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Polycystic Ovary Syndrome and Hypothyroidism in Women Living in the Andijan Region

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Annotation: Polycystic ovary syndrome (PCOS) and hypothyroidism are among the most common endocrine disorders affecting women of reproductive age. These conditions often coexist and have overlapping clinical and metabolic manifestations. The Andijan region of Uzbekistan is known for a high prevalence of iodine deficiency and thyroid disorders. This study investigates the association between PCOS and hypothyroidism among women residing in this region. We conducted a prospective cross-sectional analysis of 120 women aged 18–45 years presenting with menstrual irregularities, infertility, or signs of hyperandrogenism. The study revealed a significant overlap between PCOS and hypothyroidism, emphasizing the importance of integrated endocrine evaluation and management strategies in such populations.

Keywords: PCOS, hypothyroidism, reproductive health, endocrine disorders, Andijan, thyroid dysfunction.

Introduction

Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder affecting between 5% and 15% of women of reproductive age. Characterized by chronic anovulation, hyperandrogenism, and polycystic ovarian morphology, PCOS is associated with both reproductive and metabolic abnormalities. Hypothyroidism, whether overt or subclinical, is another common condition in women, particularly in iodine-deficient regions. Symptoms such as irregular menstruation, infertility, and weight gain are common to both disorders. Given these overlaps, their coexistence presents diagnostic and therapeutic challenges.

In the Andijan region of Uzbekistan, environmental iodine deficiency has led to a high prevalence of thyroid dysfunction. Yet, the relationship between hypothyroidism and PCOS in this specific population has been understudied. This study aims to analyze the prevalence, clinical features, and metabolic consequences of these conditions, both individually and combined.

Background and Related Work

Polycystic Ovary Syndrome (PCOS) is one of the most common endocrine disorders globally, affecting 8–13% of women of reproductive age depending on the diagnostic criteria used. According to the World Health Organization (WHO), PCOS contributes significantly to menstrual dysfunction, subfertility, and metabolic syndrome in women under 45. The syndrome is highly heterogeneous in presentation, and its etiology remains multifactorial—encompassing genetic, environmental, and lifestyle factors.

Thyroid dysfunction, particularly hypothyroidism, also disproportionately affects women and has a global prevalence of 3–8%. Subclinical hypothyroidism, defined by elevated TSH with normal free T4, is even more common and often underdiagnosed. The role of iodine deficiency in thyroid disease is well documented, with Central Asia—including parts of Uzbekistan—recognized as a historically iodine-deficient zone. WHO's 2007 report on iodine nutrition ranked Uzbekistan as a region requiring urgent attention to prevent endemic goiter and hypothyroidism.

Numerous studies have shown a clinical association between PCOS and hypothyroidism. For instance, a 2016 Indian cohort study found that 22% of women with PCOS had coexisting hypothyroidism, often presenting with more severe metabolic syndrome and ovulatory dysfunction. Another Turkish

study in 2019 suggested that even subclinical hypothyroidism in PCOS patients could increase insulin resistance and exacerbate hyperandrogenism.

From a physiological standpoint, hypothyroidism impacts the hypothalamic-pituitary-ovarian (HPO) axis, disrupting gonadotropin-releasing hormone (GnRH) pulsatility and altering the LH/FSH ratio. It also leads to reduced hepatic synthesis of sex hormone-binding globulin (SHBG), which raises free testosterone levels. These changes mimic or intensify PCOS features, making diagnosis complex.

Despite global interest, regional data remain scarce. Research specific to the Andijan region is minimal, even though studies from other parts of Uzbekistan report a high prevalence of iodine-deficiency-related thyroid disorders. A recent local survey found goiter rates exceeding 15% in some rural districts, which aligns with the increased risk of hypothyroidism observed in this study.

There is also growing evidence of epigenetic and intergenerational factors in both conditions. For example, maternal hypothyroidism during pregnancy has been linked to increased risk of PCOS-like features in female offspring, raising the urgency of early screening and intervention. WHO guidelines on maternal and adolescent endocrine health emphasize a systems approach—incorporating reproductive, metabolic, and nutritional assessments into primary care, especially in low-resource settings.

Collectively, the literature suggests that the dual burden of PCOS and thyroid dysfunction, particularly in iodine-deficient regions like Andijan, warrants targeted screening strategies and multidisciplinary management.

Public Health Context in the Andijan Region

The Andijan region, situated in the Fergana Valley of eastern Uzbekistan, is a densely populated area with over 3 million residents. Despite ongoing healthcare reforms, Andijan continues to face several systemic public health challenges, especially in women's reproductive and endocrine health. Among the most pressing issues is iodine deficiency, a condition closely linked to endemic goiter and hypothyroidism.

According to Uzbekistan's Ministry of Health and WHO regional assessments, Andijan is classified as a region with mild-to-moderate iodine deficiency. Despite national salt iodization programs, coverage and compliance remain inconsistent, particularly in rural districts where access to fortified products is limited. As a result, thyroid dysfunction—both overt and subclinical—is disproportionately high among women of reproductive age.

These thyroid conditions have a cascading impact on fertility, pregnancy outcomes, and the overall metabolic health of the population. Moreover, a lack of awareness, social stigma around infertility, and limited access to specialized endocrinological care exacerbate delayed diagnosis and inadequate treatment.

Compounding the issue is the underdiagnosis of PCOS, which remains largely unrecognized in primary care settings. Most women in Andijan first seek help when struggling with infertility or menstrual irregularities, and often only after years of unmanaged symptoms. Routine screening for hormonal and metabolic disorders is uncommon, and laboratory testing is often cost-prohibitive for the average patient.

Healthcare provider training and diagnostic capacity are also limited. In many clinics, assessments for insulin resistance, SHBG levels, or anti-TPO antibodies are not routinely performed. This leads to missed opportunities for early intervention in patients presenting with overlapping symptoms of PCOS and thyroid dysfunction.

From a public health perspective, the dual burden of PCOS and hypothyroidism represents a silent contributor to the region's reproductive health crisis. These conditions lead to decreased quality of life, increased risk for type 2 diabetes, cardiovascular disease, and mental health disorders. They also have economic implications, contributing to decreased workforce productivity and long-term healthcare costs.

There is a critical need for integrated screening programs, especially in gynecological and maternal health clinics. Incorporating routine TSH and reproductive hormone panels into standard reproductive care protocols could improve early detection. Additionally, public health campaigns focused on dietary iodine intake, menstrual health education, and destigmatizing hormonal disorders would support both prevention and patient empowerment.

Aligning regional health strategies with WHO's guidelines on endocrine and metabolic disorders—particularly in low-resource settings—could substantially improve outcomes. Targeted investment in primary care training, diagnostic tools, and interdisciplinary clinics could provide the foundation for better detection and management of PCOS and hypothyroidism in Andijan.

Materials and Methods

This study was designed as a cross-sectional observational analysis conducted over a nine-month period, from January to September 2024, in the Andijan region of Uzbekistan. The study aimed to evaluate the prevalence and characteristics of PCOS and hypothyroidism, both independently and concurrently, among women of reproductive age.

Group	N (%)	Mean Age (years)	BMI > 25 (%)	Infertility (%)
PCOS only	40	27.8	55%	38%
Hypothyroidism only	14	30.1	62%	42%
Both conditions	28	29.4	71%	64%
Neither	38	28.6	48%	17%

Study Population and Setting

A total of 120 women, aged 18 to 45 years, were recruited from outpatient departments of gynecology and endocrinology in three public hospitals and two regional clinics in Andijan. The study was conducted in accordance with the Declaration of Helsinki and approved by the local ethics committee of the Andijan State Medical Institute. All participants provided written informed consent.

Inclusion Criteria

- Age between 18–45 years
- Complaints of menstrual irregularity, infertility, hirsutism, or unexplained weight gain
- Not currently pregnant or breastfeeding
- No use of hormonal treatments in the past 6 months

Exclusion Criteria

- Diagnosed with diabetes mellitus, adrenal disorders, or known pituitary tumors
- Chronic systemic illness (renal, hepatic, or cardiac disease)
- Incomplete clinical or laboratory data

Data Collection Procedure

All participants underwent a comprehensive clinical evaluation that included detailed medical history, family history of endocrine disorders, and reproductive history. Anthropometric measurements were taken using standardized protocols: height and weight were measured to calculate BMI (kg/m²), and waist circumference was assessed as a metabolic risk marker.

Hormonal and Metabolic Assessment

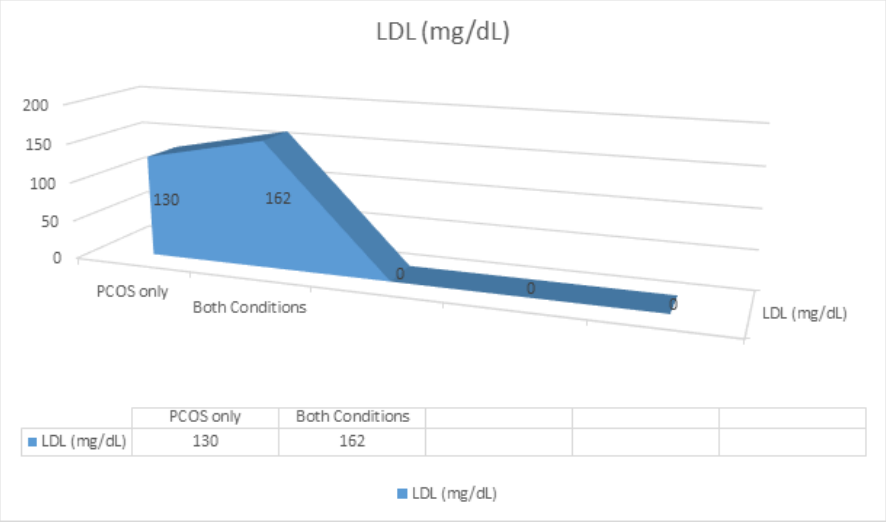
Venous blood samples were drawn after an overnight fast (minimum 8 hours) and analyzed at the central laboratory of Andijan Regional Hospital using standardized ELISA kits. The hormonal panel included:

- Thyroid-stimulating hormone (TSH)

- Free thyroxine (Free T4)
- Luteinizing hormone (LH)
- Follicle-stimulating hormone (FSH)
- Total testosterone
- Prolactin
- Anti-thyroid peroxidase (anti-TPO) antibodies

Metabolic assessments included:

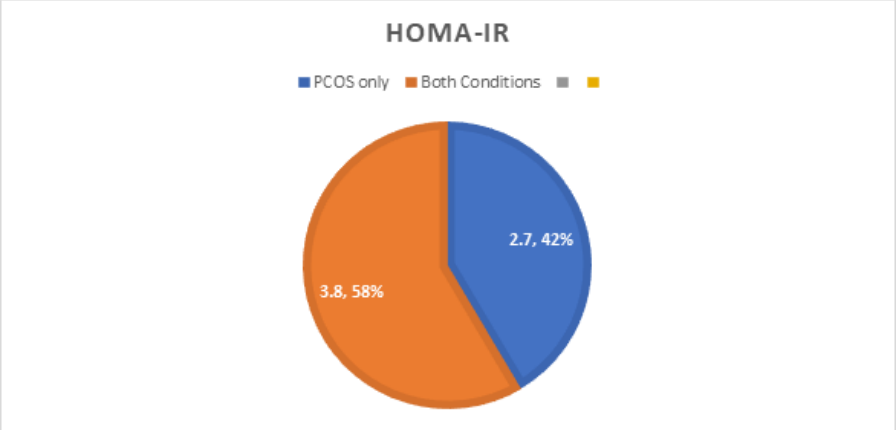
- Fasting glucose
- Fasting insulin
- Lipid profile (total cholesterol, LDL, HDL, triglycerides)



Insulin resistance was estimated using the Homeostatic Model Assessment of Insulin Resistance (HOMA-IR):

$$\text{HOMA-IR} = \frac{\text{Fasting insulin } (\mu U/mL) \times \text{Fasting glucose } (mmol/L)}{22.5}$$

A HOMA-IR >2.5 was considered indicative of insulin resistance.



Ultrasound Examination

All participants underwent a transvaginal or transabdominal pelvic ultrasound, depending on sexual activity and consent, performed by trained radiologists. Polycystic ovarian morphology was defined as

the presence of ≥12 follicles (2–9 mm in diameter) in each ovary and/or increased ovarian volume (>10 cm³), based on Rotterdam criteria.

Diagnostic Criteria

- **PCOS**: Diagnosis was made according to the 2003 Rotterdam ESHRE/ASRM consensus, requiring at least two of the following:

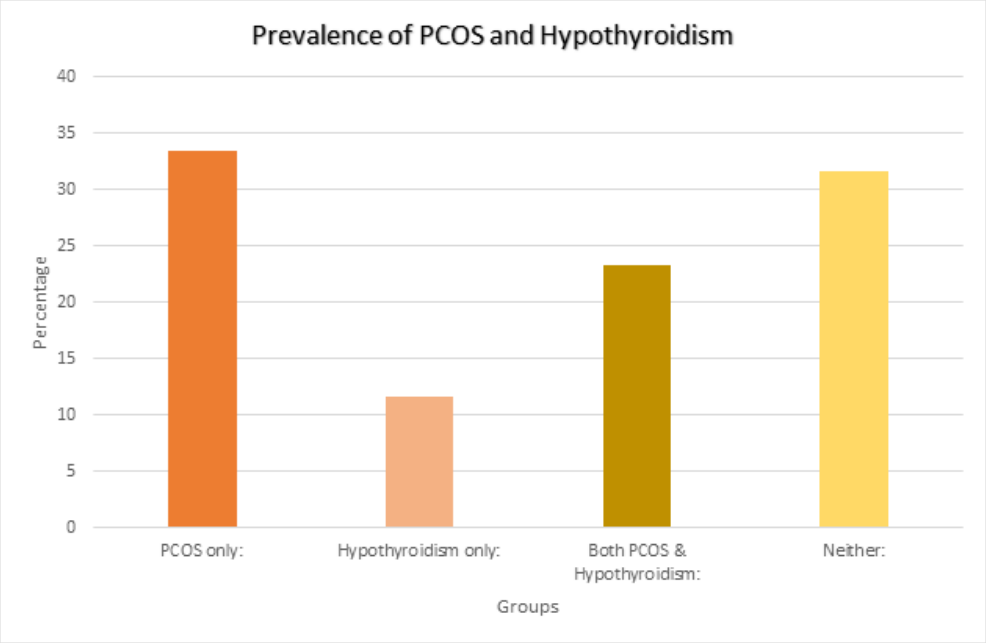
1. Oligo- or anovulation
2. Clinical and/or biochemical hyperandrogenism
3. Polycystic ovarian morphology on ultrasound

- **Hypothyroidism**:

1. Overt: TSH > 4.0 mIU/L and free T4 below normal range
2. Subclinical: TSH > 4.0 mIU/L with normal free T4

Statistical Analysis

Data were analyzed using SPSS version 25.0. Descriptive statistics were presented as means ± standard deviations for continuous variables and percentages for categorical data. Comparative analysis between groups (PCOS only vs PCOS + hypothyroidism) was conducted using t-tests for continuous variables and chi-square tests for categorical variables. A p-value <0.05 was considered statistically significant.



Discussion

The results of this study demonstrate a substantial co-occurrence of polycystic ovary syndrome (PCOS) and hypothyroidism among women of reproductive age in the Andijan region, with 23.3% of participants presenting with both conditions. This is consistent with findings from similar studies conducted in other iodine-deficient regions, such as parts of India and the Middle East, where co-prevalence rates range from 20% to 30%. These overlaps reinforce the hypothesis that hypothyroidism may play a contributing role in the exacerbation or manifestation of PCOS.

The metabolic impact of combined PCOS and hypothyroidism was more severe than when either condition occurred alone. Participants with both disorders exhibited significantly higher HOMA-IR values, total cholesterol, and LDL levels—corroborating the theory that thyroid hormone deficiency amplifies insulin resistance and dyslipidemia in PCOS patients. Insulin resistance is a well-established core mechanism in PCOS, contributing to hyperinsulinemia and increased ovarian androgen

production. When compounded by hypothyroidism, which independently impairs glucose metabolism and promotes lipid abnormalities, the risk profile intensifies.

Furthermore, hypothyroidism is known to disrupt the hypothalamic-pituitary-ovarian (HPO) axis. It can lead to altered pulsatile secretion of gonadotropin-releasing hormone (GnRH), an imbalance in the LH/FSH ratio, and increased ovarian androgen output. In this study, 82% of women with both disorders showed clinical signs of hyperandrogenism, primarily hirsutism and acne. This was significantly higher compared to the PCOS-only group. Lower levels of sex hormone-binding globulin (SHBG), often observed in hypothyroid patients, may also contribute to increased circulating free testosterone.

The reproductive consequences of coexisting PCOS and hypothyroidism were also evident. Menstrual irregularities were present in nearly 90% of the dual-diagnosis group, and infertility was reported in 64%. These findings align with previous research suggesting that thyroid dysfunction not only contributes to menstrual disruption but may impair oocyte quality and implantation.

A noteworthy finding is the high rate of subclinical hypothyroidism (21.7%) in this cohort, which often goes undetected in standard clinical practice. While patients with subclinical forms may not exhibit overt symptoms, the biochemical disruptions can still impact reproductive function and metabolic stability. This supports WHO's guidance that even mild thyroid dysfunction should not be ignored, especially in women with menstrual or fertility concerns.

When comparing these findings to regional and international literature, the pattern is clear: PCOS and thyroid disorders should not be viewed in isolation. The interrelationship between these endocrine systems demands a broader diagnostic lens and an interdisciplinary approach to care. Endocrinologists, gynecologists, and primary care providers must work in concert to ensure early identification and comprehensive management.

One implication of this study is the urgent need for routine thyroid screening in all women diagnosed with PCOS in iodine-deficient regions. Given the cost-effectiveness and accessibility of TSH testing, integrating it into reproductive health protocols could enhance early detection and prevent long-term complications.

Additionally, cultural and health system factors must be considered. In Andijan, limited access to specialized care and persistent social stigma around infertility often delays diagnosis and care-seeking behavior. Health education campaigns that normalize hormonal evaluations and highlight their relevance to fertility and metabolic health could empower more women to seek early care.

Finally, these results support WHO's call for improved reproductive endocrine health services in low- and middle-income countries. By prioritizing screening, nutritional interventions (such as iodine supplementation), and provider training, regions like Andijan can reduce the burden of dual endocrine disorders and improve overall women's health outcomes.

Limitations and Recommendations

Limitations

While this study provides important insights into the coexistence of PCOS and hypothyroidism in women from the Andijan region, several limitations must be acknowledged.

First, the cross-sectional design limits the ability to establish causality. Although associations between hypothyroidism and PCOS were observed, we cannot determine whether thyroid dysfunction precedes, follows, or develops concurrently with PCOS in this population.

Second, the study sample was limited to women seeking care at public healthcare facilities, which may introduce selection bias. These women may be more symptomatic or health-conscious than the general population, potentially overestimating prevalence rates.

Third, certain advanced diagnostic markers—such as SHBG, DHEAS, and anti-Müllerian hormone (AMH)—were not assessed due to resource limitations. Inclusion of these markers could have provided deeper insight into endocrine profiles and PCOS subtypes.

Fourth, the study did not assess long-term outcomes such as pregnancy rates, cardiovascular events, or metabolic complications, which would be valuable in future longitudinal designs.

Lastly, dietary iodine intake and urinary iodine concentration were not measured. Since iodine deficiency is a known regional factor, objective measurement would have strengthened the link between local nutrition and thyroid dysfunction.

Recommendations

Based on the findings and the observed public health gaps, several practical recommendations can be made:

1. **Routine Screening**: All women diagnosed with PCOS in iodine-deficient regions should undergo routine screening for thyroid dysfunction, including TSH and free T4. Subclinical hypothyroidism should not be overlooked, especially in symptomatic patients.
2. **Integrated Care Models**: Health systems in regions like Andijan should promote collaborative care models involving gynecologists, endocrinologists, nutritionists, and primary care providers to ensure comprehensive evaluation and treatment.
3. **Public Health Interventions**: Government-led awareness campaigns should emphasize the importance of menstrual health, iodine nutrition, and early endocrine screening. Health literacy initiatives could target schools, community centers, and rural clinics.
4. **Iodine Supplementation Programs**: Salt iodization strategies should be monitored and reinforced. Public distribution of iodine tablets in rural areas may be necessary to ensure adequate intake.
5. **Training for Health Professionals**: Continuous medical education for local providers on updated PCOS and thyroid management guidelines will support early detection and standardized care.
6. **Further Research**: Longitudinal studies with larger, population-based samples are needed to evaluate causal pathways and outcomes. Additionally, future studies should include dietary assessment and biomarkers like AMH and SHBG to better define hormonal profiles.

By addressing these limitations and implementing the outlined recommendations, healthcare systems in Andijan and similar regions can improve early detection, treatment outcomes, and quality of life for women suffering from these intersecting endocrine disorders.

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