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RESEARCH ARTICLE
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COMMUNITY-BASED STUDY OF THYROID DYSFUNCTION AND MENSTRUAL IRREGULARITIES IN REPRODUCTIVE-AGE WOMEN AND ITS TREATMENT

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ABSTRACT

Background: The hypothalamic-pituitary-ovarian axis is an important regulator of the menstrual cycle and it is influenced by thyroid hormones. Thyroid disease is a frequent but underdiagnosed disorder in women of reproductive age and commonly is linked to menstrual dysfunction.

Objective: To determine the frequency of thyroid dysfunction and its association with menstrual irregularities among reproductive-age women in a community-based setting.

Methods: This cross-sectional study was a community-based study in January 2024 to January 2025 at Pak International Medical College Peshawar. A sample of 72 women aged 1845 years was taken through non-probability consecutive sampling. A structured questionnaire was used to collect data on demographic characteristics, menstrual history and clinical features. ELISA was used to determine the levels of thyroid functions such as serum TSH, FT3, and FT4. Data analysis was done using SPSS version 25. Associations were evaluated using Chi-square test at p 0.05 which was regarded as statistically significant.

Results: The mean age of participants was 29.8 ± 6.4 years. Thyroid dysfunction was observed in 47.2% of participants, while 58.3% reported menstrual irregularities. Subclinical hypothyroidism was the most common thyroid disorder (25.0%). A significantly higher proportion of women with thyroid dysfunction had irregular menstrual cycles (61.9%) compared to euthyroid women (38.1%) ($p = 0.003$).

Conclusion: Thyroid dysfunction is highly prevalent among reproductive-age women and is significantly associated with menstrual irregularities. Routine screening and early management of thyroid disorders may improve menstrual health and reproductive outcomes.

Keywords: Thyroid dysfunction, menstrual irregularities, subclinical hypothyroidism, reproductive age, community-based study

INTRODUCTION

One of the most prevalent endocrine disorders in women of reproductive age across the world is thyroid disorders. Thyroid hormones are very important in controlling metabolism, growth and reproductive physiology. They have a strong effect on the hypothalamic-pituitary-ovarian (HPO) axis and as such, influence ovulation, menstrual regularity and fertility. Even minor changes in thyroid activity may destabilize hormones and cause a great range of menstrual disorders (1-3).

Menstrual abnormalities, such as oligomenorrhea, amenorrhea, menorrhagia, and polymenorrhea are typical gynecological issues, which influence the quality of life and reproductive capacity in women. The causes of these disturbances can be of different endocrine, metabolic, and structural origins; nevertheless, thyroid dysfunction is an essential but not the most noticeable factor. Hypothyroidism is generally linked with heavy or irregular menstrual bleeding, but hyperthyroidism could lead to light menstrual bleeding. The mechanisms underlying it include the changes in the gonadotropin secretion, estrogen metabolism, and endometrial functioning (4-6).

The thyroid dysfunction is more common in women worldwide as it has been found to be prevalent between 5% and 30% depending on the population under study and the diagnosis criteria. Recent reports have shown that there is an increasing trend in the number of thyroid disorders especially in the low and middle income nations. The burden, in South Asian communities, like Pakistan, seems to be more significant because of such factors as imbalance of iodine, nutritional deficiencies, and insufficient access to regular screening centers. In spite of this, testing of thyroid functions is not always done in women who present with menstrual aberrations, thus resulting in late diagnosis and treatment (7-9).

Some recent reports have indicated a high correlation of thyroid dysfunction with menstrual abnormalities, but most of these studies are hospital based and may not be a true indication of the actual burden within the general population. The relationship between socioeconomic and healthcare accessibility factors and disease patterns in Pakistani environments is under-researched, with limited community-based data available to explore this relationship. Moreover, subclinical thyroid dysfunction which is often not diagnosed may still have a profound effect on the health of menstruation (5, 10).

Therefore, this study was designed to determine the frequency of thyroid dysfunction and its association with menstrual irregularities among reproductive-age women in a community-based setting. The findings of this study will help in highlighting the need for routine thyroid screening and early intervention strategies to improve women's reproductive health outcomes.

METHODOLOGY

This community-based cross-sectional study was conducted at Pak International Medical College Peshawar, over a period of one year from January 2024 to January 2025. The study aimed to assess the frequency of thyroid dysfunction and its association with menstrual irregularities among reproductive-age women.

A total sample size of 72 women was included in the study. The sample size was calculated using the standard formula for prevalence studies:

$n = Z^2 \times P \times (1 - P) / d^2$, where Z = 1.96 for a 95% confidence level, P was assumed as 50% due to lack of local data, and margin of error (d) was taken as 12%, yielding a minimum required sample size close to 67, which was increased to 72 to improve study reliability. A non-probability consecutive sampling technique was used to recruit participants from the community.

The study included women between the ages of 18 and 45 years who had menstrual complaints or no menstrual complaints. Women who were pregnant, lactating, on hormonal therapy, known cases

of thyroid disease already on treatment, or having chronic systemic illnesses such as diabetes mellitus, renal failure, or hepatic disease were excluded to avoid confounding factors.
The questionnaire was structured and pre-tested, and it provided demographic information (age, marital status, residence, BMI), menstrual history (cycle regularity, type of irregularity, duration, associated symptoms), and other clinical aspects of the case. The standardized anthropometric measures (height and weight) were taken and body mass index (BMI) was determined.
To determine biochemical evaluation, 3-5 mL of venous blood were taken and analysed under aseptic condition and underwent thyroid functional test, such as serum thyroid-stimulating hormone (TSH), free triiodothyronine (FT3) and free thyroxine (FT4) by enzyme-linked immunosorbent assay (ELISA) procedure. Based on standard reference ranges, thyroid status was classified into euthyroid, subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism and overt hyperthyroidism. Thyroid dysfunction and menstrual irregularities were the primary outcome variables, whereas demographic characteristics and BMI were the independent variables.
Statistical Package of Social Sciences (SPSS) version 25 was used to enter and analyze the data. The quantitative variables were presented in the form of mean standard deviation, and the qualitative variables were presented in the form of frequency and percentage. To determine the relationship between thyroid dysfunction and menstrual irregularities, the Chi-square test was used. A p-value of 0.05 and below was taken as statistically significant.

RESULTS

This community based study involved 72 reproductive-age women. The average age of the study participants was 29.8 years old with a standard deviation of 6.4. A significant percentage of participants were found to have thyroid dysfunction and menstrual irregularities were noted to be significantly associated with thyroid dysfunction. Most of the respondents were aged 26-35 (47.2%), with most of them being married (68.1%). The prevalence of overweight and obesity was high, which shows the presence of metabolic risk factors related to thyroid dysfunction.

Table 1: Demographic Characteristics of Participants (n = 72)

Variable	Category	Frequency (%)
Age Group	18–25 years	18 (25.0%)
	26–35 years	34 (47.2%)
	36–45 years	20 (27.8%)
Marital Status	Married	49 (68.1%)
	Unmarried	23 (31.9%)
Residence	Urban	41 (56.9%)
	Rural	31 (43.1%)
BMI Category	Normal	29 (40.3%)
	Overweight	26 (36.1%)
	Obese	17 (23.6%)

Menstrual irregularities were reported in more than half of the participants. Most common abnormality was oligomenorrhea (33.3) and menorrhagia (22.2).

Table 2: Menstrual Characteristics of Participants (n = 72)

Variable	Category	Frequency (%)
Menstrual Pattern	Regular	30 (41.7%)
	Irregular	42 (58.3%)
Type of Irregularity (n=42)	Oligomenorrhea	24 (33.3%)
	Amenorrhea	10 (13.9%)
	Menorrhagia	16 (22.2%)

	Polymenorrhea	8 (11.1%)
Associated Symptoms	Dysmenorrhea	28 (38.9%)
	Infertility	19 (26.4%)
	Weight Gain	25 (34.7%)
	Fatigue	31 (43.1%)

The mean TSH level was 4.9 ± 2.8 μIU/mL. Subclinical hypothyroidism was the most common thyroid abnormality.

Table 3: Thyroid Function Profile (n = 72)

Variable	Category	Frequency (%)
Thyroid Status	Euthyroid	38 (52.8%)
	Subclinical Hypothyroidism	18 (25.0%)
	Overt Hypothyroidism	10 (13.9%)
	Subclinical Hyperthyroidism	4 (5.6%)
	Overt Hyperthyroidism	2 (2.8%)
Mean TSH (μIU/mL)	—	4.9 ± 2.8
Mean FT3	—	3.1 ± 0.9
Mean FT4	—	1.2 ± 0.4

A thyroid dysfunction was detected in 47.2 percent of participants. In individuals with menstrual abnormalities, a greater percentage of individuals were found to have thyroid abnormalities.

Table 4: Prevalence of Thyroid Dysfunction and Menstrual Irregularities (n = 72)

Variable	Frequency (%)
Thyroid Dysfunction	34 (47.2%)
Menstrual Irregularities	42 (58.3%)
Thyroid Dysfunction in Irregular Cycles	26 (61.9%)
Thyroid Dysfunction in Regular Cycles	8 (26.7%)

Thyroid dysfunction and menstrual abnormalities were statistically related ($p = 0.003$), which revealed that menstrual abnormalities were mainly due to thyroid abnormalities.

Table 5: Association Between Thyroid Dysfunction and Menstrual Irregularities

Thyroid Status	Regular Cycle n (%)	Irregular Cycle n (%)	Total	p-value
Euthyroid	22 (73.3%)	16 (38.1%)	38	
Thyroid Dysfunction	8 (26.7%)	26 (61.9%)	34	**0.003**
Total	30	42	72	

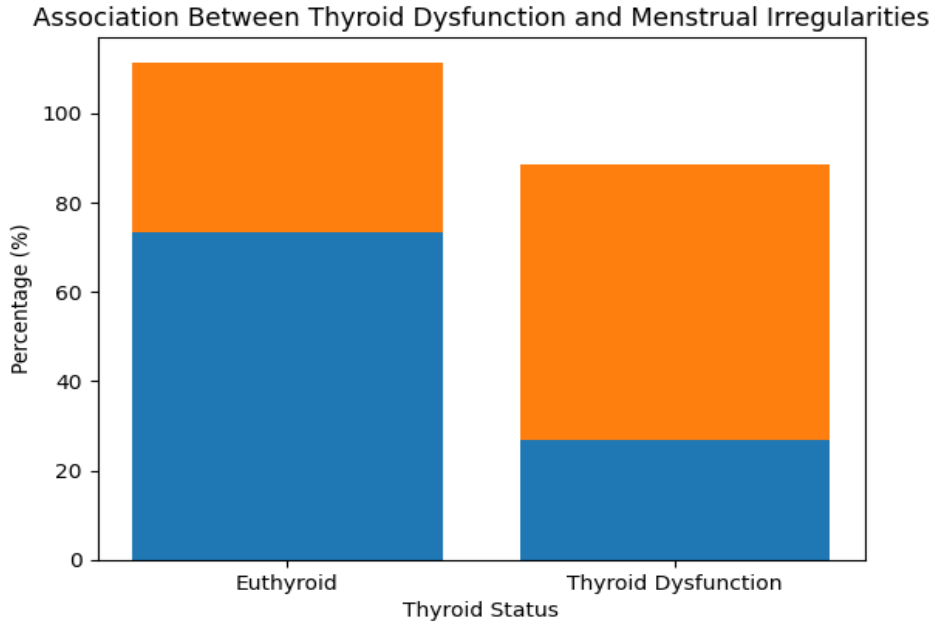


Figure 1: Association between thyroid dysfunction and menstrual irregularities among reproductive-age women. A higher proportion of women with thyroid dysfunction had irregular menstrual cycles (61.9%) compared to euthyroid women, where regular cycles were more common (73.3%), demonstrating a statistically significant association (p = 0.003).

DISCUSSION

This was a community-based research study that assessed the occurrence of thyroid dysfunction and its relation to menstrual irregularities in reproductive-age women. The results have shown that 47.2 percent of the respondents had thyroid dysfunction and 58.3 percent had menstrual irregularities. Thyroid abnormalities and menstrual disturbances were found to be statistically significantly correlated (p = 0.003), which points out the significance of thyroid hormones in the process of normal reproductive physiology.

The thyroid dysfunction prevalence in this study is quite high in comparison to some studies that have been conducted internationally with reported prevalence between 10-30 per cent among women of reproductive age. Nevertheless, other higher frequencies have been reported in South Asian populations especially in Pakistan and India whereby iodine imbalance, nutritional deficiencies and absence of regular screening are also contributing to greater thyroid disorders. The current study was also supported by a recent Pakistani study, which showed a prevalence of thyroid dysfunction of over 40% of women who presented with menstrual complaints(11-13).

The most frequent thyroid abnormality was subclinical hypothyroidism (25.0) in this study. This is in line with the recent literature that showed that subclinical hypothyroidism is not well diagnosed but linked a lot with menstrual abnormalities like oligomenorrhea and menorrhagia. Thyroid hormones affect the secretion of gonadotropin-releasing hormone (GnRH), ovary and endometrial receptivity. Even slight changes in thyroid activity may interfere with the hypothalamic-pituitary-ovarian axis and cause menstrual abnormalities (14-16).

Over 50 percent of the participants reported menstrual irregularities, with oligomenorrhea (33.3) being the most prevalent abnormality. This observation is consistent with several other recent studies that have shown that hypothyroidism is often accompanied by little or no menstrual cycle, and hyperthyroidism can result in lighter or irregular menstrual bleeding. This biological relationship is further supported by the high percentage of irregular cycles in women with thyroid dysfunction (61.9) than in euthyroid women (38.1) in this study (17, 18).

The substantive relationship between thyroid dysfunction and menstrual irregularities (p = 0.003) is in line with the current studies that indicate the necessity of regular screening of thyroid in women

who have menstrual dysfunctions. With early diagnosis and proper treatment, including levothyroxine therapy of hypothyroid patients, menstrual cycles could be normalized and fertility outcomes might be improved (19, 20). The burden that was seen in this community-based population is high and hence it is possible that a screening of thyroid functions in primary healthcare settings would greatly enhance the reproductive health outcomes of women.

CONCLUSION

Thyroid dysfunction is highly prevalent among reproductive-age women and is significantly associated with menstrual irregularities. Subclinical hypothyroidism was the most common disorder, and menstrual disturbances such as oligomenorrhea were frequently observed. These findings highlight the importance of early screening, timely diagnosis, and appropriate management of thyroid disorders to improve menstrual health and overall reproductive outcomes. Routine thyroid function testing should be considered in women presenting with menstrual irregularities, particularly in community settings where undiagnosed cases remain common.

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