

Prevalence of Thyroid Disorders in Pregnancy and Associated Maternal and Fetal Outcome

Dr. K. N. Bindusha Krishna¹, N. R. Indu², P. B. Hiremath³

Corresponding author Email: [krishnabindusha9\[at\]gmail.com](mailto:krishnabindusha9[at]gmail.com)
Contact: 6301242935

Abstract: ***Background:** One of the most common endocrinological problems during pregnancy is thyroid dysfunction. . To evaluate the prevalence of thyroid diseases in pregnant women and its correlation with fetal - maternal outcomes, we conducted this study. **Methods:** This prospective observational study was carried out in a tertiary care institute in Puducherry. We recruited 164 pregnant women who visited the OPD (Out Patient Department) through consecutive sampling. A detailed history and clinical examination were made. Apart from routine ante - natal investigations, we estimated the TSH levels. In case of abnormal TSH values, free T4 and T3 levels were assessed. **Results:** In our study, 21 (12.8%) of 164 cases had thyroid disorders, 5 (3%) had O. hypothyroidism, 3 (1.8%) had S. hyperthyroidism, and 13 (7.9%) had S. hypothyroidism. S. Hypothyroidism had 13 (7.9%) cases while S. Hyperthyroidism had 3 (1.8%). 143 of 164 patients were normal and 21 were thyroid. 2 pre - term, 139 term, and 2 post - term deliveries. **Conclusion:** We observed a significant prevalence of thyroid disorders in our study. The presence of maternal thyroid disorders significantly impacts the maternal and fetal outcomes if adequate treatment is not initiated in the early gestational period. Therefore, serum TSH should be included in the battery of routine investigations for early diagnosis and management of thyroid disorders.*

Keywords: Screening test, Serum TSH, Thyroid disorders in pregnancy

1. Introduction

Pregnancy is a common time when thyroid disorders occur. Pregnancy can be adversely affected by overt thyroid dysfunction. Studies have shown that up to 20% of surviving children can be diagnosed with mental or physical disabilities due to maternal hypothyroxinemia¹.

Approximately 40% of women with overt hypothyroidism who are untreated or inadequately treated suffer from anemia, preeclampsia, placental abruption and postpartum hemorrhage, 30% of newborns are too small for gestation, and 10% suffer perinatal mortality and congenital abnormalities. There was approximately a third the incidence of this problem in women with untreated subclinical hypothyroidism (thyroid stimulating hormone elevation only) and the maternal and fetal outcomes were improved with thyroxine therapy in both groups².

TSH levels in pregnant women were found to be elevated in 2.5% of cases of compensated hypothyroidism reported in a recent population survey. In contrast to 11% of controls, all hypothyroid patients were positive for thyroid microsomal and peroxidase antibodies (TPO antibodies). Thyroid antibody titres and maternal age were positively correlated with serum TSH³. Hypothyroidism and autoimmune diseases are prevalent in pregnancy according to previous studies⁴. An estimated 19.6 percent of thyroid patients had autoimmunity⁵. There were more than twice as many cases of miscarriage among women with antithyroid antibodies as women without them (Odds ratio 2.30, 95% confidence interval 1.80 - 2.95) according to a metaanalysis of 10 prospective studies of euthyroid women⁶.

A woman with multiple pregnancies, diabetes or hypertension, and men with a bad obstetric history with known causes have been excluded from this study. Prevalence of thyroid dysfunction in pregnancy is poorly

documented in India. This study is designed to determine whether thyroid dysfunction may cause obstetric complications in pregnancy.

We conducted this study to determine the prevalence of thyroid disorders among pregnant women and to look at their outcomes during pregnancy.

2. Materials and Methods

Study Design

Prospective study.

Study Population

Screening will be carried out in pregnant women coming for regular antenatal check up to the Obstetrics out - patient department in SVMCH & RC.

Sampling Technique

164 antenatal women coming to obstetric out - patient department for regular antenatal checkup will be randomly selected.

Duration of Study: March 2021 – November 2022 (18 months)

Participation Timeline: Antenatal period

Inclusion Criteria: Pregnant Women less than 12 weeks coming for regular antenatal checkup and planning delivery in SVMCH&RC, Singleton pregnancy, Primigravida and Multigravida

Exclusion Criteria: Patient refusal, Multifetal gestation, Known chronic disorders like hypertension / diabetes mellitus, Had previous bad obstetric history with known cause, Who planned to deliver in other hospital

Method of Collection of Data

Antenatal women meeting the study criterion and who give consent will be taken. A detailed history was taken regarding the symptoms, and signs of thyroid disorders. Menstrual history, obstetric history, past history medical history, family history, personal history A thorough general physical examination with reference to pulse, BP, Temperature, respiratory rate were noted followed by CVS, CNS, RS, Local thyroid examination. Per abdomen examination and PV examination done and pregnancy confirmed. Patients are sent for TSH testing. If TSH comes deranged then FT3 and FT4 levels are checked. Depending upon the FT3 and FT4 values they are grouped as subclinical/overt hypothyroidism or hyperthyroidism. Every 8 weeks TSH level will be estimated and the dose of the drug adjusted. At the end, the pregnancy outcome noted. Preeclampsia was defined as persistently elevated blood pressure (systolic >140 mmHg and diastolic pressure >90mmHg on more than 2 occasions 4hours apart or end organ damage) with proteinuria. Abruptio placenta was defined as a form of antepartum haemorrhage where the bleeding occurs due to premature separation of normally situated placenta. Preterm delivery was defined as delivery before 37 completed weeks of gestation. IUGR was defined as birth weight less than tenth percentile for gestational age. Low birth weight was defined as weight <2, 500g. Stillbirth was defined as the birth of a new born after period of viability (weighing 1000g or more) when the baby does not breathe or show any sign of life after delivery. Abortion was defined as spontaneous termination of pregnancy before the period of viability. The reference range taken are based on the Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy 2017.

Statistics

The descriptives procedure displays univariate summary statistics for several variables in a single table and calculates standardized values (z scores). Variables can be ordered by the size of their means (in ascending or descending order), alphabetically, or by the order in which the researcher specifies. Following descriptive statistics were employed in the present study - mean, Standard deviation, frequency and percentages.

3. Results

Out of 164 cases involved in the study 21 (12.8) cases had thyroid disorder and 143 (87.2%) cases were reported to be normal. the normal cases were high when compare to cases with thyroid disorder. Of 21 thyroid cases, 5 (3%) had O. hypothyroidism, 3 (1.8%) had S. hyperthyroidism, and 13 (7.9%) had S. hypothyroidism. S. Hypothyroidism had 13 (7.9%) cases while S. Hyperthyroidism had 3 (1.8%). TSH mean and SD were reordered for all three thyroid disorders. O. Hypothyroidism mean and SD were 9.20 ± 2.41 . S. hyperthyroidism and hypothyroidism had Mean and SD values of 0.02 ± 0.01 and 4.77 ± 1.55 , respectively. F was 28.259 and P was 0.0001. P values indicate statistical significance. All three thyroid disorders had FT3 mean and SD reordered. O. Hypothyroidism mean and SD were 1.06 ± 0.31 . S. hyperthyroidism and hypothyroidism had Mean and SD values of 3.90 ± 0.35 and 1.95 ± 0.20 , respectively. F was 122.327 and P was 0.0001. The P value indicated a very

significant test. All three thyroid disorders had FT4 mean and SD reordered.

O. Hypothyroidism mean and SD were 0.36 ± 0.09 . S. hyperthyroidism and S. hypothyroidism had Mean and SD values of 1.63 ± 0.15 and 0.944 ± 0.15 respectively. F was 3.272 and P was 0.061. P values indicate insignificant tests. 154 of 164 (100%) study cases had NA.2 (1.2) instances had pre - eclampsia and 8 (4.9%) had preterm delivery. NA had the most cases and Pre - Eclampsia the fewest. 143 of 164 cases were normal and 21 were thyroid. In the typical group, 2 instances scored 7/10, 9/10 and 141 scored 8/10, 9/10.3 thyroid cases got APGAR Scores of 7/10, 9/10, and 18 had 8/10, 9/10.8/10 and 9/10 APGAR scores were more common in both groups. 143 of 164 patients were normal and 21 were thyroid.

2 pre - term, 139 term, and 2 post - term deliveries were reported in the usual group. In 21 thyroid cases, 4 were pre - term, 16 were term, and 1 was post - term. On - term delivery had the highest number of cases (155), whereas post - term delivery had the lowest. Hours of Life, birth weight, length, HC, CC, Ponderal Index, and mean and SD were reordered for thyroid and normal groups. The thyroid group had lower mean and SD values for all variables except hours of life, which had the same values in both groups. Birth Weight, Length, HC, CC, and Ponderal Index were examined with P values of 0.0001.

Table 1: Distribution of variables of the studied group

Variable	Thyroid	Mean \pm SD	T value	P value
Hours of Life	Thyroid	48.00 ± 0.00	NA	NA
	Normal	48.00 ± 0.00		
Birth Weight	Thyroid	2.14 ± 0.35	- 7.341	0.0001
	Normal	2.95 ± 0.35		
Length	Thyroid	45.26 ± 1.24	- 4.673	0.0001
	Normal	48.34 ± 1.07		
HC	Thyroid	31.98 ± 1.08	- 6.223	0.0001
	Normal	33.36 ± 1.14		
CC	Thyroid	29.86 ± 1.90	- 3.473	0.001
	Normal	30.97 ± 1.21		
Ponderal Index	Thyroid	2.28 ± 0.22	- 7.154	0.0001
	Normal	2.57 ± 0.19		

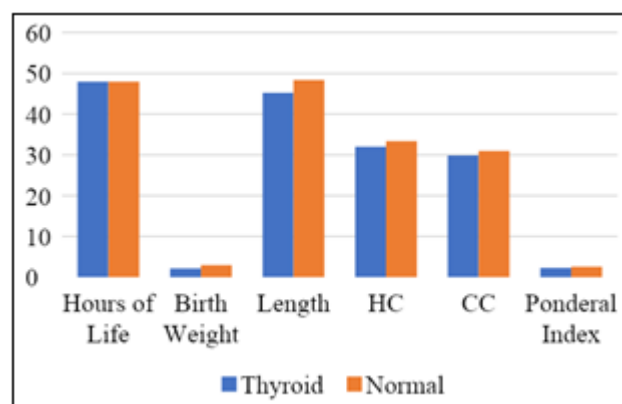


Figure 1: Distribution of variables of the studied group

Mean and SD of the following variables were reordered Hours of Life, birth weight, length, HC, CC, Ponderal Index for both thyroid and normal group. Comparing to the normal group in thyroid group the Mean and SD values of all the

variables were less except Hours of life, in Hours of life same mean and SD values were reported in both thyroid and normal group. Among the variable tested Birth Weight, Length, HC, CC, Ponderal Index were analyzed with the P value of 0.0001 which is highly statistically significant.

4. Discussion

Women who have normal thyroid function but who test positive for thyroid peroxidase (TPO) antibodies have an increased risk of experiencing a miscarriage or giving birth prematurely, according to the findings of some studies that were just recently published^{7, 8, 9}. A study that was conducted in 2005 by Brain M. Casey, Jodi S., et al., and another study that was conducted in 2006 by Aziz Nuzhat, Reddi Pranathi, et al., both showed an increased incidence of preterm delivery in the hypothyroid group^{10, 11}.

143 of the 164 participants in the study were considered to have normal thyroid function, while 21 of the participants were reported to have thyroid disease. In the control group, there were thirty - two cases that were reported to have a birth weight of less than two and a half. There were 108 cases where the birth weight was reported to be between 2.6 and 3.5, and there were 3 cases where the birth weight was reported to be greater than 3.5. Within the thyroid group, there were 5 cases that were reported to have a birth weight of less than 2.5, 13 cases that were reported to have a birth weight of between 2.6 and 3.5, and 3 cases that were reported to have a birth weight of more than 3.5. a disproportionately high number of cases were reported to have birth weights between 2.6 and 3.5^{12, 13}.

Higher levels of maternal thyroid function in the second trimester, and particularly higher levels of maternal free thyroxine (FT4), have been linked to lower birth weights in several studies, including one conducted by Kriplani et al. and several others¹⁴. In terms of a child's birth weight, maternal hyperthyroidism has been linked to an increased risk of low birth weight and small - for - gestational - age (SGA) children, whereas the findings in relation to maternal hypothyroidism are more varied. Some studies found an increased risk of low birth weight or SGA, while others found no association between the two. Other studies found no association between the two¹⁵. In conclusion, maternal isolated hypothyroxinemia in the first trimester has been linked to an increased risk of foetal macrosomia¹⁶. Additionally, a separate study found that mothers who tested positive for thyroid peroxidase antibody were more likely to give birth to children who were large for their gestational age¹⁷.

The following variables had their means and standard deviations reordered: hours of life, birth weight, length, HC, CC, and ponderal index for both the thyroid group and the normal group. In the thyroid group, the Mean and SD values of all the variables were lower when compared to the normal group, with the exception of the Hours of life variable, for which the Mean and SD values were the same in both the thyroid group and the normal group.

The birth weight, length, head circumference, and central canal circumference, as well as the ponderal index, were

examined with a P value of 0.0001, which is extremely significant statistically.

There are currently no recommendations available for the detection or screening of thyroid dysfunction among pregnant women in India¹⁸. Recent consensus guidelines do not advocate for universal thyroid function screening during pregnancy; however, they do recommend testing for high risk women who have a personal history of thyroid or other autoimmune disorders as well as women who have a family history of thyroid disorders¹⁹. According to the findings of our study, there is a high prevalence of thyroid dysfunction among pregnant women in India, particularly subclinical and overt hypothyroidism. On the basis of the findings of the current study, we therefore recommend lowering the threshold for screening and detecting thyroid dysfunction among pregnant women in India who attend routine antenatal clinics. Additionally, it is important to be aware of the potential maternal and foetal complications that can be associated with this condition²⁰.

A total of 164 patients participated in the investigation, and all of them underwent a screening process in which their serum TSH and FT4 levels were evaluated to determine whether or not they had hypothyroidism. The following is a list of the most important findings that came out of this investigation:

The present study came to the conclusion that a history of recurrent pregnancy loss and diabetes are significantly associated with hypothyroidism. The prevalence of hypothyroidism was 12.8% in this study. In the hypothyroid group, we found a statistically significant increase in the incidence of gestational hypertension, preeclampsia, premature delivery, and low birth weight infants.

The study also revealed that there was a high rate of foetal distress during labour, which resulted in a high rate of emergency caesarean sections being performed on women in the hypothyroid group. This value is also significant according to the statistical analysis.

5. Conclusion

We observed a significant prevalence of thyroid disorders in our study. The presence of maternal thyroid disorders significantly impacts the maternal and fetal outcomes if adequate treatment is not initiated in the early gestational period. Therefore, serum TSH should be included in the battery of routine investigations for early diagnosis and management of thyroid disorders. This will immensely help us in our commitment to realise our target of reducing maternal and neonatal morbidity and mortality, in track with the third Sustainable Development goal.

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