Is There Any Relationship between Poor Menstrual Hygiene Management and Anemia? – A Quantitative Study Among Adolescent Girls of the Urban Slum of Madhya Pradesh

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Abstract

Background: Anemia and poor menstrual hygiene practices have a considerable impact on all aspects of an adolescent girl’s life. There is a dire need for evidence on the burden and its association to provide actionable preventive measures. Objective: The objective of this study is to explore the magnitude and association between poor Menstrual Hygiene Management (MHM) practices and anemia. Materials and Methods: A cross-sectional study conducted among 393 adolescent girls of the urban slum of Bhopal (June 2017–July 2018). Hemoglobin (Hb) was determined by a portable Hb meter (HemoCue). Logistic regression analysis was done to find out if there is any association between poor MHM practices and anemia. Results: The present study found the prevalence of anemia as 38.7% among which 65.1%, 31.5%, and 3.2% were suffering from mild, moderate, and severe forms of anemia, respectively, and 87.3% were practicing poor MHM. Logistic regression found that the MHM, bleeding during menstruation, religion, educational status, and nutritional status of adolescents were significant factors associated with anemia. Conclusion: The study concluded that there is a significant association between poor MHM and anemia. Concerted convergent actions focusing on the provision of awareness regarding MHM and sanitary facilities to maintain proper menstrual hygiene are needed to reduce the burden of anemia.

Keywords: Adolescents, anemia, menstrual hygiene management

INTRODUCTION

Adolescent girls encounter various health problems; the most significant ones are anemia and poor menstrual hygiene management (MHM). In adolescents, the most common cause of anemia is blood loss due to heavy menstruation next to nutritional anemia.[¹] Anemia causes a spectrum of adverse health outcomes: hampering physical growth and cognitive development. It also affects the immune status which in turn leads to infection. Hence, the physical capacity and work performance of adolescents are significantly affected.[²]

MHM is defined as the adolescent girls using a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period using soap and water for washing the body as required and having access to facilities to dispose of used menstrual management material.[³] Even after advances in education and science, it is still a taboo topic in India; adolescents hardly get any chance to learn about menstruation; most girls are unaware of proper menstrual practices at the age of menarche.

Improper MHM leads to urinary or reproductive tract infections (RTI); pelvic inflammatory disease (PID), in turn, leads to blood loss ultimately resulting in anemia.[⁴] It is biologically plausible that unhygienic MHM practices lead to RTI which ends up in anemia; the strength of the effect and the pathway remain unclear. With this background, this study
was conducted to find out the prevalence of anemia and poor MHM and to find out if any relationship exists between the two conditions.

**Materials and Methods**

This is a cross-sectional study conducted among menstruating adolescent girls (10-19 years) enrolled at various anganwadi centers in Banganga, an urban slum of Bhopal during June 2017-July 2018. As there were no previous studies on this topic, the prevalence of anemia due to poor MHM was assumed to be 50% and the margin of error to be 10% and 95% confidence level. The sample size calculated using the formula \( z^2 p q/d^2 \) (\( z = \) standard normal deviate at 95% confidence interval [CI]; \( q = 100 - p \)), the minimum sample size came out to be 384. Line listing of the adolescents was prepared and simple random sampling was used to select the participants. A predesigned, pretested, and structured questionnaire was used to collect the data through a face-to-face interview of the study participants.

Data were collected regarding socio-demographic characteristics; Menstruation-related characteristics and Self-reported MHM practice assessed using six parameters. The internal consistency of the tool was assessed by Cronbach’s alpha for the Hindi version (0.78).

1. Absorbent material used: categorized as sanitary (market and homemade sanitary napkins) and unsanitary (a reused cloth not washed with soap and water; not dried under sunlight adequately)[3]
2. Storage of absorbent: categorized as satisfactory and unsatisfactory (non-availability of absorbent at home)
3. Disposal of used absorbents: categorized as satisfactory and unsatisfactory (throwing outside at the gutter or street)[6]
4. Frequency of change of absorbent - categorized as satisfactory and unsatisfactory (< 2 pads/day)[7]
5. Washing of external genitalia with soap and water - categorized as satisfactory and unsatisfactory (inadequate water and the absence of soap)[7]
6. Privacy – the presence of any private place at home to practice menstrual hygiene. (Satisfactory - Yes/ Unsatisfactory - No).

A scoring system used to segregate the MHM practices into good and poor. Each of the parameters dichotomized into satisfactory (1 point) and unsatisfactory (0 point). The score ranges from 0 - 6; Higher the score better the menstrual hygiene practice. Good MHM should be satisfactory in all six parameters and poor MHM was considered when the score was \( \leq 5 \).

The outcome variable anemia was assessed using biochemical assessment of Hemoglobin (Hb) level using HemoCue® Hb 201+ System. It is a WHO accredited standard Hb point-of-care testing tool. The necessary safety measures were taken during blood collection.

Ethical clearance was obtained from the Institutional Human Ethics Committee, AIIMS Bhopal, Madhya Pradesh. Written informed consent was secured from each study participant and for those who were aged <18 years, written informed assent was obtained from their parents/guardians. The study was conducted in accordance with the Declaration of Helsinki 1975 as revised in 2000.

Data were analyzed using the SPSS software version 16.0 (IBM, SPSS Inc., Chicago, USA). Descriptive statistics used to examine MHM and anemia among adolescent girls; the relationship between poor MHM and anemia was assessed using logistic regression. \( (P < 0.05) \).

**Results**

The data collected from 393 participants with the mean age (standard deviation [SD]) of study participants were 15.57 (1.8). About two-thirds (62.4%) and one-third (31.8%) of the respondents were 15 to 18-years-old and 11 to 14-years-old. About three-fourth (74.6%) of the participants were pursuing intermediate (9–12 classes) schooling; about 17% were in middle school (6–8 classes). Around half (46.3%) and one-fourth (22.4%) of the participants belonged to other backward and scheduled castes, respectively. About 81.4% of the respondents belonged to the below poverty line category. About one-fourth (27%) of the mothers of the participants were illiterate; about 24.4% of the participant’s mothers were educated up to primary and middle school. About 60% of the participants were not aware of menstruation before menarche and one-fourth (23.2%) of the participants knew the exact cause of menstruation. About 61% had excess bleeding during menstruation. Around three-fourth (75%) of the participants claimed that the daily activities were restricted at home. Among 393 study participants, 38.7% were anemic and nearly half of the participants (45.5%) were underweight [Table 1]. Around 30.7% were using sanitary absorbents and 9.4% of them did not store the absorbent. About three-fourth of the respondents did not clean their external genitalia more than two times a day [Figure 1]. Only 12.7% had good MHM practice (satisfactory in all the six parameters of MHM) with a mean score (SD) =3.8 (1.1) and median = 4. About one-third (34%) of the participants got

![Figure 1: Distribution of study participants according to menstrual hygiene management (n = 393)](image-url)
The prevalence of anemia among adolescents ranges from 30% to 56\% \[^8,^9\] with the lowest prevalence in Kerala-based study (21\%). It may be due to the high iron content in their local food and higher consumption of meat among the communities.\[^{10}\]

A study done in Uttar Pradesh found that socioeconomic status and adolescent’s educational status; occupation and their mother’s occupation were predictors of anemia which is consistent with the present study for few predictors.\[^9\] The present study showed mothers education as not a predictor of anemia which is similar to a study done in Ethiopia.\[^{11}\] A study in Ethiopia found that adolescents in the early period of adolescence (odds ratio [OR]: 4.75) found to have a greater risk of anemia.\[^{11}\] Women with low body mass index (BMI) have increased odds of developing anemia, adjusted ORs of 1.81 (95\% CI: 1.11–3.48) similar to studies done in Ethiopia.\[^{11}\] This study has shown that the prevalence of anemia was higher among those who were having low BMI which indirectly reflects the poor nutritional status leading to the high prevalence of anemia.

In the present study, the MHM was properly defined and equal weight was given to different parameters including perceived privacy. The study showed that nearly three-fourth (70\%) were not using sanitary pads as well as not storing them at home for timely use even after the provision of subsidized sanitary pads from the government; these finding points and stresses on lack of awareness regarding the MHM and government initiatives. Previous literature failed to adequately report questions used to capture MHM practices, which limits comparison. A study done in Uganda found 90.5\% of girls fail to meet available criteria for adequate MHM similar to the present study (87.3\%).\[^{12}\] Most of the studies enquired mostly about the absorbents used. A higher proportion of girls reported using clot in rural India (pooled prevalence: 63\%) and 56\% in Ethiopia.\[^{13,14}\]

Women who menstruate tend to lose blood through their periods, disproportionately affected by anemia. As the blood is lost every month during menstruation iron depletion occurs; if it is not replaced, it leads to iron deficiency anemia. People with heavy menstrual bleeding are more susceptible to iron deficiency anemia. A study in Kerala found the number of pads used per day during menstruation (\(P = 0.004\)) was associated with the presence of anemia, as it indirectly indicates the amount of blood loss during menstruation.\[^{10}\] Previous evidence shows that the RTI leads to PID results in menorrhagia, in turn, leading to blood loss and anemia. As anemia and infection had a bidirectional relationship, the RTI will be taken as a proxy for anemia to elicit association between MHM and anemia.\[^4\] A study done in Karnataka found that the symptoms of RTI

| Table 1: Distribution of study participants according to menstruation characteristics and its knowledge, hemoglobin level, and nutritional status (n=393) |
|---------------------------------------------------------------|
| **Age at menarche**                                           |
| 11 years and less                                             |
| 12 years                                                      |
| 13 years                                                      |
| 14 years and more                                             |
| **Awareness about menstruation before menarche**              |
| Yes                                                          |
| No                                                           |
| **What is the cause of menstruation? (knowledge)**            |
| Normal physiological process                                  |
| Because of eating hot food                                     |
| Process of cleaning body                                      |
| Curse of god                                                  |
| Don’t know                                                    |
| **Menstrual bleeding**                                        |
| Normal                                                        |
| Excessive                                                    |
| **Activities restricted during menstruation at home**         |
| Yes                                                          |
| No                                                           |
| **MHM category (score)**                                      |
| Poor (≤5)                                                     |
| Good (6)                                                      |
| **Hemoglobin level (g/dl)**                                   |
| ≥12 (no anemia)                                               |
| <12 (anemic)                                                  |
| 11.9-10 (mild)*                                               |
| 9.9-7 (moderate)*                                             |
| <7 (severe)*                                                  |
| Mean (SD); median                                             |
| Minimum-maximum (range)                                       |
| **Nutritional status (BMI)**                                  |
| Underweight (<18.5)                                           |
| Normal (≥18.5)                                                |

\[^{152}\] MHM: Menstrual hygiene management, SD: Standard deviation, BMI: Body mass index

[12] National Family Health Survey 4 (2015–2016) found that 53\% of women in the childbearing age (15–45 years) and 54\% of adolescent girls (15–19 years) have anemia, which is the highest in the world. About 29\% of nonpregnant women worldwide are affected by anemia. Various studies in India found the prevalence of anemia among adolescents ranges from 30\% to 56\% \[^8,^9\] with the lowest prevalence in Kerala-based study (21\%). It may be due to the high iron content in their local food and higher consumption of meat among the communities.\[^{10}\]

In the present study, the prevalence of anemia among adolescent girls (10–19 years) was found to be 38.7\%;
Table 2: Univariate and multivariable logistic regression showing factors associated with anemia (n=393)

| Variables                      | OR (95% CI); P  | AOR (95% CI); P |
|--------------------------------|----------------|----------------|
| MHM (poor)                     | 3.2 (1.5-6.9); 0.002** | 2.6 (1.1-5.7); 0.017* |
| Age (<15)                      | 1 (0.7-1.6); 0.713 |                |
| Religion (Hindu)               | 1.7 (1.1-2.8); 0.015* | 1.7 (1.1-2.8); 0.02* |
| Caste (OBC)                    | 0.7 (0.4-1.3); 0.360 |                |
| Caste (SC)                     | 1.4 (0.8-2.4); 0.219 |                |
| Socio economic category (BPL)  | 1 (0.6-1.8); 0.742 |                |
| Educational status (below 9th class) | 2 (1.2-3.6); 0.009** | 1.9 (1.1-3.5); 0.02* |
| Mother’s education (up to primary) | 1.3 (0.8-2); 0.164 |                |
| Age at menarche (<12 years)    | 1.4 (0.9-2.2); 0.126 |                |
| Bleeding (excess)              | 2.1 (1.3-3.2); 0.001** | 1.7 (1.1-2.7); 0.017* |
| Restrictions at home (yes)     | 1 (0.6-1.7); 0.716 |                |
| Nutritional status (underweight) | 1.7 (1.1-2.6); 0.008* | 1.8 (1.1-2.7); 0.006* |
| Knowledge regarding menstruation | 1 (0.6-1.6); 0.919 |                |
| Hosmer-Lemeshow statistic      | 0.712 |                  |
| Nagelkerke R²                  | 0.121 |                  |

*p<0.05, **p<0.005. OR: Odds ratio, AOR: Adjusted odds ratio, MHM: Menstrual hygiene management, BPL: Below poverty line, CI: Confidence interval

found to be high among adolescents using cloth as absorbent and those not maintaining the hygiene of genitalia. Various surveys found that the lack of menstrual hygiene results in anemia, prolonged or short periods, infections of reproductive tracts, as well as psychological problems such as anxiety, embarrassment, and shame. A case-control study done in Orissa concluded that the interventions that ensure women to have access to private sanitation facilities with a water supply and educate women about safer, low-cost MHM materials could reduce urogenital disease as well as reduce the occurrence of anemia in adolescent girls.[15]

**Conclusion**

The present study found the prevalence of anemia and poor MHM to be 38.7% and 87.3%, respectively. The study also concluded that there is a significant association between poor MHM and anemia. Providing awareness and breaking the taboos is an imperative strategy to reduce the burden imposed by poor MHM. Evidence-based nationwide data are needed to establish a cause-effect relationship and its consequences which will help in exploring and implementing various preventive measures.

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**Conflicts of interest**

There are no conflicts of interest.

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