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ORIGINAL ARTICLE

Prevalence of thyroid disorders during early pregnancy at Bharatpur Hospital, Chitwan district

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Abstract

Introduction: Thyroid disorders are highly prevalent among pregnant women. Thyroid dysfunction, particularly during the first trimester, can significantly impact maternal and fetal outcomes, especially during the critical period of organogenesis, and thus adequate management is required. The rationale of this study is the necessity of adequate treatment of hypothyroidism during gestation, which minimizes the risks and generally makes it possible for pregnancies to be carried out to term without complications.

Method: This is a cross-sectional observational study conducted from July 2020 to February 2021 at the Department of Obstetrics and Gynecology, Bharatpur Hospital, after ethical approval was taken from IRB NAMS (Ref no.529/2077/78). A total of 80 pregnant women in their first trimester (≤13 weeks) who met the inclusion criteria were recruited through convenience sampling. Thyroid function was assessed by measuring serum TSH, free thyroxine (FT4), and free triiodothyronine (FT3).

Result: Among 80 pregnant women in the first trimester of pregnancy,47(58.8%) were euthyroid, 2(2.5%) hyperthyroid,22 (27.5%) subclinical hypothyroid, and 9(11.3%) overt hypothyroid. Among them, 40.3% were multigravida women (30.4% and 13%, respectively) and 31.3% were primigravida (23.5% and 8.8%).

Conclusion: Approximately one in four pregnant women had thyroid dysfunction, predominantly subclinical hypothyroidism. Given the substantial impact of thyroid disorders on maternal and fetal health, routine screening of pregnant women for thyroid disorders should be considered, especially in high-prevalence settings like Nepal, to enable timely diagnosis and intervention.

Keywords: Hyperthyroidism, Overt Hypothyroidism, Pregnancy, Subclinical Hypothyroidism

INTRODUCTION

Thyroid disorders in mothers during early pregnancy can have a significant impact on both pregnancy outcomes and the baby's development.[1] Thyroid dysfunction is associated with complications such as premature birth, pregnancy-induced hypertension, higher risk of fetal mortality, and low birth weight.[2,3] Additionally, maternal hypothyroidism and low thyroid hormone levels in the first trimester can negatively affect the baby's brain development, potentially leading to developmental delays and cognitive impairment.[4] The thyroid disorders can be clinically classified into hypothyroid and hyperthyroid states.

Undiagnosed hypothyroidism in pregnant women may adversely affect their fetuses; therefore, screening for thyroid deficiency during pregnancy may be warranted. Thyroid function in the high-risk group would miss about 81.6% pregnant women with hypothyroidism and 80.4% pregnant women with hyperthyroidism.[5] During pregnancy, spontaneous hypothyroidism has a prevalence of about 2% to 3% with 0.3% to 0.5% women presenting with overt hypothyroidism and 2% to 2.5% with subclinical hypothyroidism. On the other hand, overt hyperthyroidism can affect up to 0.1% to 0.4% of pregnancies.[6]

The aim of this study was to identify the prevalence of thyroid dysfunctions in the first trimester of pregnancy. The thyroid function test is not part of routine antenatal investigations per the government protocol in Nepal, which may lead to underdiagnosis of clinically relevant cases and affect the overall health of both the mother and the fetus. The timely diagnosis and adequate treatment would thereby minimize risks, allowing uneventful pregnancies.

METHOD

This was a cross-sectional observational study done from July 2020 to February 2021 at the Department of Obstetrics and Gynecology at Bharatpur Hospital, Bharatpur. All the patients with live pregnancies of less than 13 weeks of gestation were included in the study. The patients with known cases of thyroid disorders and those unwilling to participate were excluded from the study.

The sample size for this study was calculated using the formula n=Z^2pq/d^2, where p represents the prevalence of thyroid disorders in early pregnancy (11.6%), z corresponds to the 95% confidence level (1.96), q=1−p (88.4%), and d is the acceptable margin of error (7%). Substituting these values, the sample size of 80 patients was calculated using the prevalence study design.[7] Informed written consent was taken from all the patients prior to the study. The Thyroid function tests (TFT) included blood tests for thyroid-stimulating Hormone, free T4, and free T3. Abnormal TFT reports were evaluated, and the patients were sent for Endocrine consultation for further management.

Demographic data for all patients were collected. These included age, Body Mass Index (BMI), religion, ethnicity, the number of previous pregnancies, and the last menstrual period. The Gestational age was calculated using Naegele's rule. An obstetric scan was done by Radiologists to confirm the gestational age. A detailed personal and family history of thyroid disorder was taken, along with reproductive histories like miscarriages, preterm deliveries, and infertility. The Thyroid Function Test was performed, and the results were collected. The TFT was done by the ECi method. The machine used was Vitros ECi, and the tests were conducted at Bharatpur Hospital. A pro forma was used to collect data, including all relevant details.

The first trimester-specific reference ranges for TFT were TSH 0.05-2.53µIU/ml, FT4 0.95-1.53ng/dl, FT3 1.54-5.22 pg/ml.[8] Overt hypothyroidism was considered when TSH > 2.53µIU/ml with FT4 < 0.95ng/dl with low or normal FT3 level. Subclinical hypothyroidism was considered when TSH > 2.53µIU/ml with normal FT3 and FT4. Euthyroid was considered when TSH, FT3, and FT4 were normal. Hyperthyroidism was defined as TSH < 0.05 µIU/mL and FT4 > 1.53 ng/dL, with normal or high FT3.

Data were collected and entered into MS Excel, and analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 16. Descriptive statistics were used to characterize the participants. Categorical data were summarized in percentages and proportions, whereas mean, standard deviation, and median were used for continuous data. Data were presented in frequency distribution tables. The relationship between BMI and thyroid disorder was assessed using the Chi-Square Test. A two-tailed p-value of <0.05 was considered clinically significant.

Informed written consent was taken from all the patients prior to the study. Ethical approval was obtained from the Institutional Review Board of the National Academy of Medical Sciences, Bir Hospital (Ref no:529/2077/78).

RESULT

Of the 80 patients, 28 (35%) were in the 18-23 years age group, followed by 26 (32.5%) in the 24-29 years age group. The mean ± SD age of the participants was 26.39 ± 5.2 years. The majority of the patients were Hindu by religion, accounting for 65 (81%). Most of the patients were from the Brahmin/Chhetri ethnic group, followed by the Janajati group. The majority were primigravida i.e. 46(57.5%), followed by multigravida i.e. 34(42.5%) (Table 1).

Table 1. Demographic characteristics of pregnant women (N=80)

Characteristics	*f* (%)
Age group (in years)	
18-23	28(35%)
24-29	26(32.5%)
30-35	23(28.8%)
>35	3(3.8%)
Religion	
Hindu	65(81%)
Buddhist	12(15%)
Christian	3(4%)
Ethnicity	
Bhramin/Chhetri	39(48.8%)
Janajati	17(21.3%)
Madhesi	16(20%)
Dalit	8(10%)
Gravidity	
Primigravida	46(57.5%)

Out of 80 patients in their first trimester, 47 patients were euthyroid, two were hyperthyroid, and 31 were hypothyroid. The two hyperthyroid patients were in the 24-29 age group. Subclinical hypothyroidism was seen in 22 patients, of whom 11 were in the age group 30-34. Overt hypothyroidism was also seen in a total of nine patients, and four of them were also in the age group 30-34 (Table 2).

Table 2. Pregnant women with thyroid dysfunction in terms of their Age (N=80)

Thyroid Status	Age Group (years)				Total
	18-23	24-29	30-34	>35	
Euthyroid	23	15	8	1	47
Subclinical Hypothyroidism	4	6	11	1	22
Overt Hypothyroidism	1	3	4	1	9
Hyperthyroidism	0	2	0	0	2

Table 3 shows that of the 80 patients in the first trimester, two were hyperthyroid, with an even distribution between nulliparous and parous groups (50% each). The total number of hypothyroid patients was 31, among which 22 were subclinical hypothyroid, i.e, 27.5% out of which 8 (36.4%) were nulliparous and 14 (63.6%) were parous. Similarly, 9 patients were found to have overt hypothyroidism, among whom 3(33.3%) were nulliparous and 6(66.7%) were parous.

Table 3. Pregnant women with thyroid dysfunction in terms of Parity (N=80)

Thyroid Status	Parity		Total
	Nulliparous	Parous	
Euthyroid	22 (46.8%)	25(53.2%)	47(58.8%)
Subclinical Hypothyroidism	8 (36.4%)	14(63.6.%)	22(27.5%)
Overt Hypothyroidism	3(33.3%)	6(66.7%)	9(11.3%)
Hyperthyroidism	1(50%)	1(50%)	2(2.5%)

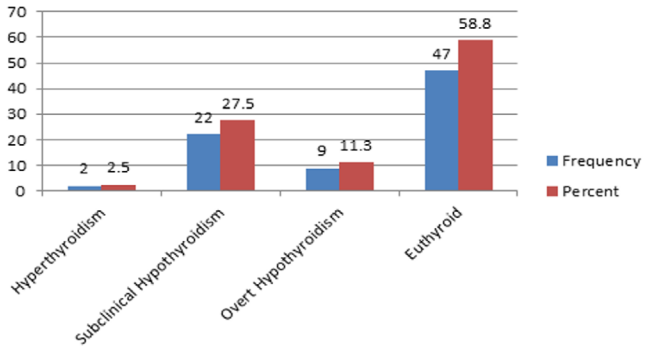

Figure 1. Distribution of pregnant women according to thyroid status

The relationship between BMI and thyroid disorder was assessed by using the Chi-Square test. There was no statistically significant association, with a coefficient of 5.176 (p-value = 0.819). This study showed that the weight of pregnant women was not correlated with TSH values, as shown in Table 4.

Table 4. Relationship between BMI and thyroid disorder

)	Value	Asymp. Sig. (2-sided)
Chi-Square	5.176	0.819
Likelihood Ratio	6.663	0.672
No of Valid Cases	80	

DISCUSSION

Thyroid diseases during pregnancy can adversely affect both maternal and fetal health, potentially impacting neuro-intellectual development in early childhood.[9] So, the exact burden of thyroid disorders in pregnant women needs to be evaluated. The prevalence of Thyroid Disorders has been increasing globally and tends to vary according to different screening and diagnostic criteria used. This study included 80 pregnant women in the first trimester, with a mean age of 26.39 years. This finding is comparable to those reported by Altomare et al. (28.3 years) at the University of Catania, Italy.[10] And Krishnamma et al. (23.9 years) at the NRI Institute of Medical Science, Andhra Pradesh, India.[11] Similarly, Pahwa S and Manga S reported a mean age of 23.27 years in Amritsar, India, which aligns with the results of this study.[12] The consistency in mean age across these studies suggests that the demographic profile of pregnant women may be similar across regions, which is important for understanding the risk factors for thyroid disorders during pregnancy.

In this study, the majority of participants were multigravida (57.5%), while 42.5% were primigravida. This finding aligns with a 2014 study by Tania et al. in Bangladesh, which reported that 56% of women in their first trimester were also predominantly multigravida.[9] Similarly, Murty et al. found a higher prevalence of multigravida women (53%) compared to primigravida (47%).[1313] These results highlight the significance of considering gravidity in the management and screening of thyroid disorders during pregnancy, as multigravida women may have different health needs and risks compared to their primigravida counterparts.

In this study, the majority of patients were of normal weight, with 55% having a mean BMI of 23.90 ± 2.86 kg/m². This finding is consistent with a similar study by Krishnamma et al., which reported an average BMI of 22.9 ± 1.6 kg/m².[11] In contrast, a 2014 study by Tania et al. in Bangladesh found that most women were overweight, with a mean BMI of 22.1 ± 4.4 kg/m².[9] These differences may reflect variations in nutritional status and health profiles among pregnant populations across different countries, highlighting the importance of considering regional factors when assessing maternal weight status and its implications for health outcomes.

In this study, the prevalence of thyroid disorders in the first trimester of pregnancy was 41.2%, with 27.5% having subclinical hypothyroidism, 11.3% overt hypothyroidism, and 2.5% hyperthyroidism. In contrast, a study by Saraladevi et al. in India reported a lower prevalence of 11.6%, with 6.4% subclinical hypothyroidism, 2.8% overt hypothyroidism, 1.8% subclinical hyperthyroidism, and 0.6% overt hyperthyroidism.[14]

Other studies done around the world showed the prevalence of subclinical hypothyroidism in pregnant women ranged from 6.0-16.13%.[10–13] Some of the studies showed the prevalence of overt hypothyroidism to be 2.0-2.8%.[15] This is lower than the rates observed in this study. These variations may be influenced by differences in sample size, regional factors, and study methodologies, highlighting the need for localized screening and management approaches tailored to specific populations.

In this study, the association between BMI and TSH was tested by using the chi-square test. There was no statistically significant correlation, with a coefficient of 5.176 (p-value = 0.819). This study showed that the weight of pregnant women was not associated with TSH levels. However, a recent survey of 210 pregnant women by Kumar et al.[16] also showed a significant positive correlation between the TSH levels of participants and those of normal pregnant women, as well as BMI during the first trimester (r = 0.254, p = 0.034). The study's limitations include a small sample size and a one-year timeframe, which may not accurately reflect the true prevalence of thyroid disorders in the first trimester; a longitudinal study would provide more precise results. The study also did not investigate thyroid function status in the last half of pregnancy or its effects on the fetus or the mother. The outcome of babies, after appropriate treatment, was not followed up on, as it is a preliminary report of screening. Given the increasing prevalence of thyroid disorders and the findings of this study, routine screening of thyroid disorders in pregnancy is strongly recommended.

CONCLUSION

Around one in every four pregnant women had an undiagnosed thyroid disorder detected during the first trimester of pregnancy. Due to the enormous impact, the quick identification of thyroid disorders and the prompt initiation of treatment are essential for the health of the mother and fetus. Hence, a preliminary screening for thyroid disorders should be considered a regular practice.

DECLARATIONS

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Department of Obstetrics and Gynaecology, Bharatpur Hospital, Department of General Practice and Emergency Medicine, NAMS, Bir Hospital

Conflict of Interest
None

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None

Ethical Clearance
It was taken from the IRC of NAMS, Bir Hospital (Ref no: 529/2077/78)

Consent of the Study
Verbal Consent was taken from all the participants

Consent for Publication from Authors
All authors consented to publication.

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