

# Assessment of Thyroid Dysfunction and Serum Prolactin Levels in Women with Abnormal Uterine Bleeding

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## Abstract

**Background:** The phenomenon of abnormal uterine bleeding (AUB) is a widespread gynaecological issue of women of reproductive age, and it is often related to endocrine abnormalities. The dysfunction of the hypothalamic-pituitary-ovarian axis has been identified to mediate thyroid disease and hyperprolactinemia, which lead to menstrual abnormalities. **Material and Methods:** A case-control study was conducted at a tertiary care teaching hospital within 2 years. The participant population comprised 600 women (ages 15-45 years): 300 participants (cases) with a report of AUB, and the remaining 300 children of the same age with no menstrual complaints (controls). Chemiluminescent immunoassays were used to measure thyroid function tests (free T3, free T4, and TSH) and serum prolactin levels. The statistical analysis was conducted using SPSS software. **Results:** Thyroid dysfunction was also much higher in cases than in controls. The proportion of women with AUB with hypothyroidism and subclinical hypothyroidism was found to be significant. Cases were also significantly greater in the terms of hyperprolactinemia. There was a significant positive correlation between serum prolactin and elevated TSH levels. **Conclusion:** The abnormal uterine bleeding is found to be of high significance with thyroid dysfunction and hyperprolactinemia. Thyroid and prolactin screening in women with AUB can help to diagnose the problem of AUB at an early stage and avoid unnecessary surgical operations.

**Keywords:** Abnormal uterine bleeding, Thyroid dysfunction, Prolactin, Hypothyroidism, Menstrual disorders.

Received: 10 November 2025

Revised: 30 November 2025

Accepted: 20 December 2025

Published: 24 January 2026

## INTRODUCTION

One of the most common gynaecological symptoms that women experience is abnormal uterine bleeding (AUB), which occupies a good percentage of outpatient care and gynecologic operations. It hurts the quality of life and can result in anaemia, frequent hospitalisation, and surgeries like curettage or a hysterectomy. The International Federation of Gynaecology and Obstetrics has established terminology and classification of AUB as part of the PALM-COEIN system, and it is important to identify underlying etiological factors to initiate definitive treatment.<sup>[1-5]</sup>

Endocrine disorders are very critical in the control of menstrual function. Thyroid hormones have a direct relationship with ovarian physiology, including the development of the endometrium and the regulation of gonadotropin secretion. Hypothyroidism and hyperthyroidism have also been linked to menstrual predicaments that include menorrhagia and polymenorrhea to oligomenorrhea and amenorrhea.<sup>[2]</sup> In certain cases, such as hypothyroidism, it is generally associated with heavy menstrual bleeding because of anovulation, estrogen breakthrough bleeding and coagulation processes.<sup>[6-9]</sup>

The other crucial hormone that influences reproductive functioning is prolactin. Hyperprolactinemia interferes with normal pulsatile secretion of gonadotropin-releasing hormone and thus results in follicular growth and defects of luteal secretions. Higher levels of prolactin can be independent or associated with thyroid dysfunction,

depending on the coincidence of regulatory mechanisms at the hypothalamic-pituitary level.<sup>[3,10-15]</sup>

Even though various studies have been used in the assessment of thyroid abnormality among women with menstrual disorders, few large-sample Indian studies have concomitantly determined the thyroid functionality and the level of serum prolactin in women with abnormal uterine bleeding through a case-control study design. As such, the current research was conducted to assess thyroid and prolactin profiles in women with AUB and to compare them with those of age-matched controls, providing stronger evidence to support the clinical utility of routine endocrine screening among these patients.<sup>[4]</sup>

### Aims and Objectives

1. To determine the status of thyroid function in the women presenting with abnormal uterine bleeding.
2. To determine the levels of serum prolactin in women with abnormal uterine bleeding.
3. To make comparisons of thyroid and prolactin between AUB

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**DOI:**  
10.21276/amit.2026.v13.i1.311

**How to cite this article:** Singh N, Sai S, Gattamaneni A, Singh P, Gupta R. Assessment of Thyroid Dysfunction and Serum Prolactin Levels in Women with Abnormal Uterine Bleeding. Acta Med Int. 2026;13(1):142-146.

women and age controls.

4. To assess the relations of TSH and serum prolactin.

## MATERIALS AND METHODS

The case-control study was hospital-based and conducted in the Department of Obstetrics and Gynaecology of Rohilkhand Medical College & Hospital, Bareilly, over two years.

**Study Population:** The study was conducted among 600 women aged 15-45 years.

**Cases:** 300 women presenting in Gynaecology OPD with abnormal uterine bleeding.

**Control group:** 300 age matched women who are not complaining of any menstrual problems visiting the hospital to get routine check-ups or minor gynaecology-related problems.

### Inclusion Criteria

- Women aged 15–45 years.
- Cases with complaints of abnormal uterine bleeding.

### Exclusion Criteria

- Pregnancy and lactation.
- Uterine structural pathology (fibroid, polyp, adenomyosis).
- Known cases of thyroid disease.
- Polycystic ovary syndrome, cases on hormonal contraceptives, PID, and bleeding disorders.

**Data Collection:** A thorough clinical history of menstrual pattern, period, amount of bleeding, and symptoms was taken. General, systemic and gynaecological check-ups were done. Ultrasonography did not exclude structural causes of AUB (PALM group), and also excluded non-structural endocrine causes of the disease, as in the study.

### Laboratory Investigations

- Venous blood could be used by taking samples and estimating:
- Free T3
- Free T4
- Thyroid-stimulating hormone (TSH)
- Serum prolactin
- All hormonal tests were performed by chemiluminescent immunoassay.
- Hyperprolactinemia was considered to be serum prolactin levels more than 25 ng/ mL.

**Statistical Analysis:** An ANOVA SPSS 25 was applied to analyse data. Quantitative variables were reported as mean  $\pm$  standard deviation, and qualitative variables as percentages. Comparison was done using the Chi-square test and Student t-test. The correlation between TSH and prolactin levels was evaluated using the Pearson correlation coefficient. A p-value that was less than 0.05 was taken to be statistically significant.

**Ethical Considerations:** This was the case with the study approved by this Institutional Ethics Committee. Informed consent was obtained from all participants.

## RESULTS

**Table 1: Age distribution of the study participants.**

Age Group (years)	Cases (n = 300)	Controls (n = 300)	p-value
15–25	54 (18.0%)	58 (19.3%)	0.82
26–35	112 (37.3%)	108 (36.0%)	
36–45	134 (44.7%)	134 (44.7%)	
Mean $\pm$ SD	33.9 $\pm$ 7.8	34.1 $\pm$ 7.5	0.74

**Table 2: Trend of abnormal uterine bleeding in the cases.**

Pattern	Number	Percentage (%)
Menorrhagia	128	42.7
Oligomenorrhoea	104	34.7
Polymenorrhagia	52	17.3
Amenorrhoea	10	3.3
Metrorrhagia	6	2.0

**Table 3: Comparing the level of hemoglobin.**

Hb (g/dL)	Cases	Controls	p-value
< 8	38	9	< 0.001
8–12	234	176	
> 12	28	115	
Mean $\pm$ SD	9.6 $\pm$ 1.4	11.8 $\pm$ 1.9	< 0.001

**Table 4: Thyroid functioning status.**

Thyroid Status	Cases n (%)	Controls n (%)	p-value
Euthyroid	122 (40.7%)	214 (71.3%)	< 0.001
Subclinical hypothyroid	92 (30.7%)	54 (18.0%)	
Overt hypothyroid	70 (23.3%)	24 (8.0%)	
Hyperthyroid	16 (5.3%)	8 (2.7%)	

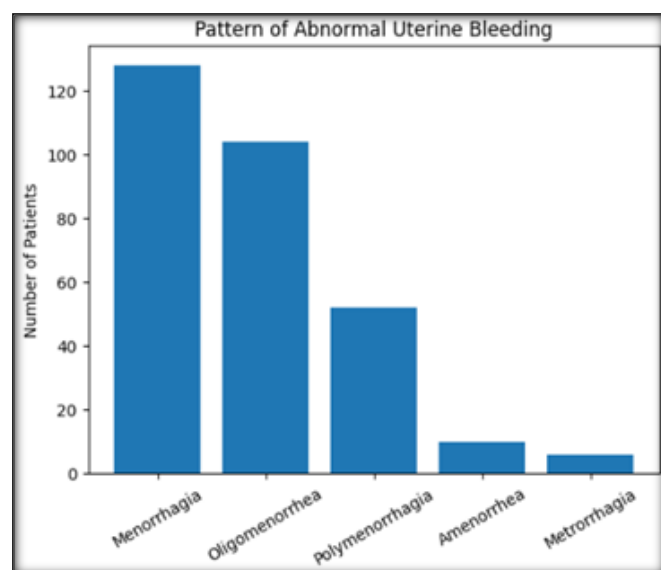
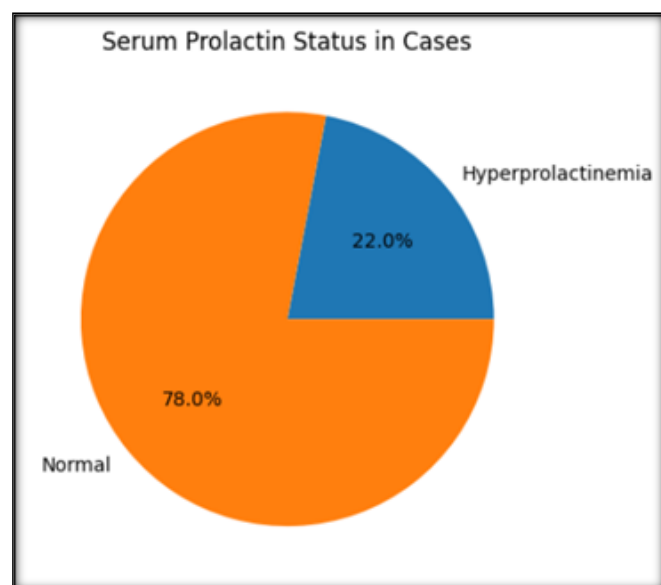
**Table 5: Level of serum prolactin.**

Prolactin Status	Cases n (%)	Controls n (%)	p-value
Hyperprolactinemia	66 (22.0%)	14 (4.7%)	< 0.001
Normal	234	286	
Mean $\pm$ SD (ng/mL)	26.4 $\pm$ 7.2	13.1 $\pm$ 4.6	< 0.001

**Table 6: Correlation between serum TSH and prolactin levels**

Group	Pearson's r	p value
Cases	Positive correlation ( $r \sim 0.63$ )	<0.001
Controls	No significant correlation	>0.05

There was positive statistically significant correlation between serum TSH and prolactin levels among cases ( $p < 0.001$ ). There was no major correlation between controls.



## DISCUSSION

Abnormal uterine bleeding (AUB) is still among the most topical gynaecological complaints of women of all reproductive ages and is still challenging to diagnose and

treat.<sup>[1]</sup> The aetiology of AUB is a complex concept and thus requires a multifactorial assessment to identify reversible factors before invasive intervention is considered.<sup>[14]</sup> The current study was a large-scale case-control study involving 300 women with AUB and 300 age-matched controls, to assess the role of thyroid dysfunction and hyperprolactinemia in the etiopathogenesis of abnormal uterine bleeding and to reinforce existing findings with a robust sample.

In the current study, all the participants were within the ages of 26 to 45 years, which is the most reproductive peak age where menstrual disorders are most noted to be reported.<sup>[10]</sup> Previous studies in India have reported similar age distributions in determining the endocrine causes of menstrual abnormalities.<sup>[11]</sup> The changes in hormones, rising cases of the endocrine disorder, and the cumulative impact of ovulatory malfunction are likely causes in this age bracket.

Among women with AUB, menorrhagia was the most common presentation, followed by oligomenorrhea and polymenorrhagia. The trend is in line with previous findings that indicated that menorrhagia was the most common bleeding anomaly in hypothyroid women.<sup>[4,5]</sup> Hypothyroid results are linked with anovulatory cycles, long-term exposure to estrogens, coagulation factor synthesis, and endometrial responsiveness, all of which are reasons behind heavy menstrual bleeding.<sup>[3,15]</sup>

The current investigation reported that anaemia was much higher among women with AUB than in controls. Long-term excessive menstrual losses of blood have been proven to be a prominent cause of iron-deficiency anaemia in women of reproductive age.<sup>[14]</sup> The same results were reported by Singh et al. and Doifode et al., who have reported a low range of haemoglobin in menstrual diseases related to thyroid dysfunction among women.<sup>[10,11]</sup>

The thyroid dysfunction was also quite prevalent among AUB women compared to controls, with the largest abnormalities being hypothyroidism and subclinical hypothyroidism. These results are also consistent with other studies that found a high level of correlation between hypothyroidism and menstrual abnormalities.<sup>[3,4,16]</sup> Thyroid hormones mediate ovarian folliculogenesis, ovulation, and endometrial development in both direct and indirect ways by stimulating and regulating gonadotropin secretion.<sup>[2]</sup>

The percentage of thyroid abnormalities included subclinical hypothyroidism, which took up a significant percentage of the cases. Subclinical hypothyroidism has been emerging as a major cause of menstrual disturbances, though it is mostly clinically silent.<sup>[6]</sup> Several authors have highlighted that a slight deficiency of thyroid hormones may disrupt the hypothalamic-pituitary-ovarian axis, resulting in abnormal uterine bleeding.<sup>[7]</sup> The

results of the current study argue in favour of the routine biochemical screening as a way of identifying subclinical disease.

The prevalence of hyperthyroidism in AUB women was lower and could be explained by the earlier studies that suggest that hyperthyroidism is rather linked with oligomenorrhea or amenorrhea, not menorrhagia.<sup>[3,9]</sup> The prevalence of hyperthyroidism in the current research is relatively lower than in other health studies; this may be due to regional differences in thyroid disease prevalence and the reproductive-age population under study.

Serum prolactin levels were significantly elevated in AUB compared with controls, and hyperprolactinemia was observed in over a quarter of cases. Hyperprolactinemia interferes with the normal pulsatility of gonadotropin-releasing hormone, leading to ovulatory dysfunction and defects of the luteal phase.<sup>[7,8]</sup> Equal levels of prevalence were noted in previous reports comparing levels of prolactin among the women with irregular menstruation.<sup>[12]</sup>

The coexistence of thyroid dysfunction and hyperprolactinemia found in this study is biologically reasonable and clinically appreciable. A close association was observed between serum TSH and prolactin concentrations, consistent with the premise of a common hypothalamic-pituitary control mechanism.<sup>[13]</sup> The TSH and prolactin secretion is promoted by thyrotropin-releasing hormone, which also explains the common co-existence of hypothyroidism and hyperprolactinemia in females with AUB.<sup>[13]</sup>

Clinically, the results of the current research are of particular significance, as the endocrine origins of AUB are largely reversible. Levothyroxine therapy and treatment of hyperprolactinemia with dopamine agonists have also been demonstrated to correct hypothyroidism and normalise ovulatory cycles and menstrual bleeding rates in a good percentage of patients with this condition.<sup>[8,15]</sup> These conditions can thus be detected early and treated before they go to unnecessary invasive procedures such as recurrent curettage and hysterectomy, which are prevalent among younger women.<sup>[15]</sup>

Some authors and professional guidelines have suggested routine screening for thyroid function and serum prolactin levels in women with abnormal uterine bleeding to detect the condition.<sup>[14,15]</sup> The findings of the current research are very convincing in their application to conventional diagnostic procedures for AUB, especially in resource-poor regions that require affordable diagnostic measures.

The strength of this study is its large sample size, a well-matched control group, and a comprehensive assessment using standardised chemoluminescent assays to evaluate hormone levels. A case-control design enabled meaningful comparisons between groups and reduced confounding factors. Certain methodological virtues have also been noted as necessary in undertaking an endocrine evaluation research within the gynaecological scope.<sup>[18]</sup>

There are some limitations to note. As a hospital-based research, the results might not be generally applicable to the community. Also, there were no long-term adherence studies on the response to endocrine treatment. Prospective

longitudinal studies might be conducted in the future to shed more light on the outcomes of treatments and the patterns of their occurrence.<sup>[19,20]</sup>

On the whole, the current study contributes to the body of evidence demonstrating a strong correlation between abnormal uterine bleeding and endocrine abnormalities. The results support the relevance of a multidisciplinary team that consists of gynaecologists and endocrinologists for the most effective treatment of women having menstrual disorders.<sup>[17]</sup>

## CONCLUSION

A complicated connection between abnormal uterine bleeding and thyroid dysfunction, and abnormal uterine bleeding and hyperprolactinemia exists among women of reproductive age. Endocrine abnormalities screening must be part of the AUB diagnosis so that these diseases can be diagnosed early, with proper management and avoidance of secondary surgeries.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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