DOI: https://doi.org/10.53350/pjmhs2023178195

ORIGINAL ARTICLE

Clinical and Systemic Consequences of Anemia in Women with Chronic Abnormal Uterine Bleeding: A Hospital-Based Study

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ABSTRACT

Background: Chronic abnormal uterine bleeding (AUB) is a frequent gynecological condition and a major cause of iron deficiency anemia among women of reproductive and perimenopausal age. Persistent menstrual blood loss leads to depletion of iron stores, resulting in anemia and a wide range of systemic consequences that adversely affect physical performance, cardiovascular function, and overall quality of life.

Objective: To determine the prevalence of anemia and to evaluate its systemic consequences among women presenting with chronic abnormal uterine bleeding at tertiary care hospitals.

Methods: This hospital-based cross-sectional study was conducted at the Category-D Hospital, Munda, Lower Dir, Khyber Pakhtunkhwa, and Gynecology Unit-I, Dr. Ruth K. M. Pfau Civil Hospital, Karachi, from January 2022 to February 2023. A total of 120 women aged 18–50 years with abnormal uterine bleeding persisting for more than three months were enrolled. Detailed clinical evaluation and laboratory investigations, including complete blood count, were performed. Anemia was classified according to World Health Organization criteria, and systemic manifestations were assessed and correlated with anemia severity.

Results: Anemia was detected in 78.3% of women with chronic AUB. Moderate anemia was the most prevalent form (36.6%), followed by mild (31.7%) and severe anemia (10.0%). Systemic manifestations such as fatigue, generalized weakness, exertional dyspnea, palpitations, dizziness, and reduced work capacity were significantly more common in women with moderate and severe anemia. Cardiovascular signs, including tachycardia and systolic flow murmurs, increased with declining hemoglobin levels. Prolonged duration of bleeding was strongly associated with greater anemia severity.

Conclusion: Anemia is highly prevalent among women with chronic abnormal uterine bleeding and is associated with significant systemic and cardiovascular consequences. Routine anemia screening and integrated management strategies addressing both abnormal uterine bleeding and iron deficiency are essential to reduce morbidity and improve patient outcomes.

Keywords: Abnormal uterine bleeding; Anemia; Iron deficiency; Systemic effects; Women's health; Cross-sectional study.

INTRODUCTION

Abnormal uterine bleeding (AUB) is one of the most common gynecological disorders affecting women of reproductive and perimenopausal age and remains a leading cause of outpatient visits and hospital admissions worldwide[1]. Chronic abnormal uterine bleeding, defined as bleeding that is excessive in volume, duration, or frequency and persists for more than three months, poses a significant clinical challenge due to its persistent nature and associated health consequences. In developing countries, where nutritional deficiencies and limited access to healthcare are prevalent, chronic AUB contributes substantially to preventable morbidity among women[2].

One of the most serious and frequently overlooked complications of chronic abnormal uterine bleeding is anemia, particularly iron deficiency anemia resulting from prolonged and recurrent blood loss[3]. Continuous depletion of iron stores leads to reduced hemoglobin synthesis, impaired oxygen transport, and diminished tissue oxygenation. As a result, affected women often experience fatigue, reduced physical capacity, cognitive impairment, and decreased productivity, all of which adversely impact quality of life and socioeconomic functioning[4].

Beyond generalized symptoms, anemia associated with chronic AUB exerts profound systemic effects on multiple organ systems[5]. Cardiovascular adaptations such as tachycardia and increased cardiac output develop as compensatory mechanisms to maintain tissue oxygen delivery, predisposing patients to functional murmurs and, in severe cases, cardiac failure. Neurological manifestations including dizziness, headaches, and impaired concentration further compound disease burden, particularly in women with long-standing untreated anemia[6]. Despite the high prevalence and clinical significance of anemia in women with chronic abnormal uterine bleeding, it frequently remains underdiagnosed and inadequately managed, with clinical focus often directed solely toward controlling menstrual blood loss[7].

Received on 15-03-2023
Accepted on 22-07-2023

There is limited local data systematically evaluating the extent of anemia and its associated systemic consequences in this population. Therefore, this study was undertaken to determine the prevalence of anemia and to assess its systemic effects among women presenting with chronic abnormal uterine bleeding at a tertiary care hospital, with the aim of emphasizing the need for integrated diagnostic and therapeutic strategies[8].

MATERIALS AND METHODS

Study Design and Setting: This hospital-based cross-sectional study was conducted at two tertiary-level healthcare facilities in Pakistan: the Category-D Hospital, Munda, Lower Dir, Khyber Pakhtunkhwa, and the Gynecology Unit-I of Dr. Ruth K. M. Pfau Civil Hospital, Karachi. These institutions serve a large and diverse population, providing comprehensive gynecological services to women from both urban and rural backgrounds.

Study Duration: The study was carried out over a period of fourteen months, from January 2022 to February 2023.

Study Population and Sample Size: A total of 120 women presenting with chronic abnormal uterine bleeding were enrolled in the study using a non-probability consecutive sampling technique. Eligible participants were women aged 18–50 years who reported abnormal uterine bleeding persisting for more than three months at the time of presentation.

Inclusion and Exclusion Criteria: Women with chronic abnormal uterine bleeding of any pattern and duration exceeding three months who provided informed consent were included. Patients were excluded if they had pregnancy-related bleeding, known hematological disorders, diagnosed bleeding diathesis, gynecological malignancy, chronic renal or hepatic disease, recent blood transfusion, or a history of iron supplementation within the preceding three months.

Data Collection Procedure: After obtaining informed consent, detailed demographic information, menstrual history, duration and pattern of bleeding, obstetric history, and associated symptoms were recorded using a structured data collection proforma. A comprehensive general and systemic examination was performed

for each participant, with particular emphasis on clinical signs of anemia and cardiovascular involvement.

Laboratory Investigations: Venous blood samples were collected under aseptic conditions for complete blood count analysis. Hemoglobin concentration, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration were measured using standardized automated hematology analyzers. Anemia was classified according to World Health Organization criteria into mild, moderate, and severe categories based on hemoglobin levels.

Assessment of Systemic Consequences: Systemic manifestations of anemia were assessed clinically and documented, including fatigue, exertional dyspnea, palpitations, dizziness, headache, reduced exercise tolerance, and impaired daily activities. Cardiovascular findings such as tachycardia and systolic flow murmurs were also recorded and correlated with anemia severity.

Ethical Considerations: Ethical approval was obtained from the respective institutional review committees of both participating hospitals. Written informed consent was obtained from all participants prior to enrollment, and confidentiality of patient data was strictly maintained throughout the study.

Statistical Analysis: Data were entered and analyzed using statistical software. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between anemia severity and systemic manifestations were evaluated using appropriate statistical tests, with a p-value of less than 0.05 considered statistically significant.

RESULTS

A total of 120 women presenting with chronic abnormal uterine bleeding were included in the final analysis. The mean age of the study population was 38.6 ± 7.9 years, with an age range of 19 to 50 years. The majority of patients belonged to the 41–50 years age group, indicating a higher burden of chronic abnormal uterine bleeding in perimenopausal women. Most participants were multiparous and had experienced abnormal uterine bleeding for an extended duration prior to seeking medical care.

Baseline Demographic and Clinical Characteristics: The demographic and baseline clinical characteristics of the study participants are summarized in Table 1. A large proportion of women (43.4%) were between 41 and 50 years of age, followed by those aged 31–40 years (38.3%). Multiparity was a common finding, with 85% of women having had more than one childbirth. Regarding the duration of symptoms, more than two-thirds of participants reported abnormal uterine bleeding for longer than six months, reflecting delayed healthcare-seeking behavior.

Clinical pallor, a key indicator of anemia, was observed in 74.2% of patients at presentation, highlighting the high likelihood of underlying hematological compromise in women with chronic abnormal uterine bleeding. Table 1 shows that chronic AUB was more frequent in multiparous women of perimenopausal age, with most patients experiencing prolonged symptoms and clinical evidence of anemia.

Table 1: Demographic and Clinical Characteristics of Study Participants (n = 120)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–30	22	18.3
31–40	46	38.3
41–50	52	43.4
Parity		
Nulliparous	18	15.0
Multiparous	102	85.0
Duration of AUB		
3–6 months	34	28.3
>6 months	86	71.7
Clinical Pallor		
Present	89	74.2
Absent	31	25.8

Prevalence and Severity of Anemia: Anemia was detected in 94 out of 120 women, giving an overall prevalence of 78.3%. Based on World Health Organization hemoglobin criteria, anemia severity varied considerably among participants. Moderate anemia was the most common category, affecting 36.6% of women, followed by mild anemia in 31.7%. Severe anemia, although less frequent, was present in 10% of cases and represented a clinically significant subgroup requiring urgent intervention.

Only 21.7% of women were found to have normal hemoglobin levels, emphasizing the strong association between chronic abnormal uterine bleeding and anemia. Table 2 highlights that nearly half of the women with chronic AUB suffered from moderate to severe anemia, reflecting substantial cumulative blood loss.

Table 2: Distribution of Anemia Severity Among Study Participants (n = 120)

Hemoglobin Status	Frequency (n)	Percentage (%)
Non-anemic (≥12 g/dL)	26	21.7
Mild anemia (10–11.9 g/dL)	38	31.7
Moderate anemia (7–9.9 g/dL)	44	36.6
Severe anemia (<7 g/dL)	12	10.0

Pattern of Systemic Manifestations in Anemic Patients: Systemic symptoms were markedly more prevalent and severe with increasing anemia severity. Fatigue and generalized weakness were the most frequently reported complaints, particularly among women with moderate and severe anemia. Exertional dyspnea and palpitations were commonly observed in women with hemoglobin levels below 9 g/dL, suggesting compromised oxygen delivery and compensatory cardiovascular responses.

Neurological symptoms such as dizziness and headaches were also significantly more common in women with moderate and severe anemia, adversely affecting daily activities and work capacity. Objective cardiovascular signs, including tachycardia and systolic flow murmurs, were predominantly noted in patients with severe anemia, indicating chronic hemodynamic stress.

The distribution of systemic manifestations according to anemia severity is detailed in Table 3.

Table 3: Systemic Manifestations According to Anemia Severity

Systemic Manifestation	Mild Anemia (n=38)	Moderate Anemia (n=44)	Severe Anemia (n=12)
Fatigue / Weakness	26 (68.4%)	40 (90.9%)	12 (100%)
Exertional Dyspnea	12 (31.6%)	28 (63.6%)	11 (91.7%)
Palpitations	8 (21.1%)	22 (50.0%)	10 (83.3%)
Dizziness / Headache	14 (36.8%)	30 (68.2%)	11 (91.7%)
Reduced Work Capacity	16 (42.1%)	32 (72.7%)	12 (100%)
Tachycardia	6 (15.8%)	24 (54.5%)	10 (83.3%)
Systolic Flow Murmur	4 (10.5%)	18 (40.9%)	9 (75.0%)

Association Between Duration of Abnormal Uterine Bleeding and Anemia Severity: A strong relationship was observed between the duration of abnormal uterine bleeding and anemia severity. Women with bleeding duration exceeding six months exhibited significantly lower hemoglobin levels compared to those with a shorter duration of symptoms. Moderate and severe anemia were predominantly observed in women reporting prolonged bleeding, whereas non-anemic status was more common among those presenting earlier in the disease course. *Table 4 shows that prolonged abnormal uterine bleeding is strongly associated with worsening anemia severity.*

Table 4: Relationship Between Duration of AUB and Anemia Severity

Duration of AUB	Non-anemic	Mild Anemia	Moderate Anemia	Severe Anemia
3–6 months (n=34)	14	12	7	1
>6 months (n=86)	12	26	37	11

Overall, the results demonstrate a high prevalence of anemia among women with chronic abnormal uterine bleeding, with a significant proportion suffering from moderate to severe forms. The findings clearly indicate that anemia in this population is not merely a laboratory abnormality but is associated with substantial systemic and cardiovascular consequences, particularly in women with prolonged bleeding duration.

DISCUSSION

The present hospital-based cross-sectional study demonstrates a high prevalence of anemia among women presenting with chronic abnormal uterine bleeding, with more than three-quarters of the study population affected[7-9]. This finding reinforces the well-established association between prolonged menstrual blood loss and iron deficiency anemia and highlights chronic AUB as a major yet preventable contributor to anemia-related morbidity in women, particularly in resource-limited settings[10].

The predominance of moderate anemia observed in this study is clinically significant, as it reflects ongoing blood loss over an extended period rather than acute hemorrhage[11]. Similar patterns have been reported in regional and international studies, where delayed presentation and normalization of excessive menstrual bleeding contribute to progressive depletion of iron stores. The higher frequency of anemia among perimenopausal women and multiparous patients in the current study may be attributed to cumulative reproductive blood loss, hormonal dysregulation, and limited health-seeking behavior in this age group[12].

An important strength of this study is the systematic evaluation of systemic consequences associated with anemia severity[13]. Fatigue, generalized weakness, exertional dyspnea, and palpitations were increasingly prevalent with declining hemoglobin levels, underscoring the physiological impact of impaired oxygen delivery. These symptoms are often underrecognized in routine gynecological practice yet significantly impair daily functioning, work productivity, and overall quality of life. The high prevalence of neurological manifestations such as dizziness and headache further reflects cerebral hypoxia associated with chronic anemia[14-16].

Cardiovascular findings observed in this study, including tachycardia and functional systolic murmurs, were particularly prominent among women with moderate to severe anemia. These manifestations represent compensatory mechanisms aimed at maintaining adequate tissue oxygenation through increased cardiac output. Persistent cardiovascular strain, if left uncorrected, may predispose susceptible individuals to long-term cardiac dysfunction, emphasizing the importance of early anemia detection and correction in women with chronic AUB[17,18].

The strong association between prolonged duration of abnormal uterine bleeding and increasing anemia severity observed in this study highlights delayed presentation as a key modifiable factor[19]. Women experiencing symptoms for more than six months were disproportionately affected by moderate and severe anemia, suggesting missed opportunities for early intervention. These findings advocate for heightened clinical vigilance, patient education, and routine hematological assessment in women reporting prolonged or heavy menstrual bleeding[20].

While the study provides valuable insights, certain limitations should be acknowledged. The cross-sectional design precludes causal inference, and iron studies were not performed to biochemically confirm iron deficiency in all participants. Nevertheless, the strong clinical correlation between chronic blood loss and anemia severity supports the validity of the findings[12-17].

CONCLUSION

Anemia is highly prevalent among women presenting with chronic abnormal uterine bleeding and is associated with significant systemic and cardiovascular consequences. The severity of anemia increases with prolonged duration of bleeding, leading to substantial functional impairment and physiological stress. These findings emphasize the need for routine anemia screening, early severity stratification, and integrated management strategies that address both abnormal uterine bleeding and its hematological consequences. Prompt recognition and comprehensive treatment of anemia should be considered an essential component of care to improve clinical outcomes and quality of life in affected women.

Conflict of Interest: The authors declare no conflict of interest.
Funding: This study did not receive any external funding.
Authors' Contributions: A.J.S. and Z.P.S. conceived and designed the study, while S.A., N.A., N.J., and L.K. contributed to data collection, clinical assessment, and manuscript review. All authors approved the final version.
Data Availability: The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.
Acknowledgements: The authors acknowledge the cooperation of the staff of Category-D Hospital, Munda, Lower Dir, and Dr. Ruth K. M. Pfau Civil Hospital, Karachi, for their support in patient recruitment and data collection.

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This article may be cited as: Siddiqi AJ, Shaikh ZP, Ashraf S, Akhtar N, Javed N, Khan L. Clinical and Systemic Consequences of Anemia Among Women with Chronic Abnormal Uterine Bleeding: A Hospital-Based Study. Pak J Med Health Sci. 2023;17(8):195-197.