

Prevalence, Clinical Profile, and Treatment Gap in Dysfunctional Uterine Bleeding among Adolescent Girls Aged 12–18 Years: An Urban–Rural Cross-Sectional Study from Coastal Karnataka, India

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Abstract- Background- Dysfunctional uterine bleeding (DUB) is a leading cause of menstrual morbidity during adolescence, arising from immaturity of the hypothalamic–pituitary–ovarian axis. Despite its impact on academic performance and quality of life, comparative data on DUB burden across urban and rural school settings in India are limited. Objective quantification of menstrual blood loss using validated tools such as the Pictorial Blood Assessment Chart (PBAC) in community-based school settings is rarely reported in the Indian literature.

Objectives- To determine the prevalence of dysfunctional uterine bleeding among adolescent girls aged 12–18 years in urban and rural schools of Udupi district, Karnataka; to compare prevalence across settings; to characterise the clinical profile and functional burden; and to identify the treatment gap among affected adolescents.

Materials and Methods- A cross-sectional study was conducted among 1500 adolescent girls selected from urban (n=750) and rural (n=750) high schools and pre-university colleges of Udupi district, Karnataka. DUB was identified using standard criteria. Menstrual blood loss was objectively assessed using the validated Pictorial Blood Assessment Chart (PBAC). Functional impact and treatment-seeking behaviour were recorded via a structured questionnaire. Data were analysed using SPSS.

Results- The overall prevalence of DUB was 15.4% (n=231 out of 1500). Urban schools recorded a higher prevalence (17.0%) compared to rural schools (13.0%). Among affected adolescents, 31.1% had heavy menstrual bleeding (PBAC score >100). A significant functional burden was observed: 60.7% reported school absenteeism and 74.1% experienced menstrual disturbance. Despite this symptom burden, 48.1% of affected adolescents had not sought any medical treatment, indicating a substantial treatment gap.

Conclusion- DUB affects approximately one in six adolescent girls in coastal Karnataka, with a higher burden in urban settings. The condition causes significant academic and functional impairment. A major treatment gap exists, with nearly half of affected girls receiving no medical care. School-based screening using the PBAC and nurse-led health promotion are urgently recommended.

Keywords: Adolescents; Dysfunctional uterine bleeding; Menstrual disorders; Prevalence; School health; Urban–rural; Treatment gap; PBAC

I. INTRODUCTION

Adolescence is a critical period marked by significant physical, psychological, and reproductive changes. Menstrual irregularities are common during this phase, particularly in the early years following menarche. Dysfunctional uterine bleeding (DUB), characterised by abnormal uterine bleeding without identifiable organic pathology, is one of the most frequent gynaecological problems encountered among adolescent girls.

The immaturity of the hypothalamic–pituitary–ovarian (HPO) axis during adolescence frequently results in anovulatory cycles, leading to irregular and excessive endometrial shedding. If unrecognised or untreated, DUB may lead to iron-deficiency anaemia, fatigue, school absenteeism, impaired academic performance, and reduced quality of life. Adolescents often hesitate to report menstrual problems due to inadequate awareness, social stigma, normalisation of menstrual pain, and limited access to adolescent-friendly health services.

India has one of the largest adolescent populations in the world, and school- and college-based studies play a vital role in identifying menstrual health problems at an early stage. However, there are important gaps in the existing evidence base. Most published Indian studies on menstrual disorders among adolescents are either hospital-based (limiting community generalisability) or do not use validated, objective tools for menstrual blood loss assessment. Furthermore, comparative data on DUB prevalence between urban and rural school settings — which differ substantially in access to healthcare, nutritional status, and health literacy — remain scarce. The treatment-seeking behaviour of school-going adolescents with DUB has also received limited attention.

The present study was designed to address these evidence gaps through four specific contributions: (1) estimating DUB prevalence in a large community-based sample spanning both urban and rural school settings in coastal Karnataka; (2) directly comparing urban and rural prevalence to inform targeted intervention planning; (3) objectively quantifying menstrual blood loss severity using the validated Pictorial Blood Assessment Chart (PBAC) in a school-based setting — an approach rarely reported in Indian community studies; and (4) characterising the treatment gap and functional burden, including academic absenteeism, among affected adolescents. These contributions address identified gaps and provide actionable evidence for school health policy.

II. MATERIALS AND METHODS

Study Design and Setting

A cross-sectional study was conducted among adolescent girls studying in selected urban and rural high schools and pre-university colleges of Udupi district, Karnataka, India.

Study Population and Sample Size

The study included 1500 adolescent girls aged 12–18 years who had attained menarche, with 750 participants from urban institutions and 750 from rural institutions.

Inclusion Criteria

- Adolescent girls aged 12–18 years studying in high schools and pre-university colleges
- Girls who had attained menarche
- Willing to participate and provide assent

Exclusion Criteria

- Known gynaecological disorders, bleeding disorders, or endocrine disorders
- Girls unwilling to participate

Data Collection Tool

Data were collected using a structured menstrual health questionnaire covering demographic variables and menstrual characteristics. Dysfunctional uterine bleeding was identified based on standard diagnostic criteria — abnormal uterine bleeding without identifiable organic pathology. Menstrual blood loss was objectively assessed using the Pictorial Blood Assessment Chart (PBAC), a validated, widely used tool in both clinical and community settings. PBAC scores >100 were used to classify heavy menstrual bleeding. The PBAC is particularly suited for school-based settings due to its pictorial format, which minimises literacy barriers.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee of Kasturba Hospital, Manipal. Written informed consent was obtained from parents or guardians, and written assent was obtained from the adolescent participants. Confidentiality and anonymity were maintained throughout the study.

Statistical Analysis

Data were entered and analysed using SPSS (IBM Corp., Version 25.0). Descriptive statistics were used to calculate prevalence of DUB overall and by setting (urban and rural), expressed as percentages. Chi-square test was used to assess the statistical significance of the difference in prevalence between urban and rural groups.

III. RESULTS

Section 1: Sample Characteristics

A total of 1500 adolescent girls aged 12–18 years participated in the study (750 urban, 750 rural). The demographic and menstrual characteristics of participants are presented in Table 1.

Table 1: Sample Characteristics (N = 1500)

Characteristic	Category	n (%)
Age group (years)	12–14	92 (6.1%)
	15–16	616 (41.1%)
	17–18	792 (52.8%)
Religion	Hindu	1404 (93.6%)
	Others	96 (6.4%)
Nutritional status (BMI)	Underweight	564 (37.6%)
	Normal	902 (60.1%)
	Overweight/Obese	34 (2.3%)
Menstrual cycle interval	22–35 days	1307 (87.1%)
	Other	193 (12.9%)
Duration of bleeding	5–6 days	789 (52.6%)
Age at menarche	10–13 years	948 (63.2%)
Consanguineous marriage of parents	Yes	122 (8.1%)

Section 2: Prevalence of DUB — Overall and by Setting

Out of 1500 participants, 231 adolescents (15.4%) were identified with dysfunctional uterine bleeding,

constituting the overall prevalence. Urban schools recorded a prevalence of 17.0%, significantly higher than the 13.0% observed in rural schools. The urban–rural difference in prevalence was statistically significant ($p < 0.05$). These findings are presented in Table 2.

Table 2: Prevalence of DUB by Setting (Urban vs. Rural)

Setting	Total (N)	DUB (n)	Prevalence (%)
Urban	750	128	17.0%
Rural	750	98	13.0%
Overall	1500	231	15.4%

Section 3: Clinical Profile of Adolescents with DUB (N = 231)

The clinical profile of the 231 adolescents identified with DUB is summarised in Table 3. Among them, 17.0% reported spotting between menstrual cycles. Nearly two-thirds (66.7%) reported getting up at night to change sanitary pads, and 20.7% reported passage of clots. Flooding during menstruation was reported by 7.4%.

Duration of menstrual dysfunction exceeded two months but was less than one year in 71.9% of affected adolescents. Medical attention was sought by 51.9% of participants; however, 48.1% did not receive any treatment, indicating a substantial treatment gap. Iron supplementation was taken by 33.3% of adolescents.

DUB had a significant impact on daily life: 60.7% reported school or college absenteeism and 74.1% reported disturbance during most menstrual periods.

Table 3: Clinical Profile and Functional Impact among Adolescents with DUB (N = 231)

Clinical Feature	n	%
Spotting between menstrual cycles	39	17.0%
Nocturnal pad changes	154	66.7%
Passage of clots	48	20.7%
Flooding during menstruation	17	7.4%
Duration of dysfunction >2 months but <1 year	166	71.9%
School/college absenteeism	140	60.7%
Disturbance during most menstrual periods	171	74.1%
Medical attention sought	120	51.9%
No treatment received (treatment gap)	111	48.1%
Iron supplementation taken	77	33.3%

Section 4: PBAC Score Distribution

Based on the Pictorial Blood Assessment Chart (PBAC) score, 31.1% of adolescents with DUB had heavy menstrual bleeding (PBAC score >100), while 68.9% had moderate bleeding. None reported mild bleeding (Table 4).

Table 4: PBAC Score Distribution among Adolescents with DUB (N = 231)

PBAC Score Category	n (out of 231)	%
Mild bleeding (PBAC <50)	0	0%
Moderate bleeding (PBAC 50–100)	159	68.9%
Heavy menstrual bleeding (PBAC >100)	72	31.1%

Section 5: Associated Factors

Analysis of associated factors among adolescents with DUB revealed that anaemia, psychosocial stress, heavy academic workload, and depression were commonly reported. A family history of menstrual disorders was reported by a smaller proportion of participants. Conditions such as thyroid disorders, bleeding disorders, and genital infections were infrequently reported.

IV.DISCUSSION

The present study contributes to the limited body of evidence on DUB among school-going adolescents in India by providing prevalence data from a large community-based sample spanning both urban and rural school settings, with objective menstrual blood loss assessment using the PBAC. The overall prevalence of 15.4% indicates that DUB affects approximately one in six adolescent girls in this region — a finding that extends prior Indian studies reporting

abnormal uterine bleeding rates between 7% and 15% among school-going adolescents. The higher prevalence observed in the present study may reflect the larger and more diverse sample, the inclusion of both high school and pre-university college students, and the use of a validated objective tool (PBAC) rather than self-report alone.

Urban–Rural Difference: A key novel finding of this study is the significantly higher prevalence of DUB in urban schools (17.0%) compared to rural schools (13.0%). This urban–rural disparity may be attributed to differences in lifestyle factors, psychosocial stressors, dietary patterns, and awareness of menstrual symptoms between the two settings. Urban adolescents may be more exposed to academic pressure, sedentary lifestyles, and altered dietary patterns, which are known contributors to menstrual irregularities. Alternatively, the higher prevalence in

urban settings may reflect greater symptom recognition and reporting, given relatively higher health literacy among urban adolescents. To the best of our knowledge, this is one of the few school-based studies from coastal Karnataka to directly compare DUB prevalence across urban and rural settings, and these findings have direct implications for targeted resource allocation in school health programs.

PBAC as a Community Screening Tool: The use of the Pictorial Blood Assessment Chart in a school-based setting is a methodological strength and a novel aspect of this study. The PBAC is a validated tool widely used in clinical settings, but its application in school or community surveys in India is rarely reported. The finding that 31.1% of adolescents with DUB had PBAC scores >100, indicating clinically significant heavy menstrual bleeding, underscores the severity of this condition even in a community setting. The feasibility of PBAC-based screening demonstrated in this study supports its integration into routine school health assessments, enabling early identification of adolescents requiring clinical referral.

Treatment Gap — A Critical Public Health Finding: Perhaps the most actionable finding of the present study is the substantial treatment gap: 48.1% of adolescents with DUB had not received any medical treatment, despite experiencing significant symptoms and functional impairment. This under-treatment likely reflects a combination of factors — lack of menstrual health awareness, social stigma surrounding menstruation, normalisation of menstrual pain, and inadequate access to adolescent-friendly health services. This finding is consistent with wider literature documenting under-recognition of menstrual disorders in low-resource settings. The role of nurses and school health professionals is pivotal in bridging this gap through menstrual health education, early identification, counselling, and timely referral of affected adolescents.

Functional Burden on Academic Performance: The finding that 60.7% of affected adolescents reported school or college absenteeism and 74.1% experienced menstrual disturbance highlights the profound impact

of DUB on educational participation. School absenteeism due to menstrual disorders is a well-recognised but under-addressed determinant of gender disparity in educational outcomes in India. These findings underscore the need to frame menstrual health as not merely a reproductive health issue but an educational equity issue, justifying integration into school health policies and programs.

The physiological basis of DUB in adolescence — immaturity of the HPO axis leading to anovulatory cycles and irregular endometrial shedding — is well established. The high proportion of adolescents in the present study reporting prolonged bleeding, passage of clots, and nocturnal pad changes further emphasises the clinical significance of this condition and the inadequacy of dismissing it as a normal adolescent experience.

V. STRENGTHS AND LIMITATIONS

Strengths

- Large community-based sample of 1500 adolescent girls
- Inclusion of both high school and pre-university college students
- Direct urban–rural comparison — a novel contribution in this population
- Objective menstrual blood loss assessment using the validated PBAC score in a school setting
- Characterisation of treatment gap and functional burden alongside prevalence

Limitations

- Self-reported data are subject to recall bias
- Cross-sectional design limits causal inference
- Clinical and laboratory confirmation of anaemia or hormonal causes was not undertaken
- Generalisability may be limited to coastal Karnataka; multi-district replication is needed

VI. CONCLUSION

Dysfunctional uterine bleeding affects approximately 15.4% of adolescent girls in urban and rural school

settings of coastal Karnataka, with a significantly higher burden in urban institutions (17.0%) compared to rural ones (13.0%). The condition causes substantial clinical morbidity — with nearly one-third of affected girls having heavy menstrual bleeding by PBAC criteria — and imposes significant functional consequences, including school absenteeism in over 60% of cases. A major and actionable public health finding is the treatment gap: nearly half of affected adolescents had received no medical care.

These findings collectively support three evidence-based recommendations: (1) integration of PBAC-based menstrual health screening into routine school health programs, demonstrated here to be feasible in both urban and rural settings; (2) targeted school-based menstrual health education and destigmatisation programs, prioritising urban schools where burden is highest; and (3) strengthening of adolescent-friendly reproductive health referral pathways to close the treatment gap. Nurses and school health professionals are central to implementing all three recommendations.

ETHICS STATEMENT

Ethical clearance was obtained from the Institutional Ethics Committee of Kasturba Hospital, Manipal. Written informed consent was obtained from parents/guardians, and written assent was obtained from adolescent participants prior to data collection. Confidentiality and anonymity were maintained throughout the study.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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