

Research Article

Pattern of Thyroid Disorders in First-Trimester of Pregnancy: A study in a Teaching Hospital in Madhesh Province, Nepal

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ABSTRACT

Background & Objectives: Thyroid disorders are common in pregnancy and associated with a higher risk of maternal and fetal complications. Early detection and intervention can prevent most of those complications. This study, conducted in a teaching hospital in the Madhesh province of Nepal, aimed to assess the prevalence of thyroid disorders in the first trimester of pregnancy in this region.

Material and Methods: A cross-sectional observational study was conducted at Janaki Medical College Teaching Hospital, Dhanusha, Nepal, over six months, from August 2021 to February 2022, after taking ethical clearance. All the females in their first trimester of pregnancy who gave their consent were included in this study. Blood samples were collected for thyroid

function test in the early morning after overnight fasting.

Results: Among 180 pregnant women, 80% were euthyroid and 20% had thyroid dysfunction. Subclinical hypothyroidism (12.22%) was most common, followed by overt hypothyroidism (6.11%) and subclinical hyperthyroidism (1.67%). No cases of overt hyperthyroidism were detected.

Conclusion: Thyroid dysfunction, particularly subclinical hypothyroidism, was common among pregnant women studied. Routine screening may help to prevent adverse maternal and fetal outcomes.

Keywords: First trimester, hypothyroidism, pregnancy, subclinical hypothyroidism, thyroid disorders

INTRODUCTION

Normal thyroid homeostasis is disrupted during pregnancy due to physiological changes such as increased metabolic demand, hormonal fluctuations, and altered iodine metabolism. These changes make pregnant women more vulnerable to thyroid disorders, which are associated with adverse maternal and fetal outcomes [1]. If left untreated, thyroid disorders can result in complications

such as miscarriage, preterm labor, preeclampsia, and neurodevelopmental anomalies in the infant [2]. Globally, the most common thyroid disorder in pregnancy is subclinical hypothyroidism, with a reported prevalence of 2%–18%, varying by geographic and demographic factors [3]. In regions with iodine deficiency, such as South Asia, the prevalence is further increased by suboptimal dietary iodine intake and limited access to diagnostic services [4].

Although thyroid disorders are common during pregnancy, their detection is often challenging because of nonspecific symptoms and the hypermetabolic state of pregnancy [5]. Targeted screening is increasingly recommended in high-risk groups, such as populations with a high prevalence of thyroid disease or documented iodine deficiency, although universal screening remains controversial [6]. Despite the implementation of national salt iodization programs, iodine deficiency continues to affect Nepal, particularly in the Terai region [7]. However, data on thyroid function in pregnancy are still scarce, especially in Madhesh Province, highlighting the need for institution-based studies to generate evidence that can guide local healthcare policy.

Maternal thyroid hormone is essential for fetal development and the progression of pregnancy, particularly in the early stages before the fetal thyroid gland becomes fully functional. While overt thyroid disorders are well established as risk factors for obstetric and fetal complications, growing evidence suggests that subclinical thyroid disorders are also associated with adverse outcomes [8]. Both overt and subclinical thyroid dysfunction—including hypothyroidism, hyperthyroidism, and autoimmune thyroid disease have been linked to complications

such as gestational hypertension, preterm delivery, low birth weight, and irreversible cognitive impairment in children [9]. Early treatment of thyroid dysfunction significantly reduces the risk of adverse outcomes, including fetal loss and preterm birth [10].

Given the limited recent data on thyroid function during pregnancy in Madhesh Province, this study aimed to assess the prevalence of thyroid disorders among pregnant women in their first trimester of pregnancy, attending Janaki Medical College Teaching Hospital (JMCTH). The findings are expected to provide insight into the local prevalence of thyroid disorders and contribute to evidence-based screening and intervention strategies in resource-limited settings.

MATERIALS AND METHODS

Study design and setting

This cross-sectional descriptive study was conducted over six months, from August 2021 to February 2022, through collaboration among the Departments of Physiology, Biochemistry, and Obstetrics and Gynecology at Janaki Medical College and Teaching Hospital (JMCTH). JMCTH is a 450-bed referral hospital located in Ramdaiya-Bhawadi, Kshireswarnath Municipality, Dhanusha District, Madhesh Province, Nepal.

Participants and procedures

Pregnant women aged 18–40 years in their first trimester, attending the antenatal outpatient department (OPD) at JMCTH, were invited to participate. Only those without a known thyroid disorder and who provided informed consent were enrolled. A structured questionnaire was used to collect socio-

demographic data (age, occupation), medical and obstetric history, and personal and family history of thyroid disease, diabetes mellitus, autoimmune disorders, and hypertension.

Inclusion and exclusion criteria

Inclusion criteria were pregnant women over 18 years of age with singleton pregnancies up to 12 weeks of gestation, regardless of gravida status. Exclusion criteria included women with known thyroid disorders; current or past use of thyroid medications (e.g., levothyroxine, methimazole, propylthiouracil) or drugs affecting thyroid function (e.g., amiodarone, lithium); pre-existing metabolic conditions such as diabetes mellitus, dyslipidemia, hepatic disease, or hypertension; pregnancies beyond 12 weeks of gestation; or unwillingness to participate.

Blood sample collection and laboratory analysis

Blood samples were collected in the morning after an overnight fast. Serum levels of thyroid-stimulating hormone (TSH), free triiodothyronine (FT3), and free thyroxine (FT4) were measured using chemiluminescence immunoassay (CLIA). Laboratory reference ranges were used for interpretation.

- **Subclinical hypothyroidism** was defined as elevated TSH with normal FT4.
- **Overt hypothyroidism** was defined as elevated TSH with low FT4.
- **Euthyroid** was defined as TSH within the normal range.

- **Subclinical hyperthyroidism** was defined as suppressed TSH with normal FT4.
- **Overt hyperthyroidism** was defined as suppressed TSH with elevated FT4.

Statistical analysis

Data were analyzed using SPSS version 26. Continuous variables were expressed as mean \pm standard deviation (SD). Descriptive statistics were applied to summarize participant characteristics and thyroid status. Thyroid hormone levels were compared between primigravida and multigravida women using the student's *t*-test. A *p*-value <0.05 was considered statistically significant.

Ethical considerations

The study was approved by the Institutional Review Committee of JMCTH (IRC/11/2077-078). Written informed consent was obtained from all participants.

RESULTS

A total of 180 pregnant women, aged 18–40 years, participated in the study. Most of the participants were in age group 30–34 years 44(24.44%) as shown in Table 1)

Table 1: Age distribution of the participants

Age Group	Frequency	Percent
18-23	42	23.33
24-29	79	43.89
30-34	44	24.44
35-40	15	8.33

The mean age was 27.53 years. Of the participants, 70 (38.9%) were primigravida, while 110 (61.1%) were multigravida (Figure 1).

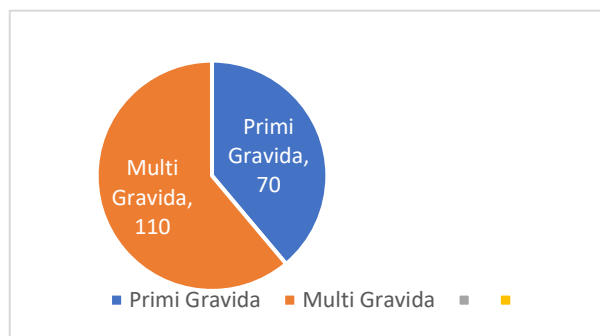


Figure 1: Distribution of participants according to gravidity

Table 2: Mean thyroid hormone levels of participants

Hormone	Mean \pm SD	Reference Range
TSH (μ IU/ml)	3.77 ± 4.39	0.38 to 4.31
FT4 (pmol/L)	15.41 ± 3.88	10.6 to 21.0
FT3 (pg/ml)	2.60 ± 0.97	1.21 to 4.20

The mean values of thyroid hormones are shown in Table 2. Overall, mean FT3, FT4, and TSH values were within the normal laboratory reference range.

Out of 180 participants, 144 (80%) were euthyroid, 22 (12.22%) had subclinical hypothyroidism, 11 (6.11%) had overt hypothyroidism, and 3 (1.67%) had subclinical hyperthyroidism. No cases of overt hyperthyroidism were observed (Figure 2).

No statistically significant differences in thyroid hormone levels were observed between primigravida and multigravida participants (Table 3).

Table 3: Comparison of thyroid hormone levels between primigravida and multigravida

Variable	Primigravida (Mean \pm SD)	Multigravida (Mean \pm SD)	p-value
FT3	2.59 ± 0.94	2.61 ± 1.00	0.892
FT4	15.36 ± 3.93	15.45 ± 3.87	0.882
TSH	4.32 ± 5.12	3.41 ± 3.84	0.207

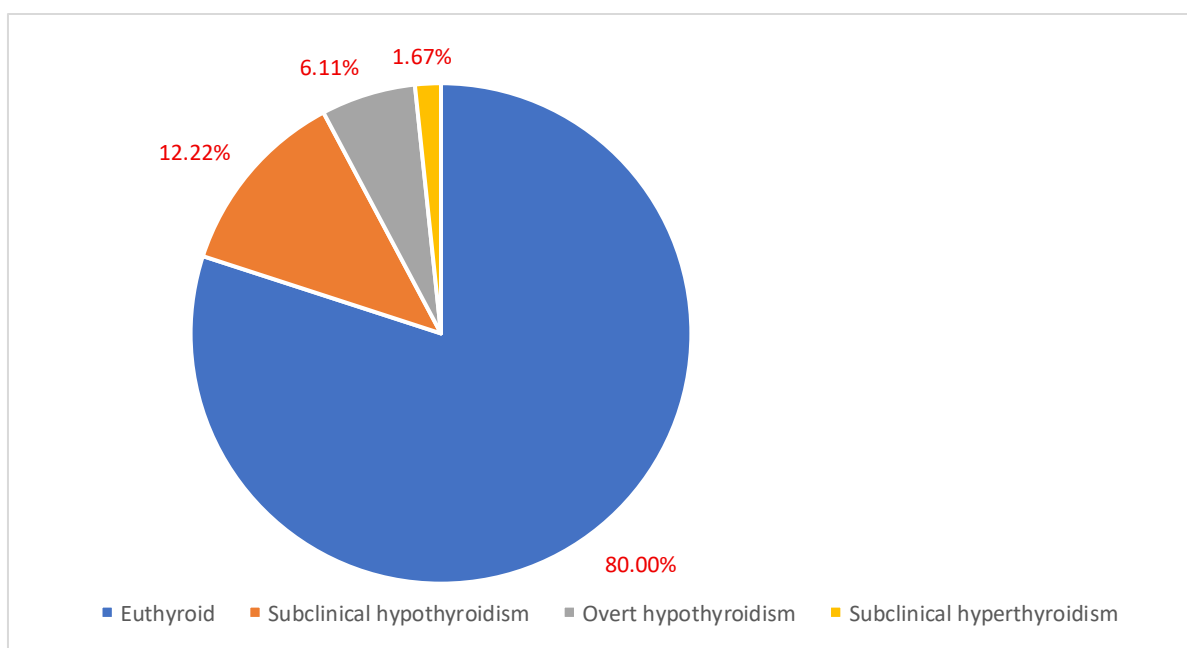


Figure 2: Thyroid status among pregnant females

DISCUSSION

Thyroid disorders are common among pregnant women worldwide, and their prevalence in Nepal has also been reported to be high [11]. Early diagnosis and timely intervention, however, can prevent several associated complications [12].

In the present study, 20% of pregnant women were found to have thyroid disorders. This prevalence is comparable to a study conducted in eastern Nepal, which reported 20.65% prevalence [13], but higher than the 14.7% reported in another tertiary hospital study in Nepal [14]. A separate study in Nepal showed an even higher prevalence of 39.48% [15], which may be attributed to the use of specific reference ranges based on the American Thyroid Association (ATA) guidelines [16]. Studies from neighboring countries have also reported varying prevalence rates. In one study among 1000 first-trimester pregnant women in northern India, the prevalence was 14.7% [17], while another study in India reported 10% prevalence [18]. In Bangladesh, the prevalence was reported at 15.6% in the first trimester [19].

Hypothyroidism was the most common thyroid disorder in our study (18.33%), consistent with findings from several previous studies. Subclinical hypothyroidism accounted for 12.22% of cases, similar to the 14.3% reported in a first-trimester study in Nepal [20]. A study from Kathmandu reported a prevalence of 19.75% for subclinical hypothyroidism, while overt hypothyroidism was observed in 2.43% of cases, lower than the 6.11% reported in our study [21]. Another study from Lumbini Province reported prevalence rates of 12.8% for subclinical hypothyroidism and 5.8% for

overt hypothyroidism [22]. Other studies in Nepal have also demonstrated variable rates of subclinical hypothyroidism in pregnancy. This variation may likely be due to different geographical conditions, iodine status, and different reference ranges used by the laboratories.

Hyperthyroidism was diagnosed in 1.67% of our study population. Comparable rates have been reported in Nepal: 2.4% in the first trimester [20], 2% [14], and 3.3% (0.7% overt and 2.6% subclinical) [23]. Indian studies have shown similar prevalence rates, with Sahu et al. reporting 1.72% (0.78% overt and 0.94% subclinical) [24], Barse et al. reporting 1.4% [25], and Saraladevi et al. reporting 2.4% (1.8% subclinical and 0.6% overt) [26].

No significant differences were observed in thyroid function test results between primigravida and multigravida women. Shrestha et al. found the prevalence of hypothyroidism to be 14.5% in primigravida and 11.2% in multigravida women. Similarly, the prevalence of hyperthyroidism was 1.4% and 1.9% in primigravida and multigravida women, respectively. However, a study in India has shown a higher prevalence of both subclinical and overt hypothyroidism in multigravida compared to primigravida [27]. The association between thyroid disorders and gravidity status needs to be further studied with a larger sample size.

The limitation of this study was that it was a single-center, cross-sectional design, which may restrict generalizability and preclude assessment of thyroid changes across pregnancy. The use of laboratory-based rather than trimester-specific reference ranges, lack of data on iodine status and thyroid autoantibodies, and relatively small

sample size may also have influenced the findings.

CONCLUSION

Thyroid dysfunction was relatively common among pregnant women in Madhesh Province, with subclinical hypothyroidism being the most prevalent form. Although most participants were euthyroid, one in five had abnormal thyroid function, underscoring the importance of early detection. Given the potential maternal and fetal complications associated with untreated thyroid disorders, routine thyroid function screening during pregnancy should be considered in similar low-resource settings to enable timely diagnosis and intervention.

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