

Attitudes and Conceptions of Menstruation and Menstrual Hygiene among Schoolgirls (Morocco)

Conceptions et attitudes liées à la menstruation et à l'hygiène menstruelle chez une population de filles scolarisées (Maroc)

S. Lghoul · M. Loukid · M. Kamal Hilali

Received: 21 August 2018; Accepted: 12 March 2019
© Société d'Anthropologie de Paris et Lavoisier SAS 2019

Abstract Menstruation is an important part of a girl's life, and inadequate knowledge about this process can have an impact on reproductive health. Menstrual hygiene is the aspect given the most importance in health education for girls. A descriptive cross-sectional study was conducted in Marrakesh among a population of schoolgirls. A total of 364 schoolgirls 12–20 years of age and attending middle and high schools were randomly selected to participate in the study. The data were collected anonymously in direct confidential interviews and analysed with SPSS.21. Our descriptive findings show that many of the girls lacked adequate knowledge about the origin of menstrual blood (54.7%) and about the physiological cause of menstruation (77.2%). More than half of the respondents (69.2%) reported a negative reaction to their first menstruation. There was a significant correlation between their knowledge about menstruation and the education level of both their mothers ($P < 0.001$; $X^2 = 25.15$) and fathers ($P < 0.001$; $X^2 = 26.01$). We conclude that the girls had misconceptions about some physiological menstrual traits but that their menstrual hygiene was generally sound.

Keywords Menstruation · Attitude to menarche · Menstrual hygiene · Schoolgirls · Knowledge and practices · Health education

Résumé La menstruation constitue une phase importante dans la vie de toutes jeunes filles. Cependant, une connaissance insuffisante sur le processus menstruel peut avoir un impact sur la santé reproductive. L'hygiène menstruelle est aussi l'un des aspects qui nécessitent la plus grande importance dans l'éducation à la santé des filles. Une étude trans-

versale descriptive a été menée à Marrakech auprès d'une population de filles scolarisées. Au total, 364 filles âgées de 12 à 20 ans, et fréquentant des collèges et des lycées, ont été sélectionnées au hasard pour participer à l'étude. Les données ont été collectées anonymement lors d'entretiens confidentiels directs, et l'analyse statistique des données a été assurée par SPSS.21. Nos résultats descriptifs montrent que beaucoup de jeunes filles n'avaient pas une connaissance suffisante concernant l'origine du sang menstruel (54,7 %) et la cause physiologique de la menstruation (77,2 %). Plus de la moitié des participantes (69,2 %) ont signalé une réaction négative vis-à-vis de leurs premières règles. Il y avait une corrélation significative entre les connaissances des participantes sur les menstruations et le niveau d'instruction de leur mère ($p < 0,001$; $X^2 = 25,15$) et de leur père ($p < 0,001$; $X^2 = 26,01$). Nous concluons que les participantes à notre étude avaient des conceptions fausses sur certains traits de la physiologie des menstruations, mais leur hygiène menstruelle était généralement bonne.

Mots clés Menstruations · Attitude face à la ménarche · Hygiène menstruelle · Filles scolarisées · Connaissances et pratiques · Éducation à la santé

Introduction

Adolescence in girls is usually considered as a phase of transition from girlhood to womanhood and is marked by the onset of menarche. In some societies, menstruation is largely treated as a taboo and rarely discussed in public [1]. Menstruation is often considered as shameful, which is why most girls are not well informed about the menarche and menstrual hygiene. Therefore, the onset of menarche is not always a happy event for girls. We found that the feelings of fear, shame and guilt experienced by girls with the onset

S. Lghoul (✉) · M. Loukid · M. Kamal Hilali
Laboratory of Human Ecology, Faculty of Sciences Semlalia,
University of Cadi-Ayyad, Marrakech, Morocco
e-mail : siham48lghoul@gmail.com

of menarche were due to lack of prior information about menstruation [2].

Managing menstrual hygiene is an everyday challenge for adolescent girls, especially in developing countries. They may have difficulties in understanding hygienic practices associated with menstruation because of the unhealthy and unsound practices associated with it [3]. However, poor menstrual hygiene can also be related to inadequate sanitary facilities and to unsound practice during menstruation [4]. Observing good practice during menstruation requires females, especially adolescents, to be psychologically prepared to help them feel in control over the physiological changes they will experience. They therefore need adequate knowledge about menstruation, the menstrual cycle and menstrual hygiene even before they attain menarche [5].

Menstruation requires material resources to be available to absorb or collect menstrual blood, facilitate personal hygiene and dispose of waste, ideally with adequate privacy [6].

Women and girls of reproductive age need access to clean, soft and absorbent sanitary products that can protect their health in the long run [7]. The lack of suitable sanitary pads can have a damaging effect on the reproductive health of girls and women. Pads come in different sizes, thicknesses and styles depending on menstrual flow, and should be changed at least every 3–4 hours, regardless of the amount of staining, for comfort and to prevent odour [8].

Learning about hygiene during menstruation is a vital aspect of health education for adolescent girls, because patterns that are developed in adolescence are likely to persist into adult life [9]. When girls can manage menstruation at school in supportive environments, they report that they are less likely to be absent and can concentrate better in class, potentially improving their educational experience [10–13].

In our country, not enough scientific research is being undertaken on health education topics, especially those related to reproductive health. This study aimed to identify conceptions among schoolgirls of some of the physiological traits of menstruation and to assess their attitudes towards menarche and menstrual hygiene. To our knowledge, this is the first study in Morocco evaluating both conceptions of menstruation and attitudes to menstrual hygiene among schoolgirls.

Method

The authors obtained ethical permission to conduct a cross-sectional study in schools (from February to May 2017) from State educational institutions (Regional Academy of Teaching and Education and the Regional Directorate for Teaching and Education), as well as permission from the school principals. The study was conducted in five different

randomly chosen public middle and secondary schools in the urban area of Marrakesh, with a sample of 364 postmenarcheal schoolgirls of 12–20 years of age, who agreed to participate in the study (consent required). They had responded voluntarily to a call for participants, and their anonymity was ensured by assigning a code number to each, to be used in the analytical process. All the participants were informed about the procedure and aims of the study and were assured that all information obtained would be confidential and secure. The questionnaire was supplemented by an interview during their physical activities class after obtaining approval from the teachers, who were in turn informed about the procedure and aims of the study.

To determine the mean age at menarche, the participants were asked to recall at what age they began menstruating (retrospective method). The statistical analysis was performed with SPSS (version 21). We performed a descriptive analysis (frequencies and percentage) and applied the Chi-square test and Pearson correlation to assess associations between variables.

Results

The mean of ages and ages at menarche of the respondents were, respectively, 16.65 ± 1.83 years and 12.89 ± 1.34 years. Table 1 shows that 79 (21.7%) of the respondents' fathers had graduated from higher education and 49 (13.5%) were illiterate. In addition, 104 of the respondents' mothers were illiterate but 74 (20.3%) had attended higher secondary school. Regarding occupations, 293 (80.5%) of the mothers were housewives, 30 (8.2%) were traders and 28 (7.7%) were workers. We found that 266 (73.1%) of the respondents lived in a nuclear family, and 103 (28.3%) of the girls said they had their own bedroom.

Their knowledge about menstruation was revealed from their answers to a questionnaire (Table 2). Only 104 (26.6%) of girls had been prepared for their menarche. We found that 162 (40%) were frightened when they experienced their first menstruation. When asked about the causes of menstruation and the origin of menstrual blood, 281 (77.2%) of the girls said they had no idea of the former and 199 (54.7%) did not know where their menstrual blood came from. We found that 29 (8%) of the girls believed that menstrual blood comes from cleansing the body, and that 99 (27.2%) of the girls declared that menstrual blood comes from the uterus.

Regarding knowledge about menstruation among these adolescent schoolgirls, half of the girls (51.9%) had information about menstruation, their main sources of information (Fig. 1) being textbooks (36%), mothers (27.7%) and the Internet (18.2%).

Regarding menstrual hygiene (Table 3), 300 (93.1%) of the respondents used sanitary pads, and 160 girls (44%)

Table 1 Some socio-demographic characteristics of the adolescent schoolgirls in our study / <i>Quelques caractéristiques socio-démographiques des participantes</i>		
	No.	%
Mother's level of education^a		
Illiterate	104	28.6
Koranic	14	3.8
Primary	62	17
Secondary	50	13.7
Higher secondary	74	20.3
Higher education	39	10.4
Father's level of education^b		
Illiterate	49	13.5
Koranic	16	4.4
Primary	52	14.3
Secondary	56	15.4
Higher secondary	59	16.2
Higher education	79	21.7
Mother's occupation^c		
Housewife	293	80.5
Unemployed	2	0.5
Artisan, worker, labourer	28	7.7
Civil servants and employees	30	8.2
Managers and independent professionals	5	1.4

^a 21 girls did not know their mother's level of education
^b 53 girls said they did not know their father's level of education
^c 2 of the girls' mothers girls were retired and 4 girls did not know their mother's job

checked the absorbent material before use. In addition, 175 (48.1%) of the respondents said they changed their absorbent material frequently, but 147 (40.4%) only changed it when it was saturated. Almost all the girls (99.2%) washed their hands after changing their absorbent material, using soap and water.

More than half of the respondents (59.6%) said they bathed during menstruation, but more than one-third of the girls (40.1%) did not. Figure 2 shows that the most common reason preventing girls from taking a shower was that doing so worsened their menstrual cramps (42.1%). When asked about the type of products they used for their intimate hygiene during menstruation, most (65.6%) said they used soap and water.

We wanted to know if the respondents had any idea about the possible effects of poor menstrual hygiene on health. The majority answered that poor menstrual hygiene could cause infections (31.1%), local inflammations (27.8%) and allergies (20.9%), while a small percentage (2.7%) considered that poor menstrual hygiene had no effect on health.

Table 2 Information about menarche and perceptions of menstruation / <i>Informations des participantes sur la ménarche et leurs perceptions à propos de la menstruation</i>			
	Frequency	%	
Attitude towards menarche			
Positive	112	30.8	
Negative	252	69.2	
Reaction to the first menses^a			
Undesirable event	34	8.4	
Happy	21	5.2	
Frightened	162	40	
Worried and stressed	21	5.2	
Normal event	90	22.2	
Shocked	16	4	
Cause of menstrual bleeding			
Hormonal activity	16	4.4	
Microbial activity	15	4.1	
Burs of the blood vessels	2	0.5	
Excess of blood in the body	1	0.3	
Sickness cure	1	0.3	
Toxic blood	17	4.7	
Disease	2	0.5	
Body cleansing	29	8	
Don't know	281	77.2	
Origin of menstrual blood			
Heart	1	0.3	
Hymen	3	0.8	
Genital organs	1	0.3	
Ovary	31	8.5	
Ovum	17	4.7	
Placenta	2	0.5	
Wound	1	0.3	
Stored blood	2	0.5	
Uterus	99	27.2	
Vagina	7	1.9	
Belly	1	0.3	
Don't know	199	54.7	
Preparation for menarche			
Yes	104	28.6	
No	260	71.4	
Information about the menstrual cycle			
Yes	189	51.9	
No	175	48.1	

^a Multiple responses

Table 4 shows a correlation association between selected variables and knowledge about menstruation among the respondents. There was a statistically significant association between having knowledge about menstruation and the level of education of the parents (mothers: $P < 0.001$; $\chi^2 = 25.15$;

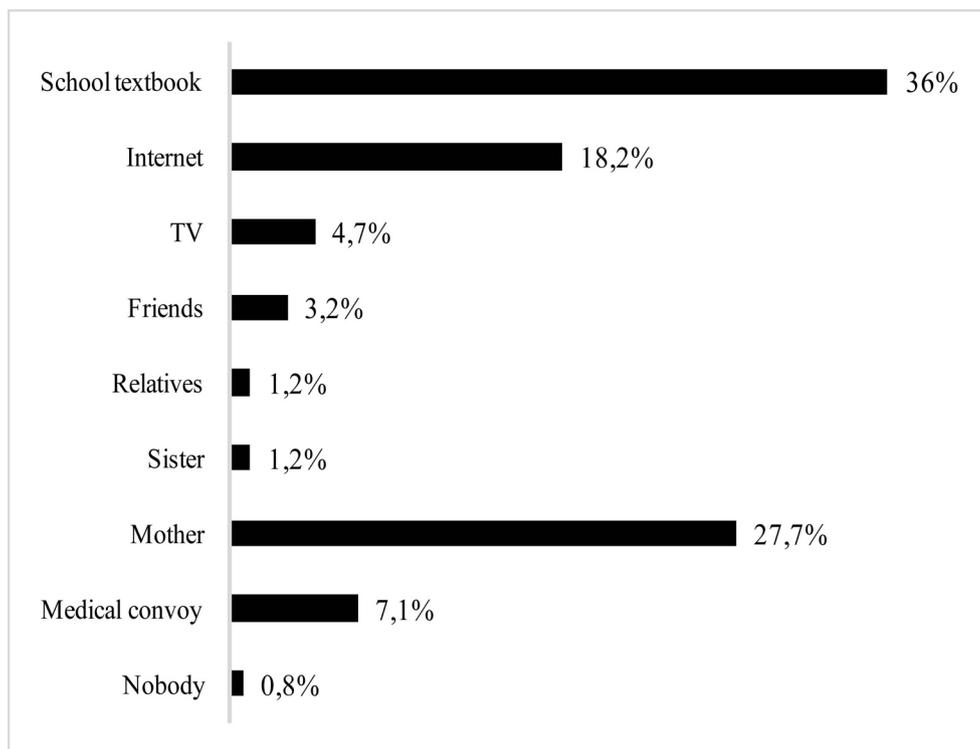


Fig. 1 Sources of knowledge about menstruation among the adolescent schoolgirls / *Différentes sources de connaissances sur les menstruations auprès des adolescentes scolarisées*

fathers: $P < 0.001$; $X^2 = 26.01$), the age of the girls ($P < 0.05$; $X^2 = 11.07$) and their education level ($P < 0.001$; $X^2 = 34.05$). Table 5 shows the associations between selected variables and attitudes towards menarche. We note that girls who began to menstruate early developed more negative attitudes ($P < 0.05$). However, girls who had been prepared for their menarche were more likely to develop positive attitudes towards it ($P < 0.001$). In this case, the girls' ages and knowledge had no influence on the attitudes they developed ($P > 0.05$).

Discussion

This study explores attitudes towards menstruation and menstrual practices among Moroccan schoolgirls. Menstruation is an essential part of a woman's life [14]. The age at menarche we found was lower by 0.84 years compared to a previous study conducted in Marrakesh [15]. This can be explained by improved nutritional, socio-economic and health conditions among the population. In recent years, Morocco has experienced major cultural and socio-economic changes and intense urbanisation [16]. The age found in our study is also lower than the 13.5 years found by a study in another city of Morocco more a decade ago [17]. Compared to other studies

conducted among a population of adolescent girls, the menarcheal age in our study was found to be higher than those reported in Saudi Arabia (12.46 years) [18], Egypt (12.49 years) [19], France (12.50 years) [20] and Iran (12.60 years) [21], and relatively similar to the age found in Spain (12.83 years) [22], but appears to be lower than the ages reported in Jordan [23] and Uganda [24], respectively, 13.10 and 13.30–13.60 years. This difference could be attributed to various factors that may be genetic, socio-economic or nutritional [25].

In this study, the majority of the girls reported that they were not prepared for their first menstruation, a finding consistent with another study conducted in Jordan, which found that 82.4% of schoolgirls were not adequately prepared before menarche [26]. Parents are embarrassed to speak about menstruation with their daughters at home. This study showed that most of the girls had experienced different negative reactions on seeing their first menstrual blood. Other studies have shown various negative reactions in girls towards their menarche: they felt ashamed [2], irritated or disgusted [27–29]; upset or tense [30], frightened [27–29] and guilty [2, 29]. In this study, the authors found a negative correlation between age at menarche and a girl's attitude towards her first menstruation. This result is supported by other studies that also found that age at menarche was

Table 3 Hygiene during menstruation / <i>Hygiène durant les menstruations</i>		
Absorbent material used during menstruation^a		
Sanitary pads	269	59.6
Fabric	31	6.9
Diapers	151	33.5
Checking of absorbent material		
Yes	160	44
No	204	56
Changing the absorbent material^a		
Once saturated	147	40.4
Appearance of stains on clothing	10	2.7
Release of odour	4	1.1
Frequently (every 4 hours)	175	48.1
Feeling of discomfort	26	7.1
Hands washing after changing absorbent material		
Yes	361	99.2
No	3	0.8
Bathing during menstruation		
Yes	217	59.6
No	147	40.4
Intimate hygiene during menstruation^a		
Water only	84	23.5
Water and soap	235	65.6
Pharmaceutical product	30	8.4
Toilet paper	3	0.8
Water and lavender	4	1.1
Water and salt	2	0.6
Effect of poor menstrual hygiene^a		
Local inflammation	136	27.8
Allergy	102	20.9
Infection	152	31.1
Disease	79	16.2
No effect	13	2.7
Don't know	7	1.4
^a Multiple responses		

negatively associated with the attitude of girls towards menstruation [31–32]. These studies found that girls' ages at the time of the surveys were also negatively associated with their attitudes towards menstruation, which is different from our result. Our study also found that girls who reported being adequately prepared for their menstruation had more positive attitudes towards their menarche. This result concurs with other studies that found girls who were better prepared had more positive initial experiences of menstruation [26,31–34]. However, knowledge about menstruation had no effect on the girls' attitudes towards their first menstua-

tion. Even when an adolescent girl has some knowledge, she will not be well prepared for menstruation if her knowledge is inadequate or inaccurate. The majority of our respondents did not have adequate knowledge about menstruation, especially about the cause of menstruation and the origin of menstrual blood. This is supported by other studies conducted in other developing countries [35,36]. This finding is related to the absence of communication about menstrual health in homes and schools, for many cultural and educational reasons: girls are usually ashamed and embarrassed to talk about their menstruation, especially with her family: they feel shy and uneasy because it is considered to be a very personal and private matter.

Girls tend to receive information about menstruation from several sources, including parents (especially mothers), school friends and the media. Despite the variety of sources of information, girls often report that the education they receive does not adequately prepare them for menstruation [37]. In our study, school textbooks were the main source of knowledge about menstruation, followed by mothers and the Internet. This differs from some other studies where mothers were found to be the main source of knowledge about menstruation [36,38–40]. The inadequacy of knowledge even when school textbooks are the most common source of information can be explained by the fact that educational practices often provide girls only with basic biological information, such as the role of the ovarian and menstrual cycles in reproduction [41]. However, the higher the socio-economic category of her family, the more information a girl will receive about menstruation. This can be explained by the associated increase in a girl's knowledge about the reproductive system and its functions. We also noted that girls whose parents had achieved a high level of education were most likely to acquire information about menstruation. This finding is consistent with other studies that have found knowledge about menstruation in girls to be influenced by their parents' level of education [38,42].

We were saddened to find that the majority of our respondents had no idea of the causes of menstruation and the origin of menstrual blood. Those who said they knew the origin of menstrual blood and the cause of menstruation actually had misconceptions about these points, with only 16 (4.4%) considering hormonal activity to be the origin of menstruation and 99 (27.2%) being aware that menstrual blood comes from the uterus. Again, this result concurs with those of other studies that have highlighted considerable lack of knowledge about the physiological aspects of menstruation [5,23,39,43–45]. In this study, the girls' attitudes to menstrual hygiene were generally sound: 93.1% used absorbent sanitary material, which none of them reused. We noted that many of the girls checked the date of expiry and the quality of their absorbent material before using it.

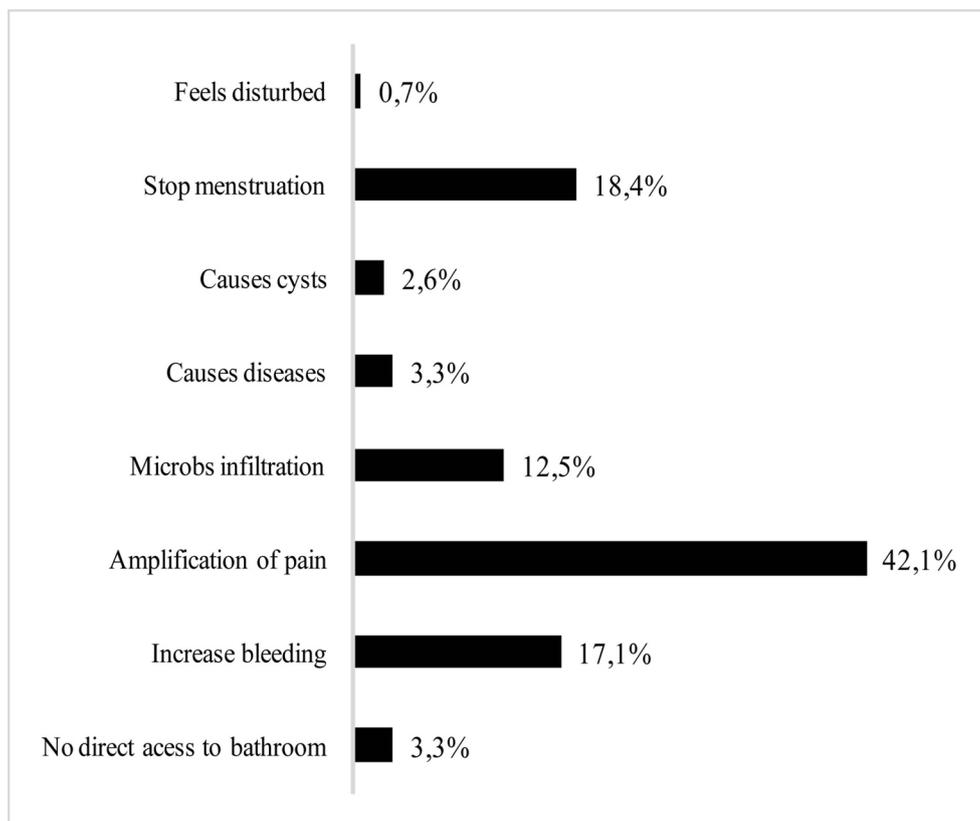


Fig. 2 Reasons for not bathing during menstruation among the adolescent schoolgirls / *Raisons pour lesquelles les adolescentes se privent du bain lors des menstruations*

Almost all the respondents washed their hands with soap and water after changing the absorbent material. Bathing after menstruation was self-evident for all of the girls because it is a religious obligation but only 59% said they bathed during menstruation. Those who did not bathe during menstruation said that doing so worsened menstrual cramps, caused retention of menstrual blood, increased the menstrual flow and could favour the infiltration of microbes. Similarly, adolescents in Egypt stated that bathing could cause retention of menstrual blood while a hot shower could increase bleeding [8], and in a study conducted in Saudi Arabia, girls abstained from showering during menstruation as they believed it might stop the menstrual flow or increase the intensity of cramps [46].

Conclusion and Recommendation

Overall, this study showed that most of the girls had sound hygienic practices and were aware that poor menstrual hygiene could have adverse effects on health. However, we identified two main problems: poor knowledge about the physiology of menstruation and inadequate preparedness of

premenarcheal girls for their first menstruation. The following recommendations are made for these reasons:

- because school textbooks are the main source of information, instruction on the physiological traits of menstruation and hygienic practice must be improved by including them in school programmes, in the natural sciences curriculum or even as an integral part of school activities for girls;
- parents, especially mothers, should have sound knowledge about menstruation: it is therefore advisable for them to increase their knowledge on the menstrual cycle to ensure that their daughters are adequately prepared for the onset of menarche;
- sensitive programmes should be developed by the media to explain the physiology and psychology of menstruation in accessible language that is easily understood by girls and their mothers.

Acknowledgements The authors are very grateful to all the girls who participated in this study. They also thank the Regional Academy for Teaching & Education, the Regional Directorate for Teaching & Education and the principals of the schools visited

Table 4 Association between selected variables and knowledge about menstruation / *Association entre les connaissances des participantes sur les menstruations et certaines variables sélectionnées*

	Knowledge about menstruation		X^2
	Yes	No	
Mother's level of education ^a			
Illiterate	45	59	$X^2 = 25.15$
Koranic	8	6	$P < 0.001$
Primary	26	36	
Secondary	22	28	
Higher secondary	55	19	
Higher education	26	13	
Father's level of education			
Illiterate	16	33	$X^2 = 26.01$
Koranic	7	9	$P < 0.001$
Primary	17	35	
Secondary	34	22	
Higher secondary	37	22	
Higher education	52	27	
Girl's level of education ^b			
Seventh year	7	21	$X^2 = 34.05$
Eighth year	9	24	$P < 0.001$
Ninth year	8	23	
CC	47	28	
First-year baccalaureate	44	35	
Second-year baccalaureate	74	44	
Age (years)			
12–13	11	29	$X^2 = 11.07$
14–15	45	40	$P < 0.05$
16–17	82	68	
≥ 18	51	38	

^a There is a statistically positive correlation between a girl's mother's level of education and her father's level of education ($P < 0.01$)

^b 7th, 8th and 9th are successively the three first years in secondary school. Common core (CC) is the prepared year for baccalaureate that lasts two years (first and second year)

Table 5 Association between selected variables and attitude towards menarche / *Association entre les attitudes des participantes vis-à-vis de la ménarche et certaines variables sélectionnées*

	Whole sample	Attitude towards menarche		P value
		Negative	Positive	
Age ± SD	16.65 ± 1.83	16.63 ± 1.9	16.70 ± 1.69	$P = 0.723$
Age at menarche ± SD	12.89 ± 1.34	12.76 ± 1.29	13.19 ± 1.42	$P < 0.05^a$
Prepared for menarche				
Yes	104	47	57	$P < 0.001^a$
No	260	205	55	
Knowledge on menstruation				
Yes	189	133	56	$P = 0.353$
No	175	119	56	

^a Statistically significant result

Conflicts of interest: The authors do not have any conflict of interest to declare.

References

- House S, Maho T, Cavill S (2012) Menstrual hygiene matters: a resource for improving menstrual hygiene around the world. Wateraid, Londres, RU, 347 p
- Oche M, Umar A, Gana G, et al (2012) Menstrual health: the unmet needs of adolescent girls' in Sokoto. Nigeria Sci Res Essays 7:410–18
- Fakhri M, Hamzehgardeshi Z, Golchin N, et al (2012) Promoting menstrual health among Persian adolescent girls from low socio-economic backgrounds: a quasi-experimental study. BMC Pub Health 12:193
- Ramaswamy D (2011) Relation between poor menstrual practices and cervical cancer. Indian Institute of Biotechnology. South Healthcare 10:57
- Lawan U, Nafisa W, Musa A (2010) Menstruation and menstrual hygiene amongst adolescent school girls in Kano Northwestern Nigeria. Afr J Reprod Health 14:201–7
- Sahin M (2015) Tackling the stigma and gender marginalization related to menstruation via WASH in schools' programmes. Waterlines 34:3–6
- Singh MM, Devi R, Gupta SS (1999) Awareness and health seeking behaviour of rural adolescent school girls on menstrual and reproductive health problems. Indian J Med Sci 53:439–43
- El-Gilany AH, Badawik K, El-fedawy S (2005) Menstrual hygiene among adolescent school girls in Mansoura, Egypt. Reprod Health Matters 13:147–52
- Narayan KA, Srinivasa DK, Pelto PJ, et al (2001) Puberty rituals, reproductive knowledge and health of adolescent schoolgirls in South India. Asia Pac Popul J 16:225–38
- McMahon SA, Winch PJ, Caruso BA, et al (2011) The girl with her period is the one to hang her head: reflections on menstrual management among schoolgirls in rural Kenya. BMC Int Health Hum Rights 11:1–10
- Montgomery P, Ryus CR, Dolan CS, et al (2012) Sanitary pad interventions for girls' education in Ghana: a pilot study. PLoS One 7:48274
- Mason L, Nyothach E, Alexander K, et al (2013) We keep it secret, so no one should know: a qualitative study to explore young schoolgirls attitudes and experiences with menstruation in rural western Kenya. PLoS One 8:e79132
- Trinies V, Caruso B, Sorgore A, et al (2015) Uncovering the challenges to menstrual hygiene management in schools in Mali. Waterlines 31:31–40
- Moronkola OA, Uzuegbu VU (2006) Menstruation: symptoms, management and attitude of female nursing students in Ibadan, Nigeria. Afr J Reprod Health 10:84–9
- Loukid M, Baali A, Hillali MK (1996) Secular trend in age at menarche in Marrakech (Morocco). Ann Hum Biol 23:333–5
- General Census of Population and Housing in Morocco (2014) High Commissioner for Planning, Morocco, 184p Available from: <https://www.hcp.ma/>
- Naber N, Amahdar L, Montero P, et al (2004) L'âge des premières règles dans deux populations de jeunes écolières de la province des Doukkala (Maroc) : aspects socio-économiques et comportementaux [Age of first menses in two populations of schoolgirls in Doukkala Province (Morocco): socio-economic and behavioral aspects]. Antropo 7:163–70 [French]
- Al Harbi K, Al-Qahtani MM, Yousef G, et al (2018) Age at menarche among school adolescents' girls in Saudi Arabia: environmental factors. J Family Med Prim Care 7:1197–202
- Abdel Hameed M, Shawkat M, Alsayed MA, et al (2017) Menstrual pattern and factors affecting among Egyptian adolescent females. Am J Sci 13:51–4
- Lalys L, Pineau JC (2014) Age at Menarche in a group of French schoolgirls. Pediatr Int 56:601–4
- Khoshnevisal P, Sadeghzadeh M, Mazloomzadeh S, et al (2017) Age at menarche and its related factors among school girls, in Zanjan, Iran. Int J Pediatr 5:4755–62
- Cabanes A, Ascunce N, Vidal E, et al (2009) Decline in age at menarche among Spanish women born from 1925 to 1962. BMC Pub Health 9:449
- Bata MS (2012) Age at menarche, menstrual patterns, and menstrual characteristics in Jordanian adolescent girls. Int J Gynaecol Obstet 119:281–3
- Mpora BO, Piloya T, Awor S, et al (2014) Age at menarche in relation to nutritional status and critical life events among rural and urban secondary school girls in post-conflict Northern Uganda. BMC Women's Health 14:66
- 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:e108644
- Jarrah SS, Kamel AA (2012) Attitudes and practices of school-aged girls towards menstruation. Int J of Nurs Pract 18:308–15
- Prateek S, Saurabh R (2011) A cross-sectional study of knowledge and practices about reproductive health among female adolescents in an urban slum of Mumbai. J Fam Reprod Health 5:117–24
- Abhay B, Naveeta K (2010) A cross-sectional study on awareness regarding safe and hygienic practices amongst school going adolescent girls in rural area of Wardha district, India. Global J Health Sci 2:225–31
- Deo S, Ghattargi H (2005) Perceptions and practices regarding menstruation: a comparative study in urban and rural adolescent girls. Indian J Community Med 30:1
- Adhikari P, Kadel B, Dhungel S, et al (2007) Knowledge and practice regarding menstrual hygiene in rural adolescent girls of Nepal. Kathmandu University Med J 5:382–6
- Hong KJ, Park YS, Kim JE, et al (1998) Transcultural differences on perimenstrual discomforts, menstrual attitudes and sex role acceptance between Korean and American college students. J Korean Acad Nurs 28:233–43
- Eswi A, Helal H, Elarousy W (2012) Menstrual attitude and knowledge among Egyptian female adolescents. J Am Sci 8:555–65
- Kim HJ (2005) Study on an attitude toward menstruation, perimenstruation and coping of nursing students. Korean J Women Health Nurs 11:288–95
- Marvan ML, Cortes-Iniestra S, Gonazalez R (2005) Beliefs about and attitudes toward menstruation among young and middle-aged Mexicans. Sex Roles 53:273–9
- Allah ASE, Elsabagh MEE (2011) Impact of health education intervention on knowledge and practice about menstruation among female secondary school students in Zagazig City. Am J Sci 7:737–47
- Sadiq MA, Salih AA (2013) Knowledge and practice of adolescent females about menstruation in Baghdad. J Gen Pract 2:138
- Koff E, Rierdan J (1995) Preparing girls for menstruation: recommendations from adolescent girls. Adolescence 30:795
- Fehintola FO, Fehintola AO, Aremu AO, et al (2017) Assessment of knowledge, attitude and practice about menstruation and menstrual hygiene among secondary high school girls in Ogbomoso, Oyo state, Nigeria. Int J Reprod Contracept Obstet Gynecol 6:1726–32

39. Rabiepoor S, Valizadeh R, Barjasteh S (2017) Study of menstrual attitudes and knowledge among postmenarcheal students, in Urmia, North West of Iran. *Int J Pediatr* 5:4991–5001
40. Channawar K, Prasad VSV (2016) Menstrual hygiene: knowledge and practice among adolescent school girls. *Panacea J Med Sci* 6:31–3
41. Rao RS, Lena A, Nair N S, et al (2008) Effectiveness of productive health education among rural adolescent girls: a school-based intervention study in Udipi Taluk, Karnataka. *Indian J Med Sci* 62:439–43
42. Abioye-Kuteyi E (2000) Menstrual knowledge and practices amongst secondary school girls in Ile-Ife, Nigeria. *J Royal Soc Prom Health* 120:23
43. Ali TS, Rizvi SN (2010) Menstrual knowledge and practices of female adolescents in urban Karachi, Pakistan. *J Adolesc* 33:531–41
44. Currie C, Ahluwalia N, Godeau, et al (2012) Is obesity at individual and national level associated with lower age at menarche? Evidence from 34 countries in the health behaviour in school-aged children study. *J Adolesc Health* 50:621–6
45. Leu HL, Chen KH, Peng NH (2012) Cultural practices relating to menarche and menstruation among adolescent girls in Taiwan: qualitative investigation. *J Pediatr Adol Gynec* 25:43–7
46. Moawed S (2001) Indigenous practices of Saudi girls in Riyadh during their menstrual period. *East Mediterr Health J* 7:197–203