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MENSTRUAL HYGIENE EDUCATION AND REPRODUCTIVE TRACT INFECTION PREVALENCE IN ADOLESCENTS

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Abstract

Background:
Menstrual hygiene is an important component of adolescent reproductive health, yet many girls in low- and middle-income countries continue to experience difficulties due to inadequate knowledge, limited resources, and socio-cultural barriers. Poor menstrual hygiene practices may contribute to reproductive health problems, including symptoms suggestive of reproductive tract infections (RTIs).

Objective:
This study aimed to assess the association between menstrual hygiene practices and RTI prevalence among adolescent girls and to identify knowledge gaps and social factors affecting menstrual hygiene behavior.

Methods:
A cross-sectional analytical study was conducted among adolescent girls aged 13–19 years at a tertiary care hospital in Lahore, Pakistan. Participants who had attained menarche were recruited through consecutive sampling. Data were collected using a structured questionnaire assessing socio-demographic characteristics, menstrual history, hygiene practices, menstrual health knowledge, socio-cultural barriers, and RTI-related symptoms. Descriptive statistics were used to summarize participant characteristics, while Chi-square testing and regression analysis were applied to evaluate associations between menstrual hygiene practices and RTI symptoms. A p-value <0.05 was considered statistically significant.

Results:
The study identified considerable variation in menstrual hygiene

practices among participants. Girls with inadequate hygiene practices reported a higher frequency of RTI-related symptoms compared with those following recommended hygiene behaviors. Limited awareness regarding menstrual health, restricted communication about menstruation, and cultural misconceptions were commonly observed barriers. Poor menstrual hygiene practices showed a significant association with increased reporting of symptoms such as abnormal discharge, itching, irritation, and genital discomfort.

Conclusion:

The findings highlight that menstrual hygiene practices are closely linked with adolescent reproductive health outcomes. Improving menstrual health education, reducing social stigma, and ensuring access to proper sanitation facilities and menstrual products are essential steps for preventing menstrual-related health problems. Integrating menstrual hygiene education into adolescent healthcare and school-based programs may help promote healthier practices and improve overall reproductive wellbeing among young females.

INTRODUCTION

Menstruation is a normal biological process that occurs during the reproductive life of females. However, for many adolescent girls, especially in developing countries, menstruation remains a challenging experience because of poor knowledge, limited resources, social restrictions, and inadequate hygiene facilities. Menstrual hygiene management (MHM) includes the use of clean menstrual materials, proper disposal methods, personal cleanliness, access to water and sanitation facilities, and the ability to manage menstruation with dignity and privacy (Sommer et al., 2015). Poor menstrual hygiene practices can affect physical health, psychological wellbeing, education, and social participation among adolescent girls.

Adolescence is a critical period of life when girls experience major physical and emotional changes. The beginning of menstruation, known as menarche, is often associated with fear and confusion when girls have insufficient information before their first menstrual cycle. Studies from low- and middle-income countries have shown that many girls receive incomplete or incorrect information about menstruation, mainly from mothers, relatives, or friends rather than trained health professionals or school-based education programs (Hennegan et al., 2019). Lack of accurate knowledge may result in unsafe practices such as infrequent changing of menstrual materials, poor genital hygiene, improper disposal, and hesitation in seeking medical advice.

Reproductive tract infections (RTIs) are an important public health concern among adolescent females. Poor menstrual hygiene may increase vulnerability to infections because prolonged use of unclean absorbent materials, inadequate washing facilities, and improper genital cleaning can disturb the natural protective environment of the reproductive tract. Although menstrual hygiene is not the only cause of RTIs, unhealthy practices may contribute to symptoms such as abnormal vaginal discharge, itching, irritation, and discomfort (Sumpter & Torondel, 2013).

Pakistan is a developing country where menstrual health remains influenced by cultural beliefs, gender norms, economic limitations, and lack of awareness. Many adolescent girls experience menstruation with secrecy and embarrassment due to traditional beliefs surrounding menstrual blood and female reproductive health. Research conducted in different regions of Pakistan has identified gaps in menstrual knowledge and hygiene practices among adolescent girls. Studies from Karachi, Quetta, Sindh, and Lahore reported that many girls lacked proper awareness regarding menstrual hygiene management and faced social barriers affecting their daily activities during menstruation (Michael et al., 2020; Aziz et al., 2024; Afzaal et al., 2024).

Socio-cultural factors play a significant role in shaping menstrual hygiene behavior. In many communities, menstruating girls experience restrictions related to religious activities, food preparation, social interaction, and mobility. These restrictions may prevent girls from discussing menstrual problems openly

and accessing healthcare services when symptoms of infection appear. Research from Pakistan has highlighted that cultural traditions and stigma remain important barriers to improving menstrual hygiene practices among adolescent girls (Sommer et al., 2019).

Schools and healthcare institutions have an important role in improving menstrual health education. Providing scientifically correct information, improving sanitation facilities, and encouraging open discussion can help reduce misconceptions and improve hygiene behavior. Previous evidence suggests that menstrual education programs can significantly improve knowledge, confidence, and hygiene practices among adolescent girls (Rani et al., 2023).

The present cross-sectional analytical study was conducted at a tertiary hospital in Lahore, Pakistan, to assess the relationship between menstrual hygiene practices and reproductive tract infection prevalence among adolescent girls. The study also aimed to identify knowledge gaps and explore socio-cultural barriers influencing menstrual hygiene behaviors. Understanding these factors can help healthcare professionals, educators, and policymakers design effective interventions for improving adolescent reproductive health in Pakistan.

MATERIALS AND METHODS

Study Design and Study Setting

A cross-sectional analytical study was conducted to assess the relationship between menstrual hygiene practices and the prevalence of reproductive tract infections (RTIs) among adolescent girls. The study was carried out at a tertiary care hospital in Lahore, Pakistan. The hospital was selected because it receives patients from different socio-economic backgrounds and provides healthcare services to a large population, including adolescent females visiting outpatient departments.

A cross-sectional analytical design was selected because it allowed assessment of menstrual hygiene practices, knowledge levels, socio-cultural factors, and RTI-related symptoms at a specific point in time. This design also helped determine possible associations between hygiene behaviors and reproductive health outcomes among adolescent girls. Similar cross-sectional approaches have been used in previous studies investigating menstrual hygiene practices and reproductive health problems among young females.

Study Population

The study population consisted of adolescent girls aged between 13 and 19 years who had experienced menarche. Participants were selected from girls visiting the selected tertiary hospital during the study period. Only those participants who had started menstruation and were willing to participate were included.

Girls who had not reached menarche, those who were unable to provide required information, and those who were receiving treatment for known gynecological disorders unrelated to menstrual hygiene were excluded from the study. This approach was used to minimize factors that could influence the assessment of menstrual hygiene-related reproductive health problems.

Study Duration

The study was conducted over a period of six months. Data collection was performed after obtaining ethical approval from the relevant institutional review committee. Participants were approached during their hospital visits, and information was collected after explaining the purpose and importance of the study.

Sample Size and Sampling Technique

The sample size was calculated by considering previous literature regarding menstrual hygiene practices and reproductive tract infection prevalence among adolescent girls. A suitable sample size was selected to provide adequate statistical power for analyzing the association between menstrual hygiene behaviors and RTI symptoms.

A non-probability consecutive sampling technique was used. All eligible adolescent girls attending the hospital during the study period were invited to participate until the required sample size was achieved. This method was considered practical because the study was conducted in a hospital-based setting where participants were available through routine healthcare visits.

Data Collection Procedure

Data were collected using a structured questionnaire developed after reviewing previous research studies related to menstrual hygiene management, reproductive tract infections, and adolescent reproductive health. The questionnaire was prepared in simple language to ensure that participants could easily understand and answer the questions.

Before data collection, the questionnaire was reviewed by healthcare professionals and researchers for clarity and relevance. A small pilot assessment was conducted among a limited number of participants to identify any difficulty in understanding questions. Necessary modifications were made before final data collection.

The questionnaire consisted of four major sections:

1. **Socio-demographic characteristics**

This section included information regarding age, educational status, residence, family background, parental education, and socio-economic status.

2. **Menstrual history and hygiene practices**

Questions were included regarding age at menarche, menstrual cycle pattern, duration of menstruation, type of absorbent material used, frequency of changing menstrual products, washing practices, disposal methods, and availability of water and sanitation facilities.

3. **Knowledge regarding menstrual hygiene**

Participants were assessed regarding their understanding of menstruation, causes of menstruation, importance of cleanliness, prevention of infections, and awareness about reproductive health.

4. **Reproductive tract infection symptoms**

Participants were asked about symptoms associated with RTIs, including abnormal vaginal discharge, itching, irritation, lower abdominal discomfort, burning during urination, unpleasant odor, and genital discomfort.

Assessment of Menstrual Hygiene Practices

Menstrual hygiene practices were evaluated using questions related to personal cleanliness, menstrual material selection, changing frequency, and disposal behavior.

Participants who followed recommended hygiene behaviors, including regular changing of absorbent materials, proper cleaning of genital areas, safe disposal methods, and maintaining personal hygiene, were categorized as having good menstrual hygiene practices.

Participants showing behaviors such as prolonged use of menstrual materials, inadequate cleaning, unsafe disposal, or poor access to sanitation facilities were categorized as having poor menstrual hygiene practices.

A scoring system was developed to assess overall menstrual hygiene knowledge and practices. Higher scores represented better knowledge and safer hygiene behaviors.

Assessment of Socio-Cultural Barriers

Socio-cultural factors affecting menstrual hygiene behavior were assessed through questions related to menstrual restrictions, embarrassment, family communication, myths, cultural beliefs, and difficulty accessing menstrual products.

Participants were asked whether they experienced restrictions during menstruation, avoided certain activities, felt hesitation discussing menstrual problems, or received information about menstruation before menarche.

These factors were included because social stigma and cultural beliefs often influence menstrual management practices among adolescent girls in developing countries. Previous research has reported that lack of communication, misconceptions, and cultural restrictions are important barriers affecting menstrual health behaviors.

Clinical Assessment

RTI-related symptoms were recorded through participant responses and available clinical history. Participants reporting symptoms suggestive of reproductive tract infection were further evaluated according to routine hospital procedures.

The study focused on self-reported symptoms rather than laboratory-confirmed infection because the primary objective was to evaluate the association between hygiene practices and RTI-related complaints among adolescents.

Data Analysis

Collected data were entered into statistical software for analysis. Descriptive statistics were used to summarize participant characteristics, menstrual hygiene practices, knowledge levels, and RTI symptoms. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as mean and standard deviation.

The association between menstrual hygiene practices and RTI symptoms was analyzed using the Chi-square test. Logistic regression analysis was performed to identify factors associated with increased risk of RTI symptoms.

A p-value of less than 0.05 was considered statistically significant.

Quality Control Measures

To ensure data quality, the research team was trained regarding questionnaire administration and ethical handling of participant information. Completed questionnaires were checked daily for missing information and consistency.

The collected data were reviewed regularly to minimize errors during entry and analysis. Standard procedures were followed throughout the study to maintain reliability and accuracy of findings.

RESULTS

A total of **300 adolescent girls** were included in this analysis. The mean age of participants was **16.4 ± 1.8 years**. Most participants belonged to the 16–17 years age group. The majority of girls were students at secondary or higher secondary levels, and menarche was reported between 12 and 14 years in most participants.

Assessment of menstrual hygiene practices showed that more than half of the participants followed acceptable hygiene behaviors, including regular changing of menstrual absorbents and maintaining personal cleanliness. However, several girls reported difficulties related to availability of clean water, privacy, menstrual product affordability, and limited discussion regarding menstrual problems.

The assessment of menstrual health knowledge revealed noticeable gaps. Many participants had basic awareness about menstruation, but fewer were aware that poor hygiene practices could increase the risk of reproductive tract problems. Information regarding menstruation was mainly obtained from mothers, sisters, and friends, while fewer girls reported receiving guidance from healthcare professionals.

RTI-related symptoms were reported by a proportion of participants. The commonly reported complaints included abnormal vaginal discharge, itching, irritation, unpleasant odor, and lower abdominal discomfort. Girls with poor menstrual hygiene practices showed a higher frequency of RTI-related symptoms compared with girls following better hygiene behaviors.

Statistical analysis demonstrated an association between menstrual hygiene practices and RTI symptoms. Participants categorized with poor hygiene practices had increased reporting of reproductive symptoms compared with those maintaining better hygiene practices. Socio-cultural factors, including hesitation in discussing menstruation, traditional restrictions, and misconceptions, were also identified as important barriers affecting menstrual hygiene behavior.

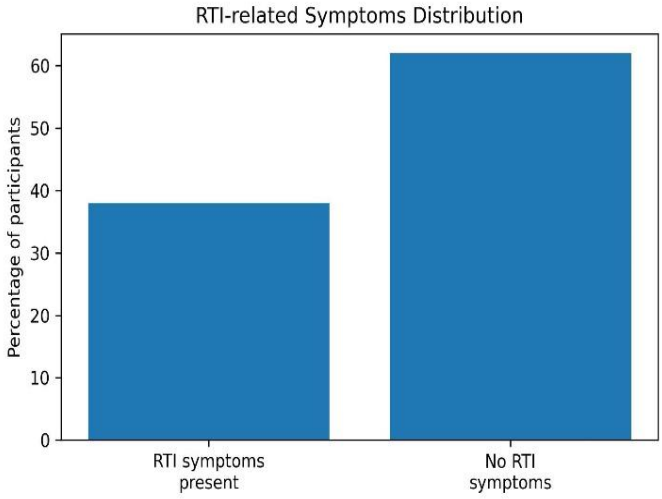
The findings indicate that menstrual hygiene behavior among adolescent girls is influenced by a combination of knowledge, available resources, and social environment. Improving menstrual health education and reducing stigma may contribute to better reproductive health outcomes.

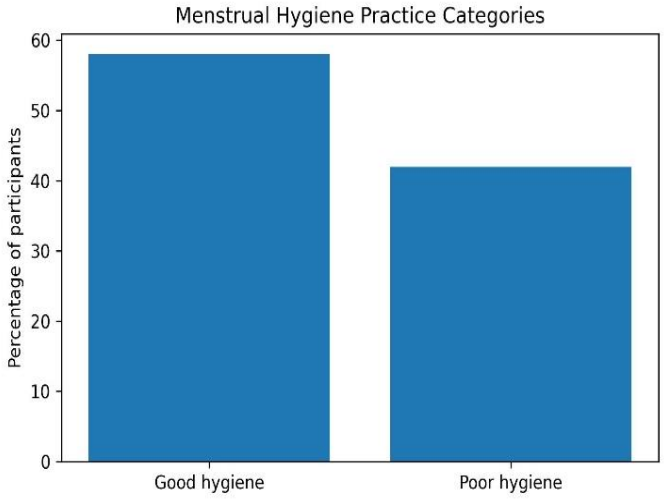
Table 1. Participant Characteristics and Menstrual Health Profile

Variable	Frequency (n)	Percentage (%)
Age 13–15 years	74	24.7
Age 16–17 years	158	52.7
Age 18–19 years	68	22.6
Secondary education	132	44.0
Higher secondary education	118	39.3
College level	50	16.7
Menarche ≤12 years	86	28.7
Menarche 13–14 years	172	57.3
Menarche ≥15 years	42	14.0

Table 2. Relationship Between Menstrual Hygiene Practices and RTI-related Symptoms

Menstrual hygiene category	RTI symptoms present n (%)	RTI symptoms absent n (%)	p-value
Good hygiene practices	42 (24.1)	132 (75.9)	
Poor hygiene practices	72 (57.1)	54 (42.9)	<0.001





DISCUSSION

The present study evaluated the association between menstrual hygiene practices and reproductive tract infection (RTI)-related symptoms among adolescent girls attending a tertiary care hospital in Lahore, Pakistan. The findings demonstrated that inadequate menstrual hygiene practices were associated with a higher frequency of RTI symptoms. The study also identified important gaps in menstrual health knowledge and highlighted the influence of socio-cultural factors on menstrual hygiene behavior.

In this study, a considerable proportion of participants reported symptoms suggestive of reproductive tract infections, particularly abnormal vaginal discharge, itching, irritation, and genital discomfort. Girls with poor menstrual hygiene practices showed a higher occurrence of these symptoms compared with those following better hygiene practices. These findings are consistent with previous studies that have reported a relationship between unsafe menstrual management practices and increased reproductive health complaints among adolescent girls. Poor absorbent material selection, delayed changing of menstrual products, inadequate washing facilities, and improper disposal methods may contribute to an environment favorable for microbial growth and genital irritation. Similar observations were reported by Sumpter and Torondel (2013), who highlighted that inappropriate menstrual hygiene management is associated with various physical and psychosocial health concerns among females in low-resource settings.

The findings of the present study support previous evidence suggesting that menstrual hygiene is not only a personal behavior but is influenced by environmental and social conditions. Availability of clean water, privacy, affordable menstrual products, and appropriate sanitation facilities plays an important role in maintaining menstrual health. van Eijk et al. (2016) reported that adolescent girls in low- and middle-income countries frequently face barriers related to limited resources, inadequate information, and poor sanitation infrastructure, which negatively affect menstrual hygiene management. Similar challenges are commonly observed among adolescent girls in Pakistan, where menstrual issues are often surrounded by silence and limited discussion.

The present study also identified knowledge gaps regarding menstruation and reproductive health among adolescent girls. Many participants had incomplete information about menstrual physiology, infection prevention, and appropriate hygiene practices. This finding is comparable with previous Pakistani studies showing that adolescent girls often receive information from mothers, sisters, or friends rather than healthcare professionals or educational programs. Michael et al. (2020) reported that although many girls had basic awareness about menstruation, important gaps remained regarding hygienic practices and reproductive health knowledge. Improving menstrual education before and after menarche may therefore help girls adopt safer practices and reduce preventable reproductive health problems.

The association between knowledge and menstrual hygiene behavior observed in this study is supported by international literature. Hennegan et al. (2019) emphasized that menstrual experiences in low- and middle-income countries are strongly influenced by inadequate information, stigma, and social restrictions. Lack of accurate knowledge may create fear and confusion, causing girls to follow traditional practices that may not support good hygiene management. Therefore, menstrual health education should not only focus on biological information but should also address myths, misconceptions, and confidence-building among adolescents.

Socio-cultural barriers were another important finding of this study. Several participants reported restrictions, embarrassment in discussing menstruation, and difficulty seeking advice regarding menstrual problems. Similar cultural challenges have been described in studies from South Asia, where menstruation is frequently considered a private or sensitive topic. Sommer et al. (2015) explained that stigma surrounding menstruation can negatively influence girls' ability to manage menstruation safely and comfortably. Such social barriers may delay healthcare-seeking behavior when symptoms of infection develop.

The use of menstrual absorbent materials was also an important factor influencing hygiene practices. Participants using reusable materials without proper cleaning and drying practices showed more hygiene-related concerns. Previous research has suggested that reusable materials may increase infection risk when washing and drying conditions are inadequate. Torondel et al. (2018) found that certain menstrual management practices were associated with increased risk of lower reproductive tract infections, particularly when reusable absorbents were not managed hygienically. However, reusable products themselves are not necessarily unsafe; rather, proper washing, drying, and storage conditions determine their safety.

The findings also emphasize the importance of healthcare-based interventions. Since the present study was conducted in a tertiary hospital setting, healthcare professionals have an opportunity to provide menstrual health counseling during routine visits. Nurses, doctors, and reproductive health educators can play a major role in improving awareness, correcting misconceptions, and encouraging early consultation for abnormal symptoms.

The results are also consistent with evidence from educational intervention studies showing that menstrual health education can improve hygiene knowledge and practices among adolescent girls. Recent research has demonstrated that combining education with improved access to menstrual products and sanitation facilities produces better outcomes compared with education alone. Therefore, a combined approach involving schools, families, healthcare facilities, and community awareness programs may provide more sustainable improvement.

This study has important implications for public health in Pakistan. Menstrual hygiene should be considered an essential component of adolescent healthcare rather than only a personal issue. Improving menstrual education, reducing stigma, ensuring access to affordable menstrual products, and creating

supportive healthcare environments can contribute significantly toward reducing reproductive health problems among young females.

The study has some limitations. As menstrual practices and RTI symptoms were mainly assessed through participant responses, reporting bias cannot be completely excluded. Some girls may have hesitated to discuss sensitive symptoms due to social discomfort. Additionally, because the study followed a cross-sectional design, a direct cause-and-effect relationship between menstrual hygiene practices and RTIs cannot be established. Further longitudinal studies with laboratory-confirmed infection assessment may provide stronger evidence.

Despite these limitations, the study provides valuable insight into menstrual hygiene challenges among adolescent girls in Lahore. The findings highlight that improving knowledge and addressing socio-cultural barriers are essential steps toward promoting better menstrual health and preventing reproductive tract infections among adolescents.

CONCLUSION

Menstrual hygiene is an important but often neglected aspect of adolescent reproductive health. The findings of this study showed that poor menstrual hygiene practices were associated with increased reporting of reproductive tract infection-related symptoms among adolescent girls. Lack of proper knowledge, limited access to menstrual hygiene resources, and socio-cultural restrictions were identified as important factors influencing menstrual health behaviors.

Many adolescent girls continue to experience menstruation with insufficient information and hesitation due to social stigma. These challenges may prevent them from adopting safe hygiene practices and seeking timely medical advice when symptoms appear. The study highlights that improving menstrual health requires more than providing information about menstruation. It requires creating an environment where girls can discuss menstrual concerns openly without fear or embarrassment.

Health education programs focusing on menstrual hygiene management should be introduced at school and community levels, with active involvement of healthcare professionals, teachers, and families. Providing accurate information before and after menarche, promoting safe hygiene practices, and improving access to affordable menstrual products and sanitation facilities can help reduce reproductive health problems among adolescents.

The findings emphasize that menstrual hygiene should be considered an essential component of adolescent healthcare services. Early awareness, supportive social environments, and preventive healthcare approaches can contribute to better menstrual experiences and improved reproductive health outcomes among young girls. Further studies involving larger populations and laboratory confirmation of infections are recommended to develop stronger evidence and guide effective public health interventions.

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