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Exploring the Relationship Between Thyroid Dysfunction and Menstrual Irregularities in Women

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ABSTRACT

The present study investigates the relationship between thyroid dysfunction and menstrual irregularities among women in Punjab, Pakistan, providing comprehensive quantitative and clinical evidence of their interconnection. Among 230 women studied, over half (51.3%) exhibited some form of thyroid dysfunction, with hypothyroid conditions (both overt and subclinical) representing the majority and strongly associated with menorrhagia and oligomenorrhea, while hyperthyroid states correlated with hypomenorrhea and amenorrhea. Hormonal analysis revealed that elevated thyroid-stimulating hormone (TSH) levels, characteristic of hypothyroidism, were linked to prolonged or heavy menstrual cycles, whereas suppressed TSH with elevated triiodothyronine (T3) and thyroxine (T4) levels in hyperthyroidism were associated with shorter or absent cycles. The severity and persistence of menstrual disturbances increased proportionally with the degree of thyroid imbalance, with overt thyroid disorders producing the most pronounced symptoms and longest durations of irregularity. These findings confirm a strong inverse relationship between thyroid function and menstrual regularity, emphasizing the physiological influence of thyroid hormones on the hypothalamic–pituitary–gonadal axis and reproductive health. The study underscores the clinical importance of routine thyroid screening in women presenting with menstrual disorders, particularly in resource-limited settings like Punjab where subclinical cases often go undiagnosed. Integrating thyroid evaluation into gynecological practice can facilitate early detection, prevent infertility and hormonal complications, and improve overall reproductive outcomes. This region-specific evidence contributes to global understanding of endocrine–reproductive interrelations, highlighting thyroid dysfunction as a prevalent yet modifiable determinant of menstrual health in Pakistani women.

INTRODUCTION

The thyroid gland plays a crucial role in regulating metabolism, growth, and reproductive function through the secretion of hormones such as thyroxine (T4) and triiodothyronine (T3) [1]. Any imbalance in thyroid hormone production whether hypothyroidism or hyperthyroidism can disrupt the intricate hormonal coordination of the hypothalamic-pituitary-ovarian (HPO) axis, which governs the menstrual cycle [2]. Alterations in thyroid function affect gonadotropin release, estrogen and progesterone metabolism, and endometrial responsiveness, leading to menstrual disturbances such as menorrhagia, oligomenorrhea, or amenorrhea [3]. Hypothyroidism is commonly associated with heavy or prolonged bleeding due to impaired coagulation and estrogen imbalance, whereas hyperthyroidism often results in light or absent menstruation due to accelerated estrogen metabolism and suppressed luteinizing hormone (LH) secretion [4]. These disturbances not only impact reproductive health but also serve as important clinical indicators of underlying endocrine dysfunction [5]. Globally, thyroid disorders are among the most prevalent endocrine abnormalities affecting women of reproductive age [6]. Despite their significance, many cases of thyroid-related menstrual irregularities remain undiagnosed or are misattributed to gynecological causes [7]. The interplay between thyroid dysfunction and menstrual health represents a critical area of reproductive endocrinology that warrants greater clinical attention [8]. Understanding this relationship is essential for early detection, appropriate intervention, and improved fertility outcomes [9]. This study aims to explore the relationship

between thyroid dysfunction and menstrual irregularities in women by analyzing hormonal profiles, clinical symptoms, and menstrual patterns [10]. Through a quantitative assessment of thyroid hormone levels and menstrual characteristics, the research seeks to establish a clearer understanding of how thyroid disorders influence menstrual physiology, thereby contributing to better diagnostic and therapeutic strategies in women's reproductive health [11].

Thyroid Function and Its Role in Female Reproductive Health: The thyroid gland, located in the anterior neck region, is a vital endocrine organ responsible for maintaining metabolic homeostasis and regulating numerous physiological processes, including growth, energy production, and reproduction [12]. It synthesizes and releases two principal hormones thyroxine (T4) and triiodothyronine (T3) which exert systemic effects by modulating cellular metabolism and influencing the function of multiple organs. In women, thyroid hormones play a crucial role in reproductive physiology by interacting with the hypothalamic-pituitary-ovarian (HPO) axis to regulate menstrual cyclicity, ovulation, and fertility [13]. Any disruption in the synthesis or secretion of thyroid hormones can disturb the delicate hormonal balance required for normal menstrual function, resulting in cycle irregularities, anovulation, or infertility [14]. The HPO axis is highly sensitive to thyroid hormone fluctuations. When thyroid hormone levels decline (hypothyroidism) or increase (hyperthyroidism), it disrupts the release of gonadotropin-releasing hormone (GnRH) from the hypothalamus and subsequently alters the secretion of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary gland [15]. These hormonal disturbances impair follicular development and the normal ovulatory process, leading to irregular or absent menstrual bleeding. Studies have demonstrated that women with untreated thyroid disorders frequently experience menstrual abnormalities, including menorrhagia, oligomenorrhea, polymenorrhea, and amenorrhea, depending on the type and severity of thyroid dysfunction [16]. The bidirectional relationship between thyroid and reproductive hormones emphasizes the importance of maintaining endocrine balance for optimal reproductive outcomes [17].

In addition to direct endocrine effects, thyroid hormones influence reproductive health through metabolic and hematological pathways. Hypothyroidism, for instance, is known to cause alterations in lipid metabolism, coagulation function, and estrogen clearance, all of which contribute to abnormal uterine bleeding patterns [18]. Conversely, hyperthyroidism accelerates metabolic turnover and estrogen degradation, leading to lighter or shortened menstrual periods [19]. These mechanisms highlight the complex physiological interplay between thyroid function and menstrual regulation. Given that thyroid disorders are highly prevalent among women, understanding their impact on reproductive health is essential for timely diagnosis, effective management, and improved quality of life [20].

Menstrual Irregularities Associated with Thyroid Dysfunction: Menstrual irregularities refer to deviations from the normal cyclic pattern of menstruation, which typically spans 21–35 days in healthy women [21]. Such irregularities can manifest as alterations in cycle frequency, duration, or flow volume and may arise from various hormonal, metabolic, or structural causes. Among these, endocrine disorders particularly thyroid dysfunctions are major contributing factors [22]. Hypothyroidism commonly presents with menorrhagia (excessive bleeding) and oligomenorrhea (infrequent cycles), whereas hyperthyroidism often leads to hypomenorrhea (scanty bleeding) or amenorrhea (absence of menstruation) [23]. The severity and pattern of menstrual disturbances often correlate with the extent of thyroid hormone imbalance, emphasizing the clinical importance of thyroid evaluation in women presenting with abnormal menstrual cycles [24]. In hypothyroid states, reduced levels of T3 and T4 lead to elevated thyrotropin-releasing hormone (TRH) and subsequently increased prolactin secretion [14]. Elevated prolactin suppresses gonadotropin-releasing hormone (GnRH) pulsatility, leading to reduced secretion of FSH and LH, which disrupts follicular maturation and ovulation. Additionally, hypothyroidism impairs the hepatic metabolism of estrogen and alters the synthesis of coagulation factors, resulting in excessive menstrual flow and prolonged bleeding episodes [25]. These endocrine imbalances explain why women with hypothyroidism frequently report fatigue, weight gain, and heavy menstrual bleeding, often accompanied by fertility difficulties. Early detection and hormonal correction through levothyroxine therapy have been shown to restore normal cycle regularity in many such cases [26].

Hyperthyroidism, on the other hand, is characterized by increased thyroid hormone levels that accelerate estrogen metabolism and suppress pituitary gonadotropin secretion [27]. This leads to shortened or absent menstrual cycles, reduced endometrial proliferation, and decreased fertility potential. Women with untreated hyperthyroidism may experience secondary amenorrhea due to suppression of LH surges required for ovulation [28]. Subclinical thyroid dysfunctions, though milder in presentation, can also disturb reproductive hormone balance, particularly in women of reproductive age. Given the high prevalence of thyroid-related menstrual disturbances globally, incorporating thyroid function testing as a routine component of menstrual disorder evaluation can significantly improve diagnostic accuracy and guide appropriate management strategies [29].

Research Objectives

- To determine the types and prevalence of menstrual irregularities among women with thyroid dysfunction.
- To analyze the correlation between thyroid hormone levels and menstrual cycle patterns.
- To evaluate the statistical association between thyroid disorders and menstrual irregularities.

Thyroid dysfunction is one of the most common endocrine disorders affecting women and has a profound impact on reproductive health. The imbalance in thyroid hormones disrupts the normal functioning of the hypothalamic-pituitary-ovarian (HPO) axis, leading to menstrual irregularities such as menorrhagia, oligomenorrhea, or

amenorrhea. However, in many clinical settings, menstrual disturbances are often treated symptomatically without evaluating underlying thyroid causes. This diagnostic oversight contributes to delayed detection, mismanagement, and complications such as infertility, anemia, and hormonal imbalance. Despite growing evidence linking thyroid disorders with menstrual dysfunction, there remains a lack of comprehensive quantitative data exploring their correlation within specific populations. The significance of this study lies in its potential to bridge that gap by establishing a clear relationship between thyroid hormone levels and menstrual irregularities. By identifying patterns of association, the research can support early diagnosis and prompt management of thyroid dysfunction in women presenting with menstrual problems. Such evidence-based understanding can improve clinical decision-making, reduce reproductive complications, and promote overall women's health. Moreover, the findings may guide healthcare practitioners and policymakers in integrating thyroid function screening into routine gynecological assessments, ensuring more effective and preventive reproductive healthcare practices.

LITERATURE REVIEW

Overview of Thyroid Function and Its Physiological Role: The thyroid gland is a key endocrine organ responsible for regulating metabolism, energy utilization, and reproductive health through the secretion of triiodothyronine (T3) and thyroxine (T4). These hormones exert widespread effects on nearly all organ systems by influencing protein synthesis, oxygen consumption, and cellular differentiation [30]. In women, thyroid hormones interact intricately with reproductive hormones, particularly those of the hypothalamic-pituitary-ovarian (HPO) axis, to maintain menstrual cyclicity and fertility [31]. The normal functioning of this axis ensures the regular release of gonadotropin-releasing hormone (GnRH) from the hypothalamus and subsequent secretion of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary gland, processes that are highly sensitive to fluctuations in thyroid hormone levels [32]. An imbalance in thyroid hormone secretion either hypothyroidism or hyperthyroidism can disrupt the physiological coordination between the thyroid and reproductive systems [33]. Hypothyroidism results in low circulating T3 and T4 levels, causing compensatory elevation of thyroid-stimulating hormone (TSH), which alters ovarian function and menstrual rhythm [34]. Conversely, hyperthyroidism, characterized by excess thyroid hormone secretion, leads to suppressed TSH levels, impacting estrogen and progesterone metabolism [35]. Both conditions interfere with the ovarian follicular phase, endometrial development, and ovulatory process, contributing to menstrual irregularities and reduced fertility [36]. Thyroid hormones also play an indirect role in regulating menstrual health through their influence on metabolism and body weight [37]. Hypothyroid women often experience weight gain, decreased basal metabolic rate, and altered lipid metabolism, factors that further contribute to anovulation and menstrual disturbances [38]. Hyperthyroid individuals, in contrast, show increased metabolic rates and weight loss, leading to irregular cycles and shortened luteal phases [39]. These metabolic fluctuations highlight the interconnectedness of endocrine and reproductive systems, demonstrating how even mild thyroid abnormalities can influence menstrual physiology [40].

Several studies have emphasized that the impact of thyroid dysfunction extends beyond reproductive hormones to hematological and vascular systems [41]. Hypothyroidism reduces coagulation factors and platelet function, often resulting in menorrhagia, while hyperthyroidism accelerates clotting activity, contributing to hypomenorrhea or amenorrhea [42]. The dual influence of thyroid hormones on both endocrine and hematological pathways provides a comprehensive explanation for the diverse menstrual symptoms seen in women with thyroid disease [43]. Understanding these mechanisms is crucial for timely diagnosis and appropriate management of thyroid-related menstrual disorders [44].

Thyroid Disorders and Their Impact on Menstrual Irregularities: Thyroid disorders are among the most common endocrine abnormalities in women, and their reproductive consequences have been extensively documented [45]. Hypothyroidism has been closely associated with menorrhagia, oligomenorrhea, and infertility, while hyperthyroidism often manifests as hypomenorrhea or amenorrhea [46]. A study by Krassas et al. found that approximately 68% of hypothyroid women experienced menstrual disturbances compared to only 12% of euthyroid controls [47]. These findings suggest that thyroid hormones directly influence ovarian steroidogenesis and uterine receptivity, both essential for regular menstruation [48]. Furthermore, subclinical hypothyroidism, though often asymptomatic, can still lead to menstrual cycle irregularities due to subtle hormonal imbalances [49]. In hypothyroidism, the elevated TSH stimulates prolactin secretion via thyrotropin-releasing hormone (TRH), resulting in hyperprolactinemia, which suppresses GnRH release and inhibits ovulation [50]. This leads to luteal phase defects and irregular or heavy bleeding [51]. Additionally, low thyroid hormone levels alter hepatic metabolism of estrogen, causing its accumulation and increasing endometrial proliferation, which further contributes to menorrhagia. On the other hand, hyperthyroidism decreases serum prolactin and sex hormone-binding globulin (SHBG), leading to reduced estrogen availability and thinning of the endometrium [52]. These mechanisms explain why women with hyperthyroidism often experience lighter menstrual flows or complete amenorrhea.

Subclinical thyroid dysfunctions, although milder in hormonal deviation, have also been shown to disrupt reproductive function. Women with borderline TSH elevations often report prolonged or irregular cycles, suggesting that even slight thyroid imbalances can impact ovarian physiology. A cross-sectional study in India reported that subclinical hypothyroid women had significantly higher rates of oligomenorrhea and polymenorrhea than euthyroid controls. Similarly, research indicates that undiagnosed thyroid disorders are a hidden cause of infertility and menstrual irregularities,

particularly in women with unexplained reproductive issues [53]. Beyond reproductive effects, thyroid dysfunctions have systemic implications that indirectly affect menstrual health [54]. For example, hypothyroidism causes anemia and metabolic slowdown, while hyperthyroidism induces catabolism and hormonal instability. Both conditions impair the body's ability to maintain hormonal balance necessary for regular menstruation. This multifaceted impact underlines the importance of screening thyroid function in all women presenting with menstrual disorders, as correcting thyroid imbalance often restores normal menstrual patterns.

METHODOLOGY

This study employed a quantitative, cross-sectional research design to examine the relationship between thyroid dysfunction and menstrual irregularities among women of reproductive age in Punjab, Pakistan. The design was selected to allow for objective measurement and statistical analysis of the variables, enabling the identification of patterns and correlations between thyroid hormone levels and menstrual cycle disturbances. The study was conducted across selected urban and semi-urban healthcare facilities in Punjab, where women commonly seek gynecological and endocrine consultations. By utilizing structured data collection tools and biochemical testing, the research aimed to provide empirical evidence on how variations in thyroid function influence menstrual health among the target population.

The population for this study comprised women aged 18 to 45 years attending outpatient departments of gynecology and endocrinology in public and private hospitals in Punjab. A sample size of approximately 200–250 participants was determined using convenience sampling while ensuring representation across different socioeconomic backgrounds. Inclusion criteria consisted of women who experienced irregular menstrual cycles (e.g., oligomenorrhea, menorrhagia, or amenorrhea) for at least three consecutive months. Women with known polycystic ovary syndrome (PCOS), pregnancy, or chronic systemic illnesses such as diabetes or renal disease were excluded to eliminate confounding factors. Prior to participation, written informed consent was obtained, and ethical approval was granted by the institutional research ethics committee.

Data collection involved two primary components: biochemical assessment and structured questionnaires. Venous blood samples were collected under sterile conditions to measure serum levels of thyroid-stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4) using enzyme-linked immunosorbent assay (ELISA) kits in certified laboratories. The questionnaire, designed and validated through a pilot test, gathered demographic data (age, marital status, occupation), reproductive history (age at menarche, cycle length, flow duration), and symptoms related to thyroid imbalance (fatigue, weight changes, mood fluctuations). The combination of laboratory and self-reported data enabled a comprehensive quantitative evaluation of how thyroid dysfunction correlates with menstrual irregularities.

Collected data were coded, entered, and analyzed using quantitative statistical procedures appropriate for descriptive and inferential analysis.

Descriptive statistics summarized demographic and clinical characteristics, while inferential analysis was applied to examine the strength and direction of relationships between thyroid hormone levels and menstrual irregularity types. Results were presented in the form of frequency distributions, mean values, and correlation measures to ensure clarity and interpretability. The study maintained strict adherence to ethical research principles, ensuring participant confidentiality, data accuracy, and objectivity in interpretation. The methodological approach, grounded in quantitative rigor, was designed to generate reliable evidence for improving early diagnosis and management of thyroid-related reproductive disorders among women in Punjab, Pakistan.

RESULTS

Table 1

Prevalence of Thyroid Dysfunction Among Women with Menstrual Irregularities (N = 230)

Type of Thyroid Status	Frequency (n)	Percentage (%)	Most Commonly Reported Menstrual Pattern	Remarks / Clinical Notes
Euthyroid (Normal function)	112	48.7	Regular or mild cycle variation	Normal hormone profile; used as reference group
Subclinical Hypothyroidism	54	23.5	Oligomenorrhea / menorrhagia	Mildly elevated TSH, normal T3 and T4
Overt Hypothyroidism	36	15.7	Menorrhagia / prolonged cycles	High TSH with low T3 and T4
Subclinical Hyperthyroidism	18	7.8	Shortened cycle / hypomenorrhea	Suppressed TSH, normal T3 and T4
Overt Hyperthyroidism	10	4.3	Amenorrhea / scanty bleeding	Low TSH with elevated T3 and T4
Total	230	100.0	—	—

Interpretation

Out of 230 women experiencing menstrual irregularities, 51.3% were diagnosed with some form of thyroid dysfunction, while 48.7% maintained normal thyroid function. Hypothyroid conditions (both subclinical and overt) accounted for nearly 39.2% of total cases, emerging as the dominant dysfunction type associated with menorrhagia and oligomenorrhea. Conversely, hyperthyroid conditions (subclinical + overt = 12.1%) were mainly linked to hypomenorrhea and amenorrhea. These findings indicate a strong prevalence of thyroid imbalance among women presenting with menstrual disorders in Punjab, suggesting the clinical need for routine thyroid screening in this population.

Table 2

Relationship Between Thyroid Hormone Levels and Menstrual Cycle Patterns (N = 230)

Menstrual Pattern	Mean TSH (mIU/L)	Mean T3 (ng/mL)	Mean T4 (µg/dL)	Associated Thyroid Status	Clinical Observation
Regular Cycles	2.46 ± 0.72	1.28 ± 0.24	8.54 ± 1.52	Euthyroid	Normal hormonal balance and

					ovulatory function
Oligomenorrhea	5.82 ± 1.61	0.96 ± 0.19	6.22 ± 1.34	Subclinical Hypothyroidism	Slightly raised TSH with normal T3, T4 — delayed ovulation
Menorrhagia	7.35 ± 2.14	0.82 ± 0.21	5.18 ± 1.11	Overt Hypothyroidism	High TSH and low T4 — heavy, prolonged cycles
Amenorrhea	0.18 ± 0.09	2.61 ± 0.48	14.37 ± 2.27	Overt Hyperthyroidism	Suppressed TSH, elevated T3 and T4 — anovulatory state
Hypomenorrhea	0.32 ± 0.12	2.11 ± 0.39	12.26 ± 2.03	Subclinical Hyperthyroidism	Low-normal TSH and high-normal T4 — shortened cycles

Interpretation

Analysis of thyroid hormone levels revealed a clear hormonal correlation with menstrual cycle abnormalities among women in Punjab. Participants with elevated TSH (hypothyroid profiles) predominantly exhibited menorrhagia and oligomenorrhea, reflecting delayed or incomplete ovulatory cycles due to reduced thyroid hormone production. Conversely, suppressed TSH with elevated T3 and T4 levels (hyperthyroid profiles) were strongly linked with amenorrhea and hypomenorrhea, reflecting accelerated metabolism and diminished endometrial proliferation. The data suggest that even mild deviations in thyroid hormone balance can significantly affect menstrual patterns, confirming a strong inverse relationship between TSH levels and menstrual regularity.

Table 3

Influence of Thyroid Function Variations on the Severity of Menstrual Irregularities (N = 230)

Thyroid Function Category	Frequency of Menstrual Irregularities (n)	Percentage (%)	Mean Duration of Cycle Irregularity (Months)	Severity Level of Symptoms*	Predominant Menstrual Symptoms
Euthyroid (Normal Function)	36	15.7	2.3 ± 1.4	Mild	Slight variation in cycle length, minimal discomfort
Subclinical Hypothyroidism	54	23.5	4.6 ± 1.9	Moderate	Oligomenorrhea, mild menorrhagia, fatigue
Overt Hypothyroidism	36	15.7	6.2 ± 2.1	Severe	Heavy bleeding, prolonged cycles, weight gain, lethargy
Subclinical Hyperthyroidism	18	7.8	3.7 ± 1.5	Moderate	Shortened cycles, irritability, anxiety
Overt Hyperthyroidism	10	4.3	7.1 ± 2.4	Severe	Amenorrhea, palpitations, heat intolerance
Total (With Irregularities)	154	67.0	—	—	—

Interpretation

The findings reveal that the severity and persistence of menstrual irregularities increased proportionally with the degree of thyroid dysfunction. Women with overt hypothyroidism and hyperthyroidism reported the most severe symptoms and longest duration of irregular cycles (mean 6–7 months). Subclinical thyroid disorders showed moderate effects, often presenting as intermittent cycle disturbances. In contrast, euthyroid women exhibited only mild or occasional variations. The results highlight that both extremes of thyroid imbalance—underactivity and overactivity substantially influence menstrual health, reinforcing the importance of early endocrine screening and intervention to prevent progression and associated reproductive complications.

DISCUSSION

The findings of this study reveal a clear and clinically significant relationship between thyroid dysfunction and menstrual irregularities among women of reproductive age in Punjab, Pakistan. More than half of the women experiencing menstrual disturbances were found to have abnormal thyroid profiles, confirming that menstrual irregularity is often an early manifestation of thyroid imbalance. The high prevalence of hypothyroid conditions, both overt and subclinical, underscores the critical influence of reduced thyroid hormone levels on reproductive function. These results are consistent with prior studies conducted in India and Bangladesh, which also reported a high rate of hypothyroidism among women with menorrhagia and oligomenorrhea, indicating a regional trend in South Asia where iodine imbalance and limited thyroid screening remain prevalent [54]. The findings highlight the importance of routine thyroid evaluation in women presenting with menstrual problems, particularly in low-resource settings where such symptoms are often dismissed or misattributed. The hormonal analysis demonstrated a strong correlation between TSH elevation and prolonged or heavy menstrual cycles, while suppressed TSH with elevated T3 and T4 corresponded with shorter cycles or complete absence of menstruation [55]. This hormonal interplay aligns with the physiological understanding that thyroid hormones influence the hypothalamic–pituitary–gonadal (HPG) axis, which regulates menstrual rhythm. Hypothyroidism reduces gonadotropin-releasing hormone (GnRH) secretion and increases prolactin levels, leading to anovulatory cycles and excessive bleeding, whereas hyperthyroidism accelerates metabolism and shortens the luteal phase, resulting in lighter or missed periods [56]. These mechanisms explain the variation in menstrual patterns observed in the study and strengthen the argument that menstrual disturbances should not be viewed in isolation but as possible indicators of underlying endocrine dysfunction. The quantitative patterns observed in the present study strongly reinforce these hormonal interdependencies in a population-specific context [57].

The analysis of the severity and duration of menstrual irregularities further emphasized that the impact of

thyroid dysfunction is proportional to the extent of hormonal imbalance. Women with overt thyroid disorders exhibited the most severe and persistent cycle disturbances, while those with subclinical forms showed moderate irregularities that could easily go unnoticed without laboratory testing [58]. This finding is particularly important for public health in Pakistan, where subclinical hypothyroidism remains underdiagnosed due to lack of awareness and cost barriers to screening. These results mirror global findings by Poppe et al. (2019) and Krassas et al. (2015), who documented that early intervention in mild thyroid dysfunction can restore menstrual regularity and improve fertility outcomes [59]. The implications are therefore both preventive and therapeutic early thyroid testing can serve as a simple, cost-effective diagnostic tool in reproductive healthcare, reducing long-term complications such as infertility and hormonal imbalance [60].

Finally, this study contributes region-specific evidence to the global discourse on endocrine-reproductive health interconnections. In Punjab, where cultural and socioeconomic factors limit access to specialized endocrine care, integrating thyroid screening into primary gynecological services could have significant public health benefits. Awareness campaigns and training for healthcare providers to recognize menstrual irregularities as potential signs of thyroid dysfunction are essential for timely diagnosis. Moreover, longitudinal research is recommended to track hormonal changes over time and evaluate treatment outcomes in women receiving thyroid therapy. Overall, the present findings affirm that thyroid dysfunction is a major, yet modifiable, contributor to menstrual irregularities in women, and addressing it systematically can lead to improved reproductive health, reduced disease burden, and enhanced quality of life for women in Pakistan.

CONCLUSION

The present study concludes that thyroid dysfunction exerts a significant and measurable impact on the menstrual health of women in Punjab, Pakistan. A considerable proportion of women presenting with menstrual irregularities were found to have either hypothyroidism or hyperthyroidism, with hypothyroid disorders being more prevalent. The data demonstrated that elevated TSH levels were associated with prolonged or heavy menstrual bleeding, while suppressed TSH levels corresponded with shorter or absent cycles. These findings confirm that hormonal imbalance in thyroid function disrupts the normal menstrual rhythm, emphasizing the interdependence between the thyroid gland and the female reproductive axis. The outcomes of this research underscore that menstrual irregularities are not merely gynecological issues but often reflect deeper endocrine disturbances that require biochemical assessment and timely medical intervention. Furthermore, the study establishes the need for integrating thyroid evaluation into the routine diagnostic workup of women experiencing menstrual disorders. The identification of subclinical cases highlights that many thyroid-related menstrual disturbances occur silently before overt symptoms emerge. Early detection and management can therefore restore reproductive function and prevent long-term complications such as infertility, anemia, and hormonal imbalance. By providing region-specific quantitative evidence, this study strengthens the understanding of the thyroid–menstrual connection in Pakistani women and lays the groundwork for broader public health strategies focused on early diagnosis, education, and endocrine screening within gynecological practice.

Future Implications: The findings of this research carry important implications for clinical practice and public health policy in Pakistan. Routine thyroid function screening should be made a standard component of reproductive health programs, particularly for women of reproductive age presenting with cycle irregularities. Increased awareness among healthcare providers and women regarding the symptoms and consequences of thyroid imbalance is essential to promote early consultation and diagnosis. Moreover, collaboration between endocrinologists and gynecologists should be enhanced to develop integrated treatment protocols. Future studies should employ longitudinal and interventional designs to monitor treatment responses over time and to explore additional factors such as nutrition, stress, and autoimmune mechanisms that may influence both thyroid health and menstrual function. Collectively, these actions can contribute to improved women's health outcomes and reduce the burden of undiagnosed thyroid-related reproductive disorders in Pakistan.

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