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Original Research Article

Thyroid Disorders in Subfertile Women

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Abstract: **Objective:** To determine the frequency of thyroid disorders in subfertile women at Saidu group of teaching hospitals Swat. **Study Design:** A descriptive cross-sectional study. **Place and Duration of Study:** Department of Obstetrics and Gynaecology, Saidu Group of Teaching Hospital Swat, Pakistan from 7th February 2025 to 7th August 2025.*m***Methodology:** A total of 176 married subfertile women aged 18 to 45 years were enrolled through non-probability consecutive sampling. Fasting venous blood samples were collected for thyroid function assessment. Hyperthyroidism was defined as thyroid stimulating hormone below 0.1 mU/L with free thyroxine above 1.5 ng/dL, while hypothyroidism was defined as thyroid stimulating hormone of 10 mU/L or above with free thyroxine below 0.7 ng/dL. Data were analysed using Statistical Package for the Social Sciences version 26.*m***Results:** The mean age was 32.29 ± 5.86 years, mean body mass index was 26.20 ± 2.15 kg/m^2 and mean duration of subfertility was 2.44 ± 1.18 years. Rural women were 113 (64.2%) and low socioeconomic group was 87 (49.4%). Hyperthyroidism was found in 8 (4.5%) and hypothyroidism in 18 (10.2%). Hypothyroidism was significantly higher in women aged above 30 years, 17 (15.9%) versus 1 (1.4%), p=0.002. **Conclusion:** Hypothyroidism was more frequent than hyperthyroidism and was significantly associated with older age and higher body mass index among subfertile women.

Keywords: Body mass index, Female infertility, Hyperthyroidism, Hypothyroidism, Subfertility, Thyroid disorders

INTRODUCTION

Subfertility is one of the most frequent causes of infertility among women and it means inability to conceive within a certain time despite having regular sex without protection.1 Subfertility can develop as a result of either a woman's factor or man's factor and even their combination or subfertility can exist in cases when there is no known cause of it at all. Endocrinological problems are one of the causes of subfertility since reproductive functions cannot work properly without correct hormone balance.2 Thyroid abnormalities are able to affect the menstrual cycle, ovulation and hormone levels; therefore, they may decrease the probability of conception.3

Hyperthyroidism is defined as a situation in which an excess production of thyroid hormones occurs in the thyroid gland. The disorder may have adverse effects on fertility in the form of menstrual dysfunction and disturbances in the process of ovulation. Women suffering from hyperthyroidism often exhibit the

symptoms of oligomenorrhea, amenorrhea or dysmenorrhea making conception complicated.5 Hyperthyroidism may also interfere with the regular functioning of the hypothalamic-pituitary-ovarian axis due to elevated levels of thyroid hormones.6 Common symptoms of this disorder include weight loss, heat sensitivity, profuse sweating, heart palpitations, tremor, nervousness and increased bowel movements.

Hypothyroidism is often linked to problems with reproduction and menstrual cycles and it is one of the significant endocrine causes of subfertility among females.7 Low levels of thyroid hormones may disrupt the interaction between the hypothalamus, pituitary gland and ovaries and lead to ovulation disorders and abnormal menstrual periods.8 Symptoms like oligomenorrhoea, menorrhagia and amenorrhoea can occur and the conception process may become complicated because of ovulation disorders. Hypothyroidism can also be accompanied by elevated prolactin levels, causing further problems related to reproduction. Typical symptoms of the condition include weight gain, fatigue, sensitivity to cold temperatures, constipation, dry skin and menstrual disorders.10

Thyroid dysfunction needs to be investigated in subfertile women because thyroid disorder can interfere with the menstrual cycle, ovulation and reproduction. Hyperthyroidism and hypothyroidism both can cause problems in conceiving and go unnoticed because of the general signs that do not point specifically toward thyroid dysfunction. Early diagnosis of this condition can allow for treatment of the disorder and potentially lead to a successful conception.

METHODOLOGY

This cross-sectional study was carried out from 7th February 2025 to 7th August 2025 in the Department of Obstetrics and Gynaecology, Saidu Group of Teaching Hospital Swat. A total of 176 subfertile women were enrolled in the study through non-probability consecutive sampling. The sample size was calculated by using WHO sample size software, with 95% confidence interval, 3% margin of error and expected frequency of hyperthyroidism of 4.3% among subfertile women.11

Ethical approval for conducting the study was obtained from the concerned ethical committee before starting the data collection. The purpose of the study was explained to the participants and their privacy and confidentiality were maintained throughout the study.

Women aged 18 to 45 years and married were included. Subfertile women were selected according to the stated study criteria. The husband was required to have sperm concentration ≥15,000,000/ml and total motility ≥40% on laboratory examination. Women with a history of known thyroid diseases, previous thyroid surgery or use of thyroid medications documented in medical record were excluded. Women having a history of uterine fibroids or previous chemotherapy or radiation therapy were also not included. Female subfertility was considered when a woman had failed to conceive despite at least 6 months of regular unprotected sexual intercourse if she was below 35 years of age. In women aged >35 years, failure to achieve conception after 3-4 months of regular unprotected sexual intercourse was considered subfertility.

After obtaining informed consent from each participant, data collection was started. The participants were informed that their participation was voluntary and that no harm was expected from the study procedures. Baseline demographic information was obtained, including age, BMI, duration of subfertility, residence status, socioeconomic status, diabetes and hypertension. The information was recorded.

A detailed relevant history was taken from each woman and the required clinical information was recorded. The eligibility of the participant was confirmed according to the inclusion and exclusion criteria. On the 21st day of the menstrual cycle, 5 ml venous blood was obtained from the antecubital vein after an overnight fasting period of 8-12 hours. Proper aseptic precautions were followed and sterile disposable plastic syringes were used for blood collection. The collected sample was transferred to the laboratory of the same hospital within 3 hours for thyroid function assessment.

Hyperthyroidism was considered when laboratory blood testing showed TSH <0.1 mU/L together with free T4 >1.5 ng/dL. Hypothyroidism was considered when TSH ≥10 mU/L together with free T4 <0.7 ng/dL. The prevalence of thyroid disorders was determined from the proportion of participants fulfilling the criteria for hyperthyroidism or hypothyroidism.

The collected data were analysed using IBM SPSS version 26. Qualitative variables including residence status, socioeconomic status, diabetes, hypertension, hypothyroidism and hyperthyroidism were presented as frequencies and percentages. Quantitative variables including age, duration of subfertility and BMI were expressed as mean ± standard deviation. Effect modifiers including age, BMI, duration of subfertility, residence status, socioeconomic status, diabetes and hypertension were controlled by stratification to assess their effect on thyroid disorders. Chi-square test or Fisher's exact test was applied after stratification, as appropriate. A p-value ≤0.05 was considered statistically significant.

RESULTS

The study enrolled 176 subfertile women with a mean age of 32.29 ± 5.86 years. The mean body mass

index was 26.20 ± 2.15 kg/m^2 and the mean duration of subfertility was 2.44 ± 1.18 years. Majority of the participants were from rural areas 113 (64.2%) as compared to urban 63 (35.8%). Regarding socioeconomic status, most of the women belongs to low socioeconomic group 87 (49.4%), followed by middle 59 (33.5%) and high 30 (17.0%). Hypertension were present in 11 (6.3%) of the participants whilst diabetes was found in only 3 (1.7%) of the women (Table 1).

Table 1. Patient Demographics n=176

Demographics	Mean ± SD / n (%)
Age (years)	32.29 ± 5.86
BMI (kg/m^2)	26.20 ± 2.15
Duration of Subfertility (years)	2.44 ± 1.18
Residence Status	
Rural n (%)	113 (64.2%)
Urban n (%)	63 (35.8%)
Socioeconomic Status	
Low n (%)	87 (49.4%)
Middle n (%)	59 (33.5%)
High n (%)	30 (17.0%)
Hypertension	
Yes n (%)	11 (6.3%)
No n (%)	165 (93.8%)
Diabetes	
Yes n (%)	3 (1.7%)
No n (%)	173 (98.3%)

With regards to frequency of thyroid disorders, hyperthyroidism was found in 8 (4.5%) of the subfertile women whilst 168 (95.5%) had no hyperthyroidism. Hypothyroidism were observed in 18 (10.2%) of the participants, whereas 158 (89.8%) were found to be without hypothyroidism (Table 2).

Table 2. Frequency of Thyroid Disorders in Subfertile Women n=176

Thyroid Disorder	Frequency	%age
Hyperthyroidism		
Yes	8	4.50%
No	168	95.50%
Total	176	100%
Hypothyroidism		
Yes	18	10.20%
No	158	89.80%
Total	176	100%

On association analysis, hypothyroidism was found to be significantly associated with age group, as women aged above 30 years shewed higher frequency 17 (15.9%) as compared to those aged 30 years or below 1 (1.4%), with p-value of 0.002. Similarly, hypothyroidism was also significantly associated with BMI, wherein women with BMI greater than 25 kg/m^2 had notably higher frequency 17 (14.5%) as compared to those with BMI of 25 or below 1 (1.7%), with p-value of 0.007. All other associations of both hyperthyroidism and hypothyroidism with duration of subfertility, residence status, socioeconomic status, hypertension and diabetes were found to be statistically non-significant (Table 3).

Table 3. Association of Thyroid Disorders with Demographic Factors n=176

Demographic Factors	Sub Groups	Hyperthyroidism		p-value	Hypothyroidism		p-value
		Yes n (%)	No n (%)		Yes n (%)	No n (%)	
Age (years)	≤30	2 (2.9%)	67 (97.1%)	0.484**	1 (1.4%)	68 (98.6%)	0.002**
	>30	6 (5.6%)	101 (94.4%)		17 (15.9%)	90 (84.1%)	
BMI (kg/m^2)	≤25	4 (6.8%)	55 (93.2%)	0.444**	1 (1.7%)	58 (98.3%)	0.007**
	>25	4 (3.4%)	113 (96.6%)		17 (14.5%)	100 (85.5%)	
Duration of Subfertility (years)	1-5	8 (4.6%)	165 (95.4%)	1.000**	18 (10.4%)	155 (89.6%)	1.000**
	>5	0 (0.0%)	3 (100.0%)		0 (0.0%)	3 (100.0%)	
Residence Status	Rural	5 (4.4%)	108 (95.6%)	1.000**	11 (9.7%)	102 (90.3%)	0.733*
	Urban	3 (4.8%)	60 (95.2%)		7 (11.1%)	56 (88.9%)	
Socioeconomic Status	Low	4 (4.6%)	83 (95.4%)	1.000**	10 (11.5%)	77 (88.5%)	0.761**
	Middle	3 (5.1%)	56 (94.9%)		6 (10.2%)	53 (89.8%)	
	High	1 (3.3%)	29 (96.7%)		2 (6.7%)	28 (93.3%)	
Hypertension	Yes	1 (9.1%)	10 (90.9%)	1.000**	1 (9.1%)	10 (90.9%)	1.000**
	No	7 (4.2%)	158 (95.8%)		17 (10.3%)	148 (89.7%)	
Diabetes	Yes	0 (0.0%)	3 (100.0%)	1.000**	0 (0.0%)	3 (100.0%)	1.000**
	No	8 (4.6%)	165 (95.4%)		18 (10.4%)	155 (89.6%)	

*Chi-Square Test, **Fisher Exact Test

DISCUSSION

The findings of present study revealed that hypothyroidism were more prevalent 18 (10.2%) as compared to hyperthyroidism 8 (4.5%) among subfertile women. This pattern was in agreement with several previous studies. Rahman et al. 12 similarly reported hypothyroidism as the dominant thyroid disorder in subfertile women, with subclinical hypothyroidism occurring in 26.7% of cases. Bibi et al. 13 also found hypothyroidism to be most frequent thyroid disorder affecting 42 (37.5%) of subfertile women, which were comparatively higher than present study findings. This difference in prevalence could possibly be attributed to variations in sample size, geographical region, diagnostic criteria and socioeconomic characteristics of study populations. Akande et al. 14 reported thyroid dysfunction in 16% of infertile women with overt hypothyroidism being most common abnormality at 9.6%, which were somewhat comparable to present study. Al-Jaroudi et al. 15 reported a notably higher prevalence of hypothyroidism at 28.5%, whilst Hussain et al. 16 found subclinical hypothyroidism in 34.81% of infertile women and Ali et al. 17 reported hypothyroidism in 28.5% of women with secondary infertility. Arif et al. 18 identified subclinical hypothyroidism in 9.9% of subfertile women attending their clinic, which were relatively closer to present study findings. Arshad et al. 19 found overall thyroid dysfunction in 41% of primary infertile women with subclinical hyperthyroidism being more prominent at 20%, which were in contrast to present study where hyperthyroidism was less frequent 8 (4.5%). Tan et al. 20 in their narrative review reported that hypothyroidism may be associated with infertility rates of up to 30%, whilst hyperthyroidism was associated with infertility in approximately 5.8% of women, which were broadly consistent with the lower frequency of hyperthyroidism observed in present study. Potiris et al. 21 also highlighted that hypothyroidism causes significant ovulatory dysfunction and luteal impairment, further supporting the higher prevalence of hypothyroidism seen in present study. Ashfaq et al. 22 reported subclinical hypothyroidism in 27% of subfertile women, which were also comparable to present study findings. These differences in prevalence across studies might be explained by differences in study design, referral bias, sample size and use of different TSH cut-off values across studies.

Regarding association of hypothyroidism with age, present study found that women aged above 30 years had significantly higher frequency of hypothyroidism 17 (15.9%) as compared to younger women 1 (1.4%), with p-value of 0.002. This were consistent with findings of Bibi et al. 13 who also reported hypothyroidism to be significantly more common in women aged above 30 years as compared to those aged 30 years or below (52.3% vs 27.9%, p=0.009). Similarly, Ali et al. 17 noted highest subclinical hypothyroidism prevalence among women aged 31–40 years (28.6%), although they did not find statistically significant association with age (p=0.256). Al-Jaroudi et al. 15 reported mean age of 29.58 ± 0.34 years in their study population, with hypothyroidism being prevalent in younger subfertile women as well, suggesting that age related susceptibility may vary across different clinical settings and populations. Hussain et al. 16 similarly noted that subclinical hypothyroidism was particularly frequent in the 18–25 year age group (44.6%), which were in contrast to present study findings where older age group were more affected. This discrepancy could be related to differences in demographic profiles and recruitment settings of respective studies. Arshad et al. 19 enrolled women aged 20–30 years only, which limits the direct age-related comparison with present study. The scientific basis of this observation lies in the progressive nature of autoimmune thyroid disease, particularly Hashimoto's thyroiditis, which tends to accumulate thyroid damage over time, making older reproductive age women more susceptible to overt hypothyroidism. Tan et al. 20 and Potiris et al. 21 also supported in their reviews that thyroid autoimmunity and its consequences on reproductive function tends to become more apparent with advancing age, further corroborating present study findings.

The significant association between hypothyroidism and higher BMI were another notable finding of present study, wherein women with BMI greater than 25 kg/m^2 had considerably higher frequency 17 (14.5%) as compared to those with normal BMI 1 (1.7%), with p-value of 0.007. This finding were supported by Ashfaq et al. 22 who reported a statistically significant association between subclinical hypothyroidism and obesity ($p<0.05$), with 74.4% of subclinical hypothyroid women being obese. Hussain et al. 16 also found that 74.5% of subclinical hypothyroid cases had BMI greater than 25 kg/m^2, further corroborating present study results. Rahman et al. 12 reported that mean BMI were significantly higher among subfertile women (27.98 ± 5.42 kg/m^2) as compared to controls (24.16 ± 3.77 kg/m^2, $p<0.01$), indicating a relationship between higher body weight and thyroid dysfunction in subfertile population. In contrast, Ali et al. 17 and Bibi et al. 13 did not found significant association between hypothyroidism and BMI (p=0.827 and $p>0.05$ respectively), which could be explained by differences in BMI cut-off values, sample characteristics and ethnicity of study populations. Akande et al. 14 and Arif et al. 18 did not specifically analyse BMI as an independent variable in relation to

thyroid dysfunction, whilst Al-Jaroudi et al. 15 and Arshad et al. 19 also did not report detailed BMI stratified analysis, making direct comparison with present study difficult in this regard. Tan et al. 20 and Potiris et al. 21 in their respective reviews acknowledged that metabolic disturbances including obesity can worsen thyroid dysfunction and its reproductive consequences, which provides theoretical support for the association observed in present study. The probable biological mechanism behind this association is that excess adipose tissue promotes chronic low grade inflammation and leptin resistance, which in turn impairs thyroid hormone synthesis and increases susceptibility to autoimmune thyroid dysfunction in overweight subfertile women. There are many limitations in the current study which need to be considered. First of all, the studies were performed at one particular center; thus, the results cannot be generalized for the subfertile population of the country. The number of participants (176 women) was rather small, which might affect the statistical power of the association analyses. The presence of other autoimmune markers associated with thyroid disease, like anti-thyroid peroxidase antibodies, was not determined, which might give a better insight into the etiology of the thyroid dysfunction in the studied patients.

CONCLUSION

It has been concluded from the current study that hypothyroidism cases are greater than hyperthyroidism cases among subfertile women, thereby pointing towards the fact that dysfunction of thyroid glands is one of the important reasons behind subfertility of females. Hypothyroidism has shown significant correlation with old age group and high body mass index.

Ethical Approval

The research was carried out after approval was granted by the Institutional Ethical Committee of the hospital.

Patients' Consent

All participants were informed about the study and written consent was taken before their inclusion.

Competing Interests

The author declares that there was no conflict of interest associated with this research.

REFERENCES

1. Madziyire MG, Magwali TL, Chikwasha V, Mhlanga T. The causes of infertility in women presenting to gynaecology clinics in Harare, Zimbabwe: a cross-sectional study. Fertil Res Pract. 2021;7(1):1. doi: 10.1186/s40738-020-00093-0.
2. Wasilewski T, Wasilewska J, Łukaszewicz-Zając M, Mroczko B. Subfertility as overlapping of nutritional, endocrine, immune, and cardiometabolic dysregulations: a study focused on biochemical endophenotypes of subfertile couples. J Clin Med. 2023;12(18):6094. doi: 10.3390/jcm12186094.
3. Brown EDL, Obeng-Gyasi B, Hall JE, Shekhar S. The thyroid hormone axis and female reproduction. Int J Mol Sci. 2023;24(12):9815. doi: 10.3390/ijms24129815.
4. Lee SY, Pearce EN. Hyperthyroidism: a review. JAMA. 2023;330(15):1472-1483. doi: 10.1001/jama.2023.19052.
5. Sharma J, Mahat B, Tiwari S, Singh NK, Yadav R, Thapa D. Thyroid disorders in patients with polycystic ovarian syndrome in a tertiary care center: an observational study. JNMA J Nepal Med Assoc. 2024;62(280):819-822. doi: 10.31729/jnma.8833.
6. Mahmud T, Khan QU, Saad S. The interplay between hyperthyroidism and ovarian cytoarchitecture in albino rats. Cureus. 2021;13(4):e14517. doi: 10.7759/cureus.14517.
7. P HH, G S, K P, Penumalla S, Kandimalla R. Hypothyroidism and its impact on menstrual irregularities in reproductive-age women: a comprehensive analysis at a tertiary care center. Cureus. 2024;16(6):e63158. doi: 10.7759/cureus.63158.
8. Ren B, Zhu Y. A new perspective on thyroid hormones: crosstalk with reproductive hormones in females. Int J Mol Sci. 2022;23(5):2708. doi: 10.3390/ijms23052708.
9. Ramadras DD, Che Soh Yusof NAA, Yaacob NM, Wan Norlina WA, Hanisah AH. Correlation of serum prolactin and thyroid stimulating hormone concentration in infertile women: a systematic review and meta-analysis. Malays J Med Sci. 2024;31(1):14-32. doi: 10.21315/mjms2024.31.1.2.
10. Zamwar UM, Muneshwar KN. Epidemiology, types, causes, clinical presentation, diagnosis, and treatment of hypothyroidism. Cureus. 2023;15(9):e46241. doi: 10.7759/cureus.46241.
11. Elahi S, Tasneem A, Nazir I, Nagra SA, Hyder SW. Thyroid dysfunction in infertile women. J Coll Physicians Surg Pak. 2007;17(4):191-194.
12. Rahman D, Fatima P, Banu J. Thyroid disorders in female subfertility. J Chittagong Med Coll Teach Assoc. 2008;19(2):46-50. doi: 10.3329/jcmcta.v19i2.3871.
13. Bibi S, Rabi S, Mian FA, Khattak ST. Frequency of thyroid disorders in subfertile females. Indus J Biosci Res. 2025;3(7):1805-1808. doi: 10.70749/ijbr.v3i7.3204.
14. Akande AA, Isah IA, Aliyu IS, Adesiyun AG. Thyroid dysfunction in women of reproductive age: laboratory protocol for infertility evaluation. Ann Ibadan Postgrad Med. 2022;20(1):53-57.
15. Al-Jaroudi D, Yassin S, Al Enezi N, Kaddour O, Al-Badr A. Hypothyroidism among subfertile

women. Clin Exp Obstet Gynecol. 2018;45(1):63-67. doi: 10.12891/ceog3759.2018.
16. Hussain SF, Aftab S, Aziz M, Bano Z, Memon E, Naqvi S. Subclinical hypothyroidism in infertile women. J Popul Ther Clin Pharmacol. 2023;30(17):2071-2076. doi: 10.53555/jptcp.v30i17.2881.
17. Ali HMM, Nadeem A, Sadaqat F, Batool A, Chaudhary S, Shaukat M, et al. Frequency of hypothyroidism and subclinical hypothyroidism in females with secondary infertility presenting at a tertiary care hospital. Pak J Health Sci. 2025;6(10):141-145. doi: 10.54393/pjhs.v6i10.3234.
18. Arif S, Nasrullah FD, Jaleel R, Hasnain FSU, Abbasi AU. Frequency of subclinical hypothyroidism in subfertile females and the effect of thyroxine replacement. J Coll Physicians Surg Pak. 2025;35(11):1413-1417. doi: 10.29271/jcpsp.2025.11.1413.
19. Arshad M, Naz S, Zeb S. Association of thyroid dysfunction with female infertility. J Gandhara Med Dent Sci. 2014;1(1):3-8. doi: 10.37762/jgmds.1-1.70.
20. Tan J, Yang YY, Yin DY, Xin Q, Ge XC. Research on the impact of thyroid disorders on reproductive function: a narrative review. J Clin Med Res. 2025;17(8):409-422. doi: 10.14740/jocmr6315.
21. Potiris A, Machairiotis N, Christidis I, Karampitsakos T, Variawa R, Drakaki E, et al. Thyroid disorders; an insidious cause leading to female infertility. HJOG. 2024;23(1):24-31. doi: 10.33574/hjog.0547.
22. Ashfaq N, Hussain W, Hussain M, Saba N, Muddasir A, Liaqat J. Connecting the dots: the impact of subclinical hypothyroidism on female subfertility and obesity. J Rawalpindi Med Coll. 2024;28(3):455-459. doi: 10.37939/jrmc.v28i3.2558.