BMC Women's Health

RESEARCH

Open Access

Taking menstruation health and hygiene seriously: a qualitative exploration of the challenges and facility requirements of female adolescent athletes in Bangladesh

Syeda Nurunnahar[1*], Nazrin Akter[1], Farjana Jahan[1], Rehnuma Haque[1,3], Julie Hennegan[2,4] and Mehjabin Tishan Mahfuz[5]

Abstract

Background Proper menstrual management is crucial for well-being and reproductive health. Despite global efforts to improve menstrual health, more than 2.3 billion girls and women still lack access to adequate menstrual hygiene facilities. This issue is exacerbated in physically demanding sports, where menstrual health can impact performance.

Objective This study examines the menstrual experiences and challenges adolescent female athletes face in Bangladesh. It seeks to identify their current menstruation management practices, assess physical, psychological, and sociocultural challenges during menstruation, and evaluate the facility improvements and support systems needed to enhance menstrual management and athletic performance.

Methods A qualitative research design was employed, focusing on a phenomenological approach to understand the lived experiences of adolescent athletes. The study was conducted at the Bangladesh Institute of Sports Education (BKSP), which serves approximately 1,500 female athletes. A purposive sampling strategy selected 32 adolescent athletes for in-depth interviews (IDIs) and two focus group discussions (FGDs), which were segmented by age. Additionally, six key informant interviews (KIIs) were conducted with coaches and administrative staff. The data were collected through audio-recorded interviews, and thematic analysis was performed.

Results This study revealed that sociocultural taboos and misconceptions significantly affect menstrual management practices among athletes. Physical challenges include discomfort, irregular cycles, and limited access to menstrual hygiene products, contributing to increased absenteeism from training. Psychological impacts, such as concerns about reproductive health and inadequate guidance on oral contraceptive pills (OCPs), further complicate the situation. Both athletes and coaches expressed a need for better education and resources.

Conclusion Addressing menstrual management challenges for adolescent female athletes requires a comprehensive approach. Enhanced knowledge and awareness, improved access to menstrual hygiene products, and targeted education for athletes and coaches are essential to enhance menstrual management and athletic performance.

*Correspondence:
Syeda Nurunnahar
nurunnahar@icddrb.org

Full list of author information is available at the end of the article

Keywords Adolescent athletes, Menstruation management, Challenges, Sports performance, Policy, And Infrastructure

Background

Menstrual health is vital to a woman's overall health and reproductive well-being. Comfortable and practical, menstrual management is essential for supporting physical and mental health and forming a foundation for future reproductive wellness [1]. Recognizing its importance, the global movement to improve menstrual management has rapidly gained momentum, with governments, UN agencies, and civil society organizations working together to address this vital public health issue [2, 3]. Menstrual health is also integral to achieving the Sustainable Development Goals [4], as emphasized by initiatives such as the WHO and UNICEF's Joint Monitoring Program. This program highlights the significance of hygienic and dignified menstruation [5]. However, despite global efforts, 2.3 billion girls and women worldwide still lack access to proper menstrual hygiene. This shortfall is often due to inadequate facilities, high costs, and inadequate information, leading to the use of unhygienic materials and an increased risk of infections [6, 7]. While menstruation is a natural physiological process, its impact on those engaged in physically demanding activities, such as sports, is profound.

The effects of the menstrual cycle on athletes' performance have become a critical focus of recent studies [6]. Research has shown notable differences in menstrual cycles and disorders between athletes and non-athletes [8]. Symptoms such as mood swings, exhaustion, and cramps have been shown to disrupt training and competition at all levels [6]. For example, a study by Bruinvels et al. revealed that half of elite British female runners and power lifters felt that their menstrual cycle affected their training and sporting performance [9]. Similarly, 66% of elite Australian athletes preparing for the 2020 Olympic and Paralympic Games reported that their menstrual cycle impacted their training [10]. In a survey of cross-country skiers and biathletes, 47% indicated that their physical fitness was reduced during their periods due to negative menstrual symptoms [11]. Moreover, socio-cultural factors play a crucial role in the menstrual health of female athletes. Despite progress, menstrual stigma persists in society, hindering open conversations about the menstrual cycle among athletes and their coaches or support staff. For example, international female rugby players have reported discomfort in discussing menstrual concerns in male-dominated environments [12]. Only a small percentage of elite female endurance athletes have had menstrual cycle-related conversations with their coaches [6].

While there is growing research on how senior athletes perceive their menstrual cycle in sports, there remains a significant gap in understanding the experiences of adolescent female athletes. Addressing menstrual health during adolescence is essential for promoting long-term athletic development. Effective menstrual health management can help prevent injuries, improve training outcomes, and support overall athletic performance, contributing to athletes' continued success and well-being.

In South Asia, sociocultural factors heavily influence menstrual health knowledge and practices among adolescents, including the general population and athletes. Many adolescent girls, particularly in low- and middle-income countries (LMICs), encounter their first menstruation unprepared, often facing fear, shame, and confusion due to limited information and the prevailing societal taboo [13–15]. Adults such as parents and teachers may also feel uncomfortable discussing these topics openly, perpetuating a culture of silence [13, 16, 17].

Research in Bangladesh has highlighted similar challenges for adolescent girls; however, adolescent athletes' menstrual needs and challenges remain underresearched, with limited studies focusing on this specific group. While studies have investigated menstruation hygiene management among the general population, there is a limited number of studies addressing how menstruation affects adolescent athletes, training health, and performance [18, 19]. A 2019 study conducted at the Bangladesh Sports Academy reported that a majority of adolescent athletes had poor knowledge (56.6%) and practices (68.5%) related to their menstrual health. However, their attitudes toward menstruation were generally positive. The authors recommended further qualitative investigation [20]. Our study initially included a quantitative component where more than 80% of participants reported receiving inadequate information about menstrual health, emphasizing a substantial knowledge gap. Additionally, a large portion of the participants reported experiencing restrictions and barriers during menstruation management; however, the specific types and reasons for these restrictions and barriers were not identified. This underlines the need for further qualitative investigation to understand the underlying factors behind these experiences. The findings from the quantitative component are being analyzed separately and will be published in a future article.

Given these insights, this study aims to address the following research questions:

1) What are the current menstruation management practices among adolescent female athletes?
2) What physical, psychological, and socio-cultural challenges do they face during menstruation?
3) What facility improvements are needed to enhance menstruation management for adolescent athletes?

By answering these questions, the study seeks to provide a comprehensive understanding of the unique challenges faced by adolescent female athletes and to identify actionable solutions that can enhance menstruation management within sports settings. Given the lack of specific policies on menstruation management for adolescent athletes in Bangladesh, the study's insights can contribute to the development of targeted policies that address these gaps, help to develop institutional strategy, and ensure better support for female athletes in managing menstruation effectively and equitably in sports settings.

Methodology

Study site

The study site was the Bangladesh Institute of Sports Education (BKSP), which is situated in *Savar*, close to Dhaka city. This residential school offers general education and specialized sports training from the secondary level, beginning at age 12. The objectives of the BKSP include identifying and training talented young athletes, providing modern scientific training, and offering courses for coaches, referees, and umpires. According to BKSP authorities, the institution has approximately 1500 female athletes, 300–400 aged 15–19, making it an ideal context for studying menstruation-related challenges among adolescent athletes in Bangladesh.

Study design

The study used a qualitative design to capture the nuanced and subjective nature of experiences and perceptions surrounding menstruation. Qualitative methods are particularly suited for exploring the complex interplay of socio-cultural factors, personal beliefs, and individual experiences. We employed a phenomenological approach to delve into the lived experiences of adolescent athletes and aimed to uncover shared patterns and meanings attributed to menstruation within the context of sports.

Sampling strategy

The sampling approach was designed to capture diverse experiences and perspectives of adolescent female athletes at BKSP regarding menstruation-related challenges. The study participants were selected purposefully to ensure relevance to the research objectives. First, a list of adolescent female athletes was obtained from BKSP, from which 32 athletes were purposefully selected to provide diverse perspectives and experiences. Only athletes who had begun menstruating were included in the study to ensure relevant insights into menstruation-related challenges. The age of menarche was self-reported by the athletes during participant selection. To gain in-depth insights, 20 in-depth interviews (IDIs) were conducted with athletes from various sports. Additionally, two focus group discussions (FGDs) were organized to explore experiences in a group setting. The athletes were divided into two groups based on their age at the onset of menstruation: FGD 1 included athletes aged 8–11 years, and FGD 2 included athletes aged 12–15 years. Each FGD consisted of six participants, facilitating an environment conducive to open discussion and shared experiences. To further understand the current facilities, necessary resources, and impacts on performance, six key informant interviews (KIIs) were conducted. These interviews included key figures and administrative authorities of BKSP, providing valuable insights into the institutional support and challenges faced by the athletes. This approach ensures data saturation, capturing the key themes related to menstruation management and its impact on adolescent athletes. The sample size was deemed appropriate based on the point of thematic saturation, where no new themes emerged, ensuring the findings robustly represented a variety of menstruation-related experiences within this institutional setting.

Data saturation

Saturation was considered in both the in-depth interviews and the focus group discussions. Once thematic saturation was achieved, indicating that additional interviews or discussions did not yield substantially new information, data collection was concluded.

Data collection procedure

Data were collected through in-depth interviews (IDIs), focus group discussions (FGDs), and key informant interviews (KIIs). Individual IDIs took place in a private and confidential setting to capture personal experiences, while FGDs encouraged open engagement and interaction among participants. KIIs were conducted with coaches and administrative staff to gather institutional perspectives.

Trained anthropologists with prior experience in qualitative research facilitated all interviews and discussions, ensuring culturally sensitive and open-ended questioning. All sessions were audio-recorded, transcribed, and anonymized to protect participant confidentiality. Field notes were taken to capture non-verbal cues and contextual details.

Reflexivity statement

The research team acknowledged the potential influence of researchers on data collection and interpretation. Efforts were made to minimize power imbalances by fostering a comfortable environment and adopting a conversational interview and discussion style. During data collection, the team maintained observational notes to document emerging biases and adjusted probing techniques as necessary. Regular debriefing sessions were held to reflect on and mitigate potential researcher influence, enhancing the credibility and trustworthiness of the findings.

Data analysis

The data analysis followed a thematic approach, which involves identifying, analyzing, and reporting patterns (themes) within the data. This iterative process allowed us to refine emerging themes and ensure a comprehensive understanding of the issues. The analysis was conducted manually. We applied both deductive (a priori) and inductive (emergent) coding to analyze data from in-depth interviews (IDIs), focus group discussions (FGDs), and key informant interviews (KIIs). Deductive coding followed our research objectives, focusing on predefined themes such as physical health challenges, socio-cultural barriers, and economic accessibility. This structured approach ensured alignment with the study's goals and facilitated the exploration of expected themes related to menstruation management and sports participation. In parallel, inductive coding captured unanticipated themes from participants' narratives, revealing new insights that influence menstruation management. Data from FGDs were not analyzed separately but integrated with IDIs and KIIs to capture both collective and individual perspectives. This integrated coding approach enabled us to identify areas of convergence (shared themes) and divergence (unique group-level insights) across the three data sources. Thematic comparisons between FGDs, IDIs, and KIIs provided a comprehensive understanding of participants' experiences.

Table 1 shows the theme, subtheme, and categorization of codes. To ensure consistency and reliability, two researchers independently coded a subset of the transcripts manually, and any discrepancies were resolved through comparative discussions to refine the coding framework. Data triangulation further strengthened the validity of our interpretations by systematically comparing insights across IDIs, FGDs, and KIIs, allowing us to identify consistencies and discrepancies. This combined approach of deductive and inductive coding, integrated and comparative analyses, enabled us to comprehensively explore expected and emergent themes related to menstruation management among adolescent athletes.

Findings

Socio-demographic characteristics of the participants

As shown in Table 2, the mean age of the participants was 16 years. Most of the participants identified as Muslim (78%), Hindu (13%), and Buddhist (9.3%). The participants represented 10 different sports, with 78% engaged in high-physical-demand sports, including football, hockey, swimming, judo, and athletics, whereas 22% participated in sports with relatively lower physical demand, such as shooting, tennis, and archery. Most participants were in grades 10 and 9, with an average age at menarche of 12 years.

The mean age of the key informants was 44. Most (3 out of 6) were in administrative and coaching roles. Half were male. Three of the six key informants had more than 10 years of experience, as shown in Table 3.

Current menstruation management practice

The following sections explore the specific practices employed by the participants, focusing on their use of sanitary pads and oral contraceptive pills (OCPs).

Use of menstrual absorbents and hygiene products

Menstruation management practices among participants primarily involved using disposable sanitary pads, with some athletes also utilizing a combination of cloth and pads. Some preferred cloth for its softness, but due to concerns about irritation in genital areas and fears of cloth displacement, pads were predominantly used. Participants also shared their experiences during the COVID-19 pandemic, when cloth became more

Table 1 Theme, subtheme, and category

Theme	Subtheme	Categories
Current menstruation management practices	Use of menstruation absorbents and hygiene products	Sanitary pad usage, cloth usage, and hygiene practices
	The Use of Oral Contraceptive Pill (OCP) for Delaying Menstruation	awareness, experiences, and misconceptions about OCPs for menstrual suppression during training and competition.
Challenges	Physical and Health-Related Challenges	menstrual cramps, menstruation irregularities, pains, vomiting, peevish mood, itching, training absences, and medical care accessibility
	Psychological and Socio-Cultural Challenges	taboos, shame, and difficulties in communicating with coaches
	Economic and Accessibility Challenges	limitations in waste disposal, lack of sanitary facilities, and the cost and availability of menstrual hygiene products

Table 2 Socio-demographic table of IDI and FGD participants

N **= 32**			
Variable	**Category**	**(n)**	**Percentage%**
Mean age of participants (mean, SD)	16 (1.26)		
Religion	Muslim	25	78
	Hindu	4	13
	Buddha	3	9.3
Category of participants by game	Football	7	22%
	Hockey	6	19%
	Swimming	5	16%
	Judo	4	13%
	Athletics	3	9.3%
	Cricket	2	6.2%
	Gymnastics	2	6.2%
	Shooting	1	3.1%
	Tennis	1	3.1%
	Archery	1	3.1%
Education	Class Eight	3	9.3%
	Class Nine	11	34%
	Class Ten	12	38%
	Class Eleven	6	19%
Age at menarche	< 12	22	69
	> 12	10	31
Monthly Income	2000–10,000	18	56
	11,000–20,000	6	19
	21,000–50,000	8	25
Hometown by zone	North	11	34%
	Southwest	10	31%
	Northeast	6	19%
	East	4	13%
	Northwest	1	3.1

Table 3 Socio-demographic table of key informants

Variable	***N*** **= 6**		
	Category	**(n)**	**Percentage**
Age of key person (mean, SD)	44 (9.69)		
Gender	Female	3	50.00
	Male	3	50.00
Education of the key informant	MS	6	100.00
Years of Experience	3 years	1	16.67
	5 years	1	16.67
	8 years	1	16.67
	10 years	2	33.33
	20years	1	16.67

prevalent because of the unavailability of sanitary pads. Some participants mentioned using both cloths and pads because of heavy flow and prolonged menstruation. During the first two or three days of menstruation, participants used sanitary pads and switched to cloth for the remaining days. However, all the participants generally preferred sanitary pads over cloths because of the inconvenience of washing and drying. One participant shared her experience with cloth usage, recounting an incident where she was injured during menstruation while in the field. She said,

> *My cloth was displaced, causing menstrual blood to leak. With an injured hand, I was unable to wash the used cloth immediately, so I stored them (used menstrual cloths) in a bucket until I recovered. I used to dry clothes inside the room.*

All the athletes reported using newspapers to wrap the used pads and dispose of them in the common waste bin, even in camps and tournaments.

Use of oral contraceptive pill (OCP) for delaying menstruation

Among the participants, only swimmers used oral contraceptive pills primarily to delay menstruation during camps or tournaments. However, none understood how OCPs worked; their coaches had limited knowledge about their proper use. Coaches from other sports did not emphasize the use of the OCP due to the concerns of participants' reproductive health. One of the swimmers expressed her concern by saying,

> *Normance (name of the OCP) is used to stop menstruation, but in my case, I saw changes in urine color. I feel like blood went through my urine. It is not red but similar to red, a yellowish color.*

Some participants mentioned experiencing pain after taking oral contraceptive pills (OCPs). They alleviated this discomfort by using a hot water sack. They attributed the pain to the OCP and did not receive specific instructions on when to start or stop taking it. Instead, they relied on advice from friends, typically taking the pills two days before a tournament and stopping after the event. They were unaware of any guidelines regarding the cessation of OCP usage.

Challenges

Three broad themes were developed to explore the challenges encountered by adolescent athletes in managing menstruation: (i) physical and health-related challenges, (ii) psychological and sociocultural challenges, and (iii) economic and accessibility challenges. Each theme is further explored through specific subthemes, emphasizing the multifaceted nature of these athletes' challenges.

Physical and health-related challenges

Among the participants, 14 out of 32 mentioned experiencing stomach and waist pain as a common issue during menstruation. The majority of adolescent athletes were reluctant to practice for the first two to three days of menstruation. Some athletes reported being unable to move during periods of heavy flow due to the intensity of the pain and muscle cramping they experienced.

Some participants noted that their irritation affected their relationships with teammates, coaches, and overall

team dynamics. Additionally, the participants mentioned experiencing itching in the genital area. Several adolescent athletes informed the housemaster about itching during their period. Based on her knowledge, the housemaster advised them to use hot water in the affected area. Fatigue and weakness were also reported, with participants experiencing muscle cramps and reduced running activity during menstruation. Figure 1 illustrates the physical challenges where all 32 participants mentioned their inability to engage in regular physical activity due to menstrual discomfort.

Coaches also observed that during menstruation, adolescent athletes were unable to train with the same level of physical intensity as on non-menstrual days. As a result, they faced challenges in maintaining fitness and skill. Coaches also mentioned that prolonged menstruation, defined as menstruation lasting longer than 7 days, was a major challenge for many athletes. They observed that some girls experienced menstruation multiple times in a single month, whereas others had only one period with gaps of two to three months in between. These irregularities were reported to affect their mental well-being. In addition, some athletes experience severe pain during menstruation, which can prevent them from engaging in exercise.

Coaches expressed concern that menstrual disorders could result in the loss of promising athletes. One of the coaches expresses her stress by saying,

> *"One of my best players has menstruation three times a month. I could not make her play. She is under treatment. Our medical team was not able to make her sound. Currently, she is under the treatment of a gynecologist outside of BKSP in her district. Her family bears the treatment cost, and she stays at her home. I am in doubt whether she can continue or leave the play".*

Another coach from swimming mentioned that their team holds 10 training sessions per week; missing practice due to menstruation disrupts the athletes' progress, making it difficult to maintain swimming rhythm. All the swimmers talked about how missing sessions during their menstrual period affects their performance and disrupts their training momentum. They also mentioned that menstruation makes their bodies feel heavier and less flexible. To compensate for the missed sessions, they needed to practice more intensively during the remainder of the month; however, they did not receive additional time for these extra sessions.

One of the coaches raised concerns about the long-term impact of menstruation, noting that iron deficiency often begins during adolescence. This condition can reduce hemoglobin levels and the oxygen consumption capacity, which decreases energy and performance. However, it was unclear whether these observations were based on specific monitoring or the measurement of biomarkers such as anemia. The coach expressed frustration by stating that if a player was not physically fit due to these issues, she could not participate. It was not specified how coaches determine physical fitness or if student-athletes were routinely tested for anemia.

Lack of medical care The lack of 24-hour access to medical professionals exacerbated the challenges of menstruation management. Students expressed hesitation in seeking medical assistance from male medical officers for menstruation-related issues. A coach mentioned that

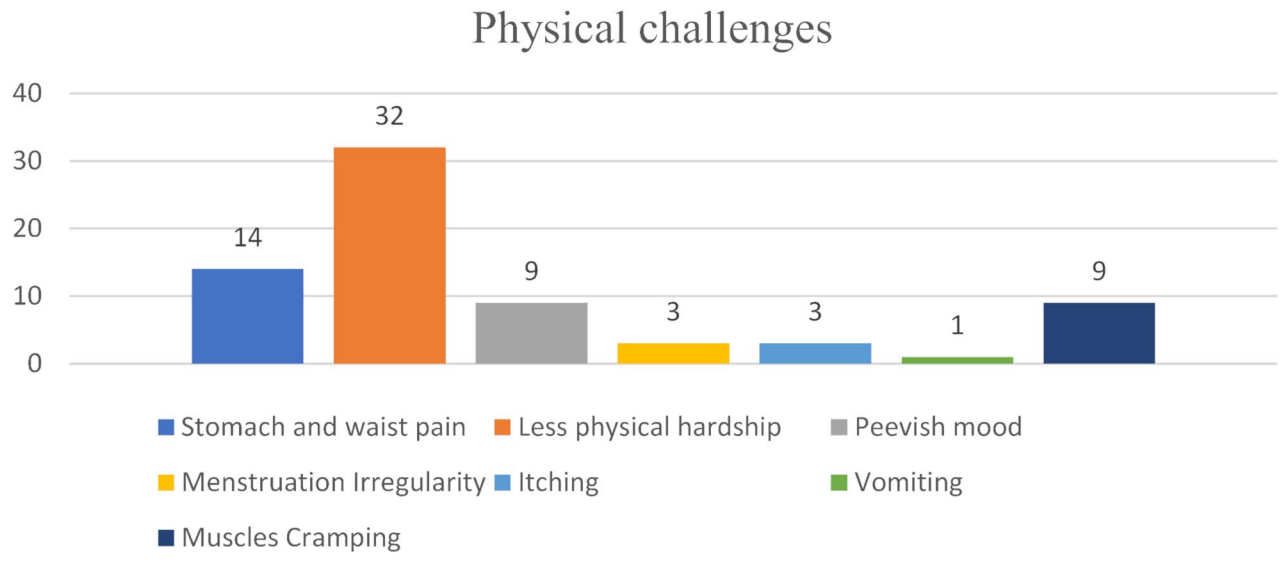

Fig. 1 Physical challenges faced during menstruation

a female physician was recently appointed, replacing the previously male-dominated medical staff. Another coach noted that while there is a medical facility on campus, doctors are not available during all shifts. During individual in-depth interviews and focus group discussions, none of the girls mentioned receiving medical care for menstruation from the medical officer. Coaches also highlighted the medical officer's insufficient expertise, citing an incident where some girls faced challenges with menstruation disorders, which the medical officer could not resolve. They took advice from a guest who was a gynecologist.

Psychological and socio-cultural challenges

Taboo and superstition Certain taboos were observed among participants, influencing their dietary choices. Two-thirds of them refrained from consuming fish based on guidance from family members and seniors, who associated fish consumption with an unpleasant odor in menstrual blood. Although the hostel's menu included fish, some girls discreetly gave their portions to friends during menstruation to avoid eating it themselves. Similar taboos were attached to eating meat, eggs, milk, and spicy food. Some participants avoided cold, icy items during menstruation, believing they could cause blood clots. One participant expressed concerns about the harmful effects of cold beverages, referencing a book, but being uncertain about the specifics. Regarding personal hygiene, many girls mentioned abstaining from using shampoo, a practice instilled by their families, with religious beliefs cited by one athlete. Despite attempts to maintain this tradition, sweating during physical activities complicated matters, adversely affecting their hair. Hindu participants shared their beliefs about the number of *swastikas* influencing the duration of menstruation. *The swastika* is a symbol of prosperity and fortune in the Hindu religion. She said,

> *My mother said to put three tika by my menstruation blood so that my menstruation does not last more than three days.*

She reported that after performing this ritual during her first menstruation, her period typically lasted three days. Another girl mentioned that refraining from shampooing during the initial three days would keep the menstrual cycle consistent. One of the participants spoke about the limited use of acidic products during menstruation, as she learned from her mother that pH levels increase during menstruation. Using soap can further raise the acidity, as they believed soap contained acidic ingredients. Families advised against vigorous physical activities during menstruation, citing potential health risks, such as the uterus descending.

Several participants emphasized the importance of maintaining cleanliness during menstruation, as taught by their mothers, to prevent infections. Practice included using hot water and Savlon to clean the vaginal area during menstruation. Some girls mentioned drinking large amounts of water during menstruation, believing that increased urine flow helps "clear" menstruation more effectively. Others opt for fruit juice to replenish the blood they feel is lost during menstruation. All the taboos mentioned by the participants are presented in Table 4.

Barriers to communication Pervasive discomfort exists when discussing menstruation-related matters, leading to hesitancy and shyness among players. While some sports benefit from the presence of female coaches, others lack this option, compelling athletes to share their concerns with male coaches despite reluctance. Most junior players preferred female coaches, who still grapple with residual shyness when they share personal concerns. They use the word "sick" to indicate menstruation. Most of the participants mentioned that when they approached their male coaches regarding menstruation issues, they were typically referred to female coaches. However, this process sometimes creates problems. As one of them said

Once in the academy, my menstrual blood started to leak, and I was confused. Initially, I mistook it for the usual white discharge I experienced, but later realized it was my menstrual blood. The flow was heavy, and I urgently sought out my female teacher. On that particular day, our school's director-general (DG) was visiting, and our female teacher was accompanying him. I tried to inform my male teacher, but he deferred the discussion, saying it could wait. However, as my bleeding worsened, I could not return to the hostel to change without permission. Eventually, I managed to speak to a sir, but he instructed me to obtain a signature from Asma madam, the female teacher, before meeting with him. However, Asma Madam was preoccupied with the DG's visit. Ultimately, I had to return to the hostel without adhering to the rules."

Nearly all the girls mentioned reading the menstruation chapter in their textbooks, primarily in the ninth and tenth grades. Before that, they learned about puberty from their health education book. However, female teachers typically taught these chapters, often only briefly covering the material. Teachers instructed them to read the chapters independently and encouraged them to seek help if they had difficulties understanding the content. The adolescents found it challenging to ask questions in class due to limited opportunities, and these classes were typically conducted only once and never repeated. Additionally, the presence of boys in the classroom often led to laughter, making the girls feel shy. As one of the girls mentioned,

Table 4 Taboos and superstitions related to menstruation

Taboo On	Taboo	Number of Response
Food	It is restricted to eating fish during menstruation, as it creates a bad smell	05
	Eating meat, milk, and eggs is verboten as it is believed to cause an unpleasant odor in menstrual blood	05
	My family advised me to avoid eating sour foods and not to eat lemons. It will increase blood flow.	05
	Eating cucumber is not good during menstruation, as it will create a blood clot	04
	It is necessary to drink lots of water during menstruation to enhance the menstrual flow	04
	Menstruation starts early if the body contains a lot of nutrients.	01
	It is advised not to drink cold drinks or icy items, because they create blood clots.	02
Personal hygiene	We didn't do shampoo for the first three days of menstruation so that our menstruation could start on the same date of next month.	09
	My seniors said to use soap less during baths on menstruation days.	02
	My family advised me not to use oil in my hair during menstruation	02
	My mother said it is important not to discard used sanitary pads indiscriminately; instead, they should be buried. She explained that if a dog were to come into contact with a used sanitary pad, it could cause stomach pain	01
	My mother advised me to limit the use of acidic products during menstruation because our pH levels increase during this time. Using soap can further elevate acidity levels, so I use less soap, especially in the genital area	01
Reproductive health	If you don't have a period, you don't have a baby	15
	Our body creates some bad blood, which comes out as menstruation	05
	The family advised not to practice running, jumping, or doing heavy work during this period, otherwise, the uterus becomes prolapsed	14
Duration of menstruation	Our senior said menstruation doesn't occur when we swim in water	05
	My mother said to put three *tikas* in *swastika* on the wall by my menstruation blood so that my menstruation does not last more than three days. I do so, and my menstruation lasts for three days.	01

"Our teacher conducts the menstruation class, but she does not delve deep into the topic because there are boys in the classroom."

Most athletes expressed dissatisfaction with the information provided in the textbooks, deeming it insufficient. They desired more comprehensive details, especially regarding dietary habits, nutritional requirements during menstruation, hygiene practices, sanitary pads or cloth use, recommended pad-changing frequency, typical blood loss levels, and potential health issues from inadequate menstruation management. Some athletes also suggested incorporating additional topics into the curriculum, such as menstrual rest, to facilitate obtaining leave from teachers.

Economic and accessibility challenges

Cost of sanitary pads The challenges posed by the unavailability and high cost of menstruation pads were significant. During focus group discussions (FGDs), many girls highlighted the high cost of sanitary pads. To manage expenses, they resort to using cloth and reduce the frequency of pad changes, particularly in the later days of menstruation, with some using a single pad for 24 h. In addition, they expressed a need for tissues as a resource in their washroom and dressing rooms, which they could use on fewer flow days. Menstruation disorders or heavy flow require more sanitary pads; therefore, they said it would be beneficial if menstrual pads were supplied at no cost or at a low price.

Accessibility challenge Many students reported experiencing sudden menstruation during classes or field activities, which often required them to leave for the hostel to access sanitary pads. It creates challenges. Athletes expressed a strong need for sanitary pad booths to be available in schools, colleges, dressing rooms, and hostels as a solution. Coaches supported this idea, noting that a central pad booth near washrooms could reduce absenteeism. The participants also emphasized the need for separate girls' washrooms equipped with bins for proper disposal and handwashing facilities, preferring handwashing with soap. Currently, the number of shared bins is inadequate, leading to improper disposal of used pads.

Comparative analysis

Building on these findings, Table 5 provides a comparative analysis to examine how the perspectives of athletes and key informants align or diverge, highlighting the key gap and actionable recommendations. While both groups recognized the importance of accessible menstrual hygiene products, institutional support, and knowledge enhancement, key informants emphasized policy-level interventions. In contrast, athletes focused more on their lived experiences and immediate challenges. The most significant gap identified is in the awareness and

Table 5 Table of comparative analysis, recommendations with their probable impact

Theme	Athletes' Perspective	Key Informants Perspective	Alignment/Gap	Recommendations provided by key informants	Impact
Menstruation Management Practices	Use sanitary pads and cloth, rest during heavy flow	Financial burden, need for better access to sanitary products	**Alignment**: Both agree on the need for accessible menstrual products	i. Provide subsidies or free sanitary products ii. Increase distribution channels for sports facilities.	i. Reduce financial strain ii. Ensure better management practices.
Physical and Health Challenges	Pain, fatigue, prolonged menstruation, irregular menstruation, inadequate medical care	Aware of challenges and the need for female medical professionals	**Gap**: Key persons suggest support, but athletes may need more potential treatment and access	i. Conduct training sessions led by female gynecologists or physicians ii. Provide counseling and motivational sessions with sports psychologists. Iii. Ensure female medical support is available.	physical challenges will be alleviated and improve overall well-being.
Socio-cultural Challenges	Taboo, misconception, and embarrassment to share with male coaches	Recognize stigma, need for a supportive environment	**Alignment**: Both recognize the issue, but more effort is needed to eliminate the taboo	i. Implement education campaigns to destigmatize menstruation and create supportive environments in sports contexts. ii. Foster family support through mental encouragement and additional nutrition.	promote a supportive environment, encouraging better management and participation.
Economic and Accessibility Challenges	High cost, unavailability of sanitary and hygiene products	Need for affordable, accessible products of MHM	**Alignment**: Both emphasize the accessibility of MHM facilities	i. Ensure the affordability of menstrual products ii. Expand educational programs on menstrual health for athletes and coaches. iii. Introduce comprehensive policies for female athletes and ensure adherence.	improve hygiene practices and reduce economic burden.
Knowledge accessibility	Prefer separate classes on menstruation tailored for girls, ask for seminars led by knowledgeable persons, comprehensive content in the textbook, and video content	Training on menstrual health and hygiene management for female athletes and coaches; workshops, seminars, and motivational sessions conducted by gynecologists or physicians; open discussions every three months	**Alignment**: Both perspectives highlight the need for improved knowledge accessibility	i. Develop and implement comprehensive menstrual health and hygiene education programs, including separate classes for girls and seminars for coaches ii. Ensure educational materials are accessible and culturally appropriate	Enhance knowledge and understanding; improve menstrual health and hygiene management practices
Use of Oral Contraceptive Pills (OCPs)	Not commonly used; lack of awareness about benefits and potential impact on performance	Highlight the importance of educating athletes on OCPs; potential use for managing menstrual cycles, training, and competition schedules	Gap: Lack of awareness and education on OCPs usage among athletes, as well as among coaches	i. Incorporate information on OCPs into menstrual health education programs ii. Encourage open discussions about OCPs to reduce stigma	Increase awareness and understanding; empower athletes to make informed decisions regarding OCP use
Policy and Infrastructure *(emerged theme from KII)*	No specific mention, but expressed a need for better infrastructure and support systems during menstruation.	Advocate for comprehensive policies to support female athletes, prioritizing a holistic strategy that includes appointing focal persons and ensuring the availability of necessary items. Stress the need for BKSP to have a well-rounded policy that considers all aspects of female athletes' well-being.	**Alignment**: Both perspectives highlight the need for improved infrastructure and support systems	i. Develop and enforce comprehensive policies that focus on the overall well-being of adolescent female athletes. ii. Appoint focal persons in hostels, colleges, and fields to oversee menstruation management. iii. Ensure the availability of necessary items and support systems for menstruating athletes. iv. Regularly assess and update the policy framework to keep it relevant and effective.	i. Provide a structured approach to supporting menstruation management ii. Ensuring consistent support and resources for female athletes. iii. Regular updates to the policy will help address emerging needs and maintain effectiveness.

education on oral contraceptive pills (OCPs), as athletes lack proper guidance, and coaches are hesitant to discuss or recommend their use. Additionally, although both groups acknowledge the impact of menstruation on training, key informants tend to suggest external medical support, and athletes emphasize the need for more accessible and practical solutions within their sports environment. The findings also highlight the socio-cultural stigma that prevents open discussions about menstruation, particularly in male-dominated coaching environments. While key informants recognized these taboos, athletes face communication barriers, indicating the need for structured education and sensitization programs. The analysis also underscored the lack of structured policies and infrastructure for menstrual health management in sports institutions. While athletes do not explicitly discuss policy gaps, their expressed challenges point to a critical need for institutionalized support, including appointing focal persons to oversee menstruation-related concerns.

Discussion

The comparative analysis highlights shared concerns and gaps in menstruation management. This discussion contextualizes the findings within broader literature, addressing policy implications and sustainable solutions to improve menstrual health and athletic performance.

The analysis reveals that adolescent female athletes frequently experience physical discomfort and irregular menstrual cycles, which are often exacerbated by energy imbalances due to inadequate nutrition. The study found that socio-cultural taboos influence dietary practices during menstruation, discouraging the consumption of nutrient-dense foods essential for physical recovery. The literature shows that intense exercise often disrupts menstrual cycles, particularly when the energy expended through physical activity exceeds the energy intake from food [21–23]. This energy imbalance can lead to irregular cycles or even amenorrhea, where menstruation ceases entirely because of insufficient caloric intake [22]. A lack of sufficient estrogen due to irregular cycles weakens bone density, making athletes more prone to osteopenia and osteoporosis [24]. A balanced diet, ensuring proper energy intake and output, is essential for maintaining regular menstrual cycles and preventing long-term health issues, such as bone fragility [24]. Moreover, the misconception derived from the family to not go for exercise during menstruation further creates adverse effects on their performance and general quality of life [25–27], where research shows that engaging in regular exercise can help alleviate certain common symptoms, such as mood swings, fatigue, cognitive issues, and bloating, experienced by women with premenstrual syndrome or primary dysmenorrhea [24, 28]. In managing these menstrual symptoms, some athletes turn to oral contraceptive pills (OCPs), but this solution is fraught with its own set of challenges. OCPs are often used without proper guidance, and adolescent athletes tend to rely on informal advice from senior players. This limited understanding of OCPs has led to confusion, particularly concerning reproductive health and fertility. Socio-cultural taboos surrounding menstruation create additional barriers to open communication, especially between female athletes and male coaches, resulting in a lack of institutional support and medical guidance [6, 12].

The challenges adolescent female athletes face in managing their menstrual health can be better understood through various theoretical lenses. Connell's Theory of Gender and Power [29] helps explain this by highlighting how gendered power structures shape female athletes' experiences. This theory identifies three main areas—the sexual division of labor, the sexual division of power, and the structure of cathexis—that shape gendered health experiences. In Bangladeshi sports, these areas highlight how institutions neglect and ignore menstruation-related needs. The sexual division of labor treats menstrual health as a private matter instead of a shared responsibility. The sexual division of power limits female athletes' voices because decision-making spaces are dominated by men, excluding menstruation from policies. The structure of cathexis reinforces menstrual stigma through cultural taboos, making it a hidden and shameful issue.

In addition to gender-based power imbalances, the stigma surrounding menstruation itself plays a crucial role. Goffman's Theory of Stigma [30] offers insight into how menstruation is perceived as a "discrediting attribute," especially in cultures like Bangladesh, where menstruation is often seen as something shameful. This stigma leads to social exclusion and discourages female athletes from openly discussing their menstrual health. Instead, they turn to informal peer networks for support, further perpetuating the lack of proper care. Goffman's theory explains how this stigma, coupled with cultural taboos, creates a cycle of silence and misinformation, which prevents athletes from receiving the support they need. Adolescent athletes are not only subjected to gendered stigma but also face economic barriers, such as the lack of access to affordable sanitary products, which are exacerbated by their age and dependency on familial or institutional support. The intersectionality of these factors means that athletes from low-income backgrounds, in particular, have limited access to necessary resources, further deepening the health inequities they experience. In Bangladesh, these overlapping identities (gender, age, socio-economic status) make menstruation-related concerns even less visible in sports institutions. This compounded marginalization highlights the urgent need for more inclusive and equitable interventions in menstrual

health management for adolescent athletes in Low and Middle-Income Countries (LMICs) like Bangladesh.

When comparing our findings with other LMICs, Similar findings have been reported among adolescents of other Low-Income Countries (LICs) and LMICs where limited menstrual health knowledge coupled with cultural taboos compel adolescents, though not specifically athletes, to navigate menstrual challenges independently [16, 17]. Economic and infrastructural limitations worsen these socio-cultural challenges. Chandra (2017) similarly reported that adolescents in low- and middle-income countries, including Bangladesh, rely heavily on their families for menstruation-related knowledge, which is consistent with the findings of this study [13]. In many cases, athletes depend heavily on their families for menstruation-related information. Even in high-income countries (HIC), A 2020 study with international female rugby players also reported discomfort in discussing menstrual issues in male-dominated environments, which resonates with the findings of this study [12].

In the case of using OCPs, studies in HIC have shown that OCPs, when used appropriately, can induce amenorrhea, helping athletes avoid menstrual disruptions and improving their performance [31] where adolescent athletes in Bangladesh are missing such knowledge. This highlights the need for institutionalized menstrual education and healthcare support for adolescent athletes in Bangladesh. Unlike HICs, where athletes have access to menstrual tracking tools, medical guidance, and tailored sanitary products [11, 18, 19], athletes in Bangladesh often lack access to even basic menstrual hygiene products, which increases absenteeism from academic classes, training, and competitions. Without proper menstrual facilities and hygiene management systems, athletes are left to manage these issues independently, which affects both their physical and mental well-being [32].

To reduce the challenges, a multifaceted approach is needed. Rastogi, Khanna, and Mathur (2019) show that robust educational programs can significantly improve knowledge and practices in menstrual management [33]. Furthermore, literature shows that strengthened communication protocols between coaches and athletes lead to better menstrual management [6]. Coaches and associated managers should be trained to monitor athletes' food habits and ensure they receive proper nutrition, especially during menstruation. In HICs, studies have shown that athletes who effectively manage their menstrual health, often with contraceptives or nutrition intake, experience fewer disruptions in their training and improved performance outcomes [34]. In addition, better access to menstruation products and policy reforms is essential to reduce the challenges and ensure adolescent athletes receive the support they need.

Limitations and strengths

This study has several limitations, such as real-time data collection, which could provide more accurate insights into adolescent athletes' experiences with menstruation as they occur. While the study noted the use of oral contraceptive pills (OCPs) among some participants, it did not include detailed medical data on the long-term effects of OCP use, limiting the discussion to immediate experiences and perceptions reported by the athletes. Additionally, the study lacked detailed data on nutritional status, which limits the ability to fully assess the impact of dietary habits and potential anemia on menstrual health and athletic performance. Future research could address these gaps through longitudinal studies to track menstrual health over time, incorporating medical assessments such as testing for anemia and examining the role of food restrictions during menstruation to provide a clearer understanding of how nutritional factors influence adolescent athletes' menstrual regularity, energy levels, and overall well-being. A key strength of our study lies in the openness of the participants. Athletes felt comfortable discussing their menstrual management practices, challenges, and support systems with female researchers, which enabled rich, in-depth data collection. This openness enabled the exploration of sensitive topics such as oral contraceptive pill use, dietary restrictions, and facility limitations, adding depth to the findings.

Conclusion

A holistic understanding of menstruation management is essential for safeguarding the health and optimizing the performance of adolescent female athletes in Bangladesh. While Bangladesh's National Menstrual Hygiene Management Strategy 2021 emphasizes school-based menstrual education, it lacks provisions specific to sports institutions. To address these challenges, we propose several key recommendations. First, it is crucial to implement systematic menstrual health education programs for athletes, coaches, and support staff. These programs should cover menstruation management, the safe use of OCPs, and the importance of balanced nutrition to mitigate menstrual irregularities. Second, access to menstrual hygiene products must be improved by providing subsidized or free sanitary pads at training facilities, dormitories, and sports complexes to alleviate financial barriers. Third, sports institutions should assign female medical professionals to provide personalized guidance on managing menstrual symptoms and the proper use of contraceptives. Fourth, addressing socio-cultural barriers is essential; this can be achieved by fostering open communication and training coaches to understand and support menstrual health concerns while actively working to reduce menstrual stigma. Lastly, institutional

policy reform is necessary to provide structured support, including comprehensive policies on menstrual hygiene facilities, product distribution, and flexible accommodations for athletes during menstruation.

Acknowledgements
We are deeply grateful to our study participants for their time and invaluable contributions. We would also like to extend our thanks to our research team. icddr, b acknowledges gratitude for providing core and unrestricted support from the governments of Bangladesh and the government of Canada.

Author contributions
Study conceptualization- SN and MTM, writing the first draft- SN; Data curation and Analysis- SN, NA; Supervision- MTM, Writing, reviewing, and Editing- JH, FJ, RH. All listed authors contributed to reviewing the draft before submission.

Funding
This publication is funded by Global Affairs Canada (GAC) through the Advancing Sexual and Reproductive Health and Rights (AdSEARCH) by the icddr, b project. Grant number: SGDE-EDRMS #9926532, Purchase Order 7428855, Project P007358. The funder has no role in the study's design, collection, analysis, or interpretation of data, or writing the manuscript. This research protocol was additionally funded by core donors who provide unrestricted support to icddr, b for its operations and research. Current donors include the governments of Bangladesh and Canada. We gratefully acknowledge our core donors' support and commitment to icddr, b's research efforts.

Data availability
The data that support the findings of this study are included within the manuscript. Due to the qualitative nature of the study and confidentiality considerations, raw interview transcripts are not publicly available. However, additional details or clarifications regarding the data may be obtained from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical approvals were obtained from the Internal Review Board (IRB) of icddr, b, consisting of the Research Review Committee (RRC) and Ethical Review Committee (ERC) (protocol no: PR-22136; Version 1.0). The ERC at icddr, b ensures that all research involving human participants meets rigorous international ethical standards. Drawing on international ethical frameworks such as the Declaration of Helsinki and CIOMS guidelines, the ERB emphasizes fundamental principles, including respect for individuals, beneficence, and justice. With a diverse membership that includes multidisciplinary experts and community representatives, the ERB provides researchers with ethical training and guidance, fostering responsible and inclusive research practices, particularly in vulnerable populations. The study received approval from the school's Directorate General (DG). Written informed consent was obtained from the legal guardians of participants under 16. Additionally, participants under the age of 18 provided written assent before enrollment. The study adhered to all ethical considerations to ensure participant confidentiality and compliance with international ethical standards.

Competing interests
The authors declare no competing interests.

Author details
[1]Environmental Health and WASH, Health Systems and Population Studies Division, icddr,b, Dhaka, Bangladesh
[2]Women's, Children's and Adolescents' Health Program, Burnet Institute, Melbourne, VIC, Australia
[3]Global Health and Migration Unit, Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden
[4]Melbourne School of Population and Global Health, University of Melbourne, Melbourne, VIC, Australia
[5]Maternal and Child Nutrition, Nutrition Research Division, icddr,b, Dhaka, Bangladesh

Received: 28 November 2024 / Accepted: 12 May 2025
Published online: 24 May 2025

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