±3.02	35.44±4.25
	No pain	33 (8.2)	5.42±1.41	26.12±3.33	32.54±5.64
	P Value		0.112	0.655	**0.008**
Faculty	Medicine and Dentistry	160 (39.6)	6.02±1.45	26.54±3.67	33.28±6.13
	Paramedical Sciences	62 (15.3)	5.53±1.47	25.68±2.96	31.54±5.49
	Nursing	70 (17.3)	5.77±1.42	25.92±3.28	31.90±5.38
	Public Health	72 (17.8)	5.62±1.55	26.34±3.35	34.98±5.79
	Rehabilitation	40 (9.9)	6.20±1.75	25.52±3.58	32.30±4.93
	P Value		0. 066	0.238	**0.003**
Life plans stopped by period pain.	Always	28 (6.9)	5.85±1.43	24.46±3.27	30.25±6.82
	Sometimes	347 (85.9)	5.80±1.54	26.28±3.47	33.21±5.82
	Never	29 (7.2)	6.44±1.02	26.20±2.96	32.89±4.02
	P value		0.086	0.026	**0.035**
Main Source of Information.	Print Media	61 (15.1)	6.20±1.34	25.92±3.15	33.00±6.08
	Internet	222 (55.0)	5.69±1.57	26.06±3.34	32.60±5.80
	Social Networks	121 (30.0)	5.94±1.44	26.45±3.77	33.66±5.71
	P value		**0.046**	0.517	0.279
Level of Education	Bachelor's degree	289 (71.5)	5.68±1.52	26.05±3.32	32.60±5.93
	Master's degree	13 (3.2)	7.23±1.16	28.76±1.83	34.46±8.48
	Medical student	102 (25.3)	6.13±1.40	26.09±3.81	33.86±4.99
	P-Value		**<0.001**	0. .021	0.113
Variables	Mean SD	% Total Score	**Weak**	Average	Good
Knowledge	5.85±1.51	0.73	79 (19.6)	175 (43.3)	149 (36.9)
Attitude	26.15±3.44	0.74	23 (5.7)	245 (60.6)	136 (33.7)
Practice	32.98±5.82	0.63	153 (37.9)	231 (57.2)	20 (5.0)

Note: Perceived feasibility of menstrual hygiene practices" = perceived ability to perform menstrual hygiene practices in the current living environment (water/soap, private space, timely pad changing). "Perceived family ability to meet menstrual hygiene needs" = perceived family capacity to provide basic menstrual hygiene requirements (pads, water/soap, private space), reflecting perceived rather than objective economic statu

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Table 3. Pearson correlation matrix among practice, knowledge, attitude, age, and academic semester (n = 404)

**p < 0.01 (two-tailed). Values are Pearson correlation coefficients. Age and academic semester were treated as continuous variables. Percentages/decimals are reported to three decimal places.

Variable	1	2	3	4	5
1. Practice	1				
2. Knowledge	0.186**	1			
3. Attitude	0.399**	0.278**	1		
4. Age	0.092	0.309**	0.154**	1	
5. Academic semester	−0.047	0.265**	0.044	0.487**	1

Table 4.

Multiple Linear Regression Analysis of Factors Associated with Menstrual Hygiene Practice

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	11.969	2.123		5.637	.000	7.795	16.142
Knowledge	.392	.179	.102	2.184	.030	.039	.744
Attitude	.580	.079	.344	7.338	.000	.425	.736
Income.	2.447	.526	.210	4.654	.000	1.413	3.480

Note. Dependent variable: menstrual hygiene practice score; $R^2 = 0.206$, adjusted $R^2 = 0.200$, SE = 5.202. Family economic status was dichotomised as favorable vs unfavorable (reference: unfavorable); B indicates the difference in practice score for the favorable group relative to the unfavorable group.

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Discussion

Although mean knowledge and attitude scores were moderate (73% and 74%, respectively), only 5.0% of students demonstrated good menstrual hygiene practices; this discrepancy may partly reflect a skewed distribution of practice scores, and it suggests that knowledge and attitudes do not necessarily translate into practice. Socioeconomic and environmental barriers may be associated with this gap, but causality cannot be established in this cross-sectional design, and these barriers should not be assumed to be the fundamental or decisive cause; academic progression was not clearly associated with practice(12). Notably, our findings contrast with those of Tashi Tshomo "et al. (13), who reported markedly lower knowledge (35.5%), and Mosotho Zenia Tshivule et al., who attributed poor knowledge to unreliable information sources and a lack of preparedness for menarche(12).

A key finding was that mothers were the most frequently reported source of menstrual information (60.9%), whereas health educators contributed minimally (6.4%). This finding is consistent with prior studies that have reported mothers as a prominent source of menstrual information; however, it describes the reported source of information and does not establish a causal role for mothers in shaping menstrual hygiene practices (14). This finding underscores the continued reliance on familial sources, which is culturally expected; such reliance may be associated with the persistence of misconceptions and incomplete knowledge, potentially linked to generational taboos and limited communication skills, although causality cannot be inferred. Similarly, other studies have reported mothers as the most frequently cited source of menstrual information(13, 15).

The underutilization of formal health education within schools and universities represents a missed opportunity for evidence-based menstrual health instruction, and studies have rightly emphasized strengthening the role of healthcare providers in schools to help bridge this gap (16-18). Cultural taboos may amplify this gap by discouraging communication and reinforcing stigma, although these relationships are largely associative and the relative contribution of structural versus individual factors remains uncertain(12, 19).

In our sample, cost and facility access were reported as barriers to menstrual hygiene management. Educational level was also associated with practice scores, with master's students scoring higher than bachelor's and medical students across all domains; this may partly reflect greater maturity and exposure to health curricula, although the cross-sectional design precludes causal inference (20-23).

In our sample, relying on print media (books and magazines) rather than social media was associated with higher knowledge scores. This may suggest that structured, credible resources are linked to better knowledge; however, the cross-sectional design cannot establish causality or comparative effectiveness (24). Print media has historically contributed to public health communication, including on taboo topics, through tangible formats such as newspapers and magazines (11, 25, 26).

This is consistent with reports emphasizing the role of media in health communication, with many people relying on media outlets for health-related informationSimilarly, a study among students in Hamedan, Iran, found that those who identified print media as their main information source had higher knowledge levels (2).These findings indicate that, to maximize effectiveness, tailored educational interventions must take into account students' educational levels and their preferred channels for receiving information. Furthermore, by identifying the communication channels preferred by the target audience, it is possible to increase the number of individuals who benefit from an educational intervention and to improve the quality of message delivery(26-28).

The positive correlations among knowledge, attitude, and practice were broadly consistent with the KAP framework, which is widely used in health education research; however, these associations do not confirm the model or establish causality(5, 29). The KAP framework, proposed by Everett M. Rogers, has been widely used to guide health education and behavioral interventions, with knowledge acquisition, attitude formation, and practice implementation as its three core constructs(5, 30). However, in our sample and in previous studies, socioeconomic barriers may impede behavioral change; causal effects cannot be inferred from these associations.

Academic semester showed a very weak negative correlation with practice ($r = -0.047$), indicating almost no meaningful linear relationship(5). Another study found that most participants had moderate or low health behavior scores, and demographic variables were not significantly associated with outcomes. Although some predictors were identified, the relationships were modest and consistent with our weak association between academic progression and practice. These findings suggest that demographic and academic factors alone may not ensure meaningful behavioral improvement, and tailored interventions may be warranted; however, causality cannot be inferred.(31).

Practice scores differed by faculty, with Public Health students scoring highest and Paramedical Sciences students lowest; this may be associated with greater exposure to community health content, although causality cannot be inferred. The link between herbal pain management and better practices warrants further qualitative study. Consistent with a study in health and dental faculties reporting mostly moderate-to-poor health-promoting behaviors, our findings suggest that knowledge alone may be insufficient, and the cross-sectional design precludes causal inference(31).

Attitude was most strongly associated with practice (β = 0.344), followed by family economic status (β = 0.210) and knowledge (β = 0.102), suggesting that knowledge alone may be insufficient. However, the adjusted R^2 was modest (0.200), indicating that other unmeasured factors may also contribute. Sociocultural background and age were associated with menstrual attitudes and openness to discussing reproductive health, but these associations do not confirm that institutional knowledge alone fails to standardize practices; causality cannot be inferred from this cross-sectional design(32)

In conclusion, medical science students showed relatively acceptable knowledge and attitudes but a low level of good menstrual hygiene practice. Economic, environmental, and institutional factors may be associated with this knowledge–practice gap; however, causality cannot be inferred from this cross-sectional, single-university study. Further multi-centre longitudinal studies using more objective measures are needed to confirm these associations and inform targeted interventions.

Conclusion

This study found a marked knowledge–practice gap: 36.9% of students had good knowledge and 33.7% had positive attitudes, but only 5.0% reported good menstrual hygiene practices. Mothers were the most frequently reported information source (60.9%), whereas health educators played a minimal role (6.4%). Socioeconomic status was associated with practice, while academic progression showed only a very weak correlation (r = −0.047). These associations should be interpreted cautiously given the cross-sectional, single-university design; further research is needed to determine whether educational, environmental, or family-focused measures would be effective.

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