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Menstrual Knowledge, practices, and restriction among college going students in Lucknow, India

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Abstract: Despite the importance of menstruation in girls' lives, educated girls' knowledge and hygienic practices towards menstruation still need to be well addressed in India. The objective of the present study was to assess menstrual-related knowledge, menstrual hygiene practices, and the restriction regarding menstruation among college-going students. An online questionnaire was developed in the Google form and was employed on college students in Lucknow. Of 1439 students who participated in the online survey, 1371 completed the interview with a response rate of 95.2%. The descriptive finding showed that abdominal pain (67%) was the primary premenstrual symptom, followed by back pain (50.5%) among college students. The sanitary pad as an absorbent was currently used by around 94% of the students. More than 90% of students observed at least one restriction related to menstruation. Logistic regression shows that students who belong to either OBC or SC/ST, Muslim or Other religion, and students with working mothers were more likely to observe at least one restriction than their counterparts. The study concluded that most college students needed better knowledge and followed hygienic practices correctly. The association was observed between the restriction related to menstruation with caste, religion, and working mothers. It demonstrated a need to create awareness and advocacy programs to improve college students' knowledge during menstruation.

Key words: College students, Menstruation, Restriction, India

Introduction

Menstruation is a universal, ordinary, unique, and physiological phenomenon (Dasgupta & Sarkar, 2008a) that females experience every month (Sinha & Pau, 2018), yet this topic is still taboo in India. The issues are inadequately acknowledged and have not received proper attention (Upashe et al., 2015); hence, most young females enter puberty with inadequate knowledge and misconceptions in many low and middle-income countries (Anand & Garg, 2015). The adults around them, including parents and teachers, are ill-informed and uncomfortable discussing sexuality, reproduction, and menstruation (Chandra-Mouli & Patel, 2017). It has been seen that in India, shopkeepers always give sanitary pads wrapped in newspaper in a black polyethene bag, and girls always try to hide their pads from the male gaze. During menstruation, these sociocultural impositions make this phenomenon burdensome and an event that makes them feel fear, disgust, and shame (Ameade & Garti, 2016). Among

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premenstrual girls, dysmenorrhea symptoms were the most frequent problems (Rupa Vani et al., 2013) linked to several misconceptions and practices (Dasgupta & Sarkar, 2008b). They led to poor menstrual hygiene (Chowdhury & Chakraborty, 2017). Management of menstruation is an essential aspect of reproductive health which, if not handled appropriately, can cause infections of the urinary tract as well as foul odour, soiled garments and ultimately, shame, leading to infringement on the girls' dignity (Bhilwar et al., 2015)(Parashar et al., 2006)(Oche et al., 2012).

School or College going students constitute a vulnerable group concerning their social status and health (Dasgupta & Sarkar, 2008a). They are often reluctant to discuss menstruation with their parents and usually hesitate to seek medical help regarding menstrual problems (Sarkar et al., 2017). This time is crucial for these students to prepare and adjust themselves to manage their menstrual bleeding safely and cleanly (S. Lee, 2002). The life of a college student is very different from that of a school student. College makes students independent, accountable, and robust, enabling them to make decisions independently to transform their future. It is also an ideal time for girls to plan for their careers and prepare to compete for jobs.

Managing menstruation's practical and psychological aspects are challenging for these girls and affects their self-confidence, hindering women's empowerment (Rajagopal & Mathur, 2017). Menstruation also elicits absenteeism and affects the academic performance of girl students (Suman et al., 2013). Risk factors associated with absenteeism include misconceptions about menstruation, insufficient and inadequate school or college facilities, and family restrictions (Alam et al., 2017).

Every year approximately 10 % of women worldwide are exposed to genital infections, including urinary tract infections and bacterial vaginosis, and 75 % of the women have a history of a genital infection. Specifically, the common risk factor for vaginal infections includes poor hygiene (Reid & Bruce, 2003). A study in India reported that the exclusive use of disposable absorbents was low among young women aged 15-24 (37%) and varied substantially by caste, education, wealth, and type of residence (Ram et al., 2020).

However, studies showed that the use of sanitary pads among college students in India was 80 % (Balla & Nallapu, 2018), in Pakistan 77.5 % (Mansoor et al., 2020), and in Ghana 100% (Ameade & Garti, 2016). A study among 10-19-year old girls in Uttar Pradesh, India, indicated that about half of the girls did not have adequate knowledge about menstruation, and less than a quarter of them followed proper hygiene practices (Malhotra et al., 2016). Another study in India revealed that rural school girls who used cloth from used clothes, boiled in water and dried before re-use suffered from genital infection (Narayan et al., 2001). The study also reported that more than half of the women who did not use any hygienic method during menstruation suffered from vaginitis (Acharya et al., 2006).

Menstrual health challenges can also be social, cultural, or psychological (Rajagopal & Mathur, 2017) (Baumann et al., 2021) attribute different meanings to it, revealing various cultural practices. In many cultures, menstruation practices in silence, myths, taboos, and stigma can direct to unsafe practices

(Garg et al., 2001)(Ali & Rizvi, 2010).In India, restrictions are placed on women and girls during menstruation, and the tradition of excluding menstruating women and girls from various activities continues (Rajagopal & Mathur, 2017). There is limited knowledge and misconceptions about menstruation among educated women in India before and even after the menarche. It leads to undue fear, anxiety, and undesirable practices (Mahon & Fernandes, 2010). The knowledge and practices related to menstruation also depend on socio-economic conditions (Drakshayani Devi & Venkata Ramaiah, 1994). Hence, the present study attempts to assess the restriction on menstruation faced by college students and the factors that affect it, which has limited evidence in India.

India is the second-largest country in the world, where we find state-wide variation in the use of menstrual absorbents, ranging from the highest in Mizoram (93.4%) to the lowest in Bihar (31%) (Goli et al., 2020). These studies were conducted among adolescents either using secondary data (Ram et al., 2020)(Goli et al., 2020) or among school students (Aarohi et al., 2015)(Dasgupta & Sarkar, 2008b) in India and abroad (Belayneh & Mekuriaw, 2019)(Ameade & Garti, 2016), showed inadequate knowledge of menstruation and poor menstrual hygiene practices followed by them. People with tertiary education and proficiency in diverse fields are expected to have adequate knowledge about their reproductive system, such as menstruation (Ameade & Garti, 2016). However, there is little information about morbidity associated with menstrual problems in young populations (such as university students) (Anastasakis et al., 2008). Considering the above scenario, this study was conducted among college-going students in Lucknow, India. The main objective of this study was to assess knowledge, practices, and restriction among college going students (primarily undergraduate and postgraduate students) regarding menstruation. Policymakers and stakeholders could use the information from the present study to provide information about menstruation and menstrual hygiene to college-going students in the study area.

Methods

This work was done in collaboration with Shri Guru Nanak Girls Degree College, Lucknow. Ethical clearance was obtained from the Institutional Ethical Committee of the Career Institute of Medical Sciences and Hospital, Lucknow. The present study was a descriptive online survey using the Google Form platform. The consent form was included in the online survey tool regarding their participation in the study. The study was carried out in September 2020 in the Lucknow district, which covered rural and urban college-going students of Uttar Pradesh, India. Undergraduate and Post Graduate students of any stream were eligible for the study. Students from 28 colleges of Lucknow participated in this study, including a nursing and a medical college. A total of 1439 participants took part in the survey. After removing 55 participants who quit the survey by clicking the disagree button and 13 who did not satisfy inclusion criteria, the final sample comprised 1371 participants.

Data collection and Analysis

Data was collected anonymous, internet-based self-administered questionnaire that contained both open- and close-ended questions. The questionnaire was in English and Hindi to get responses from Hindi medium students. The online questionnaires were conveniently distributed through emails, WhatsApp, Telegram, and other social media throughout Lucknow. The respondents' social media were identified and recruited through a link and networking of all co-researchers and colleagues. The predictor variable was chosen based on an extensive review of literature on levels and factors associated with menstruation: Course of study pursued by students (Commerce and Management, Humanities, Medicine and Allied Science and Technology), their Grade (Graduation and Post-graduation), Age (<19,20-22,23+), Caste (General, OBC, and SC/ST), Religion (Hindu, Muslim and Other), Father's education (Illiterate or up to 12th, Graduate, Postgraduate and higher), Mother's education (Illiterate or up to 12th, Graduate, Postgraduate and higher), Father's occupation (Farmer, Government employee, Self-employed/Businessman, Private employed, and Other), Mother's occupation (Homemakers and working), Monthly salary in Indian Rupees (< 25 thousand, 25 to 50 thousand, 50 thousand to 1 lakh and above 1 lakh), Type of family (Joint and Nuclear), and Place of residence (Rural and Urban). The outcome variables of the study were knowledge, practices, and restriction related to menstruation. The data recorded in the spreadsheet were exported to SPSS software. Initially, bivariate analysis was performed between the dependent variable (restriction related to menstruation) and each independent variable (socio-demographic variables). All significant variables at the bivariate level (at P-value < 0.05) were entered into multivariate analysis using a logistic regression model to control confounding factors. Their odds ratios (OR) were obtained at 95 % confidence intervals (CI) and P-values to identify essential candidate variables for multivariate analysis.

Results

Of 1439 college-going students who participated in the online survey, 1371 completed the interview with a response rate of 95.2%. Table 1 shows the socio-economic and demographic profiles of college-going students. More than half the students (56.5%) were from the Commerce and Management course, followed by Humanities (33.6%). About 88% were undergraduate students, while the rest were postgraduate students. Student's mean (±SD) age was 20.06 (±1.78) years, with a minimum and maximum age range of 16 and 30. Fifty-six per cent of the college-going students belonged to the general castes, 34% to other backward classes, and 10.3% to scheduled castes/tribes. Most students surveyed were Hindu (86%), and 12% were Muslims. Forty-nine per cent of the students' fathers were only school-educated, one-third were graduates, while 17% were postgraduates or above. Almost 60% of the students' mothers were school educated, 28% were graduates, and 12% were postgraduate or above.

Most of the students' fathers were self-employed (28%), followed by private organization employees (26%) and government employees (21%). However, 87% of the students' mothers were homemakers, and only 13% were employed. The monthly family income of fifty-nine per cent of the students was less than 25 thousand rupees, two-thirds lived in nuclear families, and three-fourths belonged to urban Lucknow.

Table 1: Socio-economic and demographic characteristics of college-going students in Lucknow

Variables	Subgroups	n	Percentage
Course of the study	Commerce and Management	774	56.5
	Humanities	460	33.6
	Medicine and Allied	97	7.1
	Science and Technology	40	2.9
Grade	Graduation	1203	87.7
	Post-Graduation	168	12.3
Age (in years)	<19	562	41.0
	20-22	681	49.7
	23+	128	9.3
	Mean(±SD)	1371	20.06(±1.78)
Caste	General	767	55.9
	OBC	463	33.8
	SC/ST	141	10.3
Religion	Hindu	1172	85.5
	Muslim	161	11.7
	Other	38	2.8
Father education	School	669	48.8
	Graduate	470	34.3
	PG and above	232	16.9
Mother education	School	825	60.2
	Graduate	384	28.0
	PG and above	162	11.8
Father occupation	Farmer	137	10.0
	Government employee	284	20.7
	Self-Employed/Businessman	383	27.9
	Private Org. employee	357	26.0
	Other	210	15.3
Mother occupation	Housewife	1191	86.9
	Working	180	13.1
Monthly salary (INR)	<25,000	809	59.0
	25 to 50,000	311	22.7
	50 to 100,000	163	11.9
	Above 100,000	88	6.4
Type of family	Joint	459	33.5
	Nuclear	912	66.5
Place of Residence	Rural	319	23.3
	Urban	1052	76.7
Total		1371	100.0

Source: Online primary survey

Table 2 depicts the menstrual-related profile of college-going students in Lucknow. More than half the students (57.8%) experienced their menarche (onset of first menses) at 12–15 years; for 54.8 %,

the menstrual flow was 3-5 days. Most college students experienced abdominal pain (67%) during menstruation, followed by back pain (50.5%), weakness (47.2%), irritability (41%), anorexia (24.3%), headache (17%), acne (17.1%), vomiting (10.3%), bloating (9.6%), insomnia (9.1%), constipation (7.9%) and breast pain (7.1%).

Table 2: Menstrual related characteristics of college going students in Lucknow, Uttar Pradesh, India 2020

Variables	Subgroup	n	Percentage
Age of Menarche	<12 Years	197	14.4
	12-15 Years	792	57.8
	>15 Years	266	19.4
	Don't Know	116	8.5
Duration of menses flow	<3 days	249	18.2
	3-5 days	751	54.8
	>5 days	371	27.1
Symptom during menstruation	Acne	234	17.1
	Vomiting	141	10.3
	Diarrhoea	73	5.3
	Insomnia	125	9.1
	Breast pain	97	7.1
	Bloating	132	9.6
	Anorexia	333	24.3
	Irritability	563	41.1
	Backpain	692	50.5
	Constipation	108	7.9
	Headache	233	17.0
	Weakness	647	47.2
	Abdominal pain	918	67.0
	At least one	1371	100.0

Source: Online primary survey

Table 3 presents the awareness among college students of menstruation at menarche and their reaction to first menstrual blood. Less than half (45.7%) of the students were aware of menstruation before the onset of menarche. Mother was the first source of information for most of them, 69.2%). Friends (19.8%), teachers (18.4%), and sisters (16.4%) were also the first sources of information for some girls. Most respondents (30.6%) felt discomfort seeing blood flowing from their genitals for the first time at menarche. However, mothers were the first persons the majority (70.8%) discussed menarche with rather than the father, who was the least consulted (0.2%). Most of the girls (82.9%) expressed satisfaction with the level of education on menstruation they got from the first persons they discussed their first menstrual episodes.

Table 3: Awareness of menstruation among college-going students in Lucknow, Uttar Pradesh, India 2020

Variable	Subgroups	n	Percentage
Awareness about menstruation before it started	No	745	54.3
	Yes	626	45.7
First source of information on menstruation	Teacher	252	18.4
	Sister	225	16.4
	Mother	949	69.2
	Media	104	7.6
	Health personal	31	2.3
	Friend	271	19.8
	Father	7	0.5
Reaction on seeing blood flow from your genitals the first time	Confusion	184	13.4
	Discomfort	420	30.6
	fear and panic	410	29.9
	Happiness	50	3.6
	Shyness	91	6.6
	Surprise	216	15.8
First person you discussed your menstruation with	Father	3	0.2
	Friends	104	7.6
	Mothers	970	70.8
	Nobody	49	3.6
	Other Relatives	24	1.8
	Sister	167	12.2
	Teacher	54	3.9
First discussed your menarche was able to educate you enough on menstruation	No	235	17.1
	Yes	1136	82.9

Source: Online primary survey

Table 4 presents the knowledge related to menstruation among college students. A meagre 31 per cent of college students reported the definition of menstruation appropriately. Less than two-thirds (63.2%) of the college students correctly indicated the typical age of menarche. In comparison, 65% of the students accurately indicated the organ of menstruation, that is, menstrual blood flows from the uterus. Only 64% of the students correctly reported the usual duration of the menstruation cycle.

Table 5 shows the menstrual hygiene practices of college students. Around 85% of the students used a sanitary pad to absorb their menstrual blood during the first year after menarche, while 15% used reusable cloth. However, almost 94% of students use a sanitary pad to manage their menstrual flow. On average, three sanitary pads were used daily, and 91% cleaned their genitals after urinating during menstruation. Around 70% of the students used paper to wrap sanitary pads before disposing of them, while 29% used plastic bags. Approximately 9% of the students were absent for at least one day during menstruation, and 19% also used medication during menstruation. Around 15% skipped bathing on the first day of menses.

Table 4: Knowledge among college-going students on menstruation in Lucknow, Uttar Pradesh, India 2020

Variable	Knowledge	n	%
What is the menstrual cycle			
Impure blood flows out	Wrong	871	63.5
Physiological and natural process	Correct	431	31.4
Some disease	Wrong	8	0.6
Curse of god	Wrong	9	0.7
Don't know	Wrong	52	3.8
What is the normal age of menarche			
<10	Wrong	48	3.5
10-13	Correct	867	63.2
>13	Wrong	456	33.3
Organ of menstruation			
Bladder	Wrong	315	23
Don't know	Wrong	109	8
Other	Wrong	19	1.4
Stomach	Wrong	37	2.7
Uterus	Correct	891	65
What is the normal duration of the menstrual cycle			
25-30	Correct	885	64.6
Else	Wrong	486	35.4

Table 5: Menstrual hygiene practices of college-going students in Lucknow, Uttar Pradesh, India 2020

Variable	**Subgroups**	**N**	**Percentage**
Sanitary material used in first year of Menstruation	Sanitary pads	1168	85.2
	Reusable cloth	207	15.1
	Toilet tissue	33	2.4
	Other	43	3.1
Current sanitary material	Sanitary Pad	1292	94.2
	Other	79	5.8
Number of Sanitary pads used per day	Mean(±SD)	1371	2.91(±1.10)
Cleaning genitals after urinating during mensuration	No	125	9.1
	Yes	1246	90.9
Types of pads wrap used for disposing of it	Papers	957	69.8
	Plastic bag	398	29.0
	Not wrap	16	1.2
Place at where pad was disposed	Drain	13	0.9
	Toilet	35	2.6
	Open field	19	1.4
	Dumped	91	6.6
	Dustbin	1260	91.9
Absent at least one day to college during menstruation	Yes	123	9.0
	No	1248	91.0
Used any medication for menstrual problems	No	1112	81.1
	Yes	259	18.9
Bath during menstruation	Daily	1161	84.7
	First day	16	1.2
	Second day	149	10.9
	Not take any time	45	3.3
Total		1371	100

Source: Online primary survey

Table 6 shows caste and religion-wise percentage distribution of selected restrictions on menstruation among college students. The first restriction was not allowed to enter the kitchen was

higher among caste 'OBC' students (21.8%) and religion 'Hindu' students (22.2%). The second restriction was not allowed outside during menstruation, which was higher among caste SC/ST students (7.1%) and 'Other' religion faith students. The third restriction was not allowed to do religious activities during menstruation, which was higher among the 'OBC' (86.2) caste and among Muslims (88.2) students. The fourth restriction, not being allowed to eat certain foods, was higher among caste 'OBC' (43.4%) and religion 'Hindu' students. The fifth restriction was that separation from the rest of the family was higher among caste' SC/ST' (13.5%) and among religion 'Hindu' students. The prevalence of any restriction related to menstruation was 90.4 % among students.

Table 6: Caste and religion wise percentage distribution of restriction related to menstruation among college-going students, Lucknow, 2020

Variables	Category	Kitchen	Outside	Religious	Certain foods	Separated	Any
Caste	General	153(19.90)	48(6.30)	648(84.50)	295(38.50)	96(12.50)	687(89.60)
	OBC	101(21.80)	30(6.50)	399(86.20)	201(43.40)	57(12.30)	431(93.10)
	SC/ST	17(12.10)	10(7.10)	110(78.00)	54(38.30)	19(13.50)	122(86.50)
P value		0.038*	0.931	0.065	0.206	0.935	0.031*
Religion	Hindu	260(22.20)	82(7.00)	1001(85.40)	488(41.60)	163(13.90)	1073(91.60)
	Muslim	7(4.30)	3(1.90)	142(88.20)	49(30.40)	8(5.00)	146(90.70)
	Other	4(10.50)	3(7.90)	14(36.80)	13(34.20)	1(2.60)	21(55.30)
P value		<0.001**	0.021*	<0.001**	0.019*	<0.001**	<0.001**
Total		19.80	6.40	84.40	40.10	12.50	90.40

Note: Kitchen-Should not enter in Kitchen, Outside- Should not allow to go outside, religious- Should not allow doing any religious activities, certain foods- Cannot allow to eat certain foods, Separated- Separated from the rest of the family, Any- Either at least one, differences between 2 groups were analyzed by $\chi 2$ test or Fisher's exact test for categorical parameters

Table 7 exhibits the bivariate and multivariable relationship between the restriction related to menstruation. The bivariate analysis shows that caste, religion, father education, mother education, and mother occupation are associated with restrictions related to menstruation. The multivariable analysis reveals that caste, religion, and the mother's occupation were significantly associated with restrictions related to menstruation. Students from the 'OBC' caste (AOR 2.07, 95%CI: 1.15-3.74) and 'SC/ST caste (AOR 2.27, 95%CI: 1.22-4.24) had significantly higher restrictions related to menstruation than students who belong to the 'general' caste. Likewise, students who followed the Muslim faith (AOR 10.03, 95%CI:4.93-20.40) and 'Other' faith (AOR 8.53, 95%CI:3.58-20.32) had higher restrictions related to menstruation than students who followed the Hindu faith. Students whose mothers were working were more restricted regarding menstruation than those who were not (AOR 1.88, 95% CI:1.14-3.09).

Table 7: Results of bivariate and multivariable analysis showing factors associated with any restriction related to menstruation college-going students, Lucknow,2020

Variables	Category	Any restriction (Yes) n(%)	AOR (95% C.I.)
Course of the study	Commerce and Management	712(92.0)	Not entered
	Humanities	408(88.7)	
	Medicine and Allied	86(88.7)	
	Science and Technology	34(85.0)	
	P value	0.139	
Grade	Graduation	1084(90.1)	Not entered
	Post-Graduation	156(92.9)	
	P value	0.256	
Age	<19	504(89.7)	Not entered
	20-22	620(91.0)	
	23+	116(90.6)	
	P value	0.716	
Caste	General	687(89.6)	Ref
	OBC	431(93.1)	2.07(1.15-3.74)*
	SC/ST	122(86.5)	2.27(1.22-4.24)*
	P value	0.031*	
Religion	Hindu®	1073(91.6)	Ref
	Muslim	146(90.7)	10.03(4.93-20.40)**
	Other	21(55.3)	8.53(3.58-20.32)**
	P value	<0.001**	
Father education	School®	614(91.8)	Ref
	Graduate	428(91.1)	1.40(0.77-2.56)
	PG and above	198(85.3)	1.42(0.82-2.49)
	P value	0.014*	
Mother education	School®	761(92.2)	Ref
	Graduate	348(90.6)	1.86(0.96-3.62)
	PG and above	131(80.9)	1.72(0.93-3.16)
	P value	<0.001**	
Father occupation	Farmer®	130(94.9)	Not entered
	Government employee	264(93.0)	
	Self-Employed / Businessman	338(88.3)	
	Private Org. employee	324(90.8)	
	Other	184(87.6)	
	P value	0.054	
Mother occupation	Housewife®	1092(91.7)	Ref
	Working	148(82.2)	1.88(1.14-3.09)*
	P value	<0.001**	
Monthly Income (INR)	<25,000®	740(91.5)	Not entered
	25 to 50,000	278(89.4)	
	50 to 100,000	145(89.0)	
	Above 100,000	77(87.5)	
	P value	0.442	
Type of family	Joint®	423(92.2)	Not entered
	Nuclear	817(89.6)	
	P value	0.126	
Place of Residence	Rural®	296(92.8)	Not entered
	Urban	944(89.7)	
	P value	0.104	
Total		1240(90.4)	

AOR Adjusted Odds Ratio, *Statistically significant at p <0.05.** *Statistically significant at p <0.01,
® Reference category, Not entered means particular variable were not entered during logistic regression because of their non-significance in bivariate analysis

Discussion

Menstruation and its management have become a globally recognized public health topic. Around the world, people and various stakeholders are mobilizing to bring attention and resources to address the menstrual-related shame, embarrassment, and taboos experienced by many girls in low and middle-income countries (Sommer et al., 2015). Menstruation is a process which every woman must encounter throughout her reproductive years. Educated women manage menstrual hygiene better, which positively impacts a girl's personal welfare and health. Furthermore, these women are more likely to be

healthier than uneducated women, possibly ensuring their children's better health status and education (World Bank Group Education Global Practice Smarter Education Systems for Brighter Futures, 2016).

Despite that, there need to be more studies on menstrual knowledge and practices among university students in India, which this study attempted to examine. The analysis introduced several significant insights.

More than 50% of the students reported their age of menarche in the present study to be between 12-15 years. It was similar to the studies where the age of onset of menstruation or menarche was between 11-15 years (Prasad & Sharma, 1972)(L. K. Lee et al., 2006)(Nooh, 2015)(Gultie et al., 2014). The age of menarche varies by geographical region, race, ethnicity and other characteristics but 'normally' occurs in low-income settings between the ages of 8 and 16 with a median of around 13years ("Menstruation in Girls and Adolescents: Using the Menstrual Cycle as a Vital Sign," 2015)(K. Sharma, 1990).

In the present study, every student experienced one or more symptoms in the premenstrual phase. Abdominal pain (menstrual cramps or dysmenorrhea) and back pain were the most common symptoms related to menstruation in students, and these findings were concordant with other studies (Omidvar et al., 2015; Wong & Khoo, 2011)(Sapkota et al., 2013)(Nooh, 2015). Students reported that premenstrual symptoms made them feel excruciating pain, exhausting them physically and mentally for several days. The high prevalence of these symptoms among students increased the need for long resting hours, negatively affected their daily activities, disturbed their social lives and increased absenteeism from institutions (Pitangui et al., 2013)(P. Sharma et al., 2008). Early diagnosis and knowledge about menstrual disturbances are essential because they help choose appropriate treatments, minimizing the disruptions or adverse effects on students' lives (Pitangui et al., 2013).

The present study revealed that 54.3% of the students were unaware of menstruation before menarche. The researchers observed that the percentage of unawareness varied in various studies, from 17% to 90 % (Dasgupta & Sarkar, 2008b)(Prasad & Sharma, 1972)(Ameade & Garti, 2016) (Khanna et al., 2005). Most students were frightened, embarrassed and disturbed due to ignorance about such a natural process (Khanna et al., 2005).

The mother was the first and primary source of information on menstruation for the daughter. A similar study done in Gujarat (Tiwari et al., 2006) also revealed, through meta-analysis (Sooki et al., 2016), that the primary source of information was the mother. However, It was also observed that imperfect knowledge regarding menstruation among mothers and other adult family members was transferred to their young girls (Drakshayani Devi & Venkata Ramaiah, 1994). Myths like, "Do not bathe, do not drink cold water, do not eat curd, do not play, and do not exercise during mensuration" were passed to children by mothers and other family members. Most students felt uncomfortable, fearful and panicked about seeing blood flow from their genitals for the first time. These results were congruent with other studies in Ghana (Ameade & Garti, 2016) and Pakistan(Mansoor et al., 2020), wherein most

students experienced fear and panic. Lack of information elicits undue fear, anxiety and wrong ideas in adolescent minds (Kumar, 1988). It was also reported that women in India said nothing about menstruation until their first personal experience (George, 1994). It was also observed in some places that mothers did not teach their daughters about menstruation and hygiene maintenance during periods (Dasgupta & Sarkar, 2008b). The present study found that about 85% of the students used sanitary pads in their first year of menstruation. Currently, 94% use sanitary pads, which is way higher than those used by women aged 15-24 (37%) in India (Ram et al., 2020). The researchers observed that current usage of menstrual pads varied in various studies, ranging from 56 to 100% among college or university students (Ameade & Garti, 2016)(Mansoor et al., 2020)(S.Pokhrel et al., 2014)(Balla & Nallapu, 2018). In the present study, around 18.9% used medication during menstruation. However, a study among school girls in Malaysia indicated that about 11.1 per cent sought medical consultation for their menstrual disorders (L. K. Lee et al., 2006). Some women had bad premenstrual symptoms, which prevented them from going about their usual activities. Women used medications to cope with and manage common symptoms such as abdominal pain.

In the present study, the overall prevalence of any restriction related to menstruation was 90.4 % among students, and 84.4 % were religious restrictions. A study in Mumbai also showed that 85.4% of young women faced restrictions during menstruation, most religious restrictions (97.6%) (Thakur et al., 2014). The maximum restriction was observed in going to the temple (87.4 %), followed by prohibition in touching pickles (48.6 %) found in the study in Uttrakhand. These restrictions were equally reported by the urban and rural girls, too (Juyal et al., 2013). A restriction like not being allowed to enter the kitchen, not eating certain foods, and being separated from the rest of the family was higher among Hindus in the present study. OBC caste also shows a significant association between restrictions of not entering the kitchen during menstruation. Entering the kitchen to cook during menstruation is regarded as 'impure' in a particular religion, and touching certain foods like achaar (pickle) is prohibited. There is a widespread belief that preserved food items can spoil. An associated view is that eating hot and spicy food increases blood flow, so there is a restriction on eating such food. Also, menstruating girls cannot touch the matka (water pot). Unmarried girls cannot serve food to their fathers and brothers during menstruation. Girls did not wash their hair for three days during their periods and could enter the kitchen after that (Rajagopal & Mathur, 2017). These sociocultural impositions during menstruation make some menstruating females perceive this phenomenon as burdensome and as an event that ushers in fear, disgust, and shame (Ameade & Garti, 2016).

In the present study, bivariate analysis shows the association between caste and religion with restrictions related to menstruation among college students. The multivariable analysis too revealed that students from 'OBC' and 'SC/ST' were more likely to have menstrual restrictions than 'General' caste students. A study conducted in Jammu and Kashmir reported several sociocultural taboos among tribal

adolescents related to menstruation. They believed there should be no regular bath during the menstrual cycle. They followed these cultural practices without questioning (Dhingra et al., 2009).

The present study also found that Muslim students were more likely not to be allowed to do religious activities compared to Hindu students during menstruation. All religions worldwide have restricted menstruating women and prohibitions on and prescribed codified purity rituals (Bhartiya, 2013)(Dunnavant & Roberts, 2013). Girls cannot visit a temple or perform pooja (prayer); reading the Quran and offering Namaz (prayer) is also forbidden (Rajagopal & Mathur, 2017). However, the present analysis shows it was higher among Muslims might be because daily prayer is more common among Muslims, so they face restrictions more commonly.

Students whose mothers were working were more likely to follow restrictions related to menstruation than those whose mothers were housewives. Mothers' employment status can improve family income, better-disciplined work behaviour, and better family routines (Poduval & Poduval, 2009), but they spend less time with their children (Chase-Lansdale et al., 2003). Some mothers do not teach kids because they think it makes children bold, and further, children express embarrassment at discussing it with their mothers (Kamalikhah et al., 2012). It is also possible that those mothers who go to work with their children learn menstruation-related information from their grandmothers or peers, who are ill-informed.

The main strength of this study was the inclusion of many students from different colleges in Lucknow. With such a large number and extensive participation, the findings of this study are difficult to ignore. Despite that, there are limitations to the study. The cross-sectional nature of the data could obscure the causal effect relationships of different factors, lacking qualitative data. Furthermore, study subjects were selected using a convenience sampling method to have shortcomings such as non-generalizability and selection bias. However, the study provided insight into menstrual knowledge and practices among Indian college students and needs further research for an in-depth understanding of the issue.

Conclusion

Most college-going students needed better knowledge but followed hygienic practices correctly. There is an urgent need to design acceptable awareness creation and advocacy programs to improve college students' knowledge regarding menstruation. Of all the sociodemographic factors, monthly income and family type influenced students' knowledge and practices related to menstruation.

Discussing the challenges faced by students during menstruation with family, friends, and colleagues can relieve anxiety and stress. Availability of adequate water, sanitary products, essential medicines and privacy at home and the educational institutions can address the challenges. This paper re-emphasizes the critical, urgent and neglected need to provide correct knowledge to the community, including college students.

Suggestion through students during survey

It is recommended that students from the fifth standard should be made aware well as males should also be imparted regarding menstruation. There should be a yearly medical check-up for the students, medication should be prescribed for premenstrual symptoms, and the institution should grant leave when menstrual pain is severe. The Sanitary pad should be cheap, accessible, environment friendly, and more comfortable available with disposal bags. A girl needs lots of love and care during her periods. It is a natural process every woman faces to stop making them feel like a curse or insult. Every school, college, hospital, and institution should have separate small spaces or restrooms for girls where all things related to the menstrual cycle should be stored.

Declaration of Conflicting Interests

This work was done in collaboration with Shri Guru Nanak Girls Degree College, Lucknow. The corresponding author AA was present in the Department of Community Medicine, Career Institute of Medical Sciences and Hospital, Lucknow, during the study period and, after its completion, left the College. Currently, he is working as Assistant Professor cum Junior Scientist in Statistics at College of Veterinary Science and Animal Husbandry, Birsa Agricultural University, Ranchi, Jharkhand.

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References

Aarohi, M., Mahajan, R. G., Matib, R., Kadri, A. M., Chikitsa, A., & Kshama, G. (2015). Awareness and practices on menstrual hygiene amongst adolescent girls in Rajkot district of Gujarat. Healthline, Journal of Indian Association of Preventive and Social Medicine, 6(2), 61–67.

Acharya, A., Yadav, K., & Baridalyne, N. (2006). Reproductive Tract Infections/ Sexually Transmitted Infections in Rural Haryana: Experiences from the Family Health Awareness Campaign. Indian Journal of Community Medicine, 31(4), 274.

Alam, M. U., Luby, S. P., Halder, A. K., Islam, K., Opel, A., Shoab, A. K., Ghosh, P. K., Rahman, M., Mahon, T., & Unicomb, L. (2017). Menstrual hygiene management among Bangladeshi adolescent schoolgirls and risk factors affecting school absence: Results from a cross-sectional survey. BMJ Open, 7(7), 1–10. https://doi.org/10.1136/bmjopen-2016-015508

Ali, T. S., & Rizvi, S. N. (2010). Menstrual knowledge and practices of female adolescents in urban Karachi, Pakistan. Journal of Adolescence, 33(4), 531–541. https://doi.org/https://doi.org/10.1016/j.adolescence.2009.05.013

Ameade, E. P. K., & Garti, H. A. (2016). Relationship between Female University Students' Knowledge on Menstruation and Their Menstrual Hygiene Practices: A Study in Tamale, Ghana. Advances in Preventive Medicine, 2016, 1–10. https://doi.org/10.1155/2016/1056235

Anand, T., & Garg, S. (2015). Menstruation related myths in India: Strategies for combating it. Journal of Family Medicine and Primary Care, 4(2), 184. https://doi.org/10.4103/2249-4863.154627

Anastasakis, E., Kingman, C. E., Lee, C. A., Economides, D. L., & Kadir, R. A. (2008). Menstrual problems in university students: An electronic mail survey. In Vivo, 22(5), 617–620.

Balla, C. P., & Nallapu, S. S. R. (2018). Knowledge, perceptions and practices of menstrual hygiene among degree college students in Guntur city of Andhra Pradesh, India. International Journal of Reproduction, Contraception, Obstetrics and Gynecology, 7(10), 4109. https://doi.org/10.18203/2320-1770.ijrcog20184137

Baumann, S. E., Lhaki, P., Terry, M. A., Sommer, M., Cutlip, T., Merante, M., & Burke, J. G. (2021). Beyond the Menstrual Shed: Exploring Caste/Ethnic and Religious Complexities of Menstrual Practices in Far-West Nepal. Women's Reproductive Health, 8(1), 1–28. https://doi.org/10.1080/23293691.2020.1861413

Belayneh, Z., & Mekuriaw, B. (2019). Knowledge and menstrual hygiene practice among adolescent school girls in southern Ethiopia: A cross-sectional study. BMC Public Health, 19(1), 1–8. https://doi.org/10.1186/s12889-019-7973-9

Bhartiya, A. (2013). Menstruation, Religion and Society. International Journal of Social Science and Humanity, 3(6), 523–527. https://doi.org/10.7763/ijssh.2013.v3.296

Bhilwar, M., Lal, P., Sharma, N., Bhalla, P., & Kumar, A. (2015). Prevalence of reproductive tract infections and their determinants in married women residing in an urban slum of North-East Delhi, India. Journal of Natural Science, Biology, and Medicine, 6(Suppl 1), S29–S34. https://doi.org/10.4103/0976-9668.166059

Chandra-Mouli, V., & Patel, S. V. (2017). Mapping the knowledge and understanding of menarche, menstrual hygiene and menstrual health among adolescent girls in low- and middle-income countries. Reproductive Health, 14(1), 1–16. https://doi.org/10.1186/s12978-017-0293-6

Chase-Lansdale, P. L., Moffitt, R. A., Lohman, B. J., Cherlin, A. J., Coley, R. L., Pittman, L. D., Roff, J., & Votruba-Drzal, E. (2003). Mothers' transitions from welfare to work and the well-being of preschoolers and adolescents. Science, 299(5612), 1548–1552. https://doi.org/10.1126/science.1076921

Chowdhury, S., & Chakraborty, P. pratim. (2017). Universal health coverage - There is more to it than meets the eye. Journal of Family Medicine and Primary Care, 6(2), 169–170. https://doi.org/10.4103/jfmpc.jfmpc

Dasgupta, A., & Sarkar, M. (2008a). Menstrual hygiene: How hygienic is the adolescent girl? Indian Journal of Community Medicine, 33(2), 77. https://doi.org/10.4103/0970-0218.40872

Dasgupta, A., & Sarkar, M. (2008b). Menstrual Hygiene : How Hygienic is the Adolescent Girl ? Indian Journal of Community Medicine, 33(2), 77–80.

Dhingra, R., Kumar, A., & Kour, M. (2009). Knowledge and Practices Related to Menstruation among Tribal (Gujjar) Adolescent Girls. Studies on Ethno-Medicine, 3(1), 43–48. https://doi.org/10.1080/09735070.2009.11886336

Drakshayani Devi, K., & Venkata Ramaiah, P. (1994). A study on menstrual hygiene among rural adolescent girls. Indian Journal of Medical Sciences, 48(6), 139–143.

Dunnavant, N. C., & Roberts, T. (2013). Restriction and Renewal , Pollution and Power , Constraint and Community : The Paradoxes of Religious Women's Experiences of Menstruation. Sex Roles, 68, 121–131. https://doi.org/10.1007/s11199-012-0132-8

Garg, S., Sharma, N., & Sahay, R. (2001). Socio-cultural aspects of menstruation in an urban slum in Delhi, India. Reproductive Health Matters, 9(17), 16–25. https://doi.org/10.1016/S0968-8080(01)90004-7

George, A. (1994). It happens to us: menstruation as perceived by poor women in Bombay in Gittelsohn, Joel Bentley, Margaret E. Pelto, Pertti J. Nag, M. Pachauri, S. Harrison, A.D. Landman, L. Edited Listening to Women Talk About Their Health Issues and Evidence from India (1st ed.). Har Anand Publication.

Goli, S., Sharif, N., Paul, S., & Salve, P. S. (2020). Geographical disparity and socio-demographic correlates of menstrual absorbent use in India: A cross-sectional study of girls aged 15-24 years. Children and Youth Services Review, 105283. https://doi.org/10.1016/j.childyouth.2020.105283

Gultie, T., Hailu, D., & Workineh, Y. (2014). Age of menarche and knowledge about menstrual hygiene management among adolescent school girls in Amhara province, Ethiopia: implication to health care workers & school teachers. PloS One, 9(9), e108644–e108644. https://doi.org/10.1371/journal.pone.0108644

Juyal, R., Kandpal, S. D., & Semwal, J. (2013). Social aspects of menstruation related practices in adolescent girls of district Dehradun. In Indian Journal of Community Health (Vol. 25, Issue 3, pp. 213–216).

Kamalikhah, T., Rahmati Najarkolaei, F., & Karimi, M. (2012). Barriers of Reproductive Health Education In Schools. Zahedan Journal Of Research In Medical Sciences (Tabib-E-Shargh), 14(2), 71–75.

Khanna, A., Goyal, R. S., & Bhawsar, R. (2005). Menstrual Practices and Reproductive Problems : A Study of Adolescent Girls in Rajasthan. Journal of Health Management, 7(1), 91–107. https://doi.org/10.1177/097206340400700103

Kumar, R. (1988). KAP of high school girls regarding menstruation in rural area. Health and Population Perspectives and Issues, 11(2), 96–100.

Lee, L. K., Chen, P. C. Y., Lee, K. K., & Kaur, J. (2006). Menstruation among adolescent girls in Malaysia: A cross-sectional school survey. Singapore Medical Journal, 47(10), 869–874.

Lee, S. (2002). Health and Sickness: The Meaning of Menstruation and Premenstrual Syndrome in Women's Lives. Sex Roles, 46(1), 25–35. https://doi.org/10.1023/A:1016033517659

Mahon, T., & Fernandes, M. (2010). Menstrual hygiene in South Asia: a neglected issue for WASH (water, sanitation and hygiene) programmes. Gender & Development, 18(1), 99–113. https://doi.org/10.1080/13552071003600083

Malhotra, A., Goli, S., Coates, S., & Mosquera-Vasquez, M. (2016). Factors associated with knowledge, attitudes, and hygiene practices during menstruation among adolescent girls in Uttar Pradesh. Waterlines, 35(3), 277–305. https://doi.org/10.3362/1756-3488.2016.021

Mansoor, H., Salman, M., Asif, N., Mustafa, Z. U., Nawaz, A. S., Mohsin, J., Arif, B., Sheikh, A., Noor-e-Hira, Shehzadi, N., Hussain, K., & Masood, A. (2020). Menstrual knowledge and

practices of Pakistani girls: A multicenter, cross-sectional study. Heliyon, 6(1), e03157. https://doi.org/10.1016/j.heliyon.2020.e03157

Menstruation in Girls and Adolescents: Using the Menstrual Cycle as a Vital Sign. (2015). The American College of Obstetricians and Gynecologists, 126, 143–146. https://doi.org/10.1016/j.yqres.2004.02.002

Narayan, K. a, Srinivasa, D. K., Pelto, P. J., & Veerammal, S. (2001). Puberty Rituals, Reproductive Knowledge and Health of Adolescent Schoolgirls in South India Public celebration of girls' coming of age would seem to offer a vehicle for broadened transmission of information about reproductive health issues. Asia-Pacific Population Journal, 16(2), 225–238.

Nooh, A. M. (2015). Menstrual disorders among Zagazig University Students, Zagazig, Egypt. Middle East Fertility Society Journal, 20(3), 198–203. https://doi.org/10.1016/j.mefs.2014.08.002

Oche, M. O., Umar, A. S., Gana, G. J., & Ango, J. T. (2012). Menstrual health: the unmet needs of adolescent girls in Sokoto, Nigeria. Scientific Research and Essays, 7(3), 410–418. https://doi.org/10.5897/SRE11.1842

Omidvar, S., Bakouei, F., Amiri, F. N., & Begum, K. (2015). Primary Dysmenorrhea and Menstrual Symptoms in Indian Female Students: Prevalence, Impact and Management. Global Journal of Health Science, 8(8), 135. https://doi.org/10.5539/gjhs.v8n8p135

Parashar, A., Gupta, B., Bhardwaj, A., & Sarin, R. (2006). Prevalence of RTIs among women of reproductive age group in Shimla city. Indian Journal of Community Medicine, 31(1), 15. https://doi.org/10.4103/0970-0218.54924

Pitangui, A. C. R., Gomes, M. R. de A., Lima, A. S., Schwingel, P. A., Albuquerque, A. P. dos S., & de Araújo, R. C. (2013). Menstruation Disturbances: Prevalence, Characteristics, and Effects on the Activities of Daily Living among Adolescent Girls from Brazil. Journal of Pediatric and Adolescent Gynecology, 26(3), 148–152. https://doi.org/10.1016/j.jpag.2012.12.001

Poduval, J., & Poduval, M. (2009). Working mothers: how much working, how much mothers, and where is the womanhood? Mens Sana Monographs, 7(1), 63–79. https://doi.org/10.4103/0973-1229.41799

Prasad, B., & Sharma, P. (1972). A study on menstruation of medical college girls at Lucknow. Journal of Obstetrics and Gynaecology of India, 22(4), 690–694.

Rajagopal, S., & Mathur, K. (2017). 'Breaking the silence around menstruation': experiences of adolescent girls in an urban setting in India. Gender and Development, 25(2), 303–317. https://doi.org/10.1080/13552074.2017.1335451

Ram, U., Pradhan, M. R., Patel, S., & Ram, F. (2020). Factors Associated with Disposable Menstrual Absorbent Use Among Young Women in India. International Perspectives on Sexual and Reproductive Health, 46, 223–234.

Reid, G., & Bruce, A. W. (2003). Urogenital infections in women: can probiotics help? Postgraduate Medical Journal, 79(934), 428–432. https://doi.org/10.1136/pmj.79.934.428

Rupa Vani, K., Veena, K. S., Subitha, L., Hemanth Kumar, V. R., & Bupathy, A. (2013). Menstrual abnormalities in school going girls - Are they related to dietary and exercise pattern? Journal of Clinical and Diagnostic Research, 7(11), 2537–2540. https://doi.org/10.7860/JCDR/2013/6464.3603

Sapkota, D., Sharma, D., Budhathoki, S., Khanal, V., & Pokharel, H. (2013). Knowledge and practices regarding menstruation among school going adolescents of rural Nepal. J Kathmandu Medical College, 2(5), 122–128.

Sarkar, I., Dobe, M., Dasgupta, A., Basu, R., & Shahbabu, B. (2017). Determinants of menstrual hygiene among school going adolescent girls in a rural area of West Bengal. Journal of Family Medicine and Primary Care, 6(3), 583. https://doi.org/10.4103/2249-4863.222054

Sharma, K. (1990). Age at menarche in northwest Indian females and a review of Indian data. Annals of Human Biology, 17(2), 159–162. https://doi.org/10.1080/03014469000000912

Sharma, P., Malhotra, C., Taneja, D. K., & Saha, R. (2008). Problems related to menstruation amongst adolescent girls. Indian Journal of Pediatrics, 75(2), 125–129. https://doi.org/10.1007/s12098-008-0018-5

Sinha, R. N., & Pau, B. (2018). Menstrual Hygiene Management in India: The Concerns. Indian Journal of Public Health, 62(3), 2018–2020. https://doi.org/10.4103/ijph.IJPH

Sommer, M., Hirsch, J. S., Nathanson, C., & Parker, R. G. (2015). Comfortably, Safely, and Without Shame: Defining Menstrual Hygiene Management as a Public Health Issue. American Journal of Public Health, 105(7), 1302–1311. https://doi.org/10.2105/AJPH.2014.302525

Sooki, Z., Shariati, M., Chaman, R., Khosravi, A., Effatpanah, M., & Keramat, A. (2016). The Role of Mother in Informing Girls About Puberty: A Meta-Analysis Study. Nursing and Midwifery Studies, 5(1), e30360–e30360. https://doi.org/10.17795/nmsjournal30360

S.Pokhrel, N.Mahantashetti, & M.Angolkar, N. D. (2014). Impact of Health Education on Knowledge, Attitude and Practice Regarding Menstrual Hygiene among Pre University Female Students of a College Located in Urban Area of Belgaum. IOSR Journal of Nursing and Health Science, 3(4), 38–44.

Suman, B., Ghate, M. M., & Majumdar, J. R. (2013). School absenteeism during menstruation among rural adolescent girls in Pune. National Journal of Community Medicine, 4(2), 212–216.

Thakur, H., Aronsson, A., Bansode, S., Lundborg, C. S., Dalvie, S., & Faxelid, E. (2014). Knowledge , practices , and restrictions related to menstruation among young women from low socioeconomic community in Mumbai , India. Frontiers in Public Health, 2(72), 1–7. https://doi.org/10.3389/fpubh.2014.00072

Tiwari, H., Oza, U. N., & Tiwari, R. (2006). Knowledge, attitudes and beliefs about menarche of adolescent girls in Anand district, Gujarat. Eastern Mediterranean Health Journal, 12(3–4), 428–433.

Upashe, S. P., Tekelab, T., & Mekonnen, J. (2015). Open Access Assessment of knowledge and practice of menstrual hygiene among high school girls in Western Ethiopia. BMC Women's Health, 15(1), 1–8. https://doi.org/10.1186/s12905-015-0245-7

Wong, L. P., & Khoo, E. M. (2011). Menstrual-related attitudes and symptoms among multi-racial Asian adolescent females. International Journal of Behavioral Medicine, 18(3), 246–253. https://doi.org/10.1007/s12529-010-9091-z

World Bank Group Education Global Practice Smarter Education Systems for Brighter Futures. (2016).