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The effect of a school-based educational intervention on menstrual health: an intervention study among adolescent girls in Bangladesh

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To cite: Haque SE, Rahman M, Itsuko K, *et al*. The effect of a school-based educational intervention on menstrual health: an intervention study among adolescent girls in Bangladesh. *BMJ Open* 2014;**4**:e004607. doi:10.1136/bmjopen-2013-004607

► Prepublication history for this paper is available online. To view these files please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2013-004607).

Received 3 December 2013
Revised 3 June 2014
Accepted 12 June 2014

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ABSTRACT

Objectives: To assess the impact of a school-based menstrual education programme on: (1) menstrual knowledge, beliefs and practices, (2) menstrual disorders experienced, and (3) restrictions on menstruating adolescents.

Design: Intervention study.

Setting: Araihazar area, Bangladesh.

Participants: 416 adolescent female students aged 11–16 years, in grade 6–8, and living with their parents.

Interventions: A school-based health education study conducted from April 2012 to April 2013.

Primary and secondary outcome measures: We randomly selected 3 of 26 high schools in the study area. We delivered 6 months of educational intervention by trained (by an obstetrician and gynaecologist) research assistants (RAs) on menstrual hygiene among school girls. RAs read the questionnaire and participants answered. The changes in knowledge, beliefs and practices regarding menstruation, menstrual disorders experienced, and the restrictions and behaviours practiced by menstruating adolescents were compared between the baseline and the follow-up assessments.

Results: After health education, participants reported a significant improvement ($p<0.001$) in 'high knowledge and beliefs' scores compared to baseline (51% vs 82.4%). Significant improvement was also observed in overall good menstrual practices (28.8% vs 88.9%), including improvements in using sanitary pads (22.4% change after the intervention), frequency of changing pads/cloths per day (68.8%), drying the used absorbent (77.6%), methods of disposing of the used absorbent (25.5%), and cleaning of genitalia (19.2%). During the follow-up, the participants reported significant improvements in the regularity of their menstrual cycle (94.5% vs 99.5%) and fewer complications during menstruation (78.6% vs 59.6%).

Conclusions: The programme produced significant changes in the knowledge, beliefs and practices of menstrual hygiene, complications from lack of hygiene, and the behaviour and restrictions of the menstruating adolescents. These results demonstrate the feasibility of implementing a health education programme for adolescents on menstrual hygiene in secondary schools serving rural Bangladesh.

Strengths and limitations of this study

- This is the first study to evaluate a menstrual education programme among adolescent school girls in Bangladesh.
- This study evaluated the menstrual knowledge, beliefs and practices of, and menstrual disorders experienced by, students in grade 6–8 in Bangladesh.
- The educational programme resulted in significant improvements in knowledge (51% to 82.4%), beliefs and practices (28.8% to 88.9%).
- Significant improvements were also observed in restrictions on visits to relatives and friends, and in school attendance during menstruation.
- The same educational programme should be implemented for all adolescent girls in Bangladesh.

INTRODUCTION

Adolescence is a period of rapid transition from girlhood to womanhood. The onset of menstruation is one of the most important changes that occur for girls during the adolescent years.[1] The first menstruation (menarche) occurs between the ages of 11 and 15.[2 3] Poor menstrual hygiene and inadequate self-care are major determinants of morbidity and other complications among this age group. Some of these problems include urinary tract infections, scabies in the vaginal area, abnormal abdominal pain, absence from school, and complications during pregnancy.[4–7] In many areas of developing countries, a culture of silence surrounds the topic of menstruation and related issues.[8 9] As a result, many young girls lack appropriate information on menstrual

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hygiene. Infections due to lack of hygiene during menstruation have been reported in many studies.[10–15] They also revealed that most adolescent girls had incomplete and inaccurate information about menstrual physiology and hygiene. The menstrual information they did have was acquired primarily through mothers, television, friends, teachers and relatives.[5 16 17]

Menstruation is still regarded as unclean or dirty in Bangladeshi society.[4] Because of various myths, misconceptions and restrictions practiced during menstruation, adolescent girls in Bangladesh often develop negative attitudes towards this natural physiological phenomenon. The majority of girls lack scientific knowledge about menstruation and puberty.[18] Adolescent girls in Bangladesh are often reluctant to discuss this topic with their parents and hesitant to seek help regarding their menstrual problems. Most girls are not informed about menarche or how to manage menstrual bleeding.[18] Studies in rural Bangladesh and India found that 69.0% of adolescent girls were using old pieces of cloth or even no protection at all during menstruation.[19 20] Therefore, the need to create awareness and increase access to sanitary facilities essential for menstrual hygiene is important for school-aged adolescents in Bangladesh.

Learning about menstrual hygiene is a vital part of health education for adolescent girls so that they can continue to work and maintain hygenic habits throughout their adult life.[21] The ideal menstrual health education curriculum would encourage students to think about the relationships between knowledge, choice, behaviours and enhanced human health. It would also help to improve maternal health, which can have an impact on the millennium development goals (MDGs), for example MDG5.[22] However, despite the need to achieve MDGs, to our knowledge no study has been conducted on an educational intervention on menstrual hygiene among school girls in Bangladesh. Therefore, the present study was designed to evaluate the effectiveness of a school-based menstrual education programme regarding: (1) menstrual knowledge, beliefs and practices, (2) menstrual disorders experienced, and (3) the restrictions practiced by 6–8 grade school girls in Bangladesh.

METHODS

Study design and participants

This intervention study was conducted in Araihazar Thana in the Narayanganj District in Bangladesh. Araihazar Thana is 25 km south-east of the capital, Dhaka. It has a total area of 183.35 km^2, 63 080 household units and a population of 331 556. Males constitute 51.7% of the population, and females 48.3%. Araihazar has an average literacy rate of 53.0% (7+ years of formal education), compared to the national average of 68.4%.[23]

Of 26 high schools (grade 6–10) in the study area, 2 were full government schools and 24 were semi-government schools. We selected one of the government schools and two of the 24 semi-government schools using a simple random sampling method (we drew numbers). We only selected three schools due to limited time and resources. These schools were well-established, older schools and conveniently located. One was a girls-only school and the other two were co-educational. The socio-economic, cultural, religious and geographical characteristics of the schools were very similar. The schools were more than 2 km apart. A total of 597 adolescent girl attended the three schools, 438 of whom were willing to join the study. Participants were selected using the following criteria: (1) they were in grades 6–8, (2) were not critically ill, and (3) had achieved menarche. As 22 girls had not yet reached menarche, 416 participants were recruited (figure 1). Participants were between 11 and 16 years of age and were living with their parents.

Data collection procedures

Before conducting each interview, the principal investigator (SEH) visited all three schools and received permission to conduct the survey and to provide health education to the adolescent girls attending the school. After permission was received, we conducted a pilot survey of the questionnaire and revised it, as suggested, for the final survey. In accordance with the general guidelines required for a full study, we selected 10% of the sample (n=42) for a pilot test in one of the schools in the study area.[24] The questionnaire was drafted in English and then translated into Bangla, the national language of Bangladesh. Back-translation from Bangla to English was carried out as a validation exercise before and after the pre-test questionnaire was administered. We also modified the questionnaire based on the results of the pre-test exercise to make it easier to understand and to answer. The baseline survey was conducted in April 2012. Trained research assistants (RAs) read the questions out loud and the participants answered. A group of 12–15 students participated in each exercise led by one RA, and we requested them not to discuss the survey questions with their peers. After each session, we invited another group to participate in the survey. The room was provided by the school.

After completion of the baseline survey, we hired a supervisor, a local obstetrician/gynaecologist, and three RAs with good knowledge of the study's target population. Before the survey, we gave 4 days of training to the RAs and one female teacher (selected from the participating schools) on adolescent health education, focusing on menstrual hygiene and the importance of maintaining the confidentiality of the participants' information. The training was delivered using a field manual which we had developed in the Bangla language. Menstrual education focused on menstrual hygiene knowledge, beliefs and behaviours, menstrual disorders, and restrictions on menstruating adolescents. The educational materials were developed by an obstetrician/

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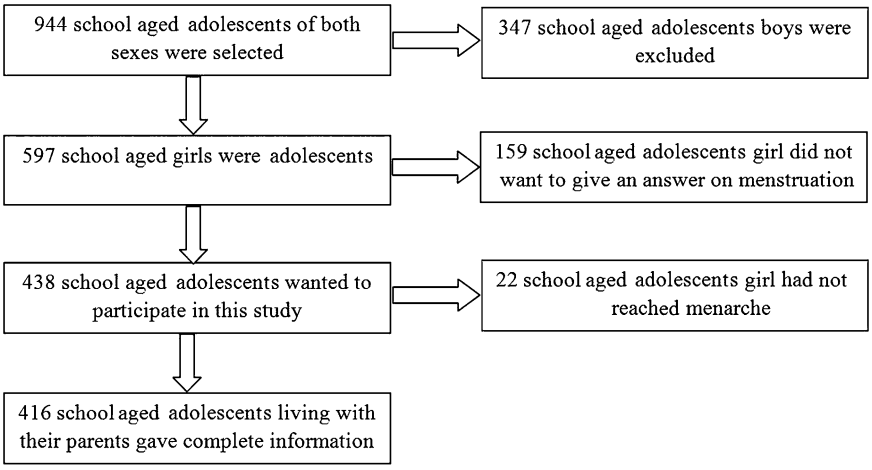

Figure 1 Selection of the sample.

gynaecologist and were culturally acceptable to the girls. They received menstrual health education from the female RAs and in the same classroom where they were regularly taught. Males were not allowed entry to the room during health education. Twelve 45-min lessons were delivered by the RAs once every 15 days. The RAs also used clean cloths and pads for demonstration purposes, and showed the girls how to dry and store them. Female RAs were recruited for the study, so that adolescent girls would feel comfortable discussing these issues. Furthermore, 12 focus group discussions (FGDs) were conducted in the schools so that RAs and adolescent girls could become well acquainted with each other, as menstruation is a very sensitive topic in Bangladesh. In addition, FGDs were conducted in order to evaluate the effectiveness of the intervention using a qualitative approach. After 6 months of intervention, follow-up data were collected in the schools using the same questionnaire as at baseline regarding menstrual hygiene knowledge, beliefs and practices, types of complications, and restrictions on menstruating adolescents. RAs visited the homes of any students who were not available at school during the follow-up data collection. In students' homes, RAs provided the questionnaire to the students and spoke with them in a private room in keeping with the data collection method in the schools.

In addition to collecting other socio-economic data, we also asked the participants about the number of persons per sleeping room in their home; the type of floor in the house; the type of roof; the type of wall; the type of cooking fuel; the presence of household assets including an electricity supply, radio, TV, mobile phone, refrigerator, watch, bicycle, motorcycle, and source of drinking water; and type of sanitary facility.

This study protocol was reviewed and approved by the ethics committee of the Bangladesh Medical Research Council (BMRC). Prior to the baseline survey, participants were informed about the study, invited to participate, and told of their right to decline. Written consent was obtained from parents and verbal consent was obtained from the head teacher, class teacher and participants. In addition, we obtained written permission for this study from the local Education Officer under the Ministry of Education (MoE) in Bangladesh.

Measures

Intervention components

Knowledge and beliefs about menstruation

This section of the questionnaire consisted of 10 multiple choice questions to determine pupils' knowledge regarding: (1) normal monthly duration of menstruation, (2) poor menstrual hygiene predisposing to infection, (3) hygienic practices preventing menstrual pain, (4) menstrual blood being considered impure, (5) proper sanitary products, (6) cause of menstruation, (7) origin of menstrual blood, (8) age of normal cessation of menstruation, (9) hot or cold food affecting the menstrual cycle, and (10) menstruation as indicating fertility (fecundity).

The students' knowledge and beliefs were scored using a system adopted from previous studies.[25–27] Each correct response was awarded 1 point, while incorrect or 'don't know' answers received no marks. This gave a total possible score of 10 points. Respondents who scored 0–3 points were adjudged to have poor knowledge, those with 4–7 points to have medium knowledge, and those with 8–10 points to have high knowledge. Cronbach's α was 0.73 for the knowledge and beliefs instrument.

Practices related to menstrual hygiene

This section of the questionnaire consisted of seven items assessing girls' menstrual hygiene practices: (1) the absorbent used during menstruation, (2) frequency of changing the absorbent each day, (3) drying of the used absorbent, (4) storing of washed clothes, (5) methods of disposal of the used absorbent, (6) cleaning of external genitalia, and (7) material used for cleaning of external genitalia. A score of 2 was given for good hygienic practices, a score of 1 was given for fair practices, and a score of 0 was given for poor practices. The maximum score was 14 points. Students who scored 0–4

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points, 5–8 points and 9+ points were judged to have poor, fair and good practices, respectively. Cronbach's α was 0.82 for the practice instrument.

Menstrual disorders experienced and restrictions during menstruation

Regarding menstrual disorders experienced by the adolescent, the following items were evaluated: (1) regularity of menstrual cycle, (2) types of complications experienced during menstruation, and (3) consultation with someone for menstrual-related complications. This section also contained items to assess girls' restrictions during menstruation: (1) visits to holy places, (2) visits to relatives, friends and neighbours, (3) participation in household activities, and (4) school attendance during menses. Dysmenorrhoea was considered as pain in the abdominal, groin or lumbar regions on the day before or on the first day of menstruation.[28] We also assessed adolescent depression using the Children's Depression Inventory (CDI).[29] The CDI evaluates feelings and ideas grouped into 27 items. Scores range from 0 to 54. Cronbach's α was 0 .73 for this section. We considered a cut-off score on the CDI of ≥20 to indicate depressed mood.[30 31]

Stress was measured using the validated Perceived Stress Scale-10 (PSS).[32 33] PSS scores range from 0 to 40, with a high score representing high social stress. Cronbach's α was 0.75. A score ≥20 was considered to indicate high stress.[31]

Statistical analysis

Data were cross-checked for consistency before final data entry using Microsoft Excel. One person entered the data and then cross-checked it with the principal investigator of the study. Descriptive analyses were conducted to determine the socio-demographic characteristics of the respondents. The household wealth index was used as a proxy indicator for household wealth status. The wealth index was constructed from existing data on a household's ownership of 15 assets and house construction materials as reported by the participants. Each asset was assigned a weight (factor score) generated through principle components analysis, and the resulting asset scores were standardised to a standard normal distribution with a mean of 0 and an SD of 1. Each household was then assigned a score for each asset, and the scores were summed by household. The sample was then divided into population tertiles: poor, middle and rich. We used McNemar's c^2 analyses as the same individuals are measured twice (before and after the survey) to evaluate the impact of an education programme on four recurrent themes of menstruation between baseline and follow-up: (1) knowledge and beliefs, (2) menstrual disorders experienced, (3) hygiene practices, and (4) menstruation behaviour and restrictions of the school-aged adolescent girls. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) V.18 (SPSS, Chicago, Illinois, USA). In all analyses, the level of significance was set at $p<0.05$ (two-tailed).

RESULTS

More than half of the respondents (52.4%) were 11–13 years old, 13.7% reported that their father had no education, and 11.8% reported that their mother had no education (table 1). Approximately 95% were Muslim and 41.8% reported there were six or more members in their household. Of 416 participants, 27.9% were defined as being poor, 34.6% as being moderately well-off, and 37.5% as being rich. Regarding house type, 17.1% reported they lived in a pakka (a house made of bricks), 14.4% in a half-pakka (where only the floor is made of brick), and 68.5% in a kacha house (no bricks were used to build the house) (table 1).

In the pre-test stage, 77.4%, 68.3% and 67.1% of the girls said that they knew how long a normal menstrual cycle lasted (between 21 and 35 days), that poor menstrual hygiene can predispose to infection, and that hygienic practices during menstruation can prevent menstrual pain. At follow-up, adolescents had significantly

Table 1 Socio-demographic characteristics of the participants (n=416)

Characteristic	Number (N)	Per cent (%)
Age (years)		
11–12	64	15.4
13	154	37.0
14+	198	47.6
Religion		
Muslim	394	94.7
Non-Muslim	22	5.3
Father's education		
No education	57	13.7
Incomplete primary	176	42.3
Complete primary	94	22.6
Secondary or higher	89	21.4
Mother's education		
No education	49	11.8
Incomplete primary	173	41.6
Complete primary	119	28.6
Secondary or higher	75	18.0
Household size		
2–4	116	27.9
5	126	30.3
6+	174	41.8
House type		
Pakka	71	17.1
Half-pakka	60	14.4
Kacha	285	68.5
Wealth index*		
Poor	116	27.9
Middle	144	34.6
Rich	156	37.5

*Constructed from data on household assets, including ownership of durable goods (such as televisions and bicycles) and dwelling characteristics, such as source of drinking water, sanitation facilities, and type of construction. We used principal components analyses to assign individual household wealth scores.
Pakka means brick-built, half-pakka means only the floor is made of brick, and kacha means no brick was used to construct the house.

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Table 2 Impact of menstrual educational programme on menstruation knowledge and beliefs (n=416)

Characteristics	Baseline		Follow-up		Percentage change	p Value
	N	Per cent	N	Per cent		
Duration of normal menstruation cycle	322	77.4	389	93.5	16.1	**0.002**
Poor menstruation hygiene predisposes to infection	284	68.3	398	95.7	27.4	**<0.001**
Good hygiene can prevent menstrual pain	279	67.1	391	94.0	26.9	**<0.001**
Menstruation blood is impure	279	67.1	399	95.9	28.8	**<0.001**
Proper sanitary products should be used for menstruation protection	241	57.9	339	81.5	23.6	**<0.001**
Cause of menstruation	334	80.3	353	84.8	4.5	0.886
Origin of menstrual blood	41	9.9	55	13.2	3.3	0.687
Age of normal cessation of menstruation	245	58.9	352	84.6	25.7	**<0.001**
Influence of hot or cold food on menses	273	65.6	358	86.1	20.5	**0.001**
As an indication of fertility (fecundity)	179	43.0	190	45.7	2.7	0.556
Knowledge and beliefs grading						
Poor (0–3)	120	28.8	7	1.7	−27.1	**<0.001**
Medium (4–7)	84	20.2	66	15.9	−4.3	
High (8–10)	212	51.0	343	82.4	31.4	

Bold typeface indicates significance level <0.05.

increased ($p<0.001$) their knowledge of these three items (93.5%, 95.7% and 94%). At follow-up, adolescents also mentioned that they now knew that menstrual blood was not impure (67.1% vs 95.9%) and that proper sanitary products should be used for menstrual protection (57.9% vs 81.5%). There was no statistically significant difference between baseline and follow-up regarding respondents' knowledge of the cause of menstruation, origin of menstrual blood, or that menstruation indicated fertility. However, during the follow-up period, adolescents significantly increased their knowledge regarding age at normal cessation of menstruation and the fact that hot and cold foods do not influence the menstrual cycle. Overall, significant improvement ($p<0.001$) was observed regarding adolescents' self-reported knowledge and beliefs scores at follow-up compared with baseline (51% vs 82.4%; table 2).

Regarding the absorbent used during menstruation, at baseline over 16% of participants mentioned that they used sanitary pads during menstruation, increasing to over 39% after the education programme. The frequency of changing pads/cloths per day and drying the absorbent outside in sunlight was higher at follow-up compared with baseline. No significant differences were observed in the storing of washed clothes between baseline and follow-up. Disposal of the absorbent by burial/burning or putting in a dustbin was significantly higher at follow-up compared with baseline. The was a significant improvement at follow-up compared to baseline in cleaning the genitalia every time the toilet was used or during bathing (table 3). However, no significant differences were observed in the material used to clean external genitalia between baseline and follow-up. Regarding hygienic practices, more participants stated that they practised good hygiene (88.9% vs 28.8%) at follow-up compared to baseline.

At baseline, 94.5% and 78.6% of girls reported that they had regular menstrual cycles and had experienced complications during menstruation. At follow-up, there was a significant improvement in the regularity of the menstrual cycle (99.5%; p=0.023) and fewer complications during menstruation (59.6%; p=0.003). As regards physiological symptoms, significantly fewer adolescents reported excessive bleeding and greasy skin at follow-up compared with baseline. Regarding dysmenorrhoea, significantly fewer adolescents reported abdominal pain and nausea and/or vomiting at follow-up. Regard psychological symptoms, there were significant differences in the amount of discomfort, stress and depression between baseline and follow-up. At follow-up, respondents stated that they were significantly more likely to consult someone for menstrual-related complications than at baseline (99.8% vs 90.8%; table 4). In the baseline survey, 45.4% reported that they did not visit relatives, friends or neighbours during menstruation and 7.7% reported that they did not attend school during menstruation (table 4). At follow-up, significant improvements were observed with regard to restrictions followed by the girls. However, there were no significant differences regarding restrictions on visits to holy places or doing household activities during menses.

DISCUSSION

To the best of our knowledge, this is the first study to evaluate the effect of a school-based educational intervention on the menstrual knowledge, beliefs and practices of adolescent girls in Bangladesh. The present study demonstrates that knowledge and beliefs regarding menstrual hygiene were low before implementation of the programme. After implementation, there was a significant increase in knowledge among the adolescents (51% vs 82.4%). This finding agrees with the results of other studies in Saudi Arabia and Egypt.[34 35]

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Table 3 Impact of menstrual educational programme on menstrual hygiene practices by adolescent girls (n=416)

Characteristics	Baseline		Follow-up		Percentage change	p Value
	N	Per cent	N	Per cent		
Absorbent used during menstruation						**0.003**
Sanitary pad	70	16.8	163	39.2	22.4	
New cloths	207	49.8	209	50.2	0.4	
Old cloths/other	139	33.4	44	10.6	−22.8	
Frequency of changing pad/cloths per day						**<0.001**
4+ times	35	8.4	321	77.2	68.8	
2–3 times	322	77.4	93	22.4	−55.0	
1 time	59	14.2	2	0.5	−13.7	
Drying of used absorbent						**<0.001**
Outside room in sunlight	78	18.8	401	96.4	77.6	
Inside room with sunlight	46	11.1	5	1.2	−9.9	
Inside/outside room without sunlight	292	70.1	10	2.4	−67.7	
Storing of washed cloths						0.077
Clean and covered place*	159	38.2	170	40.8	2.6	
Clean and open space†	104	25.0	85	20.4	−4.6	
Unclean and open/covered place‡	153	36.8	129	31.0	−5.8	
Method of disposal						**0.004**
Buried/burned/dustbin	235	56.5	341	82.0	25.5	
Latrine	65	15.6	49	11.8	−3.8	
Throw on road	116	27.9	26	6.2	−21.7	
Cleaning of genitalia						**0.005**
Every time use toilet	65	15.6	145	34.8	19.2	
During bathing	202	48.6	254	61.1	12.5	
Do not clean	149	35.8	17	4.1	−31.7	
Material used for cleaning of external genitalia						0.448
Water and antiseptic	30	7.2	45	10.8	3.6	
Soap and water	199	47.8	191	45.9	−1.9	
Only water/not cleaning	187	45.0	180	43.2	−1.8	
Practice grading						**0.012**
Poor (0–4)	60	14.4	3	0.7	−13.7	
Fair (5–8)	236	56.8	43	10.3	−46.5	
Good (9+)	120	28.8	370	88.9	60.1	

*Suitcase, box, and cupboard.
†Store room, anywhere in the room, under a cushion, under the bed, behind the door, in the washroom.
‡Gallery, under the kitchen roof, anywhere in the room, under a cushion, under the bed, behind the door, in the washroom.

Hygienic practices during menstruation are very important as poor hygiene affects health by increasing vulnerability to infections of the urinary tract and perineum,[4] and the reproductive tract.[36] In this study, only 22.4% of girls used pads even after the health intervention. The remainder used poor quality cloths dyed with toxic pigments, which might make them susceptible to uterine pain. The girls also dry the cloths inside the house, which also might have effects. Good hygiene, such as the use of sanitary pads and adequate washing of the genital area, is essential during menstruation.[4–6] Girls of reproductive age need access to clean and soft absorbent sanitary products, which protects their health in the long run. In the present study, during the pre-intervention phase, only 28.8% of adolescents had good hygiene practices. In the post-intervention phase, there was a significant improvement in good menstrual practices (60.1%). Various studies have shown that health education increases knowledge and positive attitudes towards puberty as a natural physiological phenomenon.[37]

Regarding menstrual disorders among adolescent girls, in the pre-intervention phase, 10.6% and 6.7% of the adolescents reported excessive bleeding and greasy skin, respectively. After implementation of the programme, there was a significant reduction in such disorders. Dysmenorrhoea is a very common problem among adolescent girls and affects their quality of life. In the pre-intervention phase, 61.5% and 4.6% of adolescents experienced abdominal pain, and nausea and vomiting, respectively, which findings are similar to the results of a study in Egypt.[35 38] Dysmenorrhoea (pain during menses) was reported by most students in this study, with 59.8% reporting severe pain followed by back ache and fatigue, corresponding to the findings of a study carried out among Malaysian school girls in 2009.[39] The use of oral contraceptives and hot drinks, respectively, may suppress ovulation and help reduce menstrual fluid prostaglandin activity levels which are responsible for dysmenorrhoea. Moreover, regular exercise can induce amenorrhoea and may decrease dysmenorhoea.[40]

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Table 4 Impact of menstrual educational programme on menstrual disorders, behaviours and restrictions (n=416)

Characteristics	Baseline		Follow-up		Percentage change	p Value
	N	Per cent	N	Per cent		
Menstrual disorders experienced						
Regularity of menstruation	393	94.5	414	99.5	5.0	**0.023**
Complications during menstruation	327	78.6	248	59.6	−19.0	**0.002**
Types of complications during menstruation						
Physiological symptoms						
Excessive bleeding	44	10.6	13	3.1	−7.5	**<0.001**
Headache	32	7.7	28	6.7	−1.0	0.789
Increase appetite	26	6.2	18	4.3	−1.9	0.297
Greasy skin	28	6.7	6	1.4	−5.3	**0.002**
Dysmenorrhoea						
Pain in abdominal/groin/lumbar region	256	61.5	219	52.6	−8.9	**0.012**
Psychological symptoms	35	8.4	13	3.1	−5.3	**0.025**
Discomfort	22	5.3	3	0.7	−4.6	**0.032**
High stress*	16	3.8	6	1.4	−2.4	0.052
Irritability	18	4.3	3	0.7	−3.6	**0.044**
Depression†						
Consult with someone for menstruation-related complications	378	90.8	415	99.8	9.0	**0.003**
Behaviours and restrictions						
Visit relatives, friends and neighbours during menses						**0.002**
No	189	45.4	110	26.4	−19.0	
Yes	227	54.6	306	73.6	19.0	
Do household activities during menses						0.438
No	94	22.6	85	20.4	−2.2	
Yes	322	77.4	331	79.6	2.2	
Attend school during menses						**0.019**
No	32	7.7	11	2.6	−5.1	
Yes	384	92.3	405	97.4	5.1	

*A cut-off score of ≥20 was considered to indicate high stress.
†A cut-off score of ≥20 was considered to indicate depressed mood.

Regarding psychological symptoms, discomfort and stress were also significantly reduced at follow-up. Also at follow-up, the girls were more likely to consult someone about menstrual-related complications than at baseline (99.8% vs 90.8%).

This study also demonstrated that respondents reported significant improvements in the regularity of their menstrual cycles at follow-up, possibly because they had significantly improved their knowledge, beliefs and menstrual hygiene practices. Other studies also suggest clear links between poor menstrual hygiene and vaginal scabies, abnormal discharge, and urinary and reproductive tract infections.[41] These infections can upset the balance of hormones and cause irregular bleeding.[42] In addition, participants' discomfort and stress also decreased significantly after the health intervention. Previous studies have shown that when a woman is stressed, her adrenal glands secrete the hormone cortisol, which may disrupt normal hormone function and cause irregular bleeding.[43]

During the pre-intervention phase, 45.4% of the girls reported that they did not visit relatives, friends or neighbours during menstruation, and 7.7% reported that they did not attend school during menstruation. Significant improvements were observed regarding these restrictions at follow-up. However, no significant differences were observed regarding restrictions on visits to holy places or doing household activities during menstruation. These findings demonstrate that socio-cultural beliefs and taboos regarding menstruation are still widespread. Restrictions on menstruating women were also described in an Indian study[5] which reported that girls do not perform housework during menstruation.

This intervention study has several important findings and insights for adolescent girls. However, it also has some limitations. First, the findings in this study were based on self-reported outcomes and may therefore differ from actual behaviour. Adolescents may have over-reported their use of good menstrual hygiene in order to satisfy the interviewer. However, all the participants joined the health education session regularly. Second, information about complications was obtained from participants and not from medical records due to time and budget constraints, and so bias may have affected the reliability of the data. However, our RAs were trained by physicians to collect such information in a reliable manner. Third, although adolescents who experienced pain in the abdominal, groin and lumbar regions on the

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day before or the first day of menstruation, were considered to have dysmenorrhoea in this study, we did not assess the degree of pain using a pain scale. In future, we will certainly consider doing this. Also, this study concluded that education on menstruation helps to make the menstrual cycle more regular. However, this may have been due to the fact that the girls matured during the study and their cycles naturally became more regular. A study with a control group of girls of a similar age would be helpful to settle this issue.

Finally, although all possible efforts were made to standardise the educational intervention, it is possible that environmental factors such as differences in the abilities of RAs and their ability to disseminate study messages affected the outcome of the study. Despite such limitations, the results of the study provide important findings for policy makers seeking to improve adolescent reproductive health in Bangladesh.

CONCLUSIONS AND RECOMMENDATION

These results demonstrate the feasibility of implementing a health education programme on menstrual hygiene in secondary schools serving rural Bangladesh. The programme produced significant positive changes in knowledge, beliefs, menstrual hygiene practices, experience of disorders, and restrictions on menstruating adolescents. More intense or longer interventions may be needed to significantly improve good menstrual hygiene practice in this population. Taking into account the health implications and prevailing socio-cultural and economic factors, effective strategies should be implemented to persuade adolescent school girls to adopt healthy menstrual practices. A well-informed continuous, school education programme should be delivered to students. In addition, the findings emphasise that information on safe hygiene and sanitary practices should be included in the school curriculum, and that there should be better communication between female students and their teachers, and between daughters and mothers.

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Acknowledgements The authors would like to thank all participants, teachers and education officers who helped with this research. We also thank Dr Nowsheen Sharmin Purabi, Registrar in Obstetrics and Gynaecology at Anwer Khan Medical College, Dhaka, Bangladesh for her training of, and support for, the research assistants, which made this research possible.

Contributors SEH and KS develop the proposal and implemented the study. KI and MM were involved in the field study. MR and SEH carried out the analyses and wrote the manuscript. All authors checked and approved the final manuscript.

Funding This study was funded by the Honjo International Scholarship Foundation, Japan.

Competing interests None.

Patient consent Obtained.

Ethics approval The Bangladesh Medical Research Council approved this study.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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BMJ Open 2014 4:
doi: 10.1136/bmjopen-2013-004607

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