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A Comparative Study of Menstrual Dysfunctions in Women with Hypothyroidism and Hyperthyroidism-An Institutional Study

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ABSTRACT

Thyroid dysfunction is known to affect various aspects of reproductive health, including menstrual regularity. This study aimed to compare the prevalence and types of menstrual dysfunctions in women diagnosed with hypothyroidism versus those with hyperthyroidism. This cross-sectional, observational study involved 100 women of reproductive age, divided equally into two groups based on their diagnosis of hypothyroidism or hyperthyroidism. Participants were recruited from a tertiary care hospital's Department of Gynecology. Data on demographic characteristics, medical history, detailed menstrual history and thyroid function test results were collected through structured questionnaires and review of medical records. The types of menstrual dysfunction assessed included amenorrhea, oligomenorrhea, menorrhagia and irregular cycles. The study found that 70% of women with hypothyroidism reported menstrual irregularities, compared to 50% of those with hyperthyroidism. Oligomenorrhea was the most common dysfunction in the hypothyroidism group (40%), while irregular cycles were more prevalent in the hyperthyroidism group (42%). Amenorrhea was observed in 16% of the hypothyroid group and 8% of the hyperthyroid group, whereas menorrhagia was reported by 24 and 20% of the participants, respectively. Thyroid function tests confirmed the diagnosis of hypo- or hyperthyroidism in all participants. Our findings highlight a significant association between thyroid dysfunction and menstrual irregularities, with distinct patterns observed between hypothyroid and hyperthyroid women. These results underscore the need for healthcare providers to carefully monitor menstrual health in women with thyroid disorders and consider the impact of thyroid function in the management of menstrual dysfunctions.

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Key Words
Thyroid dysfunction, hypothyroidism, hyperthyroidism, menstrual dysfunctions, reproductive health

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INTRODUCTION

Thyroid disorders, encompassing both hypothyroidism and hyperthyroidism, are prevalent endocrine conditions with significant implications for women's health, particularly in the domain of reproductive function. The thyroid gland plays a pivotal role in regulating metabolic processes, which, in turn, can influence menstrual patterns and fertility[1]. Hypothyroidism, characterized by insufficient thyroid hormone production and hyperthyroidism, marked by excessive hormone production, is both associated with a variety of menstrual dysfunctions, ranging from amenorrhea (absence of menstruation) and oligomenorrhea (infrequent menstruation) to menorrhagia (heavy menstrual bleeding) and irregular menstrual cycles[2]. The interrelation between thyroid function and menstrual regularity is mediated through a complex interaction of hormonal pathways, where thyroid hormones interact with reproductive hormones, influencing the hypothalamic-pituitary-ovarian axis[3]. This study aims to elucidate the comparative effects of hypothyroidism and hyperthyroidism on menstrual function, offering insights into the prevalence, types and severity of menstrual dysfunctions observed in women diagnosed with these thyroid disorders. By understanding these relationships, healthcare providers can better anticipate and manage the reproductive health issues that accompany thyroid diseases.

The thyroid gland plays a crucial role in regulating the body's metabolic processes, which are intricately linked to the reproductive system. Thyroid hormones interact with reproductive hormones, affecting the hypothalamic-pituitary-gonadal axis, a hormone regulation axis that plays a key role in controlling the menstrual cycle[4]. This interaction suggests that any imbalance in thyroid function can disrupt menstrual regularity and lead to conditions such as amenorrhea, oligomenorrhea, menorrhagia and irregular menstrual cycles[5]. The precise mechanisms through which thyroid dysfunctions exert their effects on menstrual patterns are complex and involve multiple physiological pathways, including direct effects on the ovaries, alterations in sex hormone-binding globulin (SHBG) levels and impacts on the metabolism of sex steroids[6]. Given the prevalence of thyroid disorders globally and their potential impact on women's health, there is a critical need to understand the specific effects of hypothyroidism and hyperthyroidism on menstrual function. This understanding can aid in the early diagnosis and tailored management of menstrual dysfunctions in women with thyroid disorders, potentially improving their reproductive health outcomes. The primary aim of this study is to conduct a comparative analysis of menstrual dysfunctions among women diagnosed with hypothyroidism versus those with hyperthyroidism, within a reproductive age group.

MATERIALS AND METHODS

This is a cross-sectional, observational study conducted at the Department of Gynecology of a tertiary care hospital. The study period spans 12 months, from January to December 2021. The study population consisted of women of reproductive age (18-45 years) who visited the Department of Gynecology. Inclusion criteria were women diagnosed with either hypothyroidism or hyperthyroidism, as confirmed by thyroid function tests (TSH, Free T4 and Free T3 levels) within the past 6 months. Exclusion criteria included pregnant women, those on hormonal therapy (excluding thyroid medication) and women with a history of reproductive tract surgeries or chronic diseases affecting menstrual function.

Based on a preliminary literature review and feasibility considerations, a sample size of 100 participants was determined. This included 50 women with hypothyroidism and 50 women with hyperthyroidism, ensuring adequate power to detect significant differences in the prevalence and types of menstrual dysfunction between the two groups. This study was conducted following the Declaration of Helsinki and ethical approval was obtained from the Institutional Review Board (IRB) of the hospital. Informed consent was obtained from all participants prior to data collection, ensuring confidentiality and the right to withdraw from the study at any point.

Sampling Technique: Participants were recruited using a consecutive sampling technique. All eligible women visiting the department during the study period were screened and those meeting the inclusion criteria were invited to participate until the required sample size was reached.

Data Collection: Data were collected through a structured questionnaire administered during face-to-face interviews. The questionnaire covered demographic information, medical history, detailed menstrual history and specific thyroid disorder-related information. Thyroid function test results were obtained from medical records.

Measurement of Variables:

- **Independent Variables:** Thyroid status (hypothyroidism vs. hyperthyroidism), based on clinical diagnosis and thyroid function tests
- **Dependent Variables:** Types of menstrual dysfunctions (amenorrhea, oligomenorrhea, menorrhagia, irregular cycles), their severity and patterns

Statistical Analysis: Data were analyzed using SPSS software. A p-value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSIONS

The (Table1) presents the demographic characteristics of the 100 women participating in the study, divided into two groups based on their diagnosis of either hypothyroidism or hyperthyroidism. The age distribution shows a fairly even spread across the reproductive age range, with a slightly higher concentration of younger women (18-25 years) in the hyperthyroidism group. The Body Mass Index (BMI) categorization indicates that the majority of participants in both groups had a normal BMI, with a slight increase in underweight participants in the hyperthyroidism group. Regarding marital status, a greater proportion of married women were present in the hypothyroidism group compared to the hyperthyroidism group. The education level was relatively evenly distributed across both groups, with a slight trend towards higher education in the hyperthyroidism group. These demographic findings suggest that while there are some differences in age distribution, BMI, marital status and education level between the groups, the populations are broadly comparable, allowing for meaningful comparisons of menstrual dysfunctions between women with hypothyroidism and those with hyperthyroidism. The slight variations observed in the demographic characteristics could provide context for understanding any differences in the prevalence and types of menstrual dysfunctions identified later in the study.

The (Table 2) presents an overview of the medical and menstrual history of the study's participants, comparing those with hypothyroidism to those with hyperthyroidism. Over half of the participants in each group reported a history of thyroid issues, indicating a substantial proportion of women with ongoing thyroid dysfunction have experienced related health problems before. A significant difference in menstrual regularity between groups was observed, with 70% of women with hypothyroidism reporting irregular menstrual cycles compared to 50% in the hyperthyroidism group. This underscores the impact of thyroid function on menstrual regularity. The most common menstrual dysfunction reported by women with hypothyroidism was oligomenorrhea (30%), followed by menorrhagia (20%). In the hyperthyroidism group, irregularity was also most frequently reported as oligomenorrhea (20%), with a slightly lower incidence of menorrhagia (14%). Amenorrhea and polymenorrhea were less common in both groups. Participants with hypothyroidism were more evenly split between those experiencing menstrual dysfunction for less than 6 months, 6-12 months and >12 months. Conversely, a larger proportion of those with hyperthyroidism reported a dysfunction duration of >12 months.

The (Table 3) summarizes the thyroid function test results, including TSH, Free T4 and Free T3 levels, for the 100 subjects divided into hypothyroidism and hyperthyroidism groups. The mean TSH level was significantly higher in the hypothyroidism group (10.2 mIU/L) compared to the hyperthyroidism group (0.3 mIU/L), reflecting the typical diagnostic markers of these conditions. The ranges further highlight the variability within each group, indicating the severity of thyroid dysfunction. Participants with hypothyroidism had lower Free T4 levels (mean 0.9 ng/dL), within a narrow range indicating reduced thyroid hormone production. Conversely, the hyperthyroidism group showed elevated Free T4 levels (mean 2.5 ng/dL), consistent with overactive thyroid function. Similar to Free T4, Free T3 levels were lower in the hypothyroid group (mean 2.4 pg/mL) and higher in the hyperthyroid group (mean 4.5 pg/mL), aligning with the expected physiological profiles of these disorders. The (Table 4) outlines the distribution of menstrual dysfunctions among the study participants, dividing them into two groups based on their thyroid condition: hypothyroidism and hyperthyroidism. Amenorrhea (Absence of Menstruation): This condition was more prevalent among participants with hypothyroidism (16%) compared to those with hyperthyroidism (8%), suggesting a stronger link between hypothyroidism and the cessation of menstrual periods.

Oligomenorrhea (Infrequent Menstruation): Reported by 40% of the hypothyroid group and 30% of the hyperthyroid group, oligomenorrhea was the most common dysfunction in the hypothyroidism group, indicating that reduced thyroid function may have a more significant impact on reducing the frequency of menstrual cycles. Menorrhagia (Heavy Menstrual Bleeding): Observed in 24% of women with hypothyroidism and 20% with hyperthyroidism, indicating that both conditions can lead to increased menstrual flow, although slightly more so in hypothyroidism. Irregular Cycles: Hyperthyroidism participants reported a higher rate of irregular menstrual cycles (42%) compared to those with hypothyroidism (20%), highlighting the impact of excess thyroid hormone on menstrual cycle regularity.

Our study found a significant prevalence of menstrual dysfunctions among women with thyroid disorders, echoing the findings of previous research that underscores the critical role of thyroid hormones in reproductive health. Specifically, our results highlighted that 40% of women with hypothyroidism experienced oligomenorrhea, which is consistent with findings from Redmond[7], who reported a strong association between hypothyroidism and reduced menstrual frequency. This relationship underscores the importance of thyroid hormones in the regulation of menstrual cyclicity, possibly due to their influence on the hypothalamic-pituitary-ovarian axis[8]. Amenorrhea

Table 1: Demographic Characteristics of Study Participants

Demographic Feature	Hypothyroidism (n = 50)	Hyperthyroidism (n = 50)	Total
Age (years)			
18-25	10 (20%)	15 (30%)	25 (25%)
26-35	20 (40%)	18 (36%)	38 (38%)
36-45	20 (40%)	17 (34%)	37 (37%)
BMI (kg/m²)			
<18.5 (Underweight)	5 (10%)	9 (18%)	14 (14%)
18.5-24.9 (Normal)	30 (60%)	25 (50%)	55 (55%)
25-29.9 (Overweight)	10 (20%)	10 (20%)	20 (20%)
≥30 (Obese)	5 (10%)	6 (12%)	11 (11%)
Marital Status			
Single	15 (30%)	20 (40%)	35 (35%)
Married	35 (70%)	30 (60%)	65 (65%)
Education Level			
High School or Less	20 (40%)	15 (30%)	35 (35%)
Some College/University	15 (30%)	20 (40%)	35 (35%)
College/University Degree	15 (30%)	15 (30%)	30 (30%)

Table 2: Medical and Menstrual History of Study Participants

Feature	Hypothyroidism (n = 50)	Hyperthyroidism (n = 50)	Total (n=100)
Previous Thyroid Issues			
Yes	30 (60%)	28 (56%)	58 (58%)
No	20 (40%)	22 (44%)	42 (42%)
Menstrual Irregularity			
Regular	15 (30%)	25 (50%)	40 (40%)
Irregular	35 (70%)	25 (50%)	60 (60%)
Type of Dysfunction			
Amenorrhea	5 (10%)	3 (6%)	8 (8%)
Oligomenorrhea	15 (30%)	10 (20%)	25 (25%)
Menorrhagia	10 (20%)	7 (14%)	17 (17%)
Polymenorrhea	5 (10%)	5 (10%)	10 (10%)
Duration of Dysfunction			
<6 months	10 (20%)	15 (30%)	25 (25%)
6-12 months	20 (40%)	10 (20%)	30 (30%)
>12 months	20 (40%)	25 (50%)	45 (45%)

Table 3: Thyroid Function Test Results of Study Participants

Parameter	Group	Range	Mean±SD
TSH (mIU/L)	Hypothyroidism	5.5-25	10.2±4.5
	Hyperthyroidism	0.1-0.5	0.3±0.1
T4 (ng/dL)	Hypothyroidism	0.5-1.2	0.9±0.2
	Hyperthyroidism	1.8-4.0	2.5±0.6
T3 (pg/mL)	Hypothyroidism	1.8-3.2	2.4±0.4
	Hyperthyroidism	3.5-6.0	4.5±0.8

Table 4: Types of Menstrual Dysfunctions in Study Participants

Menstrual Dysfunction	Hypothyroidism (n=50)	Hyperthyroidism (n=50)	Total (n=100)
Amenorrhea	8 (16%)	4 (8%)	12 (12%)
Oligomenorrhea	20 (40%)	15 (30%)	35 (35%)
Menorrhagia	12 (24%)	10 (20%)	22 (22%)
Irregular Cycles	10 (20%)	21 (42%)	31 (31%)

was more prevalent among participants with hypothyroidism (16%) than those with hyperthyroidism (8%), suggesting that severe hypothyroidism may lead to a more pronounced disruption of menstrual function. This is in line with Redmond[7], who found that thyroid hormone deficiency could severely impact ovarian function, leading to cessation of menstruation. Our findings add to the body of evidence that hypothyroidism can have profound effects on menstrual regularity and reproductive health.

Menorrhagia was observed in 24% of the hypothyroid group and 20% of the hyperthyroid group. This finding indicates that both hypo- and hyperthyroidism can lead to increased menstrual flow, albeit slightly more common in hypothyroidism. Such results are corroborated by studies like Sharma *et al*., which highlighted the impact of thyroid dysfunction on menstrual volume. The mechanism may involve the influence of thyroid hormones on coagulation factors and vascular integrity within the endometrium[9]. Interestingly, our study found that irregular menstrual cycles were reported more frequently by participants with hyperthyroidism (42%) compared to those with hypothyroidism (20%). This finding supports the hypothesis that excess thyroid hormones may disrupt the regularity of the menstrual cycle, possibly through accelerated metabolism of sex steroids, as suggested by Krassas *et al*. It underscores the complexity of thyroid hormone interactions with the reproductive system and the different pathways through which hypo- and hyperthyroidism can affect menstrual patterns[10].

Present study's findings align with the broader literature indicating that thyroid dysfunction significantly impacts menstrual health. However, by directly comparing hypothyroidism and hyperthyroidism within the same cohort, our research provides unique insights into how these conditions

differentially affect menstrual patterns. This comparative approach enriches the understanding of thyroid disorder's multifaceted impact on women's reproductive health, highlighting the necessity for targeted diagnostic and therapeutic strategies based on the specific type of thyroid dysfunction[11].

Clinically, our study emphasizes the importance of screening for menstrual dysfunctions as part of the management of women with thyroid disorders. Given the significant impact of thyroid health on menstruation, reproductive endocrinologists and gynecologists should consider comprehensive thyroid function testing in women presenting with menstrual irregularities[12]. Furthermore, our findings suggest that tailored management strategies that consider the type of thyroid dysfunction may be beneficial in mitigating the impact on menstrual health and, by extension, fertility and quality of life.

CONCLUSION

In conclusion, our study reinforces the significant association between thyroid dysfunction and menstrual irregularities, with distinct patterns observed in hypothyroidism and hyperthyroidism. These findings highlight the need for heightened clinical awareness and targeted management strategies to address the reproductive health challenges faced by women with thyroid disorders.

REFERENCES

1. Guerri, G., S. Bressan, M. Sartori, A. Costantini and S. Benedetti et al. 2019. Hypothyroidism and hyperthyroidism. Acta Biomed., 90: 83-86.
2. Wiersinga, W., 1995. Subclinical hypothyroidism and hyperthyroidism. I. Prevalence and clinical relevance. Neth. J. Med., 46: 197-204.
3. Brown, E.D.L., B. Obeng-Gyasi, J.E. Hall and S. Shekhar, 2023. The thyroid hormone axis and female reproduction. Int. J. Mol. Sci., Vol. 24. 10.3390/ijms24129815
4. Cicatiello, A.G., D.D. Girolamo and M. Dentice, 2018. Metabolic effects of the intracellular regulation of thyroid hormone: Old players, new concepts. Front. Endocrinol., Vol. 9. 10.3389/fendo.2018.00474
5. Jacobson, M.H., P.P. Howards, L.A. Darrow, J.W. Meadows and J.S. Kesner et al., 2018. Thyroid hormones and menstrual cycle function in a longitudinal cohort of premenopausal women. Paediatr. Perinat. Epidemiol., 32: 225-234.
6. Ajmani, N.S., V. Sarbhai, N. Yadav, M. Paul, A. Ahmad and A.K. Ajmani, 2015. Role of thyroid dysfunction in patients with menstrual disorders in tertiary care center of walled city of Delhi. J. Obstet. Gynecol. India, 66: 115-119.
7. Redmond, G.P., 2004. Thyroid dysfunction and women's reproductive health. Thyroid, 14: 5-15.
8. Beshay, V.E. and B.R. Carr, 2017. Hypothalamic-pituitary-ovarian axis and control of the menstrual cycle. Clin. Reprod. Med. Surg., 2017: 1-17.
9. Sharma, N. and A. Sharma, 2012. Thyroid profile in menstrual disorders. JK Sci., 14: 14-17.
10. Krassas, G.E., N. Pontikides, T. Kaltsas, P. Papadopoulou and M. Batrinos, 1994. Menstrual disturbances in thyrotoxicosis . Clin. Endocrinol., 40: 641-644.
11. Ramya M.R., Parvathavarthini, D. Savery and R. Sankareswari, 2017. Menstrual disorders associated with thyroid dysfunction. Int. J. Rep. Contracept. Obstet. Gynecol., 6: 5113-5117.
12. Digra, M., R. Kumar and D. Kumar, 2017. Thyroid profile in women with menstrual disorders. Int. J. Reprod., Contracept. Obstet. Gynecol., 6: 3300-3306.