IJPSR (2025), Volume 16, Issue 12 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 30 June 2025; received in revised form, 12 July 2025; accepted, 22 July 2025; published 01 December 2025

IMPACT OF THYROID DYSFUNCTION ON MENSTRUAL IRREGULARITIES AND FERTILITY OUTCOMES IN WOMEN FROM NORTHWESTERN RAJASTHAN: A HOSPITAL-BASED CROSS-SECTIONAL STUDY

Rohitash Kularia [1], Anita Sharma [2], Abhishek Jhajhria [*1], Ramanand [1] and Aditya Kularia [3]

Department of General Medicine [1], Department of Obstetrics and Gynaecology [2], S. P. Medical College & PBM Hospital, Bikaner - 334001, Rajasthan, India.
Pandit Deendayal Upadhyaya Medical College (PDU) [3], Churu - 331001, Rajasthan, India.

Keywords:

Thyroid dysfunction, Menstrual irregularities, Infertility, Hypothyroidism, Hyperthyroidism, Northwestern Rajasthan

Correspondence to Author:
Dr. Abhishek Jhajhria

Resident,
Department of General Medicine,
S. P. Medical College & PBM Hospital, Bikaner - 334001,
Rajasthan, India.

E-mail: abhisheknonpersonal@gmail.com

ABSTRACT: Background: Thyroid dysfunction is a common endocrine disorder affecting women's reproductive health, manifesting as menstrual irregularities and infertility. Regional data from Northwestern Rajasthan remain limited. **Objective:** To evaluate the association between thyroid dysfunction and menstrual disturbances and fertility outcomes in women attending a tertiary care hospital in Northwestern Rajasthan. **Methods:** A hospital-based cross-sectional study was conducted over 12 months, enrolling 300 women aged 18–45 years presenting with menstrual irregularities or infertility. Clinical examination, menstrual history, and thyroid function tests (TSH, FT3, FT4) were evaluated. Women were classified as euthyroid, hypothyroid, or hyperthyroid based on standard reference values. Statistical analysis was performed using SPSS v25.0. **Results:** Thyroid dysfunction was found in 60.3% of participants (hypothyroidism 48.6%, hyperthyroidism 11.7%). Menstrual disturbances, including oligomenorrhea (37.9%) and menorrhagia (25.2%), were significantly higher in the hypothyroid group ($p<0.001$). Infertility was more prevalent in thyroid-dysfunctional women (42.5%) than euthyroid women (17.8%, $p<0.001$). Subclinical hypothyroidism was the most common abnormality (28.7%). **Conclusion:** Thyroid dysfunction, especially hypothyroidism, significantly affects menstrual and fertility outcomes. Early detection and management may improve reproductive health.

INTRODUCTION: Thyroid hormones are essential regulators of the hypothalamic-pituitary-ovarian (HPO) axis. Both overt and subclinical thyroid dysfunction especially hypothyroidism can disrupt normal menstrual cycles and impair fertility [1-4]. Thyroid autoimmunity (TAI) also plays a critical role in euthyroid infertile women [3, 7, 9].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.16(12).3484-87

This article can be accessed online on www.ijpsr.com

DOI link: https://doi.org/10.13040/IJPSR.0975-8232.16(12).3484-87

India has a significant burden of thyroid disease among reproductive-aged women [2, 7]. However, regional data particularly from Northwestern Rajasthan are lacking. This study aims to explore the relationship between thyroid dysfunction and reproductive health in this population.

MATERIALS AND METHODS:

Study Design and Setting: A hospital-based cross-sectional study was conducted in the Departments of Obstetrics and Gynaecology and General Medicine at S. P. Medical College and PBM Hospital, Bikaner, from January to December 2024. The study was approved by the Institutional Ethics

Committee of S. P. Medical College, Bikaner (IEC Approval No.: IEC/SPMC/2023/112).

Inclusion Criteria:

- Women aged 18–45 years
- Presenting with menstrual irregularities or infertility
- Provided informed written consent

Exclusion Criteria:

- Known pituitary/adrenal disorders
- PCOS (as per Rotterdam criteria)
- Current hormonal therapy
- Chronic systemic illnesses

Sample Size: Assuming a 50% prevalence of thyroid dysfunction among symptomatic women, 278 participants were required (5% margin of error, 95% CI). A total of 300 were enrolled.

Data Collection:

- Sociodemographic details
- Menstrual and fertility history
- TFT (TSH, FT3, FT4) using chemiluminescence assay
- Pelvic ultrasound if indicated

Thyroid Classification:

- Euthyroid
- Subclinical hypothyroidism (↑TSH, normal FT4)
- Overt hypothyroidism (↑TSH, ↓FT4)
- Subclinical hyperthyroidism (↓TSH, normal FT4)
- Overt hyperthyroidism (↓TSH, ↑FT4)

Statistical Analysis: SPSS v25.0 was used. Categorical variables were compared *via* Chi-square; continuous *via* t-test. $p<0.05$ was considered significant.

RESULTS:

TABLE 1: BASELINE CHARACTERISTICS:

Parameter	Value (n=300)
Mean age (years)	29.4 ± 6.7
Mean BMI (kg/m²)	24.2 ± 3.1
Rural residence	71.3%
Illiteracy	38.5%

TABLE 2: THYROID STATUS DISTRIBUTION

Thyroid Function	n (%)
Euthyroid	119 (39.7%)
Subclinical Hypothyroidism	86 (28.7%)
Overt Hypothyroidism	60 (20.0%)
Subclinical Hyperthyroidism	18 (6.0%)
Overt Hyperthyroidism	17 (5.6%)

Total with Thyroid Dysfunction: 181: (60.3%)

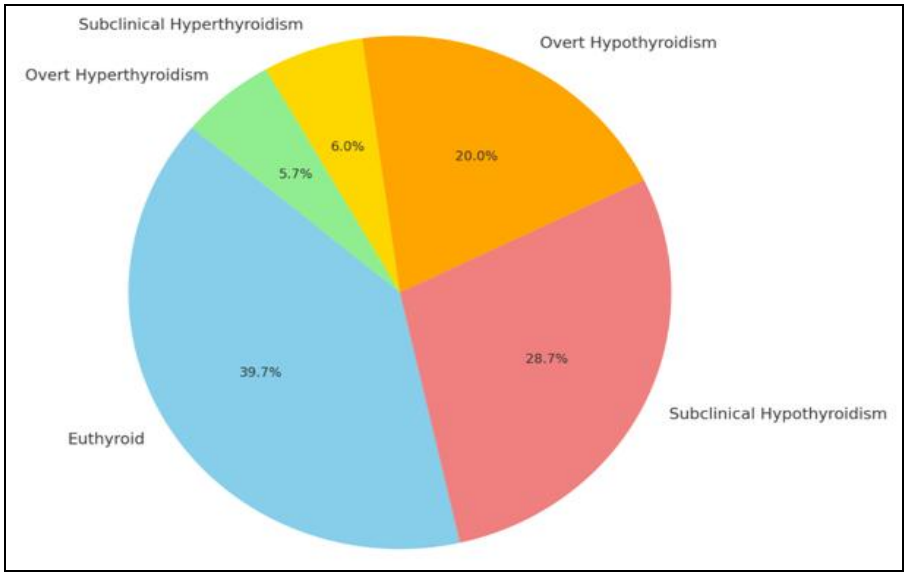

FIG. 1: DISTRIBUTION OF THYROID FUCTION (N = 300)

TABLE 3: MENSTRUAL IRREGULARITIES AND THYROID DYSFUNCTION

Menstrual Pattern	Hypothyroid (n=146)	Hyperthyroid (n=35)	Euthyroid (n=119)
Oligomenorrhea	54 (37.0%)	13 (37.1%)	14 (11.8%)
Menorrhagia	37 (25.2%)	4 (11.4%)	9 (7.5%)
Polymenorrhea	11 (7.5%)	5 (14.2%)	6 (5.0%)
Amenorrhea	12 (8.2%)	3 (8.5%)	3 (2.5%)
Normal cycle	32 (21.9%)	10 (28.5%)	87 (73.1%)

Chi-square $p < 0.001$

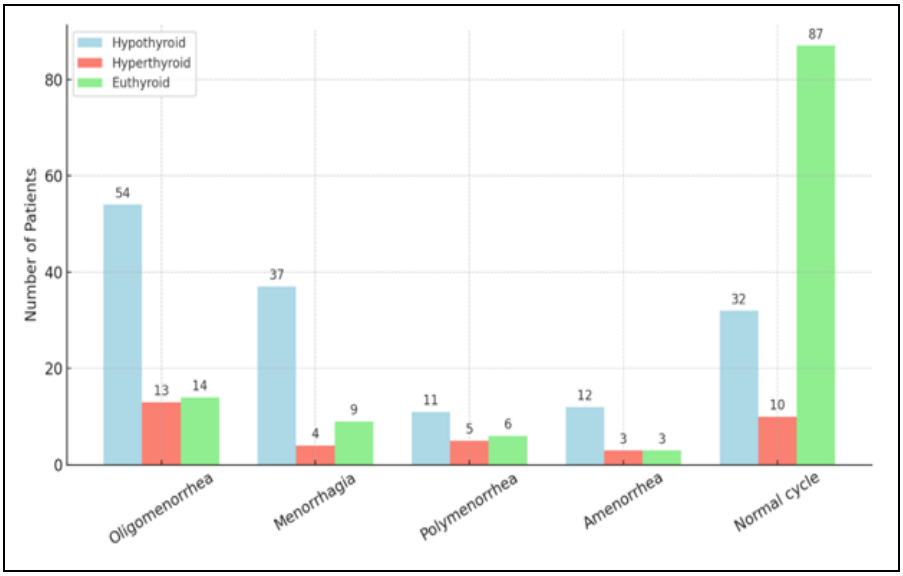

FIG. 2: MENSTRUAL PATTERNS BY THYROID FUNCTION STATUS

TABLE 4: INFERTILITY AND THYROID DYSFUNCTION

Fertility Outcome	Thyroid Dysfunction (n=181)	Euthyroid (n=119)
Primary infertility	45 (24.8%)	12 (10.1%)
Secondary infertility	32 (17.7%)	9 (7.6%)
No infertility	104 (57.5%)	98 (82.3%)

Chi-square $p < 0.001$

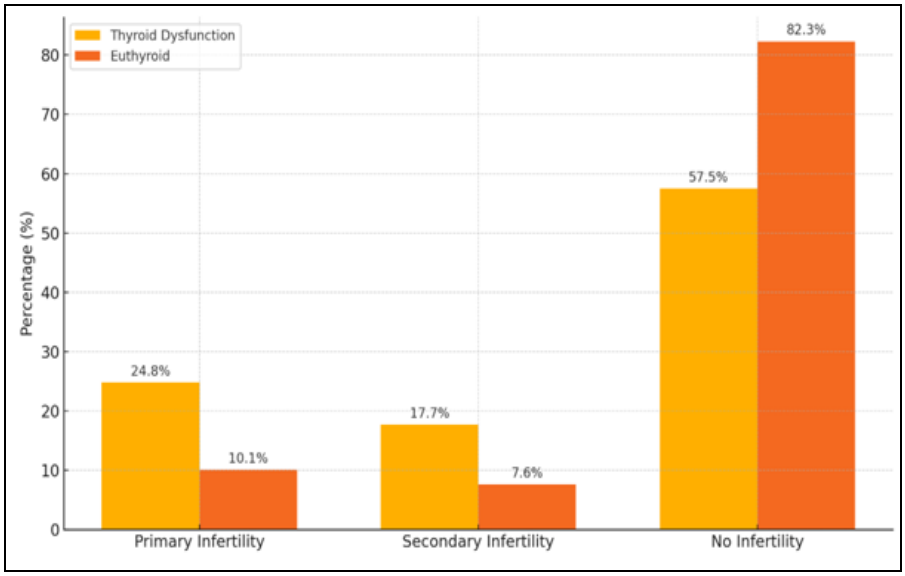

FIG. 3: FERTILITY OUTCOME BY THYROID STATUS

DISCUSSION: Our study demonstrates a high prevalence of thyroid dysfunction (60.3%) among women with reproductive complaints in Northwestern Rajasthan. Subclinical hypothyroidism was most frequent [6, 7, 10].

Menstrual disturbances and infertility were significantly more common in thyroid-dysfunctional women, consistent with Indian and global literature [5, 6, 9]. Hypothyroidism contributes to ovulatory dysfunction via HPO axis disruption [4, 5]. TAI is an independent factor in subfertility even among euthyroid women [3, 7, 9]. Timely thyroid screening improves conception rates and menstrual regulation [8, 11]. ATA and Endocrine Society guidelines now emphasize screening women with reproductive dysfunction [11, 12].

CONCLUSION: Thyroid dysfunction, particularly subclinical hypothyroidism, emerges as a significant yet reversible factor contributing to menstrual irregularities and infertility in women. Early detection and appropriate management can substantially improve reproductive health outcomes. Routine thyroid function testing (TFT), especially measuring serum TSH levels, should be considered a vital screening tool in women presenting with menstrual or fertility issues. Treatment with levothyroxine is recommended for subclinical hypothyroid women who exhibit reproductive symptoms. Where feasible, testing for thyroid peroxidase antibodies (TPO-Ab) can further aid in identifying underlying autoimmune thyroiditis. Additionally, public awareness campaigns are essential to enhance understanding and encourage timely medical evaluation of thyroid-related reproductive dysfunction.

Limitations: This study was conducted at a single center, which may limit the generalizability of the findings to broader populations. Moreover, autoimmune markers such as TPO-Ab were not assessed due to resource constraints, and long-term follow-up data on the impact of treatment was not available.

Future Scope: Further research is warranted through prospective, multicentric trials to validate these findings across diverse populations. Additionally, studies evaluating the therapeutic role of levothyroxine in euthyroid women with thyroid autoimmunity (TAI) are needed. Investigating the influence of iodine status and nutritional factors on thyroid health and reproductive outcomes will also provide valuable insights for holistic management.

ACKNOWLEDGMENT: The authors gratefully acknowledge the cooperation of the Department of Obstetrics and Gynecology and laboratory staff of S. P. Medical College and PBM Hospital, Bikaner, for their support during the study.

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

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How to cite this article:
Kularia R, Sharma A, Jhajhria A, Ramanand and Kularia A: Impact of thyroid dysfunction on menstrual irregularities and fertility outcomes in women from Northwestern Rajasthan: a hospital-based cross-sectional study. Int J Pharm Sci & Res 2025; 16(12): 3484-87. doi: 10.13040/IJPSR.0975-8232.16(12).3484-87.