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Original Research Article

Assessing thyroid abnormalities in abnormal uterine bleeding: a comprehensive prospective study

Pooja N.*, Geeta Choudary

Department of Obstetrics and Gynaecology, Al-Ameen Medical College and Hospital Vijayapura, Karnataka, India

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***Correspondence:**
Dr. Pooja N.,
E-mail: poojanagappa735@gmail.com

ABSTRACT

Background: Abnormal uterine bleeding (AUB) is a significant gynaecological concern affecting a substantial number of women, particularly during their reproductive years. It is often linked to various etiologies, including thyroid dysfunction, which can influence menstrual patterns through hormonal imbalances. The study explores the correlation between thyroid dysfunction (TDF) and AUB, aiming to establish whether thyroid hormone abnormalities are significant contributors to menstrual irregularities in women. By understanding this relationship, healthcare providers can better manage and treat AUB.
Method: A prospective, observational study was conducted at Al-Ameen Medical College, Vijayapura, from November 2022 to May 2024, involving 100 women aged 15-60 years with AUB. Participants underwent detailed clinical examinations, ultrasonography, and baseline investigations, including thyroid function tests (T3, T4, and TSH). Exclusion criteria included pregnancy, bleeding disorders, and certain medical treatments. Data were analysed using SPSS software.
Results: The study found that 55% of participants were euthyroid (EU), 38% were hypothyroid, and 7% were hyperthyroid. Significant correlations were observed between TDF and the type of bleeding, with hypothyroidism most common in prolonged and frequent cycles. The majority of cases were in women aged 31-35 years, highlighting a possible age-related vulnerability to TDF. Hormonal management was effective in most cases, particularly in those with underlying thyroid issues.
Conclusion: Thyroid dysfunction, particularly hypothyroidism and euthyroidism, is significantly associated with AUB, especially in women aged 31-35 years. Regular thyroid function evaluation should be mandatory in AUB cases to ensure early detection and treatment, thereby improving reproductive health outcomes.

Keywords: Abnormal uterine bleeding, Euthyroidism, Hypothyroidism, Menstrual irregularities**,** Thyroid dysfunction

INTRODUCTION

Abnormal uterine bleeding (AUB) refers to any bleeding from the uterus that deviates from the typical amount, frequency, duration, or cyclicity. It is a prevalent and complex clinical issue that significantly impacts women's health, affecting 15-20% of women between menarche and menopause.[1] The uterus, when not affected by a genital tract infection, may present with abnormal bleeding, often referred to as dysfunctional uterine bleeding (DUB), a term first defined by Schroeder in 1914. Although the exact cause of DUB remains unknown, it is frequently associated with ovulatory failure and the resultant hormonal imbalance.[2] The menstrual cycle is primarily regulated by the intricate interplay between the pituitary gland, ovaries, and endometrium. Follicle Stimulating Hormone (FSH) from the pituitary stimulates estrogen production from ovarian follicles, leading to endometrial proliferation. Ovulation is triggered by a surge in

Luteinizing hormone (LH), which prompts the corpus luteum to produce progesterone, causing the endometrium to become secretory.[3] Disruptions in this physiological process or anatomical changes in the endometrium can lead to AUB.[4] In 2010, the International Federation of Gynaecology and Obstetrics (FIGO) introduced the PALM-COEIN classification system for AUB. This system categorizes the causes of AUB into structural and non-structural groups. The structural causes include polyps, adenomyosis, leiomyoma, malignancy, and hyperplasia (PALM), while the non-structural causes are coagulopathy, ovulatory dysfunction, endometrial, iatrogenic, and not yet classified (COEIN).[5] Thyroid dysfunction, whether hypothyroidism or hyperthyroidism, is strongly linked to non-structural causes of AUB. Both conditions can lead to menstrual irregularities due to their impact on ovarian function and hormonal balance. The relationship between ovarian and thyroid function is closely intertwined, with the thyroid gland being both directly and indirectly influenced by ovarian activity.[6] Thyroid hormones affect the menstrual cycle by influencing the secretion of prolactin, gonadotropin-releasing hormone (GnRH), and sex hormone binding globulin (SHBG), among others.[7,8]

Thyroid dysfunction can lead to various menstrual disturbances, including menorrhagia, polymenorrhagia, and, less commonly, amenorrhea. Hypothyroidism, particularly in its subclinical form, often goes undiagnosed, affecting up to 9.5% of women.[5] In these cases, the absence of overt clinical symptoms may lead to a missed diagnosis by healthcare providers.[9] Therefore, understanding the relationship between thyroid dysfunction and AUB is crucial for accurate diagnosis and effective management of the condition. Despite numerous studies on this association, gaps in knowledge remain, underscoring the need for further research to establish a clear correlation between thyroid dysfunction and AUB. Institutional ethical clearance was obtained prior to the commencement of the study

METHODS

Study type

This was designed as a prospective, observational study.

Study duration

The study period was from November 2022 to May 2024.

Study design

This study was conducted on women of reproductive age presenting with abnormal uterine bleeding (AUB) at Al-Ameen Medical College, Vijayapura.

Sample size

Sample size of 100 cases over an 18-month period.

Data collection

Data collection involved all patients visiting the Obstetrics and Gynecology outpatient department (OPD). A detailed history was taken, including menstrual and obstetric history, followed by a thorough clinical examination, including vital signs, systemic examination, per abdominal examination, and local examination through per speculum and per vaginal methods. Additionally, all patients underwent ultrasonography (USG) and baseline investigations such as complete blood count (CBC), random blood sugar (RBS), serum creatinine, bleeding time (BT), clotting time (CT), thyroid-stimulating hormone (TSH), free T3, and free T4 levels, which were measured using the ELISA method. The study included women aged 15-60 years with complaints of AUB and those with major menstrual disturbances such as menorrhagia, polymenorrhea, polymenorrhagia, metrorrhagia, and oligomenorrhea. Pregnant women, known cases of bleeding disorders, patients with intrauterine contraceptive devices (IUCD) in situ, those using exogenous hormones, patients with hyperprolactinemia, and those on anticoagulation therapy were excluded from the study.

Statistical analysis

SPSS software (SPSS Inc., Chicago, IL, USA) was used for statistical analysis with the Windows program (26.0 version).

RESULTS

The study involved a total of 100 subjects with a mean age of 30.46±2.012 years, ranging from 25 to 35 years. The majority of the subjects (50%) were aged between 31-35 years, while the least represented age group (1%) was 21-25 years. Socioeconomic status was predominantly lower, with 37% of participants falling into this category, while the upper-middle and lower-middle classes each accounted for 13%. A significant family history was present in only 2% of subjects, with the vast majority (98%) having no significant family history. Regarding parity, most subjects had P2 (22%) and P3 (24%) parity, while 5% had no parity, and 2% were unmarried (Table 1). The cycle length distribution revealed that 18% of subjects had both 20-day and 40-day cycles, with a minimum of 1% having 25-day, 50-day, and 55-day cycles (Figure 1). In terms of bleeding types, 32% had infrequent cycles, 24% had prolonged cycles, and 21% had frequent cycles, with intra-menstrual bleeding being the least common (3%) (Figure 2).

Thyroid dysfunction (TDF) was observed in 55% of the subjects, who were euthyroid (EU), while 38% had hypothyroidism, and 7% had hyperthyroidism. A highly significant correlation was found between the type of bleeding and TDF ($p<0.001$), with hypothyroidism being most common in prolonged cycles (87.5%) and frequent cycles (66.7%), whereas EU was most prevalent in infrequent cycles (78.1%) (Table 2).

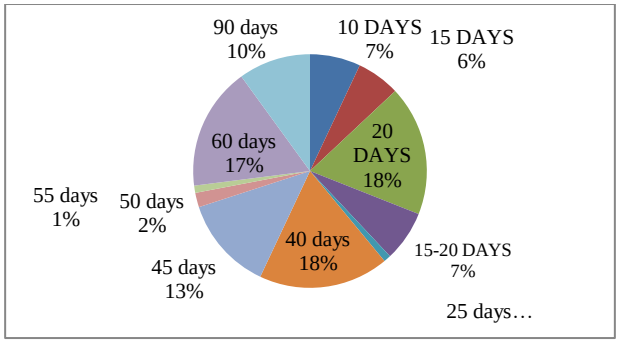

Figure 1: Graphical representation of cycle length.

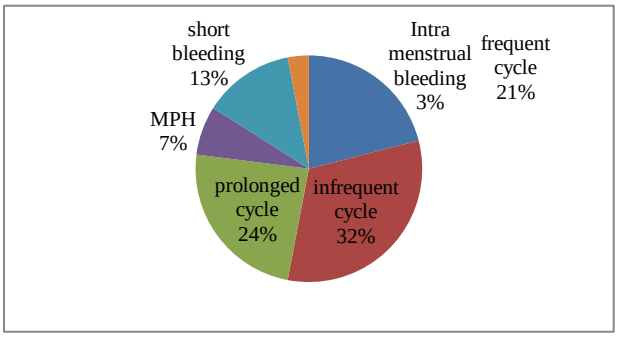

Figure 2: Graphical representation of type of bleeding.

When comparing type of bleeding with T3, T4, and TSH levels, the results showed that T3 was mostly normal across all types of bleeding ($p>0.05$), with insignificant differences. However, T4 levels were significantly associated with the type of bleeding ($p<0.001$), being decreased (<4.5) in 66.7% of frequent cycles and 87.5% of prolonged cycles, while normal (4.5-12) in 75% of infrequent cycles and 100% of intra-menstrual bleeding cases. TSH levels also showed a significant correlation with the type of bleeding ($p<0.001$), with increased TSH (>4) in 66.7% of frequent cycles and 83.3% of prolonged cycles, while normal TSH levels were observed in 96.9% of infrequent cycles and all cases of intra-menstrual bleeding (Table 3). The comparison of age with type of bleeding and TDF was found to be insignificant ($p>0.05$), with the majority of subjects in all bleeding types falling within the 31-35 years age group (Table 4).

Table 1: Socio-demographic parameter of the enrolled patients.

Parameters	Frequency (n)	%
Age (in years)		
21-25	1	1.0
26-30	31	31.0
31-35	50	50.0
36-40	12	12.0
41-45	4	4.0
46-50	2	2.0
Mean±SD	30.46±2.012	
Socio-economic status		
Upper class	20	20.0
Upper middle	13	13.0
Lower middle	13	13.0
Upper lower	17	17.0
Lower	37	37.0
Family history		
Significant	2	2.0
Not significant	98	98.0
Parity		
None	5	5.0
P1	14	14.0
P2	22	22.0
P3	24	24.0
P4	12	12.0
P5	8	8.0
P6	4	4.0
P7	4	4.0
P8	2	2.0
Abortion	3	3.0
Unmarried	2	2.0

Finally, treatment modalities did not show significant differences across bleeding types ($p>0.05$), with hormonal management being the most common treatment in 70% of subjects, followed by intrauterine contraceptive device (IUCD) in 18%, and hysterectomy in 12% (Table 5).

Table 2: Comparison of TDF with type of bleeding.

TDF	Type of bleeding						Total	P value
	Frequent cycle	Infrequent cycle	Prolonged cycle	MPH	Short bleeding	Intra menstrual bleeding		
EU	7 33.3	25 78.1	2 8.3	7 100.0	11 84.6	3 100.0	55 55.0	<0.001**
Hyperthyroidism	0 0.0	6 18.8	1 4.2	0 0.0	0 0.0	0 0.0	7 7.0	
Hypothyroidism	14 66.7	1 3.1	21 87.5	0 0.0	2 15.4	0 0.0	38 38.0	
Total	21 100.0	32 100.0	24 100.0	7 100.0	13 100.0	3 100.0	100 100.0	

Table 3: Comparison of T3, T4 and TSH with type of bleeding.

		Type of bleeding						Total	P value
		Frequent cycle	Infrequent cycle	Prolonged cycle	MPH	short bleeding	Intra menstrual bleeding		
T3	Decrease (<0.8)	0	0	0	0	0	0	0	0.06
	Normal (0.8–2)	21 100.0	26 81.2	23 95.8	7 100.0	13 100.0	3 100.0	93 93.0	
	Increase (>2)	0 0.0	6 18.8	1 4.2	0 0.0	0 0.0	0 0.0	7 7.0	
T4	Decrease (<0.8)	14 66.7	8 25.0	21 87.5	0 0.0	2 15.4	0 0.0	45 45.0	<0.001***
	Normal (0.8–2)	7 33.3	24 75.0	3 12.5	7 100.0	11 84.6	3 100.0	55 55.0	
	Increase (>2)	0	0	0	0	0	0	0	
TSH	Decrease (<0.8)	0	0	0	0	0	0	0	<0.001***
	Normal (0.8–2)	7 33.3	31 96.9	4 16.7	7 100.0	11 84.6	3 100.0	63 63.0	
	Increase (>2)	14 66.7	1 3.1	20 83.3	0 0.0	2 15.4	0 0.0	37 37.0	

Table 4: Comparison of age with type of bleeding.

Age (in years)	Type of bleeding						Total	P value
	Frequent cycle	Infrequent cycle	Prolonged cycle	MPH	Short bleeding	Intra menstrual bleeding		
21-25	0	0	0	0	0	1 33.3	1 1.0	0.762
26-30	9 42.8	8 25	8 33.3	3 42.9	3 23.3	0	31 31.0	
31-35	9 42.8	16 50	12 50	3 42.9	8 61.5	2 66.7	50 50.0	
36-40	2 9.6	5 15.6	3 12.6	1 14.2	1 7.6	0	12 12.0	
41-45	1 4.8	1 3.2	1 4.1	0	1 7.6	0	4 4.0	
46-50	0	2 6.2	0	0	0	0	2 2.0	
Total	21 100.0	32 100.0	24 100.0	7 100.0	13 100.0	3 100.0	100 100.0	

Table 5: Comparison of treatment received with menstrual irregularities.

Treatment received	Type of bleeding						Total	P value
	Frequent cycle	Infrequent cycle	Prolonged cycle	MPH	Short bleeding	Intra menstrual bleeding		
IUCD	5 23.8	4 12.5	5 20.8	2 28.6	2 15.4	0 0.0	18 18.0	0.83
Hysterectomy	3 14.3	3 9.4	4 16.7	0 0.0	1 7.7	1 33.3	12 12.0	
Hormonal management	13 61.9	25 78.1	15 62.5	5 71.4	10 76.9	2 66.7	70 70.0	

Treatment received	Type of bleeding						Total	P value
	Frequent cycle	Infrequent cycle	Prolonged cycle	MPH	Short bleeding	Intra menstrual bleeding		
Total	21 100.0	32 100.0	24 100.0	7 100.0	13 100.0	3 100.0	100 100.0	

DISCUSSION

In this prospective study at Al Ameen Medical College and Hospital, Vijayapur, 100 cases of abnormal uterine bleeding (AUB) were analyzed. Detailed histories, examinations, and baseline investigations, including thyroid function tests, were conducted. The study population had a mean age of 30.46±2.012 years, with 50% of participants aged 31-35 years and only 1% aged 21-25 years.

In a study done by Gurjar D et al, majority of patients belonged to age group of 24-32 years i.e. 56.8% followed by 32-40 years (20.4%). In a study done by Rai A et al, maximum patients were between 31-40 years. Our study aligns with previous research. In this study, 37% of subjects were from lower socioeconomic status, while the lower middle and upper middle classes each comprised 13%. Only 2% of participants had a significant family history.[10,11]

In this study shows among the subjects, maximum 22 (22%) and 24 (24%) having P2 and P3 parity and minimum that is 3 (3%), 2 (2%) and 2 (2%) having abortion, P8 and unmarried parity. 5 (5%) having no parity. In Singh S et al, study, patients belong to para-2 (32.7%) and para-3 (22.1%). Pilli et al, also reported that DUB was seen in 87% multipara, 7% primipara and 6% nulliparous women. Similar findings were seen in Komathi R et al, Gollakota S et al, and Gowri M et al, studies. Our study aligns with previous research. Among the subjects, 18% had 20-day and 40-day cycle lengths, while only 1-2% had 25-day, 50-day, and 55-day cycles. The most common bleeding types were infrequent (32%), prolonged (24%), and frequent (21%), with intra-menstrual bleeding (3%), menorrhagia (7%), and short bleeding (13%) being less common.[12-16]

In study done by Gurjar D et al, common menstrual pattern is menorrhagia i.e. 110 (44%) followed by oligomenorrhoea in 78 (31.2%), amenorrhoea in 49 (19.6%), hypomenorrhea 7 (2.8%), polymenarrhoea 6 (2.4%). This observation correlates with the study done by Gollakota S et al, Usharani N et al, and Ali J et al. Hence our study is in accordance with the previous studies.[10,15,17,18]

In this study, the mean T3 levels were highest in infrequent cycles (2.0063±1.15729) and lowest in prolonged cycles (1.4500±0.58010), with statistical insignificance. T4 levels were highest in intra-menstrual cycles (10.4300±2.61608) and lowest in prolonged cycles (2.1588±2.35266), showing statistical significance. TSH levels were highest in prolonged cycles (7.9592±2.37011) and lowest in menorrhagia (2.6414±1.18772) and infrequent cycles (2.6547±1.55167), with significant statistical differences. Thyroid dysfunction was most common in euthyroidism (55%), followed by hypothyroidism (38%) and least in hyperthyroidism (7%).

In Singh et al, study, euthyroidism was seen in 72.1% and hypothyroidism was seen in 15.3%. 9.6% of cases had subclinical hypothyroidism and 2.8% patients had hyperthyroidism though they were clinically normal. In Sharma N et al, study 64% patients were euthyroid, 22% hypothyroid and 14% hyperthyroidism.[12,19]

Gurjar et al. observed that 2.8% patients were euthyroid followed by 45 (18%) patients were hypothyroid and 23 (9.2%) were hypothyroid. All finding were comparable with the study done by Gollakota S et al, and Pandey A et al.[10,15,20] The study revealed significant associations between thyroid dysfunction (TDF) and different types of abnormal uterine bleeding (AUB). Among those with frequent bleeding, 66.7% had hypothyroidism. In cases of infrequent cycles, 78.1% were euthyroid (EU). Hypothyroidism was prevalent in 87.5% of prolonged cycle cases. All cases of mid-cycle postmenopausal haemorrhage (MPH) and intra-menstrual bleeding were euthyroid. The results indicate a strong correlation between AUB and thyroid disorders, particularly euthyroidism and hypothyroidism. Kaur et al, observed in their study that 85% of patients with AUB was euthyroid, 14% hypothyroid and 1% hyperthyroid. According to Sowers et al 90.4% were euthyroid, 6.2% hypothyroid and 3.2% hyperthyroid in perimenopausal age group.[17,21]

Singh et al, observed Subclinical hypothyroid and hypothyroid patients had menorrhagia as their commonest bleeding pattern. Thyroid dysfunction was most prevalent in patients presenting with menorrhagia (72.4%) followed by oligomenorrhoea (10.3%). Thus, our study is in accordance with the previous studies.[12] The study found that abnormal uterine bleeding (AUB) was most commonly observed in women aged 31-35 years. Specifically, 50% of women with infrequent and prolonged cycles, 61.5% with short bleeding, and 66.7% with intra-menstrual cycles fell within this age group. In cases of mid-cycle postmenopausal haemorrhage (MPH), 42.9% were from both the 26-30 and 31-35 age groups. This suggests that AUB is more prevalent among women aged 31-35 years.

It is more common in 4th to 5th decades of life or in perimenopausal age group 8. Das and Chugh et al reported that highest incidence of DUB was seen in 41-50 years (32.5%) of age group and then 31-40 years (28.2%). Sangeeta Pahwa et al, observed that majority of patients were in the age group between 31-40 years (42%).[22,23] In Singh et al, study patients were taken from all age groups which included less than 20 years, 21-30 years, 31-40 years and 41-50 years maximum no of patients 43.27% were found to be in the age group of 41-50 years followed by 31-40 years (30.77%).[12] This is because most commonly TDF is usually acquired and can occur at any time in life. The prevalence of clinical and subclinical hypothyroidism in women of reproductive age and during pregnancy is 0.3% and 4.3%, respectively. In our study, AUB is seen between 31-35 years which is in good agreement with the previous studies. In the present study, shows comparison of age with TDF. This reveals that Among total 55 (100%) EU, maximum subjects was 26 (47.3%) from 31-35 years of age. Among total 7 (100%) hyperthyroidism, maximum subjects were 6 (85.7%) from 31-35 years of age. Among total 38 (100%) hypothyroidism, maximum subjects were 18 (47.4%) from 31-35 years of age. Thus, in our study total TDF was observed between 31-35 years of age and this is in association with the AUB which is also observes at the age 31-35 years. This shows both factors were inter-related and TDF was the main cause foe the AUB in our study.

In our study shows comparison of T3 and T4 with bleeding and it is observed that T3 was normal in all patients but T4 was highly significant revealing the TDF in most of the cases. In our study, most cases showed decrease in T4 levels and normal T4 levels. But when the type of bleeding was compared with TSH levels there was increase in TSH levels in frequent bleeding and prolonged cycle (TSH > 4). This clearly shows that present study has maximum of euthyroidism and hypothyroidism which is comparable to the previous studies.[12,21]

In the present study, comparison of treatment received with the menstrual irregularities was done which presented that hormonal management was done in all types of bleeding but on comparison of TDF and treatment received (table 19, fig 19) shows that among total 18 (100%) IUCD treatment received, maximum 11(61.1%) was having EU and among total 12 (100%) hysterectomy treatment received, maximum 38 (54.3%) was having EU maximum 6 (50%) and 6 (50%) was having EU and hypothyroidism. Among total 70 (100%) hormonal management treatment received maximum 38 (54.3%) was having EU. This shows that most of the cases in the present study were having TDF problem in comparison to other causes of the AUB. This is comparable to the other studies. Doifode et al, observed menorrhagia in hypothyroidism was 38 (63.33%), In hypothyroid patients Menon and Bharucha gave an incidence of 46.15% was menorrhagic.[7,9,10,12,21]

In this study, the comparison of thyroid dysfunction (TDF) with socioeconomic status revealed that euthyroidism (EU) was most common across all classes, with the highest prevalence in the lower class (62.2%). Hypothyroidism was most common in the lower-middle class (46.2%). The analysis also showed no significant relationship between TDF and family history, as EU was prevalent in both groups with and without a significant family history. The study highlighted that thyroid dysfunction, particularly hypothyroidism and euthyroidism, significantly contributes to abnormal uterine bleeding (AUB), especially in women aged 31-35 years. The findings suggest that thyroid hormones directly influence menstrual patterns and are crucial for the proper functioning of the female reproductive system, affecting fertility and menstrual health. Hormonal management was effective in improving AUB symptoms within 3 to 6 months of follow-up.

CONCLUSION

There is a significant association between thyroid disorders and AUB. In our study we found hypothyroidism as most common in all patients. Many cases showed euthyroidism which shows the risk of progression to overt hypothyroidism The high incidence of thyroid disorders in women with AUB presents the biochemical evaluation of free T3, total T4, TSH are extremely important and valuable. TSH is most sensitive test in detecting thyroid dysfunction. Subclinical cases need to be treated. Hence thyroid function evaluation should be made mandatory in cases of AUB to detect thyroid dysfunction. In patients with subclinical disease and the cost-benefit ratio also emphasises the need for selective screening. Early detection of subclinical disease by selective screening facilitates appropriate therapy early in the course of the disease.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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