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Original Research Article

## Maternal and foetal outcome of hypothyroidism in pregnancy: a prospective observational study

Neha S. Kulkarni<sup>1\*</sup>, Balaji J. Jadhav<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, Deshpande Hospital, Parbhani, Maharashtra, India

<sup>2</sup>Department of Obstetrics and Gynecology, Dr. R. N. Cooper Hospital, Juhu, Mumbai, Maharashtra, India

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**\*Correspondence:**

Dr. Neha S. Kulkarni,

E-mail: [nehakulkarni2891@gmail.com](mailto:nehakulkarni2891@gmail.com)

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### ABSTRACT

**Background:** Thyroid dysfunction is one of the most common endocrine disorders affecting women of reproductive age group. There is a debate among obstetricians about universal versus targeted screening for hypothyroidism during pregnancy. Therefore, we conducted this study with aim to highlight the need for universal screening of pregnant women for hypothyroidism.

**Methods:** This was prospective analytical study involving 200 pregnant women conducted in a tertiary care hospital in Mumbai from January 2018 to December 2019. Thyroid-stimulating hormone (TSH) was done as a screening test. Estimation of free T3 (FT3) and free T4 (FT4) are advised if TSH was found abnormal. Patients were followed up throughout the pregnancy and postpartum up to 6 weeks. Study parameters were assessed in both mother and neonate and statistical analysis was done.

**Results:** Pregnancy induced hypertension (PIH) was observed in 13% of study population. Premature labour was observed in 11% of study population. Recurrent abortion was observed in 7% of study population. Postpartum haemorrhage (PPH) was observed in 4% of study population. Anaemia was observed in 69% of study population. Neonatal intensive care unit (NICU) admission was observed in 17% of study population. Neonatal hypo/hyperthyroidism was observed in 3% of study population.

**Conclusions:** Pregnant females should routinely be screened for thyroid functions to detect hypothyroidism and be given adequate treatment to prevent maternal and foetal complications. Adequate treatment and regular follow up will improve the maternal and foetal outcomes.

**Keywords:** Hypothyroidism, Pregnancy, TSH, Foetal outcome, Thyroid profile

### INTRODUCTION

Thyroid dysfunction is one of the most common endocrine disorders affecting women of reproductive age group. Over the past several years it has been contemplated that maternal thyroid disorder influence the outcome of mother and foetus, during and after the pregnancy. There are a few reports of prevalence of hypothyroidism during pregnancy for Indian population with prevalence rates ranging from 4.8% to 11% and subclinical hypothyroidism is as high as 13.5% women.<sup>1-4</sup> Despite the known complications and

adverse effects due to thyroid abnormalities, there is still ongoing debate regarding the need for universal screening for thyroid dysfunction during pregnancy.<sup>5,6</sup> Subclinical maternal hypothyroidism might be associated with poor pregnancy outcomes such as placental abruption, preterm birth, and low birth weight infants.<sup>3</sup> There is a debate among obstetricians about universal versus targeted screening for hypothyroidism in pregnancy. Targeted screening is considered cost effective due to any lack of studies showing a universal need for screening. Therefore, we conducted this study to assess if universal

screening of pregnant women for hypothyroidism is beneficial.

## METHODS

This was prospective observational study involving 200 pregnant women with abnormal thyroid-stimulating hormone (TSH) in TNMC and BYL Nair Hospital, Mumbai from January 2018 to December 2019. All pregnant females <35 years age, with no other comorbidity causing unfavourable maternal or fetal outcome were included. Females with known comorbidities and bad obstetric history were excluded.

Apart from the routine obstetrical investigations, TSH was done as a screening test by the chemiluminescence method. Estimation of free T3 (FT3) and Free T4 (FT4) are advised if TSH was found to be abnormal. Cut off values for TSH were taken as per American Thyroid Association – 1<sup>st</sup> trimester: 0.1- 2.5 micro IU/l, 2<sup>nd</sup> trimester: 0.2-3.0 micro IU/l, 3<sup>rd</sup> trimester: 0.3 -3 micro IU/L.<sup>7</sup> Those with the abnormal tests are categorized as Subclinical hypothyroidism (Normal FT4 with high TSH) and overt hypothyroidism (low FT4 with high TSH). Patients were put on treatment and thyroid function tests were repeated every 6-8 weeks during pregnancy and drug dosages titrated accordingly. Patients were followed up throughout the pregnancy. Maternal and fetal outcome parameters were assessed. Maternal outcomes assessed were- mode of delivery, abortion, anemia, preeclampsia, preterm delivery, postpartum hemorrhage while fetal outcome is assessed by birth weight, APGAR score, NICU admission, neonatal hypo/hyperthyroidism.

These parameters were compared with national standard as per Indian thyroid society statistics. Statistical analysis was done with z-test of proportions.

## RESULTS

Study was conducted on 200 pregnant patients with abnormal TSH and data was collected.

**Table 1: Age group amongst study population.**

Age group (years)	Frequency	Percentage
Less than 25	25	12.3
25-30	85	42.7
More than 30	90	45
Total	200	100

**Table 2: Parity amongst study population.**

Parity	Frequency	Percentage
Multipara	114	57
Primi	86	43
Total	200	100

**Table 3: Socioeconomic status amongst study population.**

SES	Frequency	Percentage
Upper class	4	2
Upper middle	34	17
Lower middle	68	34
Upper lower	44	22
Lower	50	25
Total	200	100

**Table 4: Hypothyroidism detection amongst study population.**

Hypothyroidism detection	Frequency	Percentage
1 <sup>st</sup> trimester	98	49
2 <sup>nd</sup> trimester	77	39
3 <sup>rd</sup> trimester	25	13
Total	200	100

**Table 5: Comparison between study population and reference data.**

Complications	Treated patients (study population)	Untreated patients (reference data taken from Indian Thyroid Society Statistics)
Recurrent miscarriage	7	16
PIH	13	16
Preterm birth	11	33
PPH	4	16
NICU stay	17	46.7

Preterm labour was observed in 11% of study population. Recurrent abortion was observed in 7% of study population. Postpartum Hemorrhage was observed in 4% of study population. Anaemia was observed in 69% of study population. In 27% population lower segment caesarean section (LSCS) was the mode of delivery while in 73% normal vaginal delivery was the mode of delivery. most of the study population had 2.5 to 3 kg (47%) followed by more than 3 kg (25%), 2 to 2.5 kg (20%) and less than 2 kg (9%). NICU admission was observed in 17% of study population. Hyperbilirubinemia was seen in 5% of study population. Neonatal hypothyroidism was observed in 3% of the study population and Z test of proportion is applied.

Recurrent miscarriage rate of 7% observed in treated population whereas it's 16% in untreated population. The value of z is 1.9948, which is statistically significant. Treating hypothyroid patients with thyroxine significantly reduces recurrent miscarriage rate.

In the study percentage of PIH in treated patients is 13 while it's 16 in untreated patients. The value of z is 0.6025

which is statistically insignificant. Treating patients with thyroxine doesn't decrease the percentage of pre-eclampsia, in current study.

In the present study it's observed that percentage of preterm birth on treatment is 11 while it's 33 without treatment. The value of z is 3.7553 which is statistically significant. Early detection of hypothyroidism in pregnant patients and treating them reduces the incidence of preterm labour in them significantly.

PPH is one of the leading causes of maternal mortality in India. The percentage of PPH in treated patients is 4 while it's 16 in untreated patients in current study. The value of z is 2.8284 which is statistically significant meaning treating patients with hypothyroidism reduces the percentage of PPH in them significantly.

In the present study it's observed that NICU stay in treated patients is 17 while it's 46.7 in untreated patients. The value of z is 4.4145 which is statistically significant. Treating patients with hypothyroidism reduces the NICU stay in their infants significantly. Majority of NICU stay is attributed to prematurity in untreated patients.

Though neonatal hypothyroidism is detected in 3% of population, there was no neonatal hypothyroidism leading to cretinism in present study.

## DISCUSSION

Thyroid disorders are a significant concern for women of child-bearing age, particularly during pregnancy and the postpartum period. When left untreated, these conditions can have detrimental effects on both the mother and the developing foetus. Complications such as spontaneous abortion, preeclampsia, preterm labor, abruption placenta,<sup>1-4,8,9</sup> low birth weight, neonatal hypothyroidism, and even stillbirth can arise from uncorrected thyroid disorders during pregnancy. Neonatal hypothyroidism is the most common cause of preventable mental retardation in children.<sup>8,10-12</sup>

The prevalence of subclinical hypothyroidism, a mild form of the condition, is alarmingly high among pregnant women in India. This poses a substantial public health burden that demands attention. One potential solution is the implementation of routine antenatal thyroid screening and early administration of levothyroxine, a synthetic thyroid hormone. Interestingly, while many developed countries have already adopted national neonatal screening programs for hypothyroidism, the question of whether to universally screen pregnant women for the condition remains unresolved, according to the recently published guidelines by the American Thyroid Association (ATA).<sup>5,6</sup>

To shed light on this matter, a study was conducted in Nair Hospital in Mumbai, India, analyzing data from 200 pregnant women diagnosed with hypothyroidism. These women were followed up until the postnatal period,

allowing for a comprehensive evaluation of the outcomes. The findings of the study indicated that pregnant women who received appropriate treatment for hypothyroidism had significantly lower rates of intra and postpartum complications compared to untreated cases. Furthermore, the neonates born to treated mothers exhibited reduced rates of ICU stay and low birth weight.

The conclusions drawn from this study align with the findings of a study conducted by Negro et al, which emphasized the significant reduction in adverse pregnancy outcomes among hypothyroid patients who underwent universal screening.<sup>5</sup> Additionally, another study by Vaidya et al highlighted that during at-risk screening, 30% of subclinical hypothyroid patients were missed.<sup>14</sup> Remarkably, our study mirrored these results, with 32% of cases falling under the subclinical category.

In light of these compelling findings, it is evident that prompt detection and appropriate treatment of hypothyroidism during pregnancy not only improve maternal and fetal outcomes but also alleviate the healthcare burden associated with preventable complications. This is particularly relevant for countries like India, where healthcare resources may be limited. By implementing widespread screening and effective management protocols, the healthcare system can effectively address the challenges posed by thyroid disorders during pregnancy, ultimately ensuring the well-being of both mothers and their unborn children.

## Limitations

### Observational study design

The study is limited by its observational nature, meaning that it cannot establish causality or determine the effectiveness of treatment compared to a control group. Since all participants received the same treatment, there is no population for comparison.

### Lack of population comparison

Without a control group or a comparison population, it is difficult to assess the true impact of treatment on the outcomes. The study relies on reference data from the Indian Thyroid Society for comparisons, which may introduce bias or confounding factors.

### Absence of gestational age at screening

The study does not assign specific gestational ages for thyroid screening. Patients are screened whenever they visit the outpatient department (OPD) for the first time, leading to variations in the timing of screening. This lack of uniformity in gestational age limits the assessment of the duration of treatment and its potential effects on outcomes. By highlighting these limitations, it is essential to acknowledge the study's constraints and recognize the need for further research to strengthen the findings and

provide more robust evidence regarding the benefits of timely detection and treatment of hypothyroidism during pregnancy.

## CONCLUSION

Pregnant patients should be screened for thyroid functions to detect hypothyroidism at their first OPD visit and be treated adequately to prevent maternal and foetal complications. Women with thyroid disorders should be followed closely throughout pregnancy for the prevention of obstetric complications and their newborn infants should be followed closely in the first months of postnatal life for thyroid dysfunction. Adequate treatment and regular follow up will improve maternal and foetal outcomes.

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