



Thyroid Dysfunctions in Patients with Menstrual Disturbances

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Abstract: Background: The menstrual cycle is intricately governed by hormonal changes and organ responses. Imbalances in this finely tuned system can result in various menstrual problems. Thyroid dysfunction, including hypothyroidism, hyperthyroidism, and subclinical hypothyroidism, has been identified as a potential cause of menstrual irregularities. **Objective:** To assess the frequency of thyroid function disorders in patients presenting with menstrual disturbances and to investigate the association between thyroid function disorders and specific types of menstrual abnormalities. **Methods:** Conducted as a non-interventional study, research was carried out within the Obstetrics and Gynecology department of Rajshahi Medical College Hospital from January 2009 to December 2010. A total of 166 female patients aged 16-45 years with a history of menstrual disturbances were included, adhering to predetermined inclusion and exclusion criteria. Data were collected using a structured questionnaire encompassing all pertinent variables. Data analysis involved descriptive statistics and the Chi-square (χ^2) test. **Results:** Out of the 166 patients examined through a comprehensive process involving history, examination, and relevant laboratory tests (including T3, T4, and TSH), 28 were diagnosed with thyroid disorders. At the same time, 138 were found to have euthyroid status. The frequency distribution of thyroid function among these cases revealed 138 (83.1%) were euthyroid, 18 (10.8%) were hypothyroid, 4 (2.4%) were hyperthyroid, and 6 (3.6%) exhibited subclinical hypothyroidism. **Conclusions:** Thyroid dysfunction is intricately linked with menstrual irregularities, impacting various aspects of the menstrual cycle. Menorrhagia, oligomenorrhea, hypomenorrhea, amenorrhea, and Polymenorrhoea were among the common menstrual disturbances observed in patients with thyroid disorders. Thus, a comprehensive evaluation of individuals with menstrual disturbances should incorporate thyroid assessment, detailed medical history, and thyroid examination. Moreover, specific thyroid function tests should be administered to these patients.

Keywords: Menstrual disturbances, Thyroid dysfunction, Hypothyroidism, Hyperthyroidism, Subclinical hypothyroidism.

Article at a glance:

Study Purpose: The purpose of the study was to investigate thyroid disorders and menstrual problems in 166 female patients.

Key findings: 16.9% had thyroid disorders, most suffered for over two years, thyroid disorders linked to irregular cycles, and menorrhagia was common.

Newer findings: Highlighted thyroid dysfunction prevalence in the 26-30 age group, emphasizing the importance of thyroid evaluation in gynecological care.

Abbreviations: SD - Standard Deviation, FSH - Follicle-Stimulating Hormone, TSH - Thyroid-Stimulating Hormone, SD - Standard Deviation.

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INTRODUCTION

Menstruation is a visible manifestation of cyclic physiological uterine bleeding, primarily

regulated by the intricate interplay of hormones, notably through the hypothalamic-pituitary-ovarian axis.¹ This phenomenon occurs

approximately every 28 days from menarche (onset of menstruation) to menopause (cessation of menstruation) and typically lasts 3 to 5 days. The regularity of the menstrual cycle is maintained through hormonal feedback mechanisms on the central nervous system.² The relationship between the thyroid gland and the female reproductive organs is a well-established and ancient interconnection among the functions of internal secretion glands. Thyroid dysfunction often underlies issues related to a woman's menstrual cycle.³ Both hyperthyroidism and hypothyroidism can lead to menstrual disturbances.⁴ The actions of thyroid hormones on the gonads involve metabolic effects on the ovaries and feedback mechanisms through anterior pituitary hormones that govern sexual functions.⁵

Thyroid hormones directly influence the menstrual pattern by affecting the ovaries and indirectly by impacting the secretion of hormones like SHBG, PRL, and GnRH, as well as coagulation factors.⁶ Various mechanisms contribute to menstrual disturbances in thyroid dysfunction, including altered responses to TRH and LH, changes in androgen to estrogen conversion, catechol estrogens, and shifts in sex hormone binding globulin levels.⁷ have suggested that menstrual irregularities can precede other clinical symptoms of thyroid dysfunction, emphasizing the importance of evaluating thyroid function in women with menstrual irregularities.⁸

A similar study describes amenorrhea in thyrotoxicosis patients and menorrhagia in hypothyroidism patients, possibly due to estrogen breakthrough bleeding caused by anovulation, which is common in severe hypothyroidism.⁹ Hemostatic defects observed in hypothyroidism, including decreased levels of clotting factors, may also contribute to polymenorrhea and menorrhagia.¹⁰ Interestingly, ovarian function and ovulation are generally preserved even in cases of myxedema, with hypothyroid women being more prone to miscarriages than failure to conceive.¹¹

The length of menstrual flow has been associated with TSH concentration, and treating

thyroid dysfunction can reverse menstrual abnormalities.¹² Menstrual disturbances tend to be more frequent in severe hypothyroidism compared to subclinical and mild cases. Subclinical hypothyroidism may be particularly relevant in sub-fertile women with menstrual disorders, although the treatment of subclinical hypothyroidism remains a subject of debate. Diagnosis of hyperthyroidism and hypothyroidism requires measuring TSH and total or free thyroxine concentrations. The prevalence of thyroid disorders in Bangladesh is estimated at approximately 7.35%, and thyroid dysfunction, particularly subclinical hypothyroidism, has a notable impact on female infertility and menstrual cycle disorders, affecting a significant portion of the population.¹³

OBJECTIVE

General Objective

- To investigate the association between thyroid function disorders and menstrual abnormalities in patients.

Specific Objectives

- To identify and classify the various types of menstrual abnormalities, including oligomenorrhea, polymenorrhea, amenorrhea, hypomenorrhea, and menorrhagia, in women of reproductive age.
- To assess thyroid function disorders by measuring the levels of thyroid-stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4) in the study subjects.

METHODOLOGY

Study Design

The study employed a cross-sectional descriptive design to investigate the association between thyroid function disorders and menstrual abnormalities in women. Data was collected at the Obstetrics and Gynecology Department of Rajshahi Medical College Hospital from January 2009 to December 2010. The study included women aged 16-45 with various menstrual disturbances, following specific inclusion and exclusion criteria. Data were collected through structured questionnaires, and statistical analyses, including

descriptive statistics and chi-square tests, were used for data analysis.

Inclusion Criteria

- Female participants were aged between 16 and 45 years.
- Patients presenting with various types of menstrual abnormalities.
- Patients are willing to participate in the study and provide informed consent.

Exclusion Criteria

- Individuals outside the specified age range.
- Patients with known thyroid disorders who are already receiving treatment.
- Patients with a history of gynecological surgeries that may directly affect menstrual patterns (e.g., hysterectomy).
- Individuals are unwilling or unable to provide informed consent for participation in the study.
- Patients with underlying medical conditions or medications known to influence menstrual function, not related to thyroid disorders.

Data Collection

Data collection involved face-to-face interviews with eligible female participants aged 16 to 45 years who presented with menstrual abnormalities. A structured questionnaire was utilized to gather socio-economic information, medical history, and menstrual history. Relevant laboratory investigations were conducted at the Nuclear Medicine Center, Rajshahi, including T3, T4, and TSH levels. Data were recorded, verified for accuracy, and coded for analysis. Statistical tests such as descriptive statistics and Chi-square tests were employed to analyze the data, and findings were presented using tables, charts, and graphs.

Data Analysis

Data analysis was performed using IBM SPSS Statistics version 23. Descriptive statistics were calculated to summarize the data, including mean, median, frequency distribution, and standard deviation. The association between menstrual disturbances and thyroid function disorders was assessed using statistical tests such as the Chi-square (χ^2) test. A significance level of $p < 0.05$ was considered statistically significant. The results were presented using tables, charts, and graphs to illustrate key findings.

Ethical considerations

Ethical considerations were carefully addressed throughout the study. Prior approval was obtained from the Institutional Review Board of Rajshahi Medical College, Rajshahi, and ethical clearance was granted by the ethics review committee of the same institution. Informed consent was obtained from all participants, ensuring their voluntary participation and confidentiality. The study adhered to ethical principles, including respect for autonomy, beneficence, and non-maleficence, and all data were handled with utmost confidentiality and in compliance with ethical guidelines and regulations.

RESULTS

The study included 166 cases of menstrual problems. The range of age was 16 to 45 years, and the mean age was 28.2771 with $SD \pm 6.49$ years. Regarding age distribution of patients, the study revealed that 49 (29.5%) patients were within the 26-30 years age group, 43 (25.9 %) patients were within 21-25 years age group, and 33(19.9%) patients within the 31-35 years (Table-1).

Table 1: Age Distribution of Study Subjects (n = 166)

Age Group (Years)	Number of Patients	Percentage	Mean Age (SD)
16-20	20	12.0%	
21-25	43	25.9%	
26-30	49	29.5%	28.2771±6.49
31-35	33	19.9%	
36-40	17	10.2%	
41-45	4	2.4%	

A total of 166 cases of different types of menstrual disorders patients were evaluated by proper history taking, clinical examination, and relevant investigations who were presented with

normal thyroid functions or thyroid function disorders. Among them, 138 (83.1%) patients were diagnosed as euthyroid, and 28 (16.9%) had thyroid disorders (Figure-1).

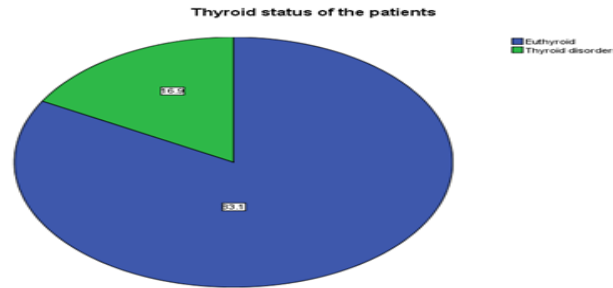


Figure 1: Distribution of Patients by Thyroid Status (n = 166)

Regarding frequency distribution of patients of thyroid functions, it was found that out of 166 cases, 138(83.1%) were euthyroid, 18(10.8%)

were hypothyroid, 4 (2.4%) were hyperthyroid, 6 (3.6%) were subclinical hypothyroidism (Figure- 2).

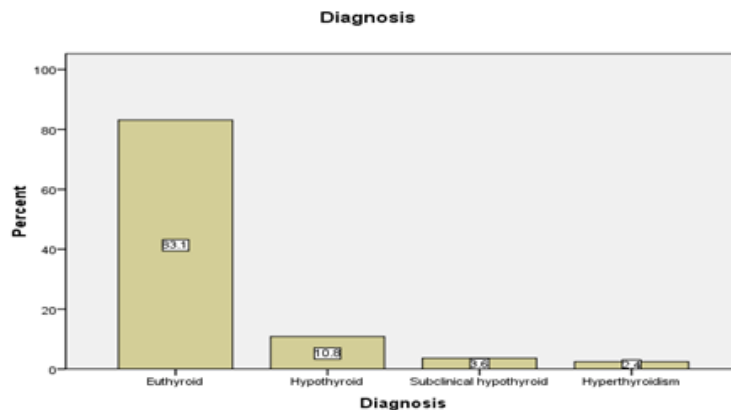


Figure 2: Distribution of Patients by Thyroid Functions (n = 166)

Table 2 Distribution of thyroid dysfunction by age group. Among the 16-20 age group, 7.1% had hypothyroidism, 7.1% had hyperthyroidism, and none had subclinical hypothyroidism. The 26-

30 age group had the highest overall thyroid dysfunction (35.7%). Overall, thyroid dysfunction varied with age, with 26-30 being the most affected group.

Table 2: Thyroid Dysfunction in Different Age Groups (n = 28)

Age Group (Years)	Hypothyroid	Hyperthyroid	Subclinical Hypothyroid	Total Dysfunction	Thyroid Percentage (%)
16-20	1	1	0	2	7.1%
21-25	3	0	1	4	14.2%
26-30	4	3	3	10	35.7%
31-35	5	0	2	7	25.0%
36-40	5	0	0	5	17.85%
41-45	0	0	0	0	0
Total	18	4	6	28	100.0%

Table 3: Duration of Menstrual Problems in Patients with Thyroid Disorders (n = 28)

Duration of Problem (Years)	Number of Patients	Percentage
Upto-2	7	25.0%
>2	21	75.0%
Total	28	100.0%

Table 4: Distribution of Patients by Thyroid Dysfunction and Menstrual Regularity (n = 166)

Menstrual Cycle	Thyroid Status	Total
Regular	4 (3.7%)	107
Irregular	24 (40.7%)	59
Total	28 (16.9%)	166

Chi-square $\chi^2 = 37.01$, $df = 1$, $p < 0.001$ (Statistically significant)

Table 5 displays the distribution of various menstrual problems among 166 patients. Menorrhagia is the most common issue, affecting 50.0% of patients. Hypomenorrhea and

oligomenorrhea are the next most prevalent, at 20.5% and 16.9%, respectively. Polymenorrhoea, hypomenorrhea, and amenorrhea make up smaller proportions of the cases.

Table 5: Different Types of Menstrual Disorders in Study Subjects (n = 166)

Type of Menstrual Problem	Number of Patients	Percentage
Menorrhagia	83	50.0%
Hypomenorrhea	34	20.5%
Oligomenorrhea	28	16.9%
Polymenorrhoea	10	6.0%
Hypomenorrhea	6	3.6%
Amenorrhea	5	3.0%

The distribution of menstrual conditions in patients with thyroid dysfunction. Menorrhagia is the most common condition among all patients (39.30%). Hypothyroid patients primarily have

menorrhagia (55.6%), while hyperthyroid patients mainly have oligomenorrhea (75.0%). Subclinical hypothyroidism patients show a mix of conditions, with oligomenorrhea being prevalent (33.3%).

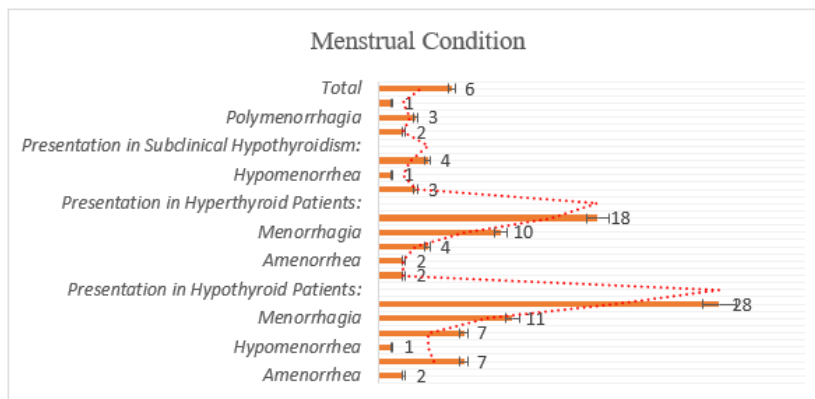


Figure 3: Different Types of Menstrual Disorders in Patients with Thyroid Dysfunctions

DISCUSSION

The modern healthcare landscape frequently witnesses women seeking gynecological

care for a variety of menstrual problems, with abnormal uterine bleeding emerging as a prevalent concern among the reproductive-age population.

These menstrual patterns, which result from complex biological systems regulated by hormonal status¹⁴, remain poorly understood in terms of their underlying biology and mechanisms. The length of the follicular phase, a key determinant of cycle length, is influenced by the process of follicular maturation and primary follicle selection, dependent on follicle-stimulating hormone (FSH) from the pituitary gland and the ovarian response. Notably, shorter and longer menstrual cycles are more prone to anovulation than cycles of 25 to 35 days.¹⁵

Thyroid dysfunction is associated with a myriad of menstrual aberrations. Many menstrual issues can be indicative of undiagnosed thyroid conditions, and thyroid disease often underlies menstrual irregularities in women. It is crucial to recognize that menstrual problems may serve as early indicators of undiagnosed thyroid conditions. Girls who experience either precocious or delayed menstruation should undergo thyroid evaluation, as thyroid problems can frequently contribute to early or delayed puberty and menstruation. Furthermore, any alterations in menstrual patterns, such as increased or decreased frequency, substantial changes in menstrual flow, or the absence of periods, should prompt a thorough thyroid evaluation by a physician¹⁶. Interestingly, women exhibit a higher susceptibility to most types of thyroid disease than men¹⁷.

This study examined 166 consecutively selected patients with menstrual dysfunction, aged 16 to 45 years, with a mean age of 28.28 and a standard deviation of ± 6.49 years. The age distribution revealed that 29.5% were aged 26 to 30, 25.9% were in the 21 to 25 age group, and 19.9% were between 31 and 35 years old. Notably, our study diverges from the findings of¹⁸, which indicated that women in their thirties were less likely to report irregular menstrual cycles. In contrast, our study observed most patients experiencing menstrual irregularities at ages beyond 38 to 40 years. Among the 166 cases of menstrual disorders in our study, 16.9% were diagnosed with thyroid disorders, while 83.1% were classified as euthyroid. Among the thyroid

disorder patients, 83.1% were euthyroid, 10.8% were hypothyroid, 2.4% were hyperthyroid, and 3.6% exhibited subclinical hypothyroidism. These findings align with previous research, which reported that among 100 patients with menstrual disorders, 23% were diagnosed with thyroid disorders, with 77% being euthyroid. Similarly, a study in Pakistan found thyroid disorders in 40 patients with menstrual disturbances, with 82.5% being diagnosed with hypothyroidism and 17.5% with hyperthyroidism, consistent with our findings.¹⁹

The study also explored the types of menstrual problems observed in the study subjects, with the majority (50.0%) presenting with menorrhagia, followed by hypomenorrhea (20.5%) and oligomenorrhea (16.9%). A similar finding, where menorrhagia was the most common menstrual problem (32%), followed by oligomenorrhea (19%). The study also revealed that most of the patients suffering from menstrual problems with thyroid disorders were housewives (68.7%), followed by students (21.7%) and service holders (9.6%)¹⁷. Moreover, a significant proportion (75.0%) of these patients had been suffering from menstrual problems for more than 2 years, while the rest (25.0%) had experienced issues for 2 years. Regarding the regularity of menstrual cycles, the study found that among thyroid disorder patients, 40.7% had irregular menstrual cycles, whereas among euthyroid patients, 59.3% had irregular menstrual cycles. Additionally, the study examined the types of menstrual problems associated with thyroid dysfunction. Among thyroid disorder patients, 39.3% had menorrhagia, 25.0% had oligomenorrhea, 25.0% had polymenorrhea, 3.6% had hypomenorrhea, and 7.1% had amenorrhea. These findings are consistent with previous research and highlight the diverse spectrum of menstrual issues that can accompany thyroid disorders.

Hypothyroidism was also analyzed in the study, revealing that among 28 cases of hypothyroid patients, 55.6% presented with menorrhagia, 11.1% had oligomenorrhea, 22.2% had polymenorrhea, and 11.1% had amenorrhea.

A similar found that menstrual irregularities, including menorrhagia and oligomenorrhea, are typical in hypothyroidism. Hyperthyroidism, on the other hand, was observed in 4 patients, with 25.0% experiencing hypomenorrhea and 75.0% having oligomenorrhea. A similarly reported oligomenorrhea as the most common menstrual abnormality in hyperthyroidism²⁰. Finally, subclinical hypothyroidism was investigated, revealing that 16.7% of patients with subclinical hypothyroidism presented with menorrhagia, 33.3% had oligomenorrhea, and 50.0% had polymenorrhagia. These findings correspond with a study that reported that most thyroid disorder patients with subclinical hypothyroidism experienced menorrhagia (25%).

This study contributes valuable insights into the complex relationship between thyroid dysfunction and menstrual problems. It reinforces the importance of considering thyroid evaluation in patients presenting with menstrual disorders and highlights that menstrual issues can serve as potential indicators of underlying thyroid dysfunction, including subclinical cases. The study also demonstrates the wide range of menstrual problems that can accompany thyroid disorders and underscores the need for comprehensive evaluation and treatment in clinical practice. Ultimately, this understanding can aid healthcare providers in effectively diagnosing and managing thyroid conditions and menstrual irregularities, improving patients' overall health and well-being.

CONCLUSION

This study reveals a significant association between thyroid dysfunction and menstrual problems. The majority of patients with thyroid disorders experienced irregular menstrual cycles and menorrhagia. Understanding this relationship is crucial for effective management and treatment of both thyroid and menstrual disorders.

Recommendations

- Regular thyroid screening for women with menstrual irregularities.
- Multidisciplinary care involving gynecologists and endocrinologists.

- Patient education on the thyroid-menstrual link.

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