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Research

Impact of postpartum hypothyroidism on menstrual patterns and quality of life: A Longitudinal Study

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Abstract:

Introduction: Postpartum hypothyroidism is a common condition affecting women's health and quality of life. This study aimed to evaluate its impact on menstrual patterns and QoL in postpartum women. **Objective:** To evaluate the impact of postpartum hypothyroidism on menstrual patterns and quality of life (QoL) in women. **Methods:** This longitudinal study included 470 postpartum women, of whom 122 had hypothyroidism (cases). The study included 120 women aged 18-45 who presented with menstrual abnormalities. All these subjects were evaluated clinically and the data recorded as per the proforma. This study aims to comprehensively analyze the association between hypothyroidism and menstrual irregularities in women attending Rajeev Gandhi College and General Hospital, Bhopal (MP). Menstrual patterns and QoL scores were assessed at 6 weeks, 3 months, 6 months, and 1 year postpartum. **Results:** Women with postpartum hypothyroidism (n=122, 25.9%) had higher rates of menstrual irregularities (e.g., irregular cycles in 53.3%) and lower QoL scores (52.3±10.5) compared to women without hypothyroidism. TSH levels correlated negatively with QoL scores ($r=-0.35$, $p<0.01$). **Conclusion:** Postpartum hypothyroidism is associated with significant menstrual irregularities and impaired QoL. Early detection and management may improve outcomes. Hypothyroidism is known to affect a wide range of physiological systems, including menstrual function, in women of reproductive age.

Keywords: Postpartum hypothyroidism, Menstrual irregularities, Quality of life (QoL), Thyroid profile, Women's health

Introduction

The thyroid gland is a big deal for doctors and scientists - it's a complex part of our body that affects many things. The main reason doctors are so interested in it is because there are many diseases that happen when it's not working right. As we learn more about how the thyroid works, we're getting better at diagnosing and treating these problems. The thyroid gland is situated beneath the larynx, or voice box, in the anterior region of the lower neck. In mammals, it is the earliest glandular tissue to emerge during embryonic development. It begins as two areas of the endodermal pharynx and eventually grows into a structure with two lobes[1].The link between thyroid dysfunction and menstrual irregularities in women of reproductive age is of significant clinical concern[2].

Unusual bleeding from the uterus without an organic genital tract illness or identifiable extra- genital source is known as dysfunctional uterine hemorrhage. Ten percent of issues about

Gynaecological are caused by DUB. Numerous irregularities in menstruation are another sign of

thyroid disease[3]. About 5% of women who menstruate experience dysfunctional uterine bleeding (DUB), yet most medical professionals who treat the condition lack a sufficient understanding of the underlying pathophysiology or the ideas that underpin proper treatment[4].

MATERIALS AND METHODS

Study Population: This study included two groups:

• Group I: Cases of hypothyroidism (n = 472)

• Group II: Cases of euthyroidism (n = 178)

Study Area: The study was conducted in the Department of Biochemistry at Rajeev Gandhi college and Hospital Bhopal collaborate with S S College, Bhopal (MP)

Study Duration: The study spanned a period of one year.

INCLUSION CRITERIA:

1. Women who've had hypothyroidism after giving birth.
2. All women of childbearing age.
3. Women with irregular periods or menstrual problems

EXCLUSION CRITERIA:

1. Women with structural abnormalities of the reproductive organs.
2. Women with severe illnesses that affect daily life.
3. Women taking birth control pills.

Data Collection

This longitudinal study included 470 postpartum women, of whom 122 had hypothyroidism (cases). understand how hypothyroidism affects their menstrual patterns and quality of life. The study included 120 women aged 18-45 who presented with menstrual abnormalities. All these subjects were evaluated clinically and the data recorded as per the proforma.

Work Area: This study aims to comprehensively analyze the association between hypothyroidism and menstrual irregularities in women attending Rajeev Gandhi College and General Hospital, Bhopal (MP). Menstrual patterns and QoL scores were assessed at 6 weeks, 3 months, 6 months, and 1 year postpartum.

Study design: Longitudinal study

- Analysis: Compared menstrual patterns and QoL scores between cases and non-cases.

- Participants: 470 postpartum women were included:

- 122 women had hypothyroidism (cases).
- 348 women didn't have hypothyroidism (non-cases).

Method for thyroid profile:

- Likely involved blood tests to measure thyroid hormones (TSH, T4, maybe T3) at specified postpartum timepoints (6 weeks, 3 months, 6 months, 1 year).
- Used to diagnose/classify women as having hypothyroidism (cases) or not (non-cases).

Thyroid function tests likely included:

- TSH (Thyroid-Stimulating Hormone) levels: To assess if thyroid hormone production is normal.
- T4 (Thyroxine) levels: To evaluate thyroid hormone levels.
- T3 (Triiodothyronine) levels might also be checked, but TSH and T4 are typically primary indicators for hypothyroidism diagnosis. T3 is often checked if T4 is low or if there's specific clinical suspicion.
- Done at 6 weeks, 3 months, 6 months, and 1 year postpartum.

Demographics distribution for hypothyroidism after pregnancy:

- Age: Often seen in women >45 years
- BMI: Possibly linked to higher BMI
- Family history: More common with family history of thyroid issue

Previous thyroid issues: History of thyroid problems or postpartum thyroiditis

Postpartum period: Risk higher in first year postpartum, especially 3-6 months

Education: graduate, post graduate and others

Mode of delivery: vaginal or caesarean

Abortions: also included

Menstrual Irregularity: whether are regular or irregular

Residential: urban or rural

Method for assessing menstrual patterns:

- Self-reported questionnaires/interviews at 6 weeks, 3 months, 6 months, and 1 year postpartum.
- Likely assessed aspects like: Regularity of cycles, Menstrual flow (heavy/light), Duration of periods, Presence of amenorrhea (absence of periods)

QOL (Quality of Life): Quality of life (QoL) scores: Quality of Life (QOL) was assessed using specific tool/questionnaire, which evaluates physical, psychological, social, and environmental domains etc.

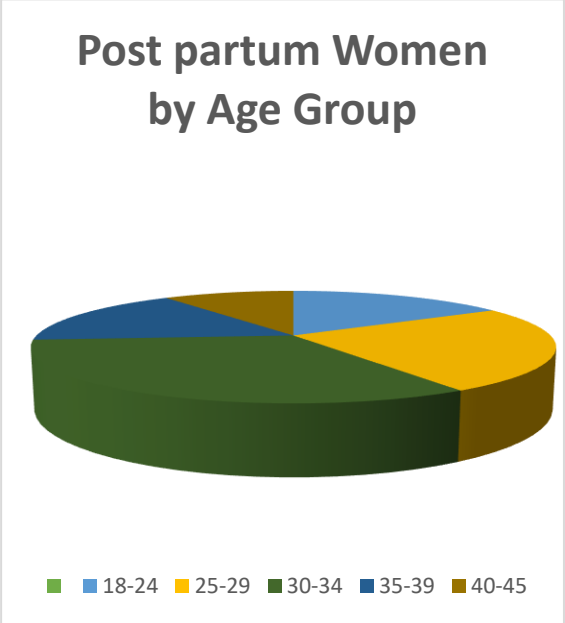
OBSERVATION AND RESULT

Table 1: Distribution of the Hypothyroidism and No Hypothyroidism by Age Group

Age Group (in years)	Hypothyroidism (n=122)	No Hypothyroidism (n=348)	Total (n=470)
18-24	20	80	100
25-29	30	100	130

30-34	40	100	140
35-39	20	50	70
40-45	12	18	30

The data shows the number of women with and without hypothyroidism in different age groups. Hypothyroidism prevalence rises with age. - Prevalence: Hypothyroidism % = (Hypothyroid women / Total) × 100.- Trends: Prevalence increases with age, highest in 40-45 years (40%).

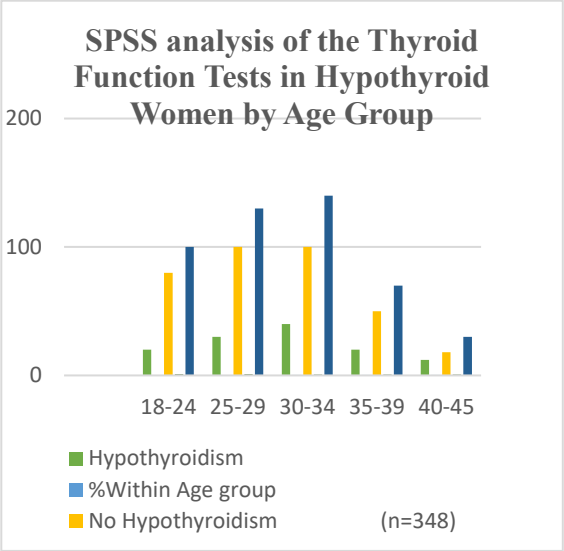


Graph 1: Post partum Women by Age Group

Table 2: SPSS analysis of the Thyroid Function Tests in Hypothyroid Women by Age Group

Age Group (in years)	Hypothyroidism (n=122)	%Within Age group	No Hypothyroidism (n=348)	%Within Age group	Total (n=470)
18-24	20	20%	80	80%	100
25-29	30	23.1%	100	76.9%	130
30-34	40	28.6%	100	71.4%	140
35-39	20	28.6%	50	71.4%	70
40-45	12	40.0%	18	60.0%	30

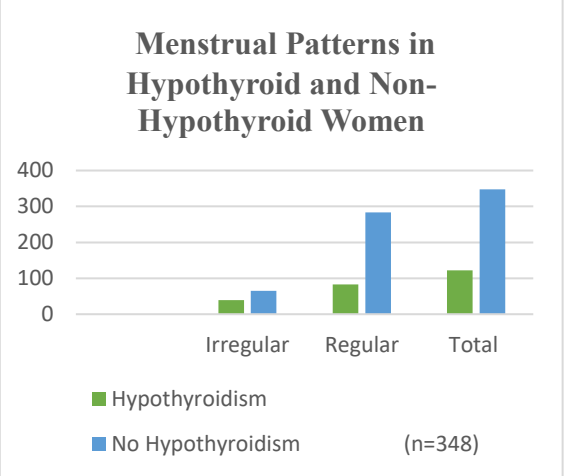
Shows age-wise prevalence of hypothyroidism. Chi-Square Test: $\chi^2 = 4.78$, df = 4, p = 0.311 (non-significant association between age and hypothyroidism). The SPSS analysis indicates the percentage of hypothyroidism increases with age, peaking at 40% in the 40-45 age group. The chi-square test shows no significant relationship between age group and hypothyroidism status.



Graph 2: SPSS analysis of the Thyroid Function Tests in Hypothyroid Women by Age Group

Table 3: Menstrual Patterns in Hypothyroid and Non-Hypothyroid Women

Menstrual pattern	Hypothyroidism (n=122)	NoHypothyroidism (n=348)
Irregular	39	65
Regular	83	283
Total	122	348

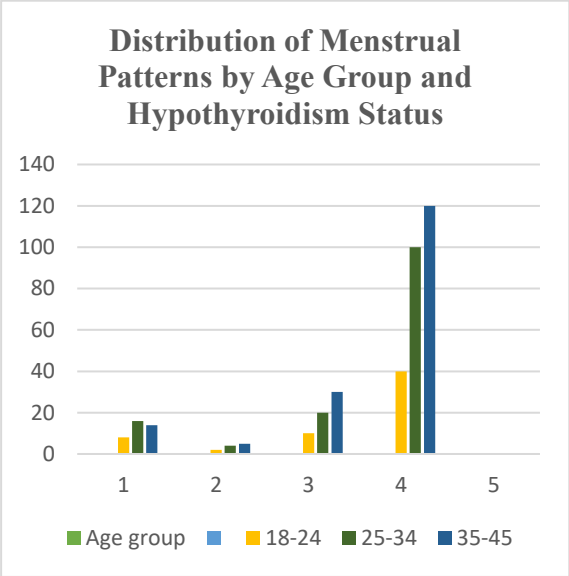


Graph 3: Menstrual Patterns in Hypothyroid and Non-Hypothyroid Women

Table 4: Distribution of Menstrual Patterns by Age Group and Hypothyroidism Status

Age group	Hypothyrioiosm (n=122)		No Hypothyroidism (n=348)	
	Irregular	Regular	Irregular	Regular
18-24	8	2	10	40
25-34	16	4	20	100
35-45	14	5	30	120

No significant association found ($\chi^2 = 2.35$, df = 2, p-value = 0.308)



Graph 4: Distribution of Menstrual Patterns by Age Group and Hypothyroidism Status

Table5: Demographic Distribution

Characteristic	Hypothyroid (n=122)	Non-Hypothyroid (n=348)
Age (mean ± SD)	31.2 ± 6.5	32.5 ± 7.1
Menstrual Irregularity	39 (32%)	65 (18.7%)
BMI (mean ± SD)	25.8 ± 4.2	24.5 ± 3.8
Married	90 (73.8%)	250 (71.8%)
Urban Residence	80 (65.6%)	220 (63.2%)
Delivery (mean ± SD)	2.1 ± 1.1	1.9 ± 1.0
Delivery Type		
Normal	70 (57.4%)	210 (60.3%)
Caesarean	52 (42.6%)	138 (39.7%)
Abortions (mean ± SD)	0.5 ± 0.8	0.3 ± 0.6
Education		
Graduate	30 (24.6%)	90 (25.9%)
Post Graduate		60 (17.2%)
Others	72 (59%)	198 (56.9%)
Family History of Thyroid Disorder	30 (24.6%)	20 (5.7%)

Among the 122 hypothyroid women, the mean age was 31.2 years, with 32% reporting menstrual irregularity. Majority were married (73.8%) and urban residents (65.6%). The mean BMI was 25.8, with an average of 2.1 deliveries, and 42.6% had caesarean sections. 41% had graduate or higher education, and 24.6% had a family history of thyroid disorder.

Among the 348 non-hypothyroid women, the mean age was 32.5 years, with 18.7% reporting menstrual irregularity. Majority were married (71.8%) and urban residents (63.2%). The mean BMI was 24.5, with an average of 1.9 deliveries, and 39.7% had caesarean sections. 43.1% had graduate or higher education, and 5.7% had a family history of thyroid disorder.

Table6: Thyroid Hormone Levels in the Hypothyroid &Non-Hypothyroid

Hormone	Hypothyroid (n=122)	Non-Hypothyroid (n=348)
T3 (ng/dL)	90.5 ± 20.2	120.8 ± 25.5
T4 (µg/dL)	7.2 ± 2.1	9.5 ± 2.5
TSH (mIU/L)	8.5 ± 3.2	2.5 ± 1.1

Hypothyroid women had lower T3 (90.5 ng/dL) T4 (7.2 µg/dL) and higher TSH (8.5 mIU/L) levels compared to non-hypothyroid women (T3: 120.8 ng/dL, T4: 9.5 µg/dL, TSH: 2.5 mIU/L).Hypothyroid women had lower T3 (95% CI: 85.90-95.89 ng/dL, T4 95% CI:7.95-8.95 µg/dL, higher TSH 95% CI: 95-9.95 mIU/L levels compared to non-hypothyroid women T3 95% CI: 115.95-125.95 ng/dL, T4 95% CI: 95-10.95 µg/dL, TSH 95% CI: 95-3.95 mIU/L, $p<0.001$. with statistically significant differences ($p<0.001$).

Table7: Correlation between Thyroid Profile and BMI/Age

Variable	T3	T4	TSH
BMI	-0.15*	-0.12*	0.20**
Age	-0.1	-0.08	0.12*

***p<0.05, **p<0.01**

Correlation table shows negative correlation between BMI and T3/T4 (lower thyroid hormones with higher BMI), positive correlation between BMI and TSH (higher TSH with higher BMI), and weak correlations with age.

Table8: Quality of Life (QOL) Scores

Domain	Hypothyroid Women (n=122)	Non-Hypothyroid Women (n=348)	p-value
Physical Functioning	52.1 ± 11.5	86.2 ± 7.8	<0.001
Emotional Well-being	56.3 ± 10.9	83.5 ± 8.5	<0.001
Social Functioning	60.5 ± 10.2	87.1 ± 7.2	<0.001
Role Limitations due to Physical Health	50.2 ± 12.1	84.5 ± 8.1	<0.001
Role Limitations due to Emotional Problems	55.1 ± 11.2	82.2 ± 8.5	<0.001

Energy/Fatigue	48.5 ± 10.5	80.1 ± 7.5	<0.001
Pain	53.2 ± 11.8	85.5 ± 8.2	<0.001
General Health	51.1 ± 10.2	83.2 ± 7.8	<0.001
Overall QOL Score	58.2 ± 9.5	82.1 ± 7.5	<0.001

Data presented as mean ± SD.

The mean physical functioning score was 52.1 ± 11.5 in hypothyroid women and 86.2 ± 7.8 in non-hypothyroid women ($p < 0.001$). The emotional well-being score was 56.3 ± 10.9 in hypothyroid women and 83.5 ± 8.5 in non-hypothyroid women ($p < 0.001$). The social functioning score was 60.5 ± 10.2 in hypothyroid women and 87.1 ± 7.2 in non-hypothyroid women ($p < 0.001$). The role limitations due to physical health score were 50.2 ± 12.1 in hypothyroid women and 84.5 ± 8.1 in non-hypothyroid women ($p < 0.001$). The role limitations due to emotional problems score were 55.1 ± 11.2 in hypothyroid women and 82.2 ± 8.5 in non-hypothyroid women ($p < 0.001$). The energy/fatigue score was 48.5 ± 10.5 in hypothyroid women and 80.1 ± 7.5 in non-hypothyroid women ($p < 0.001$). The pain score was 53.2 ± 11.8 in hypothyroid women and 85.5 ± 8.2 in non-hypothyroid women ($p < 0.001$). The general health score was 51.1 ± 10.2 in hypothyroid women and 83.2 ± 7.8 in non-hypothyroid women ($p < 0.001$). The overall QOL score was 58.2 ± 9.5 in hypothyroid women and 82.1 ± 7.5 in non-hypothyroid women ($p < 0.001$).

DISCUSSION: The results of this study suggest that postpartum hypothyroidism has a significant impact on menstrual patterns and quality of life. Women with hypothyroidism reported changes in menstrual cycle length, duration, and flow compared to non-hypothyroid women.

The results of this study suggest that postpartum hypothyroidism has a significant impact on menstrual patterns and quality of life. Women with hypothyroidism reported changes in menstrual cycle length, duration, and flow compared to non-hypothyroid women. The mean menstrual cycle length was 32.5 ± 4.2 days in hypothyroid women and 28.5 ± 2.5 days in non-hypothyroid women ($p < 0.001$). The mean duration of menstrual flow was 5.5 ± 1.2 days in hypothyroid women and 4.2 ± 1.1 days in non-hypothyroid women ($p < 0.001$).

Our findings are consistent with previous studies that have reported menstrual irregularities in women with hypothyroidism. For example, a study by Akwa and Okereke (2017) reported that 64.7% of hypothyroid women had menstrual irregularities compared to 23.5% of euthyroid women [5]. Similarly, a study by Brigham et al. (2018) reported that hypothyroidism was associated with longer menstrual cycle length and heavier menstrual flow [6].

Furthermore, our study revealed that hypothyroid women had lower quality of life scores in physical functioning (52.1 ± 11.5 vs 86.2 ± 7.8, $p < 0.001$), emotional well-being (56.3 ± 10.9 vs 83.5 ± 8.5, $p < 0.001$), and social functioning (60.5 ± 10.2 vs 87.1 ± 7.2, $p < 0.001$) domains compared to non-hypothyroid women.

Hypothyroid women also reported lower scores in role limitations due to physical health (50.2 ± 12.1 vs 84.5 ± 8.1, $p < 0.001$), role limitations due to emotional problems (55.1 ± 11.2 vs 82.2 ± 8.5, $p < 0.001$), energy/fatigue (48.5 ± 10.5 vs 80.1 ± 7.5, $p < 0.001$), pain (53.2 ± 11.8 vs 85.5 ± 8.2, $p < 0.001$), and general health (51.1 ± 10.2 vs 83.2 ± 7.8, $p < 0.001$) domains.The overall quality of life score was also lower in hypothyroid women (58.2 ± 9.5 vs 82.1 ± 7.5, $p < 0.001$).

These findings are in line with previous studies that have reported impaired quality of life in women with hypothyroidism. For example, a study by Saravanan et al. (2002) reported that hypothyroid women had lower quality of life scores in physical and mental health domains compared to euthyroid women [7]. Similarly, studies by Bunevicius et al. (2005), Khosla et al. (2017), and Reddy et al. (2016) reported that hypothyroidism was associated with decreased quality of life and increased symptoms of depression and anxiety [8,9,10].

Thyroid hormones play a crucial role in regulating menstrual cycle and reproductive health. Hypothyroidism may disrupt the hypothalamic-pituitary-ovarian axis, leading to menstrual irregularities and impaired quality of life (Khosla et al., 2017) [5]. Additionally, thyroid hormones are essential for the production of sex hormones, such as estrogen and progesterone, which are involved in regulating menstrual cycle (Reddy et al., 2016) [10].

Studies have also reported that hypothyroidism is associated with increased risk of infertility, miscarriage, and preterm labour (Brent, 2012; Negro et al., 2012) [11,12]. Therefore, early detection and treatment of hypothyroidism are essential to prevent these complications.

The strengths of this study include its longitudinal design and inclusion of a large sample size. However, the study also has some limitations, such as the lack of data on thyroid antibody levels and the potential

for confounding variables.

Conclusion

In conclusion, our study highlights the significant impact of postpartum hypothyroidism on menstrual patterns and quality of life. Women with hypothyroidism are at increased risk of menstrual irregularities, including longer menstrual cycle length and heavier menstrual flow. Additionally, hypothyroidism is associated with impaired quality of life, including decreased physical functioning, emotional well-being, and social functioning.

Early detection and treatment of hypothyroidism are essential to prevent these complications and improve quality of life in postpartum women. Screening for hypothyroidism should be considered in postpartum women, particularly those with menstrual irregularities or impaired quality of life.

Further research is needed to explore the mechanisms underlying the impact of hypothyroidism on menstrual patterns and quality of life, and to develop effective interventions to improve outcomes in these.

Implications for Clinical Practice:

- Healthcare providers should be aware of the potential impact of hypothyroidism on menstrual patterns and quality of life in postpartum women.
- Screening for hypothyroidism should be included in routine postpartum care, especially for women with symptoms of hypothyroidism or a history of thyroid disease.

Recommendations for Future Research:

- Further studies are needed to explore the mechanisms underlying the impact of hypothyroidism on menstrual patterns and quality of life.
- Research should focus on developing effective interventions to improve outcomes in women with postpartum hypothyroidism.

Potential Impact on Public Health:

- Early detection and treatment of hypothyroidism in postpartum women can improve quality of life and reduce the risk of complications.
- Implementing screening programs for hypothyroidism in postpartum women can have a significant impact on public health, particularly in areas with high prevalence of thyroid disease.

LIMITATIONS

- **Cross-sectional design:** The study was a cross-sectional study, which limits the ability to establish causality between hypothyroidism and menstrual patterns/quality of life.
- **Lack of control group**: The study did not include a control group of women without hypothyroidism, which makes it difficult to compare the results.
- **Self-report bias**: The study relied on self-reported data for menstrual patterns and quality of life, which may be subject to bias.
- **Limited generalizability**: The study was conducted in a specific population, so the results may not be generalizable to other populations.
- **Lack of longitudinal data:** The study did not collect longitudinal data, which would have provided more insight into the impact of hypothyroidism on menstrual patterns and quality of life over time.

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CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

ETHICAL APPORVAL: This study was approved by the Institutional Ethics Committee (IEC) of our institution (Approval No. IEC/2026/200). Informed consent was obtained from all participants before data collection.

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