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Original Research Article

## Prevalence of thyroid disorders in antenatal patients and its fetomaternal outcome

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### ABSTRACT

**Background:** Thyroid disorders are common in pregnancy and most common disorder is subclinical hypothyroidism. Due to the complex hormonal changes during pregnancy, it is important to remember that thyroxine requirements are higher in pregnancy. Maternal hypothyroidism is an easily treatable condition that has been associated with increased risk of low birth weight, fetal distress and impaired neuropsychological development. Hyperthyroidism in pregnancy is less common as conception is a problem. Majority of them are due to Graves' disease, though gestational hyperthyroidism is to be excluded. Early and effective treatment of thyroid disorder ensures a safe pregnancy with minimal maternal and neonatal complications.

**Methods:** One hundred pregnant women attending antenatal clinic in first trimester were registered. Apart from routine basic and obstetrical investigations, TSH, FT3 and FT4 level estimation was done. L-thyroxine was given for hypothyroidism, this dosing was based on a study by Abalovich et al according to the body weight to maintain serum TSH near normal. For hyperthyroidism, given carbimazole if serum TSH level <1 MIU/l. Serum TSH estimation was repeated at regular interval. All the patients followed till the end of pregnancy. The normal patients served as controls. Pregnancy outcome studied statistically.

**Results:** Around 68.8% of the inadequately treated patients developed complications like GDM, pre-eclampsia, oligohydramnios and preterm deliveries. Whereas only 32% of the control group developed these mentioned complications, this implied a significant association between inadequately treated thyroid disorders and poor pregnancy outcomes as evidenced by the p value of 0.002 which was very significant.

**Conclusions:** Adequate treatment of thyroid disorders in pregnancy significantly reduces complications like miscarriages, pre-eclampsia, IUGR, oligohydramnios, glucose intolerance, preterm labour, low birth weight babies, abruptio placentae and stillbirth.

**Keywords:** Thyroid disorders, Pregnancy, Hypothyroidism, Hyperthyroidism

### INTRODUCTION

Thyroid disorders constitute one of the most common endocrine disorders seen in pregnancy. Maternal thyroid function changes during pregnancy and inadequate adaptation to these changes results in thyroid dysfunction because of an increase in thyroglobulin due to elevated estrogen and human chorionic gonadotrophin, increased renal losses of iodine due to increase in glomerular

filtration rate, modifications in peripheral metabolism of maternal thyroid hormone and modifications in iodine transfer to placenta. The thyroid hormone production and iodine requirement increases by 50% during pregnancy.<sup>1</sup> During pregnancy, the thyroid gland bigger in size by 10% in iodine sufficient countries and to greater extent in iodine deficient countries.<sup>1</sup> Pregnancy is a stressful physiological condition for thyroid gland, resulting in hypothyroidism in women with limited thyroid reserve or iodine deficiency.

Thyroid disorders during early pregnancy has been associated with adverse fetomaternal outcome. The main obstetric complications are abortion, pre-eclampsia, abruptio placenta, preterm labour and fetal complications are prematurity, low birth weight, still birth and perinatal death. Children born to untreated mothers have profound effect on future intellectual development.<sup>2</sup> There is an increase in the incidence of NICU admissions and respiratory distress syndrome. Maternal hypothyroidism in the 1st trimester may be harmful for fetal brain development and leads to mental retardation and cretinism which includes impairment of mental and physical growth and development and has a negative impact on most organ systems. Data from recently published studies have underscored the association between miscarriage and preterm delivery in women with normal thyroid function who test positive for thyroid peroxidase (TPO) antibodies.<sup>3</sup> During the first trimester, approximately 1 in 10 pregnant women develop antibodies to TPO or thyroglobulin and hypothyroidism develops in roughly 16% of these women.<sup>4</sup> Physiological changes of pregnancy can stimulate thyroid disease and overlooked because of nonspecific symptoms. Prevalence of thyroid disorders during pregnancy has a wide geographic variation. Western literature shows a prevalence of hypothyroidism in pregnancy of 2.5% and hyperthyroidism in pregnancy has prevalence of 0.1 to 0.4%.<sup>5</sup> There is paucity of data on prevalence of thyroid disorders in Indian pregnant women. Few reports show a prevalence of 4.8% to 11% amongst Indian pregnant population.<sup>6</sup> In view of adverse maternal and fetal outcome in pregnant women with thyroid disorders and obvious benefits of early diagnosis and treatment, some expert panels all around the world have suggested routine thyroid function screening of all pregnant women. Therefore, this study was carried out in pregnant women during 1st trimester who attended antenatal clinic of department of obstetrics and gynecology, C. U. Shah medical college and hospital (CUSMCH), Surendranagar to know the prevalence of thyroid disorders in pregnant women and its fetomaternal outcome.

## METHODS

This was a prospective observational type institution based study conducted on 100 antenatal women enrolled during first trimester from August 2019 to July 2020 at CUSMCH, Surendranagar, Gujarat, India. Blood was collected in fasting state. The TSH was estimated by using ELISA method. If serum TSH was abnormal fT4 and fT3 were estimated. According to the biochemical values, those patients were divided into overt hypothyroidism, subclinical hypothyroidism and euthyroid. Overt hypothyroidism, subclinical hypothyroidism patients were treated with L-thyroxine in the dose of 1.20 pg/kg/day for subclinical hypothyroidism with TSH less than 4.2 mIU/l, 1.42 pg/kg/day with TSH greater than 4.2 to 10 and 2.33 pg/kg/day for overt hypothyroidism. This dosing was based on a study by Abalovich et al which was published in the journal of overt and subclinical hypothyroidism and

which had been confirmed by numerous other studies according to the body weight to maintain serum TSH near normal. Serum TSH estimation was repeated at 4-6 weeks interval.<sup>7</sup> TSH concentration was maintained less than 2.5 mIU/l in the first trimester, less than 3 mIU/l in the second and third trimester. Serum TSH level <1 mIU/l considered as hyperthyroidism and those pregnant women treated with carbimazole in the dose 5 mg per day. Repeat TSH done in second and third trimester. All the patients were followed till the end of pregnancy. The normal patients served as controls. Pregnancy outcome was studied statistically. Patient were included less than 13 weeks gestation, singleton pregnancy. Primi gravida or multi gravida, known thyroid disorder patients, multifetal gestation, known chronic disorders like diabetes and hypertension, liver disorders, renal disorders, previous bad obstetric history with known cause, those who planned to deliver in other hospital were excluded. The study was approved by institutional ethics committee and results of study was analyzed statistically by SPSS statistical software.

## RESULTS

The data collected from the study will be analysed statistically.

In our study most of the patients underwent screening at less than 10 weeks gestational age. There was no significant difference between the groups based on period of gestation between the groups.

The prevalence of thyroid dysfunction in study group that was 3.1% of the totally screened patients. 2.5% of them were sub clinically hypothyroid, 0.6% of them were overt hypothyroid. Chi square and  $p=0.001$ , which is significant.

Figure 3 shows only 6.66% of the patients of adequately treated patients developed complication, whereas 68.75% of the inadequately treated patients developed complications. Overall Chi square value for complications: 12.57,  $p$  value for complications was 0.00039.

Table 1 shows that 12.5% of the inadequately treated woman delivered low birth weight babies and only 6.66% of the adequately treated patients delivered low birth weight baby.

Table 2 compares the outcome of inadequately treated pregnant mothers with normal control group. In our study group 19.23% of the inadequately treated mothers developed preeclampsia whereas only 8% of the control population developed pre-eclampsia. In our study group 15.4% of the inadequately treated patients developed oligohydramnios whereas only 6% of the control group developed oligohydramnios. Around 23.07% of the inadequately treated patients delivered preterm babies against the control group where only 10%. Patients delivered preterm babies. Around 7.6% of the

inadequately treated patients developed abruption, whereas only 4% of the patients in the control group developed abruption. In our study group 15.3% of the inadequately treated hypothyroid mothers delivered low birth weight babies, whereas in the control group only 6% patients delivered low birth weight babies. From the above table we came to know that 68.8% of the inadequately treated patients developed complications like GDM, pre-

eclampsia, oligohydramnios and preterm deliveries. Whereas only 32% of the control group developed these complications, this implied a significant association between inadequately treated thyroid disorders and poor pregnancy outcomes as evidenced by the p value of 0.002 which was very significant. The overall Chi square value: 9.26, p value was 0.00233. It was statistically significant ( $p < 0.05$ ).

**Table 1: Low birth weight.**

LBW	Adequately treated	Inadequately treated
	N (%)	N (%)
No	22 (93.33)	22 (87.5)
Yes	2 (6.66)	4 (12.5)

**Table 2: Comparison of pregnancy outcomes between inadequately treated group and control.**

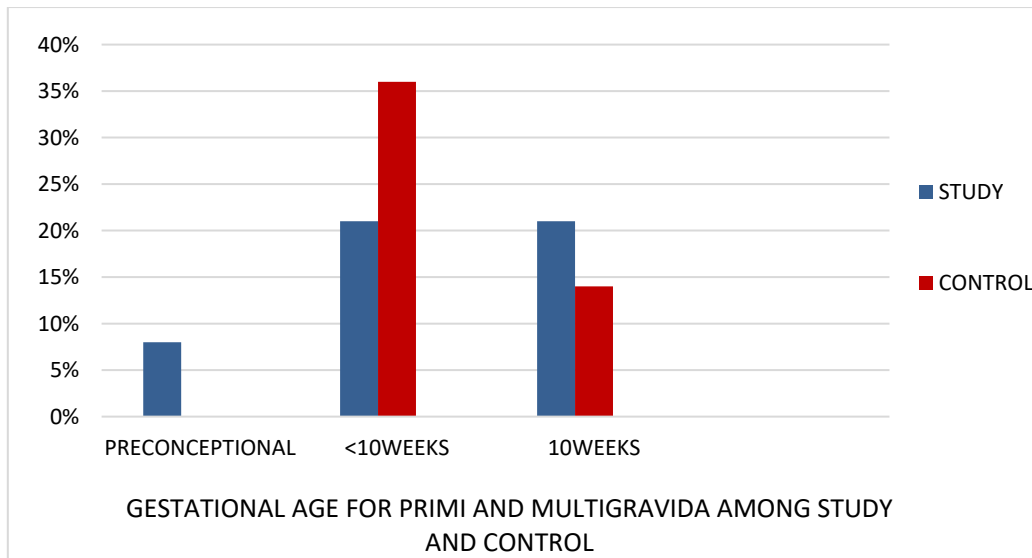
Pregnancy Outcome	Inadequate	Inadequate (%)	Control	Control (%)	Chi square	P value
GDM	1	3.8	2	4		
PIH	5	19.23	4	8		
Oligohydramnios	4	15.4	3	6		
Preterm labour	6	23.07	5	10		
Abruption	2	7.6%	2	4		
Total complications	18	69.2	16	32		
No complications	8	31.2	34	68		
Total	26	100	50	100		

**Table 3: Comparison of fetal outcomes between test and control groups.**

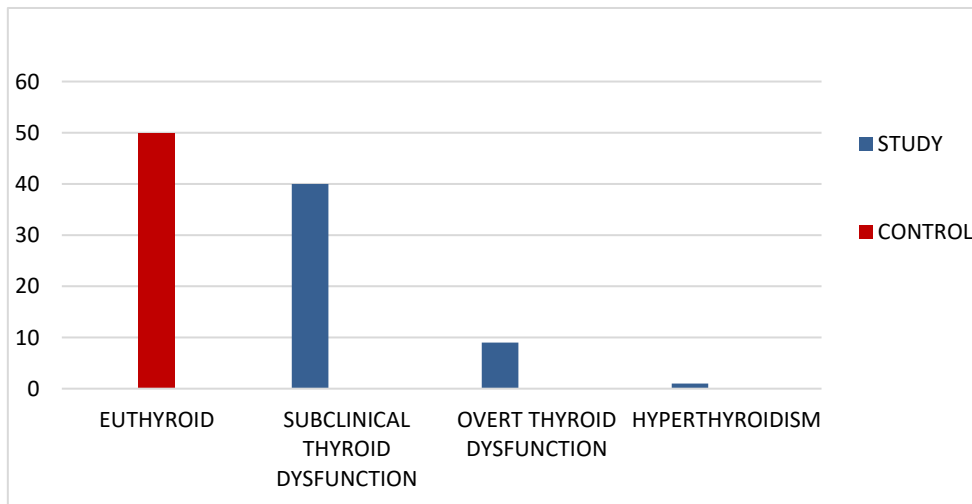
Conditions	Study (test)	Control
Spontaneous abortion	2	1
IUGR	5	3
IUD	2	1
Neonatal jaundice	3	2
LBW	6	4
NICU admission	3	2
NA	29	37
Total	50	50

**Table 4: Prevalence of thyroid disorder in various previous study.**

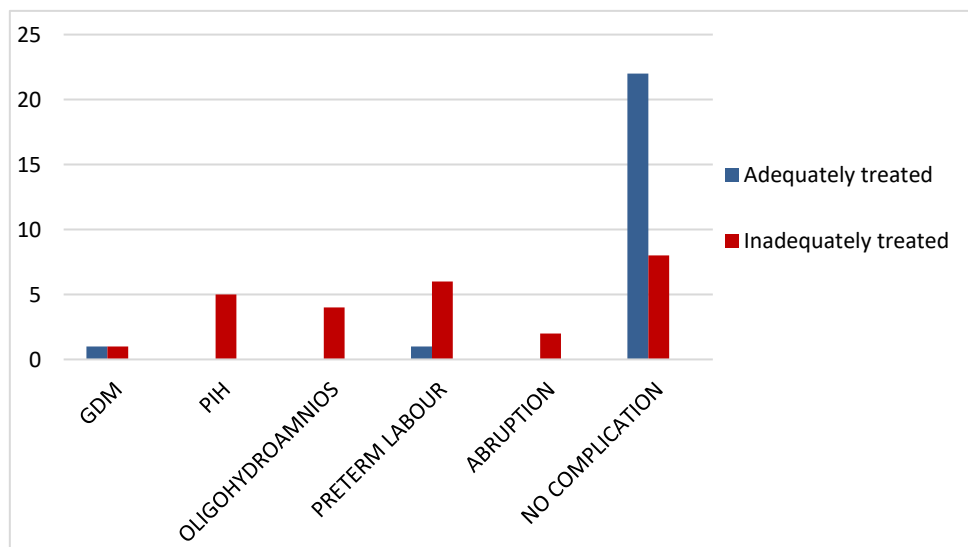
Study	Prospective/retrospective	Place	Prevalence	Period of screening
Klein 1991	R	USA	2.5%, TSH >6	15-18 weeks
Glincoer 1995	P	Belgium	2.2%, TSH >4	1st prenatal visit
Allan 2000	R	USA	2.2%, TSH >6	15-18 weeks



**Figure 1: Period of gestation at diagnosis (POG).**



**Figure 2: Classification of thyroid disorder.**



**Figure 3: Pregnancy outcome.**

## DISCUSSION

Thyroid hormone was essential for normal development of the placenta. There was evidence that pre-eclampsia, placental abruption and preterm labour were causally linked to faulty early placentation. Based on whether they were started on treatment before 10 weeks and given prompt dosage titration or after 10 weeks they were grouped as those receiving adequate treatment and inadequate treatment. A patient was considered to have received adequate treatment if the repeat TSH values were less than 3 mIU/ml Both the groups were followed till delivery and closely observed for the development of complications. Out of 100 pregnant women screened in the first trimester 6%. Hypothyroid mothers were also at an increased risk of developing fetal growth restriction and delivering low birth weight babies.<sup>12</sup> The results of our study revealed that gestational diabetes (GDM) was found in 1 out of the 26 inadequately treated thyroid disorders patients (6.2%) showing a possible relationship between hypothyroidism and glucose intolerance. Approximately 12.5% of inadequately treated patients end in spontaneous miscarriage against 5.9% in the control group.<sup>17</sup> It was also noted that in our study group, the women who had miscarriages had higher TSH values at diagnosis (>5mU/l). Pre-eclampsia was identified in 3 (12.5%) out of the 26 inadequately treated thyroid disorders patients, against 4 out of 50, that was, 8% of control group patients. Davis et al 1988 followed 25 hypothyroid women through 28 pregnancies who were divided into two groups, of which 16 were clinically hypothyroid and 12 had subclinical hypothyroidism. This study showed that mothers with overt hypothyroidism were more at risk for pre-eclampsia. Inadequately treated thyroid disorders women in our study had 15.4% pregnancies complicated by oligohydramnios which was higher than control group which was only 6%. In our study population 23.07% of inadequately treated thyroid disorders pregnancies ended up in preterm delivery (delivery before 37 weeks of gestation) which was higher than the control group which was 1. This was similar to the outcome of a study done by Jones et al in the American journal of obstetrics and gynaecology in 1969 who concluded that premature deliveries were more frequent in pregnant women who had low thyroxine levels. In our study 6.2% of the fetuses of inadequately treated mothers had intrauterine growth restriction which was higher than its occurrence in the control population which was only 3.8%. Out of the 16 inadequately treated patients in our study, 2 women delivered babies with low birth weight (12.5%), whereas, only 1 woman in the adequately treated group had low birth weight babies (6.7%) and in the control population only 5.5% of the woman delivered low birth weight babies. But, low birth weight among these babies was mainly attributed to prematurity. There was 2 case of placental abruption in the inadequately treated patients in my study although Brian et al in 2005 in their study concluded that pregnancies complicated by subclinical hypothyroidism had a 3 fold increased risk of developing placental

abruption and 2 fold increased risk of preterm labour compared to euthyroid women.

## CONCLUSION

Hence, early diagnosis and adequate treatment of maternal thyroid disorder in pregnancy is essential in decreasing the incidence of complications like abortion, pre-eclampsia, IUGR, placental abruption, oligohydramnios and low birth weight which are associated with thyroid disorders. Inadequately treated pregnant women in my study group had higher risk of developing pre-eclampsia, higher incidence of abortion, placental abruption, oligohydramnios, fetal growth restriction. Adequate treatment of thyroid disorders in pregnancy significantly reduces certain complications like miscarriages, pre-eclampsia, IUGR, oligohydramnios, glucose intolerance, preterm labour, low birth weight babies, abruption placenta and stillbirth.

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