

**A PROSPECTIVE STUDY: EVALUATING BLEEDING PATTERNS IN ABNORMAL
UTERINE BLEEDING AND THE EFFICACY OF TRANEXAMIC ACID IN
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ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a prevalent gynecological condition that significantly affects women's physical health, psychological well-being, and quality of life. It is a major contributor to iron deficiency anemia and often requires long-term medical management. Tranexamic acid (TXA), a non-hormonal antifibrinolytic agent, is widely used for reducing menstrual blood loss in AUB. **Objective:** This study aimed to assess the clinical bleeding patterns in women with abnormal uterine bleeding and to evaluate associated anemia and thyroid dysfunction, quantify menstrual blood loss using PBAC scoring, and determine the efficacy of tranexamic acid in reducing blood loss and improving quality of life & clinical outcomes. **Methods:** A prospective observational study was conducted for six months in the Department of Obstetrics and Gynecology, among women diagnosed with AUB attending a tertiary care teaching hospital. Data regarding demographic characteristics, bleeding patterns, menstrual cycle parameters, hemoglobin levels, thyroid status, and comorbidities were collected. The effectiveness of tranexamic acid was evaluated over a four-month treatment period using the Pictorial Blood Loss Assessment Chart (PBAC) and quality of life (QoL) assessment scores. Pre- and post-treatment outcomes were statistically compared. **Results:** Menorrhagia was the most frequently observed bleeding pattern among the study population. A considerable number of patients had iron deficiency anemia and thyroid dysfunction, predominantly hypothyroidism. Treatment with tranexamic acid resulted in a significant reduction in menstrual blood loss, reflected by decreased PBAC scores. Improvements were also noted in hemoglobin levels, menstrual cycle regularity, and quality of life parameters. Tranexamic acid was well tolerated, with no serious adverse effects reported. **Conclusion:** Tranexamic acid is a safe, effective, and well-tolerated non-hormonal therapeutic option for the management of abnormal uterine bleeding. Early diagnosis and appropriate medical intervention can significantly reduce disease burden and enhance quality of life.

KEYWORDS: Abnormal uterine bleeding, Tranexamic acid, Menorrhagia, PBAC, Quality of life.**INTRODUCTION**

Abnormal uterine bleeding (AUB) is one of the most common gynecological problems affecting women of reproductive age and is defined as bleeding from the uterine corpus that is abnormal in volume, duration, frequency, or regularity and is not related to pregnancy.^[1] The condition results in numerous gynecology outpatient visits while it distributes its effects throughout multiple

aspects of women's physical and emotional and social health.

AUB is a major cause of iron deficiency anemia and it leads to fatigue, decreased work capacity, mental distress, and a decline in life quality.^[2] AUB has high prevalence rates yet it remains underreported and receives insufficient treatment because people in

developing countries delay their healthcare seeking due to social stigma.

Physiology of Menstruation

The natural physiological cycle of menstruation occurs through the hormonal control of the hypothalamic–pituitary–ovarian axis system. The endometrium undergoes changes through its two stages which begin with estrogen and progesterone production and end with their subsequent shutdown. The endometrial lining detaches from the uterus when progesterone levels decrease following unsuccessful fertilization which leads to menstrual bleeding.^[3]

The Normal and Abnormal Menstruation

A standard menstrual cycle takes place between 24 and 38 days which results in bleeding that lasts up to eight days while women experience blood loss between 5 and 80 milliliters during each cycle. Menstrual bleeding that exceeds these parameters in terms of volume, duration, or regularity is considered abnormal and may indicate underlying pathology.^[4,5]

Abnormal Uterine Bleeding

Abnormal uterine bleeding describes any uterine bleeding which occurs at inappropriate times and which exceeds normal amounts or which follows irregular patterns and which occurs outside of pregnancy. Women experience heavy menstrual bleeding as their primary health issue which leads to high rates of illness for affected individuals.^[6]

Epidemiology

AUB affects 10% to 30% of reproductive-aged women who experience AUB, but its prevalence increases during the perimenopausal stage. Many women tolerate symptoms for long durations before seeking medical care, which results in underestimation of the actual disease burden.^[7]

Etiology

The International Federation of Gynecology and Obstetrics (FIGO) introduced the PALM–COEIN classification system to establish standardized procedures for assessing AUB. Structural causes include polyp, adenomyosis, leiomyoma, and malignancy or hyperplasia, while non-structural causes include coagulopathy, ovulatory dysfunction, endometrial disorders, iatrogenic causes, and conditions not otherwise classified.^[1,8]

Pathophysiology

AUB pathophysiology develops through endometrial hemostatic disturbances and hormonal regulation disruption and uterine contractility impairment and coagulation mechanism failure. Anovulatory cycles result in prolonged estrogen exposure without progesterone opposition, leading to excessive endometrial proliferation and irregular bleeding.^[9]

Clinical Features and Complications

Patients experience common clinical symptoms which include heavy or prolonged menstrual bleeding and passage of clots and irregular cycles and fatigue and dizziness and anemia symptoms. AUB untreated condition leads to three health outcomes which include iron deficiency anemia and impaired quality of life and infertility and endometrial hyperplasia.^[10–13]

Tranexamic Acid in the Management of AUB

Tranexamic acid functions as a synthetic antifibrinolytic drug which decreases menstrual blood flow by blocking the plasminogen-to-plasmin conversion process and thus maintains fibrin clots. The treatment functions as a non-hormonal solution which allows women to continue ovulating and maintaining their fertility, while it successfully reduces menstrual blood loss for women experiencing heavy menstrual bleeding.^[14]

Iron Deficiency Anemia in AUB

The primary reason for iron deficiency anemia in women experiencing AUB results from their continuous menstrual blood loss which occurs throughout their condition. Anemia leads to fatigue and decreased physical performance and lower life quality. Women experiencing AUB require early anemia diagnosis which doctors should properly treat through effective treatment methods.^[12,15]

Thyroid Dysfunction in AUB

The body uses thyroid hormones to control its menstrual cycle. Women who have both hypothyroidism and hyperthyroidism experience menstrual cycle disruptions which include excessive and unpredictable menstrual bleeding. Women who experience AUB should undergo thyroid dysfunction testing according to current medical guidelines.^[16]

Pictorial Blood Loss Assessment Chart (PBAC)

The pictorial blood loss assessment chart (PBAC) functions as a validated semi-quantitative instrument which measures menstrual blood loss through sanitary product usage data that includes both product quantity and product saturation levels. The PBAC test enables clinicians to measure bleeding intensity while observing how their patients respond to therapeutic interventions.^[17]

Quality of Life in AUB

Women with abnormal uterine bleeding experience severe life quality declines because their condition affects their physical health and emotional state and social interactions and work performance. Patients who receive effective treatment methods that decrease their bleeding intensity experience major benefits in both their health-related life quality and their overall treatment experience.^[18]

METHODS AND MATERIALS

Study Design and Setting

A prospective observational study was conducted to evaluate bleeding patterns in patients with abnormal uterine bleeding (AUB) and to assess the efficacy of tranexamic acid in its management.

Study Site

The study was carried out in the Department of Obstetrics and Gynecology, Malla Reddy Hospital, Hyderabad, after approval from the Institutional Ethics Committee.

Study Duration

The study was conducted over a period of six months.

Study Population and Sample Size

A total of 180 female patients diagnosed with abnormal uterine bleeding and attending the gynecology department during the study period were enrolled in the study.

Inclusion Criteria

Females in the reproductive age group
Patients clinically diagnosed with abnormal uterine bleeding
Patients willing to participate and provide written informed consent

Exclusion Criteria

Pregnant women
Patients with known bleeding disorders
Patients with gynecological malignancies
Patients with contraindications to tranexamic acid therapy

Study Procedure

After obtaining Institutional Ethics Committee approval, eligible patients with abnormal uterine bleeding were enrolled based on inclusion and exclusion criteria, and written informed consent was obtained. Baseline

demographic, clinical, and menstrual history were recorded using a structured questionnaire. Laboratory investigations, including hemoglobin levels, complete blood count, and thyroid function tests, were performed.

Menstrual blood loss was assessed using the Pictorial Blood Loss Assessment Chart (PBAC) score before treatment and during follow-up. All participants received tranexamic acid 500 mg orally three times daily for five days during menstruation. PBAC scores were documented monthly to assess treatment efficacy.

Supportive treatments such as folic acid and thyroid medications were provided when clinically indicated. Quality of life was evaluated using a modified Abnormal Uterine Bleeding–Quality of Life (AUB-QOL) questionnaire. Collected data were subjected to statistical analysis.

Outcome Measures

The primary outcome measure was the reduction in menstrual blood loss, assessed using the Pictorial Blood Loss Assessment Chart (PBAC) score before and after treatment with tranexamic acid and Improvement in bleeding pattern.

Secondary outcome measures included improvement in hemoglobin levels to assess anemia status and evaluation of thyroid function parameters to identify associated thyroid abnormalities in patients with abnormal uterine bleeding. Changes in quality of life were assessed using a modified Abnormal Uterine Bleeding–Quality of Life (AUB-QOL) questionnaire.

Statistical Analysis

Statistical analysis was performed using Chi-square test, paired t-test, Wilcoxon signed-rank test, one-way ANOVA, Kruskal–Wallis test, Friedman test, and correlation analysis. A p value < 0.05 was considered statistically significant.

RESULTS

➤ The total number of patients included in this study was 180 (n = 180).

1. AGE DISTRIBUTION

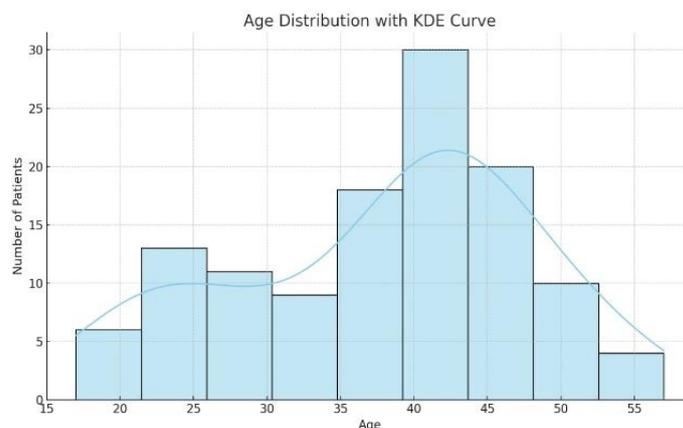


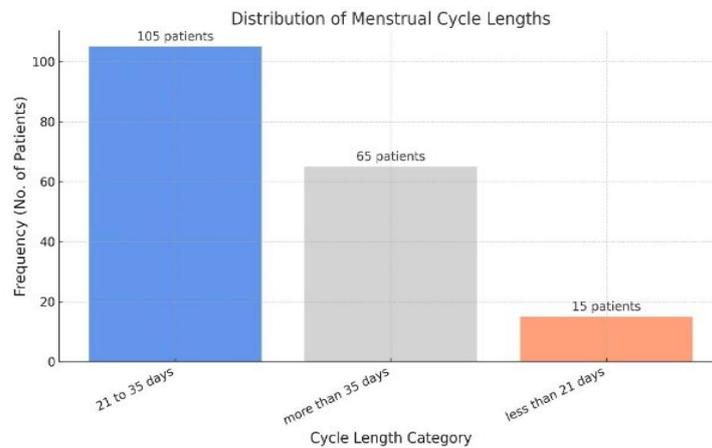
Figure 4.1: Distribution of Subjects with Abnormal Uterine Bleeding (n = 180).

Table 4.1.1: Age-wise Distribution of Patients Based on Age in AUB Population (n=180).

<i>Age Range</i>	<i>Frequency (number of patients n=180)</i>	<i>Percentage (%)</i>
(15, 20]	6	3.39
(20, 25]	13	7.34
(25, 30]	11	6.21
(30, 35]	9	5.08
(35, 40]	50	28.25
(40, 45]	48	27.12
(45, 50]	33	18.64
(50, 55]	7	3.95

INFERENCE: The age distribution shows most AUB patients were between 30–45 years, with a peak at 35–40 years, aligning with the reproductive age group commonly affected by AUB.

2. CYCLE LENGTH

**Fig. 4.2: Distribution of Menstrual Cycle Lengths among Patients with Abnormal Uterine Bleeding (n = 180).****Table 4.1.2: Distribution of Menstrual Cycle Length among Patients with Abnormal Uterine Bleeding (n = 180).**

<i>Category</i>	<i>Frequency [n=180]</i>	<i>Percentage</i>
<i>21 to 35 days</i>	<i>105.0</i>	<i>58.33</i>
<i>more than 35 days</i>	<i>65.0</i>	<i>36.11</i>
<i>less than 21 days</i>	<i>10.0</i>	<i>5.56</i>

INFERENCE: Most women (58.33%) had normal cycle lengths (21–35 days), but 36.11% had cycles >35 days, suggesting anovulatory bleeding, which is a significant contributor to AUB and indicates hormonal imbalance or endometrial instability.

2B. Menstrual Cycle Length Comparison: Pre vs Post Treatment

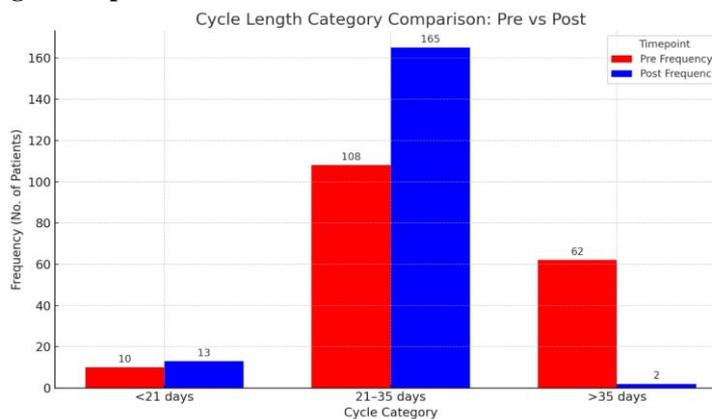
**Figure 4.3: Comparison of Menstrual Cycle Length Categories Before and After Tranexamic Acid Treatment (n = 180).**

Table 4.1.3: Comparison of Menstrual Cycle Length Before and After Tranexamic Acid Treatment (n = 180).

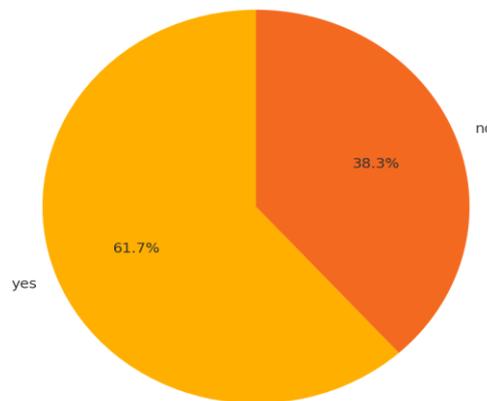
<i>Cycle Length Category</i>	<i>Pre-Treatment Frequency (n=180)</i>	<i>Post-Treatment Frequency(n=180)</i>
<i><21 days</i>	<i>10</i>	<i>13</i>
<i>21–35 days</i>	<i>105</i>	<i>165</i>
<i>>35 days</i>	<i>65</i>	<i>2</i>

INFERENCE: Post-treatment, the proportion of patients with normal menstrual cycles (21–35 days) increased, while both short (<21 days) and prolonged (>35 days)

cycles decreased. This indicates improved hormonal balance and cycle regularity, reflecting the effectiveness of the treatment.

3. BLOOD CLOT PASSAGE IN MENSTRUAL BLEEDING

Presence of Blood Clots in Menstrual Bleeding

**Figure 4.4: Distribution of Patients Reporting Presence of Blood Clots in Menstrual Bleeding (n = 180).****Table 4.1.5: Distribution of Patients Reporting Passage of Clots in Abnormal Uterine Bleeding (n = 180).**

<i>Category</i>	<i>Frequency[n=180]</i>	<i>Percentage</i>
<i>yes</i>	<i>111.0</i>	<i>61.67</i>
<i>no</i>	<i>69.0</i>	<i>38.33</i>

INFERENCE: 61.7% of AUB patients reported blood clot passage during menstruation, while 38.3% did not. This suggests clotting is a common feature in AUB,

often linked to heavy bleeding or impaired uterine contractility.

4. SPOTTING

Spotting Between Periods Distribution

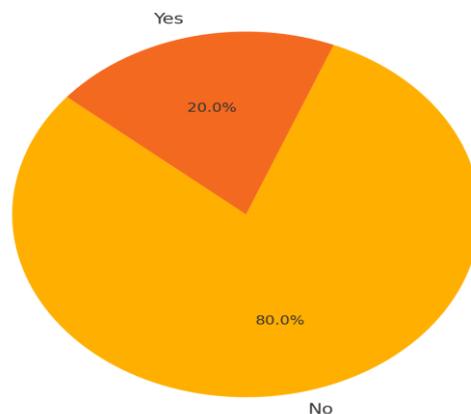
**Figure 4.5: Prevalence of Spotting Between Menstrual Periods among Patients with Abnormal Uterine Bleeding (n = 180).**

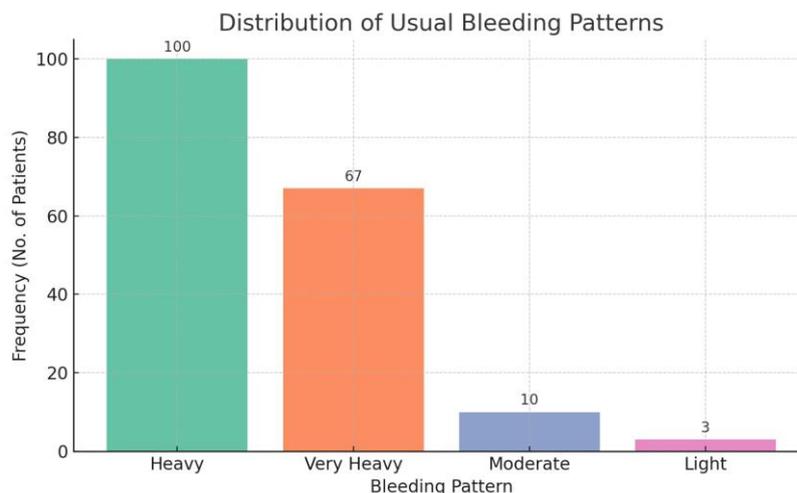
Table 4.1.6: Distribution of Patients Reporting Spotting in Abnormal Uterine Bleeding (n = 180).

Category	Frequency	Percentage
No	144.0	80.0
Yes	36.0	20.0

INFERENCE: While 80% did not report spotting, the 20% who did may be experiencing hormonal fluctuations

or uterine/endometrial abnormalities such as polyps or endometritis, necessitating further evaluation.

5. USUAL BLEEDING PATTERNS

**Figure 4.6: Distribution of Usual Bleeding Pattern Severity among Patients with Abnormal Uterine Bleeding (n = 180).****Table 4.1.7: Distribution of Bleeding Pattern Severity among Patients with Abnormal Uterine Bleeding (n = 180).**

Bleeding Pattern	Frequency	Percentage (%)
Heavy [soaking through a pad or tampon within 2 hours] - menorrhagia	100	55.56
very heavy [passing large blood clots, needed double protection]	67	37.22
Moderate [regular pads or tampons changes every 3 to 4 hours]	10	5.56
Light [minimal bleeding, few pads or tampons needed]	3	1.67

INFERENCE: The majority of AUB patients reported heavy bleeding (55.56%), followed by very heavy bleeding (37.22%), indicating a high burden of severe menstrual blood loss. Only a small proportion

experienced moderate (5.56%) or light bleeding (1.67%), highlighting the need for targeted clinical intervention in most cases.

6. COMPARISON OF BLEEDING PATTERNS

Table 4.1.8: Distribution of Bleeding Types comparison among Patients with Abnormal Uterine Bleeding (n = 180).

Bleeding Type	Frequency	Percentage (%)
Oligomenorrhea	18	10.0
Polymenorrhagia	13	7.22
Dysmenorrhea	98	54.44
Hypomenorrhea	12	6.67
Menorrhagia	120	66.67
Metrorrhagia	11	6.11
Menometrorrhagia	24	13.33
Perimenopausal Bleeding	23	12.78
Post Menopausal Bleeding	10	5.56
Inter Menstrual Bleeding	8	4.44

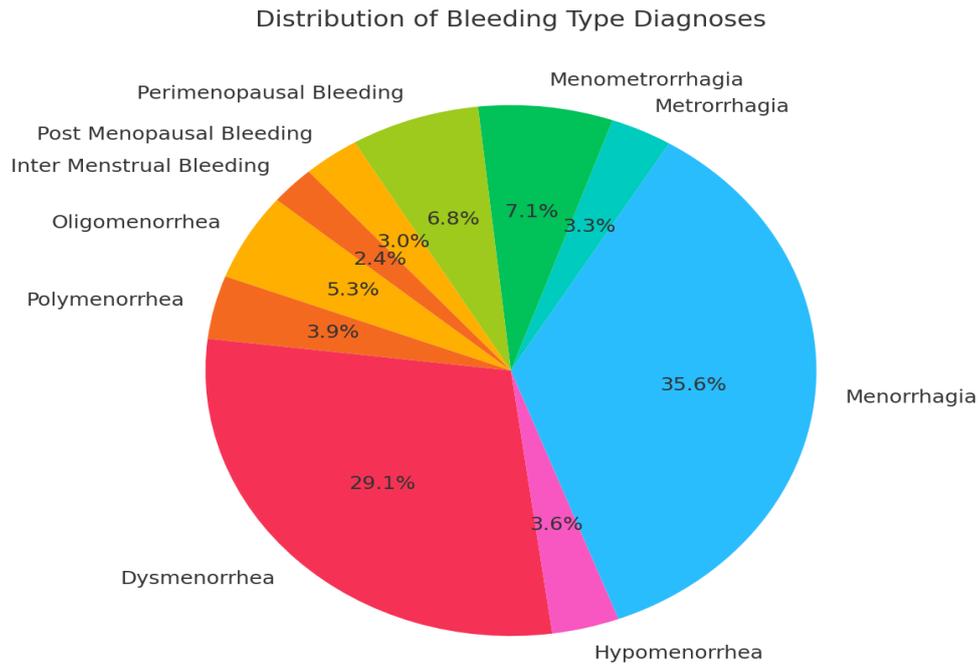


Figure 4.7: Distribution of Bleeding Type Diagnoses among Patients with Abnormal Uterine Bleeding (n = 180)

INFERENCE: In this study, menorrhagia was the most prevalent bleeding type, reported by 66.67% of patients, followed by dysmenorrhea at 54.44%, indicating that heavy and painful menstruation are the most common complaints. Menometrorrhagia and perimenopausal bleeding were seen in 13.33% and 12.78% of cases, respectively. Less common patterns included

oligomenorrhea (10.0%), polymenorrhagia (7.22%), hypomenorrhea (6.67%), and metrorrhagia (6.11%). Postmenopausal bleeding and intermenstrual bleeding were the least reported, at 5.56% and 4.44%, respectively. These findings reflect the varied clinical spectrum of AUB, with a predominance of heavy and painful bleeding patterns.

7. COMORBID CONDITIONS

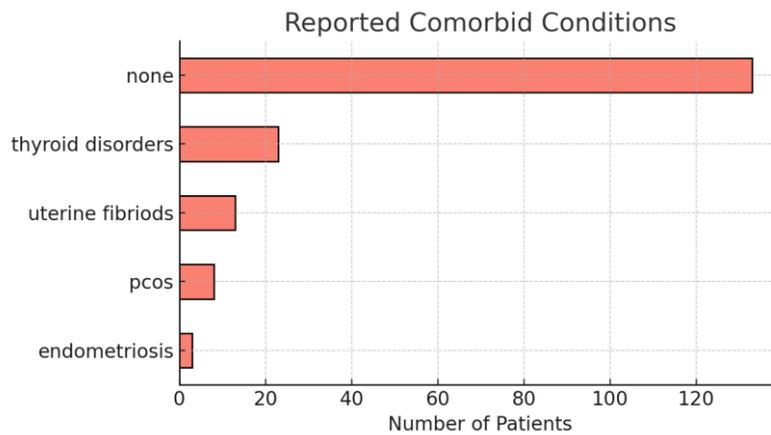


Figure 4.8: Distribution of Reported Comorbid Conditions among Patients with Abnormal Uterine Bleeding (n = 180).

Table 4.1.9: Distribution of Patients According to Comorbid Conditions Associated with Abnormal Uterine Bleeding (n = 180).

Condition	Number of Patients	Percentage (%)
none	133	73.89
thyroid disorders	23	12.78
uterine fibroids	13	7.22
PCOS	8	4.44
endometriosis	3	1.67

INFERENCE: The majority of AUB patients (73.89%) had no identified underlying condition. Among those with comorbidities, thyroid disorders were most common (12.78%), followed by uterine fibroids (7.22%), PCOS

(4.44%), and endometriosis (1.67%), highlighting the need to screen for endocrine and structural causes in symptomatic individuals.

8. ANEMIA PREVALENCE

Anaemia Symptom Prevalence Based on Patient Experience

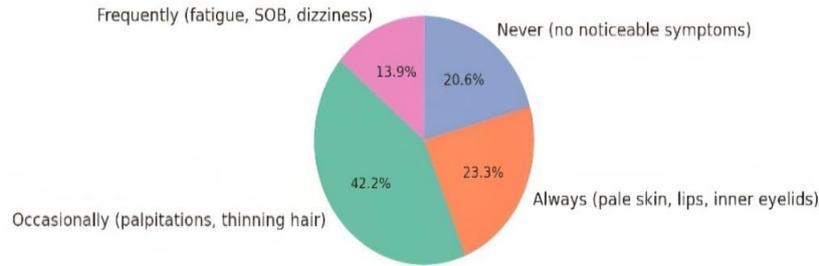


Figure 4.9: Prevalence of Self-Reported Anemia Symptoms among Patients with Abnormal Uterine Bleeding (n = 180).

Table 4.1.10: Distribution of Anemia-Related Symptoms among Patients with Abnormal Uterine Bleeding (n = 180).

<i>Response</i>	<i>No. of patients</i>	<i>Percentage</i>
<i>occasionally</i>	76	42.2%
<i>always</i>	42	23.3%
<i>Never</i>	37	20.6%
<i>frequently</i>	25	13.9%

INFERENCE: The majority of patients experienced symptoms occasionally (42.2%), while 23.3% reported them always. A smaller proportion reported symptoms

frequently (13.9%) or never (20.6%), indicating that symptom occurrence varied but was common among most patients.

9. HEMOGLOBIN LEVELS BY BLEEDING PATTERNS (PRE & POST)

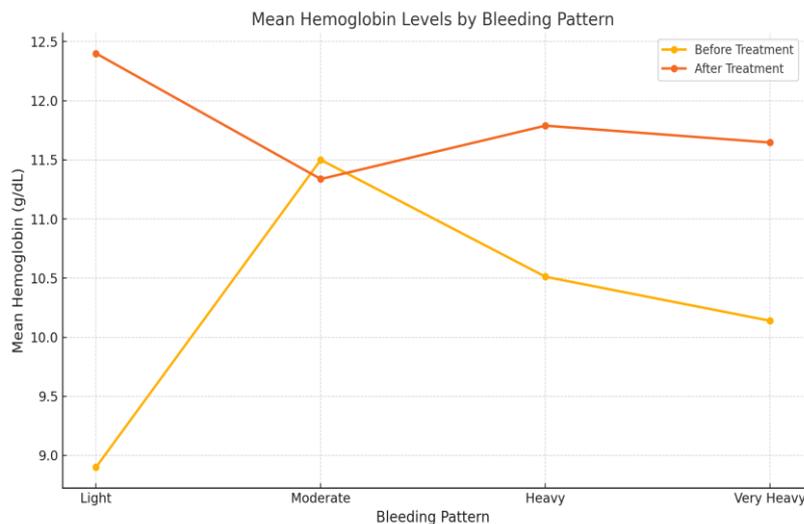


Figure 4.10: Comparison of Mean Hemoglobin Levels Before and After Treatment across Different Bleeding Patterns (n = 180).

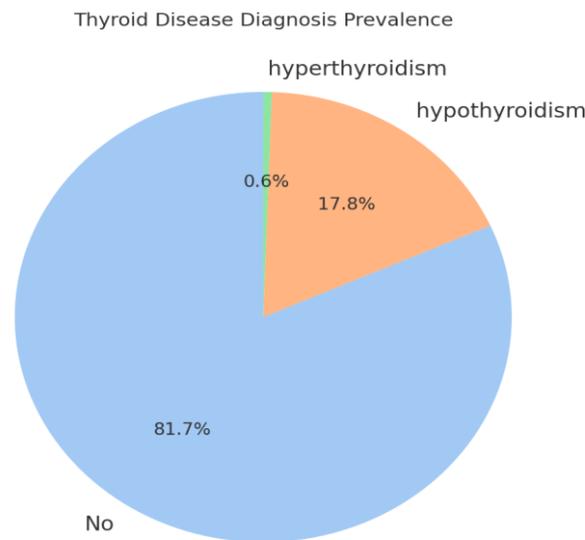
Table 4.1.11: Comparison of Mean Hemoglobin Levels Before and After Treatment Based on Bleeding Pattern (n = 180).

<i>Bleeding Pattern</i>	<i>Hb Before Mean</i>	<i>Hb Before SD</i>	<i>Hb After Mean</i>	<i>Hb After SD</i>
<i>Heavy</i>	10.51	1.76	11.79	1.67
<i>Light</i>	8.90	nan	12.40	nan
<i>Moderate</i>	11.50	1.36	11.34	2.04
<i>Very Heavy</i>	10.14	1.90	11.65	1.67

INFERENCE: The graph shows that patients with heavier bleeding had lower pre-treatment hemoglobin.

After treatment, hemoglobin improved significantly, especially in the 'Heavy' and 'Very Heavy' groups.

10. THYROID PREVALENCE

**Figure 4.11: Prevalence of Thyroid Disorders among Patients with Abnormal Uterine Bleeding (n = 180).****Table 4.1.12: Distribution of Thyroid Diagnoses among Patients with Abnormal Uterine Bleeding (n = 180).**

Thyroid Diagnosis	Frequency (n = 180)	Percentage (%)
No	147	81.7%
Hypothyroidism	32	17.8%
Hyperthyroidism	1	0.6%
Total	180	100%

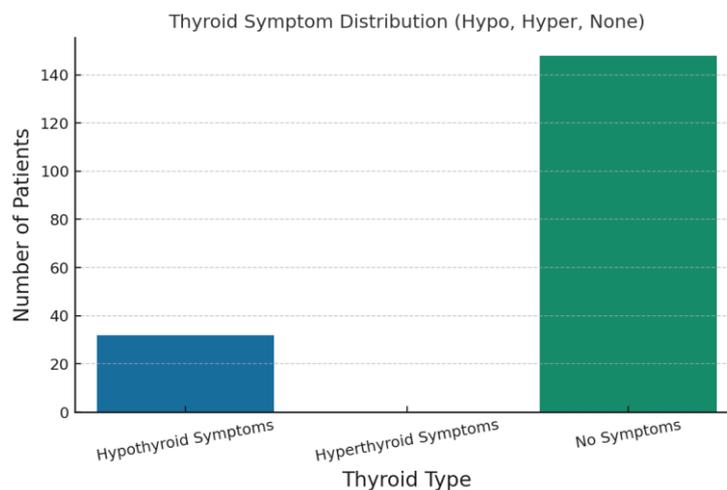
**Figure 4.12: Distribution of Thyroid-Related Symptoms Among AUB Patients.**

Table 4.1.13: Distribution of Thyroid-Related Symptoms among Patients with Abnormal Uterine Bleeding (n = 180).

Thyroid Type	Frequency (n=180)
Hypothyroid Symptoms	32
Hyperthyroid Symptoms	1
No Symptoms	147

INFERENCE: The pie chart shows 17.8% reported symptoms suggestive of hypothyroidism. 1 case of hyperthyroid symptoms was reported.

11. PBAC SCORE TRENDS ACROSS 4 MONTHS

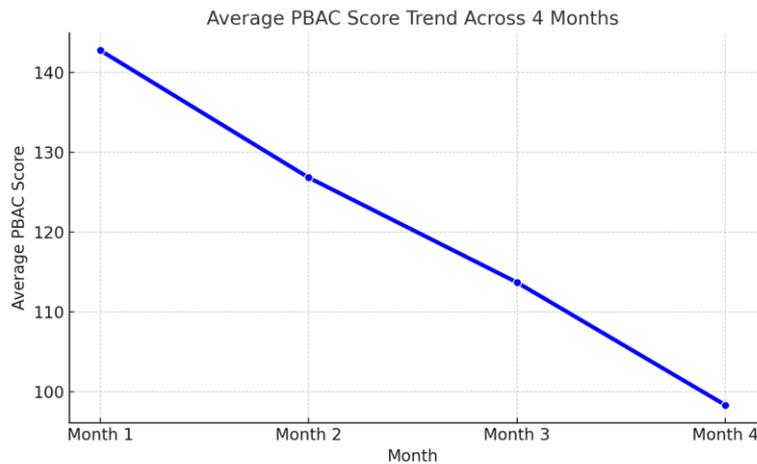


Figure 4.13: Trend of Average PBAC Score Over a 4-Month Treatment Period.

INFERENCE: PBAC scores showed a steady decline over four months, indicating reduced bleeding severity and suggesting effective treatment over time.

PBAC Month-wise Summary

Table 4.1.14: Descriptive Statistics of PBAC Scores Over a 4-Month Treatment Period.

Month	count	mean	std	min	25%	50%	75%	max
Month 1	180.0	142.76	13.04	99.0	136.0	140.0	155.0	170.0
Month 2	180.0	126.82	11.65	90.0	117.0	132.0	136.0	155.0
Month 3	180.0	113.69	9.7	86.0	113.0	113.0	117.0	136.0
Month 4	180.0	98.32	8.25	83.0	94.0	94.0	99.0	117.0

The Friedman test showed a highly significant difference in PBAC scores across 4 months ($\chi^2 = 529.85$, $p < 0.000001$), confirming a strong treatment effect over time.

12. QUALITY OF LIFE COMPARISON (PRE VS POST)

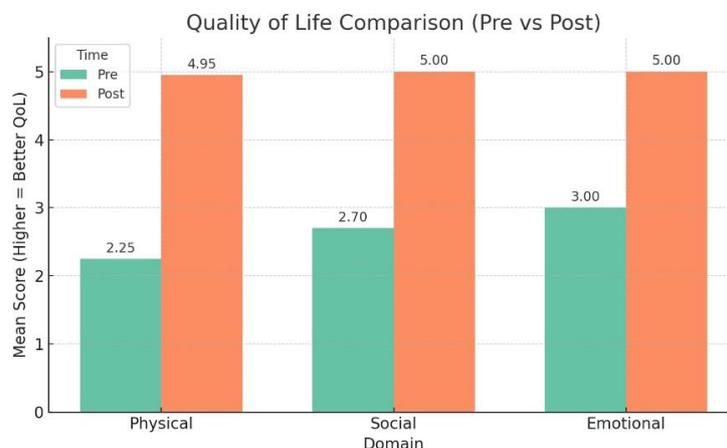


Figure 4.14: Comparison of Quality-of-Life Scores Before and After Treatment.

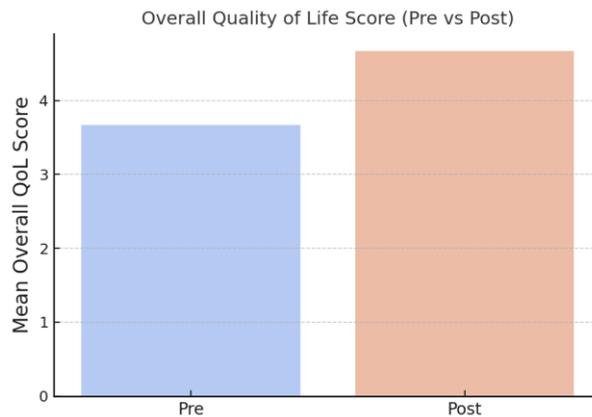
Table 4.1.15: Comparison of Mean Quality of Life Scores Before and After Treatment.

QoL Domain	Pre-Treatment Mean	Post-Treatment Mean
Physical	2.24	4.91
Social	2.72	5.0
Emotional	3.0	5.0

INFERENCE: Post-treatment QoL significantly improved across physical, social, and emotional domains, with the greatest gain in emotional well-being.

Statistical tests (paired t-test, Wilcoxon) confirmed these changes, highlighting the effectiveness of Tranexamic acid in enhancing overall QoL.

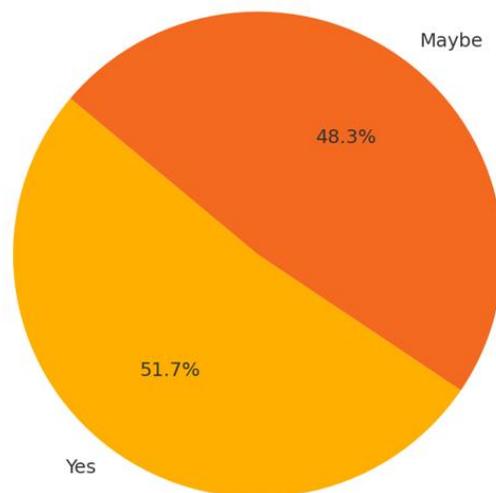
12B. OVERALL QUALITY OF LIFE COMPARISON (PRE VS POST)

**Figure 4.15: Overall Quality of Life Score Comparison Before and After Treatment.**

INFERENCE: Overall QoL scores improved notably post-treatment, reflecting gains across physical, social, and emotional domains. This confirms the positive

impact of Tranexamic acid on patients' daily functioning and well-being.

13. EFFECT OF TRANEXAMIC ACID ON BLEEDING (USING PRE DATA)

**Figure 4.16: Patient Perception of the Effect of Tranexamic Acid on Bleeding.****Table 4.1.16: Patient Responses on the Effectiveness of Tranexamic Acid in Reducing Bleeding.**

Response	Frequency	Percentage
Yes	93	51.67
Maybe	87	48.33

INFERENCE: Most patients reported reduced bleeding after TXA, confirming its effectiveness in AUB

management. These findings support TXA's role in improving real-world outcomes and quality of life.

13B. EFFECT OF TRANEXAMIC ACID ON BLEEDING (USING POST DATA)

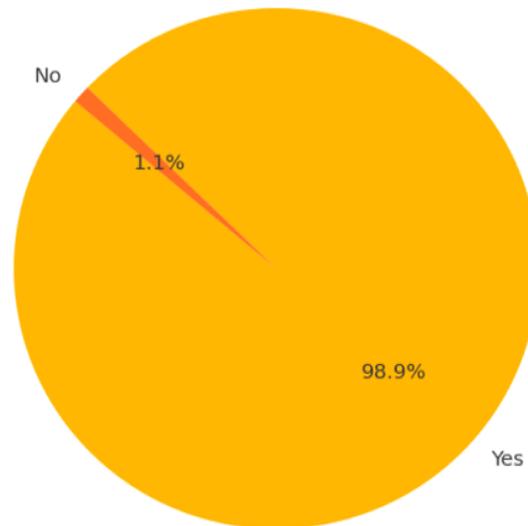


Figure 4.17: Patient Responses on Reduction in Bleeding Duration After Tranexamic Acid Use.

Table 4.1.17: Effect of Tranexamic Acid on Duration of Menstrual Bleeding.

Response	Frequency	Percentage
Yes	178	98.89
No	2	1.11

INFERENCE: Most patients reported reduced bleeding after TXA, confirming its effectiveness in AUB management. These findings support TXA's role in improving real-world outcomes and quality of life. The Chi-square test ($\chi^2 = 105.32$, $p < 0.0001$) shows a highly significant difference between pre- and post-treatment responses, confirming improved satisfaction and reduced bleeding after TXA treatment.

14. BLEEDING PATTERN VS AGE

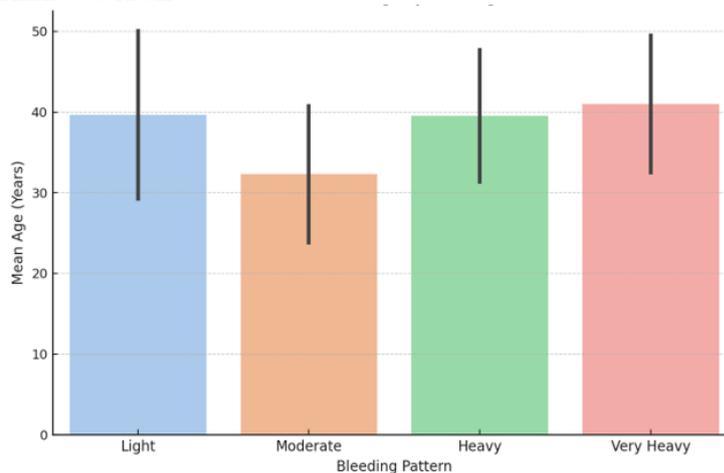


Figure 4.18: Mean Age Distribution by Menstrual Bleeding Pattern.

Table 4.1.18: Mean Age of Patients According to Bleeding Pattern.

Bleeding Pattern	N	Mean Age	Std Dev
Light	3	39.7	12.7
Moderate	10	32.3	8.9
Heavy	99	39.5	8.2
Very Heavy	67	41.0	8.5

INFERENCE: One-Way ANOVA ($F = 3.11, p = 0.028$) revealed a significant age difference across bleeding patterns, with heavier bleeding linked to older age. This

suggests age may influence menstrual bleeding severity and clinical approach.

14B. BLEEDING PATTERN VS ANEMIA

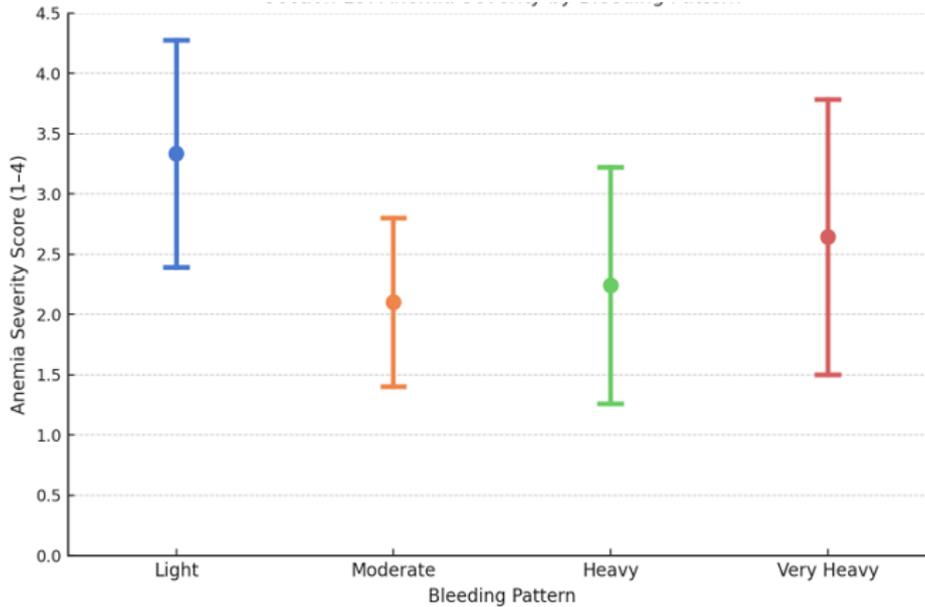


Figure 4.19: Anemia Severity Scores Across Different Bleeding Patterns.

Table 4.1.19: Anemia Severity Scores by Menstrual Bleeding Pattern.

Bleeding Pattern	N	Mean Score	Std Dev
Light	3	3.33	1.15
Moderate	10	2.10	0.74
Heavy	100	2.24	0.99
Very Heavy	67	2.64	1.15

INFERENCE: Kruskal-Wallis test ($H = 7.80, p = 0.050$) showed a borderline significant difference in anemia symptoms across bleeding patterns. Light and very heavy

bleeding groups reported higher symptom severity, warranting further study with haemoglobin levels.

14C. BLEEDING PATTERN VS THYROID DYSFUNCTION

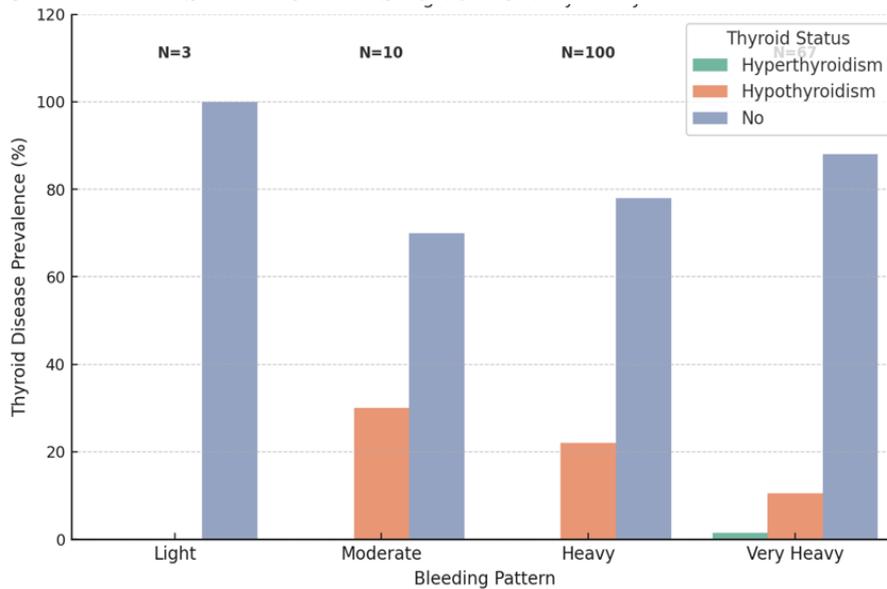


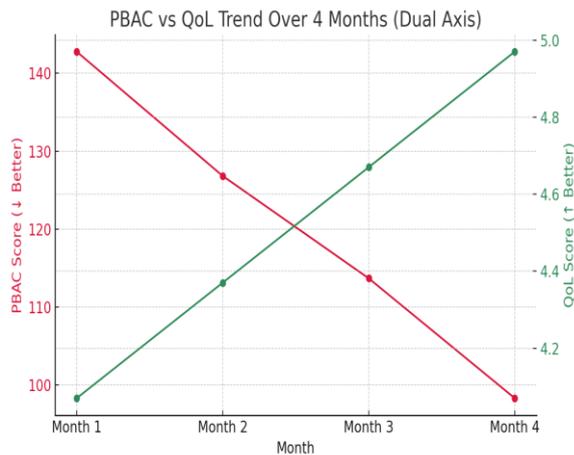
Figure 4.20: Association Between Bleeding Pattern and Thyroid Dysfunction.

Table 4.1.20: Distribution of Thyroid Dysfunction Across Different Bleeding Patterns.

Bleeding Pattern	Hyperthyroidism	Hypothyroidism	No	Total
Heavy	0	22	78	100
Light	0	0	3	3
Moderate	0	3	7	10
Very Heavy	1	7	59	67
Total	1	32	147	180

INFERENCE: Chi-square test ($\chi^2 = 6.88$, $p = 0.332$) showed no significant association between bleeding patterns and thyroid disorders. However, hypothyroidism was more common in heavy bleeders, hinting at a possible clinical link needing further study.

15. CORRELATION BETWEEN PBAC SCORE AND QOL OVER TIME

**Figure 4.21: PBAC Score vs. Quality of Life (QoL) Trend Over 4 Months.****Table 4.1.21: Mean PBAC and Quality of Life (QoL) Scores Over 4-Month Treatment Period.**

Month	PBAC Mean	QoL Mean
Month 1	142.76	4.07
Month 2	126.82	4.37
Month 3	113.69	4.67
Month 4	98.32	4.97

INFERENCE: PBAC scores decreased while QoL scores increased over 4 months, showing a strong inverse relationship (Pearson $r = -0.999$, Spearman $= -1.0$, $p < 0.001$). This highlights the treatment's effectiveness in improving both clinical outcomes and patient well-being.

DISCUSSION

Abnormal uterine bleeding (AUB) represents a frequent gynecological concern with multifactorial etiologies, posing diagnostic and therapeutic challenges in routine clinical practice. The present prospective study evaluated bleeding patterns among women with AUB and assessed the clinical efficacy of tranexamic acid (TXA) as a conservative, non-hormonal treatment option. In addition, associated factors such as anemia and thyroid dysfunction were analyzed to provide a holistic understanding of disease burden and treatment outcomes.

In the present study, menorrhagia was identified as the most common bleeding pattern, affecting 66.67% of participants, which is consistent with findings reported in several earlier studies where heavy menstrual bleeding was the predominant presentation of AUB. This predominance may be attributed to underlying hormonal imbalance, ovulatory dysfunction, and systemic factors commonly observed in reproductive-age women. Other bleeding patterns such as dysmenorrhea, oligomenorrhea, polymenorrhagia, hypomenorrhea, metrorrhagia, and menometrorrhagia were observed at lower frequencies, highlighting the heterogeneous clinical presentation of AUB.

Due to regulatory restrictions imposed by IPC-CDSO on the routine use of mefenamic acid, tranexamic acid was selected as the primary therapeutic agent for managing menorrhagia in this study. TXA acts by inhibiting fibrinolysis, thereby reducing menstrual blood loss without affecting the hormonal axis. Administration of TXA during menstruation resulted in a significant reduction in menstrual blood loss, as evidenced by markedly decreased Pictorial Blood Assessment Chart (PBAC) scores following treatment. These findings align with previous literature demonstrating TXA's efficacy in reducing menstrual blood loss by 40–60% in women with heavy menstrual bleeding.

Anemia is a well-recognized complication of chronic AUB. In the present study, folic acid supplementation was co-prescribed with TXA to address iron deficiency and support hematological recovery. Post-treatment evaluation revealed maintenance and improvement of hemoglobin levels, indicating effective clinical management and reinforcing the importance of addressing anemia alongside bleeding control. This integrated approach contributed to improved patient outcomes and symptom relief.

Thyroid dysfunction, particularly hypothyroidism, was identified in 17.8% of the study population, underscoring its significant association with abnormal menstrual patterns. Early identification and timely management through endocrinologist consultation and initiation of levothyroxine therapy played a crucial role in stabilizing menstrual irregularities and improving overall treatment response. These findings emphasize the importance of routine thyroid screening in women presenting with AUB.

Assessment of quality of life (QoL) revealed substantial improvement across physical, emotional, and social domains following TXA therapy. Reduction in menstrual blood loss translated into decreased fatigue, improved daily functioning, and enhanced emotional well-being. These outcomes highlight that effective AUB management extends beyond clinical parameters and significantly impacts patients' psychosocial health.

Overall, the findings of this study support tranexamic acid as an effective, safe, and well-tolerated first-line non-hormonal therapy for the management of abnormal uterine bleeding, particularly menorrhagia. TXA offers a valuable alternative for women who are contraindicated for or unwilling to use hormonal treatments. However, further large-scale comparative studies evaluating TXA against hormonal therapies and other non-surgical interventions are warranted to optimize individualized treatment strategies and long-term management of AUB.

CONCLUSION

A prospective evaluation of 180 women with Abnormal Uterine Bleeding (AUB) revealed that menorrhagia was the most common presenting complaint, affecting 66.67% of participants. The study also identified a notable prevalence of thyroid dysfunction (18.33%) and baseline anemia among the cohort. Following treatment with Tranexamic Acid (TXA), there was a significant improvement in clinical outcomes, including marked reductions in PBAC (Pictorial Blood Assessment Chart) scores and increases in mean hemoglobin levels ($p < 0.001$), indicating effective control of menstrual blood loss and correction of anemia. Moreover, Quality of Life assessments demonstrated substantial post-treatment enhancement, underlining the dual benefits of symptom relief and overall well-being. TXA was well-tolerated, with minimal side effects, and proved to be a safe, affordable, and fertility-preserving alternative to hormonal or surgical interventions. These findings underscore the importance of a comprehensive diagnostic protocol involving thyroid function and anemia screening, combined with early initiation of TXA therapy. Such an approach can lead to timely, non-invasive, and effective management of AUB, significantly reducing the need for surgical procedures and improving patient outcomes.

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REFERENCES

1. Munro MG, Critchley HOD, Broder MS, Fraser IS. FIGO classification system (PALM COEIN) for causes of AUB. *Int J Gynaecol Obstet*, 2011; 113(1): 3–13.
2. National Institute for Health and Care Excellence (NICE). Heavy menstrual bleeding: assessment and management. NICE Guideline NG88, 2018.
3. Guyton AC, Hall JE. *Textbook of Medical Physiology*. 13th ed. Elsevier, 2016.
4. Fraser IS, Critchley HOD, Munro MG, Broder M. Terminology and definitions for normal and abnormal uterine bleeding. *Hum Reprod*, 2007; 22(3): 635–643.
5. Berek JS. *Berek & Novak's Gynecology*. 16th ed. Wolters Kluwer, 2020.
6. Dutta DC. *Textbook of Gynecology*. 7th ed. Jaypee Brothers, 2016.
7. Harlow SD, Campbell OM. Epidemiology of menstrual disorders. *Int J Epidemiol*, 2004; 33(1): 123–130.
8. Munro MG. Practical aspects of FIGO classification of abnormal uterine bleeding. *Int J Gynecol Obstet*, 2017; 139: 3–10.
9. Winkler UH. Endometrial hemostasis and abnormal uterine bleeding. *Hum Reprod Update*, 1999; 5(2): 141–148.
10. Leminen A. Clinical presentation of abnormal uterine bleeding. *Best Pract Res Clin Obstet Gynaecol*, 2017; 40: 1–10.
11. Speroff L, Fritz MA. *Clinical Gynecologic Endocrinology and Infertility*. 8th ed. Lippincott Williams & Wilkins, 2011.
12. World Health Organization. *Iron Deficiency Anaemia: Assessment, Prevention and Control*. Geneva, 2001.
13. Fraser IS. Menstrual blood loss measurement and AUB classification. *Best Pract Res Clin Obstet Gynaecol*, 2012; 26(1): 59–71.
14. Lethaby A, Farquhar C. Tranexamic acid for heavy menstrual bleeding. *Cochrane Database Syst Rev.*, 2017; 1: CD000249.
15. Auerbach M, Adamson JW. Iron deficiency anemia. *N Engl J Med.*, 2016; 374: 1832–1843.
16. Krassas GE. Thyroid disease and female reproduction. *Fertil Steril*, 2010; 94(6): 2123–2133.

17. Higham JM, O'Brien PM, Shaw RW. Assessment of menstrual blood loss using a pictorial chart. *Br J Obstet Gynaecol*, 1990; 97: 734–739.
18. Matteson KA, et al. Health-related quality of life in women with abnormal uterine bleeding. *Obstet Gynecol*, 2013; 121(3): 590–598.