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Original Research Article

Thyroid Dysfunction among Patients with Abnormal Uterine Bleeding: A Hospital Based Prospective Study from North India

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Abstract:

Background: Abnormal uterine bleeding (AUB) affects around 20% of women attending outpatient departments globally. AUB encompasses various menstrual irregularities, and its etiology involves hormonal, structural, and systemic factors. Thyroid dysfunction has emerged as a significant factor, as thyroid hormones play a vital role in regulating the menstrual cycle. Both hypothyroidism and hyperthyroidism can lead to menstrual disturbances and AUB. However, the prevalence and clinical impact of thyroid dysfunction on AUB management are not fully understood. This study aims to investigate the prevalence and clinical implications of thyroid dysfunction in AUB patients.

Methods: This cross-sectional study conducted at a tertiary care center aimed to assess thyroid dysfunction in female patients with abnormal uterine bleeding (AUB). The study included reproductive-age women (18-45 years) presenting with AUB, excluding those with pre-existing thyroid dysfunction or using thyroid-related medications. Data collection involved a questionnaire to gather clinical, demographic, and laboratory information. Standard diagnostic investigations and thyroid function tests were performed. Statistical analysis using descriptive statistics and appropriate tests were conducted.

Results: The present study aimed to investigate the association between thyroid dysfunction and abnormal uterine bleeding (AUB) in a population of 157 female patients. In our study, 35.0% of patients were in the age group of 30-39 years, and 12.7% were above 40 years. In our study, regarding thyroid dysfunction, 16.6% of the patients were diagnosed with hypothyroidism, 5.7% with hyperthyroidism, 18.5% with subclinical hypothyroidism, and 59.2% were classified as euthyroid. In our study, among patients with hypothyroidism, menorrhagia was the most common pattern, accounting for 42.3% of cases, followed by polymenorrhagia in 34.6% and metrorrhagia in 11.5%. Among those with hyperthyroidism, menorrhagia was also the predominant pattern, reported in 72.4% of cases, followed by oligomenorrhea in 77.8%.

Conclusion: In conclusion, this study provides valuable insights into the prevalence of thyroid dysfunction and its potential associations with demographic factors in patients with AUB. The findings suggest that occupation and parity may have some association with thyroid dysfunction in this population.

Keywords: Abnormal Uterine Bleeding, Menstrual Irregularities, Thyroid Dysfunction, Hypothyroidism, Hyperthyroidism.

Introduction

Abnormal uterine bleeding (AUB) is a prevalent gynecological disorder that significantly affects the reproductive health and quality of life of women worldwide (around 20% patients attending the outpatient department [OPD]) [1].It encompasses a range of menstrual irregularities, including heavy or prolonged bleeding, intermenstrual bleeding, and unpredictable menstrual patterns. The etiology of AUB is multifactorial, involving a complex interplay of hormonal, structural, and systemic factors. Among these factors, endocrine abnormalities have gained increasing attention in recent years [2,3].The thyroid

gland plays a crucial role in regulating the body's metabolic processes, including the menstrual cycle. Thyroid hormones, primarily thyroxine (T4) and triiodothyronine (T3), have a direct impact on the hypothalamic-pituitary-ovarian axis and are integral to the maintenance of normal ovarian function. Consequently, disturbances in thyroid function may disrupt the delicate balance of reproductive hormones, leading to menstrual irregularities and AUB [4].

Thyroid dysfunction is a broad term that encompasses both hypothyroidism and hyperthyroidism, conditions characterized by an underactive or overactive thyroid gland, respectively[5,6]. Hypothyroidism is associated with decreased production of thyroid hormones, leading to a slowing down of the body's metabolic processes. Hyperthyroidism, on the other hand, results from excessive thyroid hormone production, leading to increased metabolic activity. Both conditions have been implicated in menstrual abnormalities and have been linked to the development of AUB [5,6].

Despite the potential association between thyroid dysfunction and AUB, the precise mechanisms underlying this relationship are still not fully understood. Furthermore, the prevalence of thyroid dysfunction among women with AUB (varies between 32-80%) and its impact on the clinical presentation and management of AUB remains uncertain [7,8,9]. Therefore, this study aims to investigate the prevalence of thyroid dysfunction in patients with AUB and evaluate its clinical implications.

Materials and Methods

Study Design

This present cross-sectional study was conducted at a tertiary care center from April 2021 to March 2023. The study protocol was approved by the Institutional Review Board (IRB) and was performed in accordance with the principles of the Declaration of Helsinki.

Study Population

The study included female patients of reproductive age (18-45 years) who presented with abnormal uterine bleeding (AUB) to the gynaecology department during the study period. Patients with a known history of thyroid dysfunction or those on thyroid-related medications were excluded from the study to ensure the examination of new-onset thyroid dysfunction in relation to AUB. With the reported incidence rate of Dysfunctional Uterine Bleeding (DUB) being 10%, and considering a 95% confidence interval and 5% margin of error, the calculated sample size was determined to be 140 individuals using Epi tools software [10].

Data Collection

A pretested preformed questionnaire was used to obtain relevant clinical, demographic, and laboratory data. Demographic variables collected included age, parity, and body mass index (BMI). Clinical information encompassed menstrual history, menstrual bleeding patterns, and any co-existing medical conditions. A comprehensive clinical assessment was performed, which included a thorough examination of the patient's general physical condition, evaluation of the neck and thyroid gland area, gynaecological examination using a speculum and bimanual examination, as well as a meticulous systemic examination. The participants underwent standard diagnostic investigations, including a complete blood count, urinary analysis for albumin and sugar, assessment of coagulation parameters such as bleeding time and clotting time, as well as abdominal and pelvic ultrasonographic evaluation.

Thyroid Function Assessment

Thyroid function tests were conducted as part of the routine clinical evaluation for AUB. Blood samples were collected in the morning after an overnight fast. Serum Thyroid Stimulating Hormone (TSH), Thyroxine (T4), Triiodothyronine (T3) and Thyroid Peroxidase antibodies (TPO-Ab) levels were measured using the Chemiluminescence Immuno Assay (CLIA) method with the utilization of the Monobind IN C kit, manufactured in the United States (US). Thyroid dysfunction was defined as follows: hypothyroidism - TSH > 4.0 mIU/L with low FT4 levels, hyperthyroidism - TSH < 0.4 mIU/L with elevated FT4 levels, and euthyroidism - TSH and FT4 levels within the reference range. Patients who were identified to have thyroid dysfunction were appropriately referred to a physician for further evaluation and appropriate management.

Statistical Analysis

Data were analyzed using SPSS version 22. Descriptive statistics were used to summarize demographic and clinical characteristics of the study population. Categorical variables were presented as frequencies and percentages, while continuous variables were reported as means ± standard deviation (SD). The Chi-square test or Fisher's exact test was employed to compare categorical variables. A p-value < 0.05 was considered statistically significant.

Results

The study population consisted of 157 female patients with abnormal uterine bleeding (AUB). The mean age of the participants was 33.5±13.8 years. The age distribution revealed that 22.9% of the patients were below 20 years, 29.3% were in the age group of 20-29 years, 35.0% were in the age group of 30-39 years, and 12.7% were above 40 years. In terms of parity, 19.7% were unmarried, 11.5% were nulliparous, 20.4% were primiparous, and 49.7% were multiparous. Regarding occupation, 21.0% were students, 63.7% were homemakers, and 15.3% were employed. Smoking was reported by 12.1% of the patients, while the majority (87.9%) were non-smokers. The mean body mass index (BMI) of the participants was 26.7±5.7 kg/m2. Based on BMI categories, 28.0% were classified as normal weight, 26.8% as overweight, and 45.2% as obese (Table 1).

Table 1: Baseline characteristics of the patients

Variables	Frequency	%
Mean age (in years)	33.5±13.8	
Age group		
<20 years	36	22.9
20-29 years	46	29.3
30-39 years	55	35.0
>40 years	20	12.7
Parity		
Unmarried	31	19.7
Nulliparous	18	11.5
Primiparous	32	20.4
Multiparous	78	49.7
Occupation		
Student	33	21.0
Homemaker	100	63.7
Working	24	15.3
Smoking		
Yes	19	12.1
No	138	87.9
Mean BMI (Kg/m^2)	26.7±5.7	
BMI category (Kg/m^2)		
Normal	44	28.0
Overweight	42	26.8
Obese	71	45.2

Among the participants with abnormal uterine bleeding (AUB), the distribution of bleeding patterns was as follows: 8.3% experienced amenorrhea, 14.0% had polymenorrhea, 45.2% presented with menorrhagia, 8.3% reported metrorrhagia, 8.3% had meno-metrorrhagia, and 15.9% had oligomenorrhea. Regarding thyroid dysfunction, 16.6% of the patients were diagnosed with hypothyroidism, 5.7% with hyperthyroidism, 18.5% with subclinical hypothyroidism, and 59.2% were classified as euthyroid. The mean serum levels of thyroid-stimulating hormone (TSH) were 2.8±2.3 mIU/L, indicating a relatively normal range. The mean levels of triiodothyronine (T3) were 1.4±0.7 pmol/L, and the mean levels of thyroxine (T4) were 84.3±29.5 pmol/L. So, it was concluded that the majority of the participants had menorrhagia, while hypothyroidism was the most commonly observed thyroid dysfunction (Table 2).

Table 2: Bleeding pattern and thyroid profile of patients

Variables	Frequency	%
Bleeding pattern		
Amenorrhea	13	8.3
Polymenorrhagia	22	14.0
Menorrhagia	71	45.2
Metrorrhagia	13	8.3
Meno-metrorrhagia	13	8.3

Oligomenorrhoea	25	15.9
Thyroid dysfunction		
Hypothyroidism	26	16.6
Hyperthyroidism	9	5.7
Subclinical hypothyroidism	29	18.5
Euthyroid	93	59.2
Mean TSH (mIU/L)	2.8±2.3	
Mean T3 (pmol/L)	1.4±0.7	
Mean T4 (pmol/L)	84.3±29.5	

Among those who were euthyroid, amenorrhea was observed in 10.2% of cases, polymenorrhea in 9.3%, menorrhagia in 36.3%, metrorrhagia in 8.4%, meno-metrorrhagia in 6.5%, and oligomenorrhea in 15.8%. In patients with hypothyroidism, menorrhagia was the most common pattern, accounting for 42.3% of cases, followed by polymenorrhea in 34.6% and metrorrhagia in 11.5%. Among those with hyperthyroidism, menorrhagia was also the predominant pattern, reported in 72.4% of cases, followed by oligomenorrhea in 77.8%. Subclinical hypothyroidism was associated with menorrhagia in 72.4% of cases, polymenorrhea in 10.3%, and oligomenorrhea in 3.4%. These findings highlight the relationship between thyroid dysfunction and specific bleeding patterns in patients with abnormal uterine bleeding (Table 3).

Table 3: Distribution of bleeding pattern among patients based on their thyroid status

Bleeding pattern*	Number (%)			
	Euthyroid	Hypothyroidism	Hyperthyroidism	Subclinical hypothyroidism
Amenorrhea	11 (10.2)	0 (0.0)	2 (22.2)	0 (0.0)
Polymenorrhagia	10 (9.3)	9 (34.6)	0 (0.0)	3 (10.3)
Menorrhagia	39 (36.3)	11 (42.3)	0 (0.0)	21 (72.4)
Metrorrhagia	9 (8.4)	3 (11.5)	0 (0.0)	1 (3.4)
Meno-metrorrhagia	7 (6.5)	3 (11.5)	0 (0.0)	3 (10.3)
Oligomenorrhoea	17 (15.8)	0 (0.0)	7 (77.8)	1 (3.4)

*P<0.0001 (statistically significant)

The analysis of the distribution of thyroid dysfunction among patients with abnormal uterine bleeding (AUB) compared to those who were euthyroid revealed some notable findings. There was no statistically significant difference in the distribution of thyroid dysfunction across different age groups (p = 0.555), indicating that thyroid dysfunction was not significantly associated with age in this study population. However, there was a statistically significant difference between the groups in terms of occupation, with a higher proportion of individuals with thyroid dysfunction being employed compared to those with a normal thyroid (p = 0.031).The association between thyroid dysfunction and parity approached statistical significance (p = 0.056), with a higher proportion of individuals with thyroid dysfunction being primiparous. No significant associations were observed between thyroid dysfunction and smoking status (p = 0.532) or body mass index (BMI) category (p = 0.633). Additionally, there was no statistically significant difference in the distribution of thyroid dysfunction among patients with different bleeding patterns (p = 0.203) (Table 4).

Table 4: Association of thyroid dysfunction with the various factors among patients

Variables	Euthyroid		Thyroid dysfunction		P value
	Frequency	%	Frequency	%	
Age group					
<20 years	19	20.4	17	26.6	0.555
20-29 years	31	33.3	15	23.4	
30-39 years	31	33.3	24	37.5	
>40 years	12	12.9	8	12.5	
Parity					
Unmarried	17	18.3	12	18.8	0.056
Nulliparous	14	15.1	4	6.3	

Primiparous	13	14.0	19	29.7	
Multiparous	49	52.7	29	45.3	
Occupation					
Student	18	19.4	15	23.4	0.031
Homemaker	66	71.0	34	53.1	
Working	9	9.7	15	23.4	
Smoking					
Yes	10	10.8	9	14.1	0.532
No	83	89.2	55	85.9	
BMI category					
Normal	25	26.9	19	29.7	0.633
Overweight	28	30.1	14	21.9	
Obese	40	43.0	31	48.4	
Bleeding pattern					
Amenorrhea	11	11.8	2	3.1	0.203
Polymenohhrea	10	10.8	12	18.8	
Menorrhagia	39	41.9	32	50.0	
Metrorrhagia	9	9.7	4	6.3	
Meno-metrorrhagia	7	7.5	6	9.4	
Oligomenorrhoea	17	18.3	8	12.5	

Discussion

The present study aimed to investigate the association between thyroid dysfunction and abnormal uterine bleeding (AUB) in a population of 157 female patients. In our study, 35.0% of patients were in the age group of 30-39 years, and 12.7% were above 40 years. Talukadar et al., conducted a study and observed that abnormal uterine bleeding (AUB) commonly occurs in the fourth to fifth decades of life, particularly in the perimenopausal age group [1]. Similarly, Bhavani et al., reported that the highest proportion of AUB patients were in the age group of 41 to 50 years (40%), followed by 31 to 40 years (37%) [5]. In our study, we found that 49.7% of patients with AUB were multiparous. Furthermore, Pilli et al., also noted a high prevalence of AUB in multiparous women (87%), with lower rates in primiparous (7%) and nulliparous women (6%) [11]. The findings revealed that the majority of the participants had menorrhagia (45.2%), a common form of AUB characterized by heavy or prolonged menstrual bleeding. In a study by Talukdar et al., it was found that menorrhagia accounted for 44.44% of cases among patients with abnormal uterine bleeding [1]. Similar findings regarding the prevalence of AUB patterns were reported by Bhavani et al., and Mohapatra et al., with menorrhagia observed in 73.4% and 62.5% of cases, respectively [5,12]. These results are consistent with previous studies conducted by Parveen et al., Verma et al., Maria et al., Mohan et al., Fraser et al., Byna et al., and Deshmukh et al., which all identified menorrhagia as the most common bleeding pattern among patients with AUB [13,14,15,16,17,8,18].

In our study, regarding thyroid dysfunction, 16.6% of the patients were diagnosed with hypothyroidism, 5.7% with hyperthyroidism, 18.5% with subclinical hypothyroidism, and 59.2% were classified as euthyroid. According to Ajmani et al., the prevalence of thyroid dysfunction among women with menstrual disorders was found to be 14% [4]. In a study by Pahwa et al., it was reported that hypothyroidism accounted for 22% of cases, hyperthyroidism for 2%, and the remaining 76% were euthyroid [6]. Al-Hakeim et al., conducted a previous study revealing a prevalence of 16.1% for hypothyroidism and 3.4% for hyperthyroidism among women with menstrual disturbances [19]. Similarly, Kaur et al., observed that 85% of patients with abnormal uterine bleeding were euthyroid, while 14% had hypothyroidism, and 1% had hyperthyroidism [20]. In a study by Sruthi et al., it was found that 10% of patients with abnormal uterine bleeding were hypothyroid, and 1% were hyperthyroid [21].

Disruptions in the levels of thyroid hormones can interfere with ovulatory hormones and predispose individuals to experience irregular bleeding [22,23].In our study, among patients with hypothyroidism, menorrhagia was the most common pattern, accounting for 42.3% of cases, followed by polymenorrhagia in 34.6% and metrorrhagia in 11.5%. Among those with hyperthyroidism, menorrhagia was also the predominant pattern, reported in 72.4% of cases, followed by oligomenorrhea in 77.8%.The prevalence of

oligomenorrhea and hypomenorrhea, as the most frequently observed abnormal uterine bleeding (AUB) patterns in hyperthyroid patients, is substantiated by several studies. Jinger et al., reported a percentage of 75%, while Somani et al., documented a prevalence rate of 55.5% [24,25].

Furthermore, Parveen et al., Paari et al., and Singh et al., conducted studies that exclusively identified oligomenorrhea as the AUB pattern in all hyperthyroidism patients [13,26,27]. However, it is noteworthy that the findings of the current study significantly diverge from the results reported by Bhavani et al., [5].

In our study, we implemented appropriate therapeutic interventions for patients diagnosed with hypothyroidism, utilizing Thyroxine as a key component. Encouragingly, a significant proportion of patients (approximately 76.5%) exhibited positive responses to a daily dosage of 25-50 µg, leading to the restoration of normal menstrual cycles within a six-month timeframe. For a smaller subset (approximately 17.94%) of patients, a more extended treatment duration of 6-12 months, with a higher dosage of 75-100 µg/day, was necessary to achieve the desired outcome.

These results align with the observations made by Ross et al., who found that patients with myxoedema experienced regular menstrual cycles following desiccated thyroid treatment [28]. Additionally, Wilansky et al., reported a similar outcome where menorrhagia, occurring in patients with hypothyroidism, ceased within 3-6 months after l-thyroxine therapy and did not recur during a follow-up period spanning one to three years [29]. These findings collectively underscore the efficacy of Thyroxine-based treatments in addressing menstrual irregularities associated with hypothyroidism.

Limitations

As the study was conducted in a single center, which may limit the generalizability of the findings. Despite these limitations, this research provides valuable insights into the relationship between thyroid dysfunction and AUB, contributing to the existing body of knowledge and guiding future research directions in this field.

Conclusion

In conclusion, this study provides valuable insights into the prevalence of thyroid dysfunction and its potential associations with demographic factors in patients with AUB. The findings suggest that occupation and parity may have some association with thyroid dysfunction in this population. However, further research is needed to explore the underlying mechanisms and clinical implications of these associations. The lack of significant associations with age, smoking status, BMI categories, and bleeding patterns indicates that these factors may not play a major role in the development of thyroid dysfunction in the context of AUB in this study population.

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