

# Knowledge and practice of self-hygiene during menstruation among female adolescent students in Buraidah city

Hayam AlMutairi<sup>1</sup>, Saulat Jahan<sup>2</sup>

<sup>1</sup>Family Medicine Academy, <sup>2</sup>Research and Innovation Unit, Family Medicine Academy, Qassim, Saudi Arabia

## ABSTRACT

**Background:** Menstruation is a physiological phenomenon that begins in females in adolescent age. Poor menstrual hygiene can result in significant reproductive disorders. However, improving the knowledge about menstruation even before menarche can improve menstrual hygiene. **Objective:** The aim of this study was to determine the knowledge and practice of adolescent girls towards menstrual hygiene, in Buraidah city. **Materials and Methods:** A cross-sectional study was conducted among 258 intermediate school girls in Buraidah city. A semi-structured, self-administered questionnaire was used to collect information on demographics, menstrual history, knowledge about menstruation, hygiene practices, and school absence during menstruation. The survey was conducted from December 2019 to February 2020. **Results:** Before menarche, 49.6% of the girls knew about menstruation. The mothers were the most common (94%) source of information about menstruation. Regarding menstruation, 68.2% had bleeding for four to six days, and 42.2% had an interval of 21 to 35 days between periods. Approximately 61.7% participants had 'acceptable' level of knowledge, 2.0% had a 'good' knowledge and 36.3% had 'poor' knowledge regarding menstruation. Most (60.5%) students were categorized as having unsatisfactory self-hygiene practice. During the last three months, 35.8% of the girls were absent for one day due to menstruation. 47.7% of the students omit some foods and drinks from their diet during menstruation; soft drinks were the most omitted. Mother's occupation ( $P = 0.022$ ), family monthly income ( $P = 0.007$ ), and prior knowledge on menstruation ( $P = 0.006$ ) were significantly associated with knowledge regarding menstruation. **Conclusion:** Knowledge and practice toward menstrual hygiene is unsatisfactory. Creating awareness on self-hygiene during menstruation is recommended.

**Keywords:** Adolescence, menstruation, Qassim, self-hygiene, school, Saudi Arabia

## Introduction

Adolescent menstrual hygiene and proper self-care play an essential role in adolescent health and wellbeing. Besides the risk of physical health issues, notably reproductive tract infections (RTI), improper menstrual hygiene exposes to psychological and social effect on girls.<sup>[1-3]</sup> In most of developing countries, menstruations and related problems are considered

an embarrassing topic,<sup>[2]</sup> portrayed by low knowledge, social myths and misconceptions, along with a negative attitude among adolescents.<sup>[1,2,4-6]</sup>

Adolescent menstrual hygiene and proper self-care play an essential role in adolescent health and wellbeing. The attitude and behaviour toward menstruation and menstrual hygiene practice are affected by many factors, including the social, cultural, economic, and religious background. To develop effective interventions to improve menstrual hygiene practices, it is important to explore existing knowledge and practice towards menstrual hygiene. Worldwide and especially in Saudi Arabia,

**Address for correspondence:** Dr. Hayam Al Mutairi, AlQassim Region, Buraidah City, P.O. Box 3768, Saudi Arabia. E-mail: hyym@hotmail.com

Received: 25-11-2020

Revised: 24-12-2020

Accepted: 14-01-2021

Published: 29-04-2021

### Access this article online

#### Quick Response Code:



Website:  
www.jfmprc.com

DOI:  
10.4103/jfmprc.jfmprc\_2321\_20

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Al Mutairi H, Jahan S. Knowledge and practice of self-hygiene during menstruation among female adolescent students in Buraidah city. J Family Med Prim Care 2021;10:1569-75.

a few studies are conducted on this topic. To fill the gap, this study was designed to assess knowledge and practice regarding self-hygiene during menstruation among adolescent school girls in Buraidah city, Saudi Arabia. Moreover, the study also determined the age of menarche, and explored the association of socio-demographic characteristics with knowledge and practice of self-hygiene during menstruation among adolescent school girls in Buraidah city.

## Subjects and Methods

This cross-sectional study was conducted among intermediate girls' schools in Buraidah city, Saudi Arabia. The survey was conducted from December 2019 to February 2020. All intermediate girls in selected schools who have reached menarche were considered for inclusion and girls who were absent on the day of data collection were excluded.

Two-stage cluster sampling was used. In the first stage, five schools were selected by simple random sampling. In the second stage, two intermediate classes were randomly selected, and all the students meeting eligibility criteria in the selected classes were invited to participate in the study.

After approval from the school authorities, data were collected using a semi-structured, self-administered questionnaire. The contents of the questionnaire were adapted from a validated instrument used in a previous study.<sup>[7]</sup> Some modifications were done in the questionnaire according to objectives of the current study. The questionnaire was prepared in English language and back-translated into Arabic language. The questionnaire was pre-tested, and modified according to feedback of the participants.

The questionnaire consisted of 6 sections:

- First section about sociodemographic data (age, educational level and occupations of a mother, monthly income)
- Second section about menstruation history (age of menarche, durations of blood flow, the interval between period)
- Third section about knowledge of hygiene during menstruation
- Fourth section about practice during menses (the type of absorbent material used during menses, ways to dispose materials, frequency of changing pads, frequency and type of genital cleaning, bathing, hand washing)
- Fifth section about school attendance during menstruation (absence from schools, causes of absence)
- Sixth section about the activities restricted during menses (including sports, foods, herbal use)

## Data management and analysis plan

Statistical package for social sciences (SPSS) software Version 21.0 (Chicago) was used for data entry and statistical analysis. Categorical variables were summarized using frequency and percentage, and continuous variables were described using mean with standard deviation.

Girls' knowledge and practices towards menstruation were evaluated by giving one point to the correct answer and zero for the wrong answer, then calculating the score for each of the knowledge and practice sections. The total score for the knowledge section was ten, while the total score for the practice section was seven. The average score was then compared over different demographic variables for both knowledge and practices using one-way ANOVA and t-tests at a level of significance  $P < 0.05$ .

The total score for knowledge was classified as follows:

- Good knowledge = Score  $\geq 8$
- Acceptable knowledge = Score 4-7
- Poor knowledge = Score  $< 4$

The total score for practice was classified as follows:

- Good self-hygiene practice = 5-7
- Unsatisfactory self-hygiene practice = 0-4

## Ethical considerations

Informed Consent Form was included in the questionnaire and was obtained from all participants. Institutional ethical committee approval was taken from Qassim Regional Ethics Committee on 12/3/2019 reference 1440-1411907 and later permission was taken from school authorities. After explanation of the nature and purpose of the study, verbal permission was taken from each participant. Participation in the study was voluntary, and the participants had the choice to refuse to participate. The questionnaire did not include participants' names. All data were kept confidential and were used for study purpose only. Institutional ethical committee approval was taken from Qassim Regional Ethics Committee (Letter No:1440-1411907) march 11/2019.

## Results

Three hundred girl students were contacted for participation in the study. Out of these, 258 (86%) students responded to this questionnaire. The characteristics of respondents and analysis of the questionnaire are described below:

### General characteristics of respondents

Out of 258 students, 87 students (33.7%) were 13 years old, with a minimum age of 12 and a maximum age of 16. Additionally, 226 students (87.6%) lived with both parents. As for the mothers' educational level, 1.9% had a university degree or higher, while 89.5% had illiterate mothers. Regarding the profession of the mothers, 60.9% of the mothers were housewives, while 4.3% were administrative employees. Also, 24.0% of the students mentioned that their family income was more than 10,000 Saudi Riyal, and 54.3% did not know their family's monthly income [Table 1].

The students were also asked if they knew about menstruation before it started. 49.6% of the girls mentioned that they 'knew

**Table 1: Demographic characteristics of the participants (n=258)**

	Frequency	Percentage
Age		
12.00	18	7.0
13.00	87	33.7
14.00	78	30.2
15.00	68	26.4
16.00	7	2.7
Living with family members		
With my mother and father	226	87.6
With my mother only	24	9.3
Other	8	3.1
Mother's educational level		
No formal education	231	89.5
School education	22	8.5
College and above	5	1.9
Mothers' occupation		
Housewife	157	60.9
Teacher	74	28.7
Businesswomen	9	3.5
Health worker	7	2.7
Administrative employee	11	4.3
Family monthly income (Saudi Riyals/month)		
<5000	21	8.1
5000-10000	35	13.6
>10000	62	24.0
Don't know	140	54.3

about it very clearly', 41.5% responded that they 'had some idea' while 8.9% stated that they 'did not know at all' about it. Also, the students were asked about their source of information about menstruation. The most common (94.1%) source of information was mother followed by sister and teacher. Around 4.3% of the students used social media to get information about menstruation.

### Characteristics of menstruation

The students were asked about their characteristics of menstruation. Regarding the age of menarche, 98 (38.0%) respondents attained menses at the age of 12 years. Duration of bleeding was four to six days for 68.2% of the girls, while 8.9% had bleeding for less than four days. Responding to the question regarding interval between periods, 42.6% reported 21 to 35 days between their periods. A total of 160 (35.2%) students mentioned of having abdominal pain during menstruation [Table 2].

### Knowledge about menstruation

To evaluate the level of knowledge of the students, they were asked a set of ten questions about their knowledge of menstruation. A total of 170 (65.9%) participating students knew that normal menstruation should start at the age between 11 and 14 years. One hundred and eighty two (70.5%) participants knew that normal menstruation lasts for three to seven days, around half of them were aware that regular menstruation is repeated after 20 to 30 days (51.9%), and that the cause of menstruation

**Table 2: Characteristics of menstruation in the sample of the students (n=258)**

	Frequency	Percentage
Age of menarche (Years)		
9.00	2	0.8
10.00	10	3.9
11.00	38	14.7
12.00	98	38.0
13.00	82	31.8
14.00	25	9.7
15.00	3	1.2
Knowing about menstruation before it started		
Yes, very clearly	128	49.6
Not at all	23	8.9
Had Some idea	107	41.5
Duration of blood flow		
<4 days	23	8.9
Four days to six days	176	68.2
Seven days and more	27	10.5
Don't know	32	12.4
Interval between periods		
Less than twenty-one days	64	24.8
Twenty-one days to thirty-five days	110	42.6
More than thirty-five days	15	5.8
Other, specify	66	25.6
Don't know	3	1.2
Symptoms associated with menstruation <sup>a</sup>		
Headache	58	12.7%
Vomiting	10	2.2%
Fatigue	76	16.7%
Anorexia	48	10.5%
Abdominal pain	160	35.2%
Backache	103	22.6%

<sup>a</sup>Multiple responses were allowed

is physiological (51.2%), and 60.9% knew that menstrual blood comes from the uterus. 82.6% of them answered correctly that absorbent sanitary pads are ideal for menstruation [Table 3].

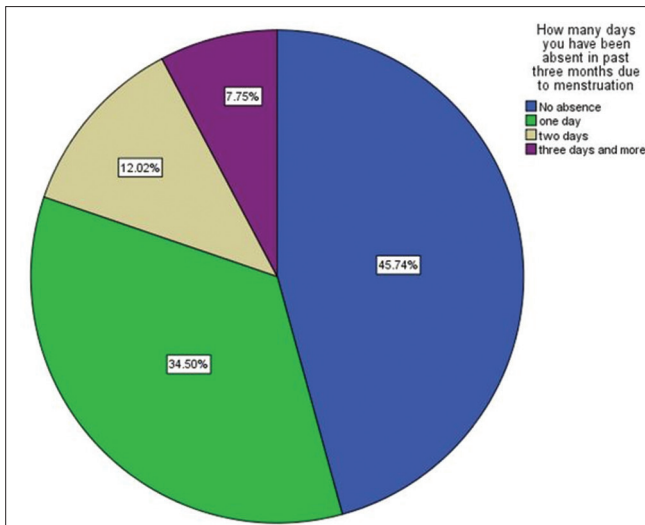
The result of the study showed that out of 256 students who responded to all knowledge questions, 61.7% participants had acceptable level of knowledge, while 2.0% had a good knowledge and 36.3% had poor knowledge regarding menstruation [Table 4].

### Practices during menstruation

The practices of students towards menses were also explored. A total of 238 (92.2%) respondents used commercially available sanitary pads, 82.2% of them dispose pads in plastic bags, and 96.9% of them washed their hands regularly after changing pads and toileting [Table 5]. The results of the study showed that 156 (60.5%) students fall into the category of unsatisfactory self-hygiene practice and 102 (39.5%) were categorized as having good self-hygiene practice towards menstruation.

### School absenteeism during menstruation

On enquiring about school absenteeism because of menstruation, 34.5% of the girls were absent for one day due to menstruation



**Figure 1:** School absenteeism during menstruation

during the last three months [Figure 1]. Among those absent from school, 68.4% were absent because of pain, and 6.9% of the students were absent because their family prohibited them to go to school.

### Restrictions during menstruation

The students were asked about their restriction of activities during menstruation. Around 44.2% of the students omit some foods and drinks from their diet during menstruation, where soft drinks were the most commonly omitted drinks (48.1%) among students. Also, 20.9% of the girls used herbal medicines during menstruation.

### Association of demographic characteristics with knowledge and practices towards menstruation

The mother’s occupation ( $P = 0.022$ ), family monthly income ( $P = 0.007$ ), and prior knowledge on menstruation before menarche ( $P = 0.006$ ), were significantly associated with the knowledge regarding menstruation, where girls of teachers, family income of more than 10000 Saudi Riyals/month and girls with previous knowledge on menstruation had higher mean knowledge scores as compared to their peers [Table 6].

Regarding practices, family monthly income was significantly associated ( $P = 0.039$ ) with the mean practice scores of girls, where girls with a family income of more than 10000 Saudi Riyals/month had better practices compared to their peers.

## Discussion

Menarche represents a significant change in females’ development, which can be fearsome to some young girls due to a lack of knowledge.<sup>[8,9]</sup> The behaviour towards menstruation largely depends on the level of knowledge about it and girls’ practices during menses.<sup>[10,11]</sup> A good knowledge can reduce the incidence

**Table 3: Responses of students to the questions for assessment of knowledge about menstruation**

	Frequency	Percentage
Normal Menstruation should start at the age of		
Less than ten years	25	9.7
Eleven to Fourteen years*	170	65.9
More than Fourteen years	8	3.1
Don’t know	55	21.3
Normal Menstruation lasts for		
Less than three days	12	4.7
Three to seven days*	182	70.5
More than seven days	6	2.3
Don’t know	58	22.5
Regular menstruation is repeated after an interval of		
Ten to twenty days	22	8.5
Twenty to thirty days*	134	51.9
Thirty to forty days	8	3.1
Don’t know	94	36.4
The cause of menstruation is		
Physiological (normal change)*	132	51.2
Pathological (disease)	14	5.4
Don’t know	76	29.5
Other (Specify)	36	14.0
The organ menstrual blood comes from		
Uterus*	157	60.9
Vagina	16	6.2
Bladder	6	2.3
Abdomen	5	1.9
Don’t know	74	28.7
Absorbent sanitary pads ideal material for menstruations		
Yes*	213	82.6
No	4	1.6
Don’t know	41	15.9
The pads should be changed more than three times daily		
Yes*	212	82.2
No	14	5.4
Don’t know	32	12.4
The genitalia should be washed with water every time the pad is changed		
Yes*	146	56.6
No	22	8.5
Don’t know	89	34.5
Physical activity should be stopped during menstruation		
Yes	73	28.3
No*	127	49.2
Don’t know	58	22.5
It’s harmful to take bath in on the first day of menses		
Yes	104	40.3
No*	92	35.7
Don’t know	62	24.0

\*Correct Answer

of future reproductive disorders.<sup>[12,13]</sup> Hence, it is essential to understand the knowledge and practices of girls during menstruation.

**Table 4: Knowledge category of the students (n=256)**

	Frequency	Percentage
Knowledge level		
Good*	5	2.0
Acceptable*	158	61.7
Poor*	93	36.3
Total	256	100.0

\*Good knowledge=Score >8. \*Acceptable knowledge=Score 4-7. \*Poor knowledge=Score<4

**Table 5: Practice questions distribution of the sample of the students (n=258)**

	Frequency	Percentage
The absorbent material use during menstruation		
Commercially made sanitary pad*	238	92.2
Napkin (soft paper)	17	6.6
Other (specify)	3	1.2
Types of pads wrap used for disposing of it		
Papers	10	3.9
Plastic bag*	212	82.2
Not wrap	32	12.4
Other	4	1.6
Change the pads during the night on the first and second day		
Always*	160	62.0
Sometime	78	30.2
Never	20	7.8
How many times did you change your underwear during menstruation?		
Daily*	149	57.8
two to three times per day	43	16.7
When it's soaked with blood	50	19.4
When taking shower	16	6.2
Wash the genitalia during menstruation		
Always*	174	67.4
Sometime	70	27.1
Never	14	5.4
Take bath during menses		
Daily*	41	15.9
Second day	107	41.5
Alternative day	79	30.6
Do not take bath during menstruation	31	12.0
Wash hands regularly after changing pads and toilet		
Always*	250	96.9
Sometime	8	3.1

\*Correct Answer

According to socio-demographic data in our study, the mean age of menarche is  $12.29 \pm 1.04$  years. The same mean age was observed in the study conducted in Saudi Arabia, which illustrated the mean age of menarche as  $12.7 \pm 1.3$  years.<sup>[14]</sup> Another study conducted in India reported the mean age of  $12.84 \pm 1.4$  years for menarche.<sup>[15]</sup> Also in Kuwait, Egypt and Canada, similar mean ages for menarche are reported (12.41 years, 12.44 years, and 12.72 years, respectively).<sup>[16-18]</sup>

The present study aimed at examining the knowledge and practice of self-hygiene during menstruation among female

adolescent students in Buraidah, Saudi Arabia. The study demonstrated that 49.6% of the girls knew about menstruation before it started, where 94.1% of the students had their mothers as their source of information. In our study, the teachers had a little role as a source of information on this topic. A similar result in a study conducted in Riyadh, Saudi Arabia revealed that 61.5% of girls went to their mothers to get information related to menstruation and teachers were the last source of information.<sup>[19]</sup>

In our study, 68.2% of the girls reported bleeding for four to six days, and 42.2% had 21 to 35 days between their periods. As for absence from school, 34.5% of the girls were absent for one day due to menstruation during the last three months, among these 68.4% of them were absent because of pain. Furthermore, 44.2% of the students omit some foods and drinks from their diet during menstruation, where cold drinks were the most omitted drinks. A similar result in the study from Saudi Arabia was found in which 64.4% of participants avoided certain food and drink and especially cold drinks and spicy food.<sup>[2]</sup> In the present study, 49.2% of students believed that physical activity should be performed during menstruation. Whereas, 57% of the participants in another similar study avoided physical activity during menstruation.<sup>[2]</sup>

In the current study, the mother's occupation ( $P = 0.022$ ), family monthly income ( $P = 0.007$ ), and prior knowledge on menstruation before menarche ( $P = 0.006$ ), were significantly associated with the knowledge of girls towards menstruation. Family monthly income ( $P = 0.047$ ) was significantly associated with the practices of girls towards menstruation.

The knowledge and practices of menstruation have been evaluated in different settings and countries. In the present study, mothers represented the primary source of information for their girls. A review article on the knowledge and practice towards menstrual hygiene among adolescent girls in low- and middle-income countries, illustrated that adolescent girls in low- and middle-income countries usually do not receive sufficient and trusted information about menstrual health and hygiene before menarche and that the source of information is mainly the mothers who might not have all the information required by their daughters in a reliable form.<sup>[20]</sup> These findings support the results of the present study, where mothers represented the primary source of information for their girls.

Another study was carried out by Alam *et al.* in Bangladesh to examine the knowledge and practices of adolescent girls towards menstrual health and absence from school due to menstruation, through surveying 700 girls in the age between 11 and 17 years old.<sup>[21]</sup> Alam *et al.* found that the girls had a reduced level of knowledge towards menstrual health, which has led to misconception and increased absence from school due to menstruation.<sup>[21]</sup>

**Table 6: Association of demographic characteristics with mean knowledge scores**

Parameter	Category	Mean±SD Knowledge Score	*P
Age group (Years)	12-14	4.23±2.04	P=0.737
	15-16	4.32±1.93	
Mother's educational level	No formal education	4.27±1.99	P=0.41
	School education	3.90±2.09	
	Collage and above	5.20±2.48	
Mother's job group	Housewife	4.06±1.93	P=0.022*
	Working mother	4.56±2.10	
Living with family members	With mother & father	4.33±2.02	P=0.31
	With mother only	3.75±2.11	
	Other	3.75±1.03	
Family income	<5000	4.00±1.97	P=0.007*
	5000-10000	4.17±2.26	
	>10000	5.01±1.82	
	Don't know	3.97±1.96	
Prior knowledge on menstruation before starting	Yes, very clearly	4.52±1.78542	P=0.006*
	Not at all	3.08±2.44788	
	Had Some idea	4.18±2.08903	

\*P at level of significance < 0.05

Additionally, the most significant factors that affected their knowledge were the mother's occupation ( $P = 0.022$ ), family monthly income ( $P = 0.007$ ), and prior knowledge on menstruation before starting ( $P = 0.006$ ). Similar findings were also reported in other countries such as Tanzania, Ghana, Cambodia, and Ethiopia, as documented by Sommer *et al.*<sup>[22]</sup>

This research project had some limitations; it was performed in only one city in Saudi Arabia, leading to limited generalizability of the results. A self-administered questionnaire was used which might have resulted in misunderstanding of some of the questions. Also, the responses to the questionnaire included in this survey depend mainly on the honesty and subjective view of the respondents, which could influence the reliability of the outcomes.

To the best of our knowledge, this is the first study in Buraidah, Saudi Arabia, to examine the knowledge and practices of Saudi girls towards self-hygiene during menstruation. To get the broader picture of the knowledge and practice towards hygienic measures during menstruation among adolescent females on a national level, further similar studies with larger sample sizes and in different areas in Saudi Arabia is recommended.

To conclude, the level of knowledge and practices towards menstruation among adolescent girls in Buraidah, Saudi Arabia, requires significant improvements. This improvement of knowledge could reduce the risk of future reproductive disorders. We recommend that the decision-makers in the education sector include in educational courses for adolescent girls lessons about their reproductive health and healthy hygienic measures during menstruation. This needs to be the primary source of information for girls about their menstruation rather than relying on their mothers' knowledge or obtaining information from untrusted resources, which might affect their health and wellbeing.

To summarize, most of students fall into the category of unsatisfactory self-hygiene practice and had acceptable level of knowledge. The most significant factors affected knowledge about menstruation is mother's occupation, family monthly income, and prior knowledge on menstruation before starting. Regarding practices, family monthly income was significant affected factor.

One of the main goals in primary health care is prevention. After exploring the knowledge and practice we have the clear picture size of problem and establish a plan to prevent it by made health program in schools supervised by primary health care physicians.

### Acknowledgments

We would like to thank all the respondents who participated in this study. We are grateful to the school administration of Buraidah city and school health unit for facilitating the data collection for our study.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

### References

1. Haque SE, Rahman M, Itsuko K, Mutahara M, Sakisaka K. The effect of a school-based educational intervention on menstrual health: An intervention study among adolescent girls in Bangladesh. *BMJ Open* 2014;4:e004607.
2. Karout N. Knowledge and beliefs regarding menstruation among Saudi nursing students. *J Nurs Educ Pract* 2016;6:23-30.
3. Akpenpuun JR, Azende PM. Menstrual knowledge and practices among adolescents females in makurdi

- metropolis. *GJISS* 2014;3:113-21.
4. Michael J, Iqbal Q, Haider S, Khalid A, Haque N, Ishaq R, *et al.* Knowledge and practice of adolescent females about menstruation and menstruation hygiene visiting a public healthcare institute of Quetta, Pakistan. *BMC Women's Health* 2020;20:4.
  5. Coast E, Lattof SR, Strong J. Puberty, and menstruation knowledge among young adolescents in low- and middle-income countries: A scoping review. *Int J Public Health* 2019;64:293-304.
  6. Mohammed S, Larsen-Reindorf RE, Awal I. Menstrual hygiene management and school absenteeism among adolescents in Ghana: Results from a school-based cross-sectional study in a rural community. *Int J Reprod Med* 2020;2020:6872491. doi: 10.1155/2020/6872491.
  7. Upashe SP, Tekelab T, Mekonnen J. Assessment of knowledge and practice of menstrual hygiene among high school girls in Western Ethiopia. *BMC Women's Health* 2015;15:84.
  8. Anusree PC, Ardra R, Aswathy BS, Faseela VC, Gincy PB, Anupama T. Knowledge regarding menstrual hygiene among adolescent girls in selected schools, Mangalore to develop an information booklet. *J Nurs Health Sci* 2014;3:55-60.
  9. Ameade EP, Garti HA. Relationship between female university students' knowledge of menstruation and their menstrual hygiene practices: A study in Tamale, Ghana. *Adv Prev Med* 2016;2016:1056235. doi: 10.1155/2016/1056235.
  10. Nath KR, John J. Menstrual hygiene practices among adolescent girls in a rural area of Kanyakumari district of Tamil Nadu. *Ind J Youth and Adol Health* 2019;6:8-14.
  11. Bhore N, Kumbhar VR. Knowledge and practices regarding menarche and menstrual hygiene among adolescent girls. *Innov Pharm Pharmacother* 2014;2:359-64.
  12. UNICEF. Menstrual hygiene in schools in 2 countries of Francophone West Africa-Burkina Faso and Niger case studies in 2013. Available from: [https://www.unicef.org/wash/schools/files/MHM\\_study\\_report\\_Burkina\\_Faso\\_and\\_Niger\\_English\\_Final.pdf](https://www.unicef.org/wash/schools/files/MHM_study_report_Burkina_Faso_and_Niger_English_Final.pdf). [Last accessed on 2020 Nov 04].
  13. Arunmozhi R, Antharam P. A cross-sectional study to assess the levels of knowledge practices of menstrual hygiene among adolescent girls of Chennai higher secondary schools, Tamil Nadu, 2013. *Med EJ* 2013;3:211.
  14. Aburshaid FA, Ahmad SG, Ashmauey AA, Mohammad HG. Effect of planned health educational program on menstrual knowledge and practices among adolescent Saudi girls. *J Nurs Health Stud* 2017;2:16.
  15. Sachan B, Kumari R, Singh A, Idris M, Jain S. Age at menarche and menstrual problems among school-going adolescent girls of a North Indian district. *J Basic Clin Reprod Sci* 2012;1:56-9.
  16. Al-Awadhi N, Al-Kandari N, Al-Hasan T, Almurjan D, Ali S, Al-Taiar A. Age at menarche and its relationship to body mass index among adolescent girls in Kuwait. *BMC Public Health* 2013;13:29.
  17. Ghaly I, Hussein FH, Abdelghaffar S, Anwar G, Seirvogel RM. Optimal age of sexual maturation in Egyptian children. *East Mediterr Health J* 2008;14:1391-9.
  18. Al-Sahab B, Ardern CI, Hamadeh MJ, Tamim H. Age at menarche in Canada: Results from the national longitudinal survey of children & youth. *BMC Public Health* 2010;10:736.
  19. Fetohy EM. Impact of a health education program for secondary school Saudi girls about menstruation at Riyadh city. *J Egypt Public Health Assoc* 2007;82:105-26.
  20. Chandra-Mouli V, Patel SV. Mapping the knowledge and understanding of menarche, menstrual hygiene, and menstrual health among adolescent girls in low-and middle-income countries. *Reprod Health* 2017;14:30.
  21. Alam MU, Luby SP, Halder AK, Islam K, Opel A, Shoab AK, *et al.* Menstrual hygiene management among Bangladeshi adolescent schoolgirls and risk factors affecting school absence: Results from a cross-sectional survey. *BMJ Open* 2017;7:e015508.
  22. SOMMER, Marni, *et al.* A comparison of the menstruation and education experiences of girls in Tanzania, Ghana, Cambodia and Ethiopia. *Compare: A Journal of Comparative and International Education*, 2015, 45.4: 589-609.