



Original Article

Prevalence and Factors Associated with Severe Anaemia in Women Presenting with Abnormal Uterine Bleeding: A Hospital-Based Cross-Sectional Study

Bharathi. P.¹, Srinivasa K.²

¹ Associate professor, Department of Department of Obstetrics and Gynecology, Chamarajanagar Institute of Medical College, Chamarajanagar -571313, Karnataka, India.

² Professor and Head, Department of Pharmacology, Chamarajanagar Institute of Medical College, Chamarajanagar -571313, Karnataka, India.

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Corresponding Author:

Bharathi. P.

Associate professor, Department of Department of Obstetrics and Gynecology, Chamarajanagar Institute of Medical College, Chamarajanagar -571313, Karnataka, India.

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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a common gynecological disorder among reproductive-aged women and a major contributor to iron deficiency anaemia. Severe anaemia increases morbidity, reduces quality of life, and may necessitate urgent intervention. This study aimed to determine the prevalence of anaemia and evaluate factors associated with severe anaemia among women presenting with AUB.

Methods: This hospital-based cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Chamarajanagar Institute of Medical Sciences, Karnataka, India, from January 2023 to December 2025. A total of 126 women aged 25–50 years presenting with AUB were included. Clinical evaluation, ultrasonography, and histopathology (where indicated) were performed. Anaemia was classified according to World Health Organization criteria as mild (11.0–11.9 g/dL), moderate (8.0–10.9 g/dL), and severe (<8.0 g/dL). Associations between bleeding patterns, etiological categories, and severe anaemia were analysed using the Chi-square test. A p-value <0.05 was considered statistically significant.

Results: Heavy menstrual bleeding (68.3%) was the most common presentation. Structural causes accounted for 73.0% of cases, with leiomyoma (30.2%) and adenomyosis (20.6%) being predominant. The overall prevalence of anaemia was 63.5% (95% CI: 54.8–71.5). Severe anaemia (<8 g/dL) was observed in 19.8% of women and was significantly associated with heavy menstrual bleeding (p=0.002) and structural causes (p=0.018).

Conclusion: Anaemia is highly prevalent among women with AUB. Severe anaemia is significantly associated with heavy menstrual bleeding and structural uterine pathology. Routine haemoglobin assessment and early correction of iron deficiency should be integral to AUB management.

Keywords: Abnormal uterine bleeding, Anaemia, Heavy menstrual bleeding, PALM–COEIN classification, Leiomyoma, Hysterectomy.

INTRODUCTION

Abnormal uterine bleeding (AUB) is a common, important gynecological disorder. It refers to abnormal bleeding from the uterus in non-pregnant women of reproductive age, defined by changes in bleeding volume, regularity, frequency, or duration. Normal cycles last 24–38 days, up to 8 days, with blood loss of 5–80 ml per cycle. These definitions follow updated International Federation of Gynecology and Obstetrics (FIGO) terminology. Deviations are classified as AUB[1].

AUB accounts for a major global health burden, accounting for about a third of gynecological outpatient visits. It harms physical, emotional, social, and economic well-being and may result in iron-deficiency anemia and lower quality of life.

Studies estimate AUB affects 10–30 percent of reproductive-aged women, and up to 50 percent of perimenopausal women. Etiology and symptoms differ by age, reproductive status, and comorbidities [2].

Normal menstruation relies on the hypothalamic-pituitary-ovarian (HPO) axis, ovarian steroid hormones, endometrial receptivity, and local hemostasis. Disruptions from endocrine, structural, inflammatory, hematologic, or iatrogenic factors may cause AUB. Clinically, AUB includes heavy menstrual bleeding (HMB), intermenstrual bleeding, prolonged or shortened duration, or changed frequency. FIGO classifies AUB as acute or chronic[3]. Acute AUB involves excessive bleeding needing urgent care to prevent instability. Chronic AUB is abnormal bleeding over most of the last six months, usually not an emergency[4].

To improve diagnosis and standardization, FIGO introduced the PALM–COEIN classification in 2011 and updated the terms in 2018. This system divides AUB causes into structural (PALM: polyp, adenomyosis, leiomyoma, malignancy/hyperplasia) and non-structural (COEIN: coagulopathy, ovulatory dysfunction, endometrial, iatrogenic, not otherwise classified). PALM causes are seen by imaging or histopathology. Using this system has improved consistency in practice, research, and treatment decisions [5-7].

AUB management depends on cause, age, reproductive goals, severity, and comorbidities. Treatments include medications—NSAIDs, antifibrinolytics, hormonal contraceptives, progestins, levonorgestrel intrauterine systems, and gonadotropin-releasing hormone analogues—as well as minimally invasive and, if needed, surgical options[8].

Given AUB's frequency, multiple causes, and changing therapies, diagnostic and management strategies should be reviewed regularly [9.] Using standardized classifications and evidence-based treatments is key to improving outcomes and efficient resource use.

This study aims to quantify the prevalence of anemia among women of reproductive age. Additionally, it seeks to examine the association between the severity of abnormal uterine bleeding (AUB) and both the incidence and severity of anemia in this population, providing clearer insight into this relationship.

MATERIALS AND METHODS

Study Design and Setting

The research was a cross-sectional hospital-based study. It was conducted at the Department of Obstetrics and Gynaecology, Chamarajanagar Institute of Medical Sciences (CIMS), Chamarajanagar, Karnataka, India. The study period was between January 2023 to December 2025. CIMS is a teaching hospital and tertiary care center. It offers comprehensive obstetric and gynecological services to urban and rural citizens of Chamarajanagar district and nearby areas. therefore, the research aimed to determine the frequency of anemia in women with abnormal uterine bleeding (AUB) and assess how the severity of AUB relates to anemia in women of reproductive age.

Study Population

A total of 120 women reporting abnormal uterine bleeding were included in the study. Participants were selected according to predefined inclusion and exclusion criteria.

Inclusion Criteria

Women aged 25 to 50 years with abnormal uterine bleeding who are willing to participate and provide written informed consent.

Inclusion criteria: Women who attended the Department of Obstetrics and Gynaecology at CIMS during the January 2023 to December 2025.

Exclusion Criteria

- Pregnant women or those within six months postpartum.
- Women with known inherited or acquired bleeding disorders unrelated to abnormal uterine bleeding.
- Women receiving anticoagulant therapy.
- Patients diagnosed with malignancies of the reproductive tract.

Women with systemic illnesses (e.g., chronic kidney disease, chronic liver disease) accompanied by anemia. Women who have undergone a hysterectomy or major gynecological surgery.

Data Collection: Detailed menstrual history including duration, frequency, and perceived severity of bleeding was recorded. Heavy menstrual bleeding was defined clinically as excessive menstrual blood loss interfering with daily activities. Physical examination and hemoglobin estimation were performed for all participants. Ultrasonography was conducted to identify structural abnormalities. Endometrial sampling was performed where clinically indicated.

Ethical Considerations

The Institutional Ethics Committee of Chamarajanagar Institute of Medical Sciences reviewed and approved the study protocol (Approval No.: CIMS/IEC/2023/32). All participants received information and gave written informed consent. The researchers complied with the principles of the Declaration of Helsinki and maintained the confidentiality of patient data.

Statistical analysis

Data were manually entered into Microsoft Excel by trained staff, who transcribed information from data collection forms. The data were then analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics summarized demographic and clinical characteristics. Age and hemoglobin levels were presented as mean \pm SD or median \pm IQR, depending on data distribution. Categorical variables, including AUB severity and anemia status, were reported as frequencies and percentages.

The incidence of anemia among women with abnormal uterine bleeding (AUB) was calculated as a proportion of the total study population. Anemia was classified according to the World Health Organization (WHO) criteria as mild (hemoglobin 11.0-11.9 g/dL), moderate (hemoglobin 8.0-10.9 g/dL), or severe (hemoglobin <8.0 g/dL).

We used the Chi-square test or Fisher's exact test to assess whether AUB severity was associated with anemia status. To compare mean hemoglobin levels across AUB severity groups, we used the independent t-test or a one-way ANOVA, depending on the group count. A p-value < 0.05 was considered statistically significant.

Clinical Patterns of Abnormal Uterine Bleeding

Clinical Patterns of AUB

Among 126 women, heavy menstrual bleeding was the most common presentation (68.3%), followed by intermenstrual bleeding (14.3%), polymenorrhoea (11.1%), and menometrorrhagia (6.3%). No cases of oligomenorrhoea were observed.

Table 1: Different Patterns of Abnormal Uterine Bleeding (n = 126)

Types of Bleeding	Number of Patients (n=126)	Percentage (%)
Heavy menstrual bleeding (Menorrhagia)	86	68.3
Intermenstrual bleeding (Metrorrhagia)	18	14.3
Heavy & prolonged bleeding (Menometrorrhagia)	8	6.3
Frequent menstrual bleeding (Polymenorrhoea)	14	11.1
Oligomenorrhea	0	0
Total	126	100

Data are presented as frequencies (n) and percentages (%), calculated relative to the overall study sample.

Sonographic Profile of AUB

Ultrasonography revealed fibroids in 26.2%, adenomyosis in 20.6%, endometrial polyps in 7.9%, thickened endometrium in 14.3%, ovarian cysts in 2.4%, and normal findings in 28.6% of patients.

Table 2: Sonographic Findings in Patients with AUB (n = 126)

Sonographic Finding	Number of Patients (n=126)	Percentage (%)
Fibroid	33	26.2
Adenomyoma	26	20.6
Endometrial polyp	10	7.9
Thick endometrium	18	14.3
Ovarian cyst	3	2.4
Normal scan	36	28.6
Total	126	100

Values are expressed as number (n) and proportion (%), with percentages derived from the total cohort.

Histopathological Findings

Proliferative endometrium was the most common histopathological pattern (42.9%), followed by secretory endometrium (19.0%), disordered proliferative endometrium (11.1%), and out-of-phase endometrium (7.1%). Hyperplasia was observed in 4.0%, and malignancy in 0.8% of cases.

Table 3: Endometrial Pattern in AUB (by D&C and Hysterectomy) (n = 126)

Endometrial Pattern	Number of Patients (n=126)	Percentage (%)
Proliferative endometrium	54	42.9

Secretory endometrium	24	19.0
Disordered proliferative endometrium	14	11.1
Out of phase endometrium	9	7.1
Polyp	10	7.9
Chronic endometritis	4	3.2
Atrophic endometrium	1	0.8
Simple hyperplasia with atypia	1	0.8
Simple hyperplasia without atypia	4	3.2
Malignancy	1	0.8
Gestation related	0	0
Inadequate for opinion	4	3.2
Total	126	100

Results are reported as absolute counts and corresponding percentages, based on all patients who underwent histopathological evaluation.

D&C, dilatation and curettage.

Etiological Distribution According to FIGO PALM–COEIN Classification

Structural causes accounted for 73.0% of cases, with leiomyoma (30.2%) being the most common, followed by adenomyosis (20.6%) and polyps (7.9%). Ovulatory disorders (19.8%) and endometrial causes (19.0%) were the predominant non-structural etiologies.

Table 4: Distribution of Causes of AUB Based on PALM–COEIN Classification (n = 126)

Cause	Number of Patients (n=126)	Percentage (%)
Polyp	10	7.9
Adenomyosis	26	20.6
Leiomyoma	38	30.2
Malignancy	1	0.8
Coagulopathy	0	0
Ovulatory disorder	25	19.8
Endometrial disorder	24	19.0
Iatrogenic	0	0
Not yet classified	2	1.6
Total	126	100

Data are shown as number (n) and percentage (%) of the study population. Classification was performed in accordance with the FIGO PALM–COEIN system. PALM: Polyp, Adenomyosis, Leiomyoma, Malignancy and hyperplasia. COEIN: Coagulopathy, Ovulatory dysfunction, Endometrial causes, Iatrogenic, Not yet classified.

Anaemia Profile

The overall prevalence of anaemia was 63.5% (95% CI: 54.8–71.5). Severe anaemia (<8 g/dL) was present in 19.8% of participants. Severe anaemia was significantly associated with heavy menstrual bleeding (p=0.002) and structural causes of AUB (p=0.018).

Treatment Modalities

Surgical management was performed in 78.6% of cases, with hysterectomy being the most common procedure (46.8%), followed by dilatation and curettage (19.0%), polypectomy (7.9%), and myomectomy (4.8%). Medical management alone was provided in 21.4% of women.

Table 5: Treatment Modalities for AUB (n = 126)

Treatment	Number of Patients (n=126)	Percentage (%)
Hysterectomy	59	46.8
Polypectomy	10	7.9
Cystectomy	0	0
Dilatation & Curettage	24	19.0
Fibroid excision (Myomectomy)	6	4.8
Only drugs without surgery	27	21.4
Total	126	100

Frequencies and percentages are presented relative to the total number of included participants.

DISCUSSION

This study assessed the prevalence and predictors of severe anaemia in women with abnormal uterine bleeding (AUB) at a teaching tertiary hospital in South India. A high burden of anaemia was found, especially among those with heavy menstrual bleeding (HMB) and structural uterine pathology[6].

Heavy menstrual bleeding (68.3%) emerged as the predominant clinical manifestation in the cohort, reinforcing existing research that identifies HMB as the most common presentation of AUB. Specifically, Munro et al. and subsequent FIGO updates emphasize HMB as the main symptom in gynecological settings. In alignment with this, a hospital-based study from North India reported HMB in 60-70.5% of AUB cases, which closely matches these findings.

Regarding etiology, the most common causes identified were structural, notably leiomyoma (30.2%) and adenomyosis (20.6%). These findings align with previous Indian and international reports, which consistently identify leiomyoma as the predominant structural cause of AUB in women aged 35 to 50 years. For instance, a tertiary care center in Kerala reported leiomyoma in nearly one-third of AUB cases and adenomyosis in approximately 18 to 22 cases, echoing this distribution. These results suggest that the predominance of structural causes in late reproductive and perimenopausal women may contribute to the inability to control bleeding severity and the development of resultant anaemia.

The presence of anaemia in this study underscores the significant hematologic impact of chronic abnormal uterine bleeding. Consistent with these observations, Kaur et al. reported moderate to severe anaemia in nearly half of the women with HMB. Chronic blood loss, especially in leiomyoma and adenomyosis cases, results in iron deficiency and progressive hemoglobin depletion. Importantly, this study demonstrates a statistically significant association between AUB severity and anaemia ($p < 0.05$), reinforcing prior cross-sectional findings that heavy menstrual bleeding is an independent predictor of severe anaemia.

Proliferative endometrium was the most frequent histopathological finding (42.9%), followed by secretory phase endometrium. This pattern is consistent with previous research assessing endometrial biopsies in patients with AUB. For example, a tertiary care study in Maharashtra similarly reported a proliferative endometrium in 40-45% of cases [10.] This predominance suggests underlying ovulatory dysfunction in a substantial proportion of patients, as further indicated by the 19.8% ovulatory disorder group classified under PALM–COEIN in this study.

Regarding management, the hysterectomy rate was 46.8%, which is not notably lower than recent reports. Previous urban tertiary-based studies have reported hysterectomy rates for AUB management ranging from 30 to 40%. The elevated rate in this study may result from late patient presentation, inadequate prior medical management, limited access to minimally invasive procedures, and socioeconomic factors influencing treatment decisions in semi-urban and rural populations.

Turning to malignancy, the rate observed was 0.8 percent, which is relatively similar to the 12 percent range reported in other hospital-based studies of similar-age groups. Although uncommon, this finding supports the need for early endometrial assessment, especially in women over 40 years or those with risk factors.

Overall, these results align with existing literature indicating that heavy menstrual bleeding and structural uterine pathology are significant contributors to severe anaemia in women with AUB. The strong correlation between bleeding severity and anaemia underscores the need for early haemoglobin testing and prompt treatment of iron deficiency.

Taken together, this study provides region-specific data from a teaching tertiary care hospital in Karnataka, thereby addressing the limited evidence on predictors of severe anaemia in AUB among semi-urban populations in India. Nonetheless, the single-center design and prospective methodology may limit generalizability. Looking ahead, future multicentre studies incorporating detailed hematologic indices and long-term outcomes are necessary to strengthen the evidence base. Notably, a high incidence of anaemia was identified—especially among women presenting with heavy menstrual bleeding and structural uterine pathology, including leiomyoma and adenomyosis.

CONCLUSION

The problem of severe anaemia was closely associated with the severity of bleeding. Accordingly, regular hemoglobin testing and timely correction of iron deficiency should be included in AUB management to minimize morbidity and improve patient outcomes. Moreover, improving diagnostic assessment at an early stage, along with medical treatment, may reduce the need for final surgical procedures. Further prospective research is needed to identify independent predictors of severe anaemia and to refine evidence-based management strategies in tertiary care settings.

DECLARATIONS

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Conflict of Interest: None declared.

Data Availability: Available upon reasonable request from the corresponding author.

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