

Study of Prevalence of Thyroid Disorders in Pregnancy in A Tertiary Care Hospital And its Maternal And Fetal Outcome

Dr. Aditi P Kaundinya¹, Dr. Ajit Nagarsenkar²

Abstract:

Objective: To determine the incidence and prevalence of thyroid disorders in pregnancy and to study and compare pregnancy outcomes in the same.

Methods: 500 antenatal patients visiting Goa Medical College outpatient department in the first trimester were randomly selected in this prospective observational study. A subgroup of additional 50 pregnant patients who presented in the later half of pregnancy (2nd and 3rd trimester), mostly referred patients with uncontrolled thyroid disorders were also studied.

Results: The prevalence of thyroid disorders was 13.2%, prevalence of subclinical hypothyroidism was 7%, overt hypothyroidism was 3.4%, subclinical hyperthyroidism 1.6%, overt hyperthyroidism was 0.8%. Patients with uncontrolled thyroid disorders had a higher incidence of pregnancy complications i.e.: preeclampsia, abruptio-placentae, preterm deliveries, intrauterine growth restriction, low birth weight, stillbirths. Patients in whom thyroid disorders were diagnosed and treated early in pregnancy had similar outcome as the normal pregnant population.

Conclusion: Thyroid disorders if left untreated can lead to adverse maternal and fetal outcome, hence early diagnosis which can be facilitated by universal thyroid screening and prompt treatment can reduce the risk of complications and ensure that pregnancy be continued till term without significant morbidity.

I. Introduction

Thyroid disorders constitute one of the most common endocrine disorders of pregnancy. Development of maternal thyroid disorders during early gestation can influence pregnancy outcome and fetal development especially neurological and psychomotor development.

The prevalence of hypothyroidism in pregnancy is around 2.5% according to the Western literature¹ There are a few studies reporting the prevalence of hypothyroidism during pregnancy in India ranging from 4.8% to 11%^{2,3} The prevalence of hyperthyroidism in pregnancy is 0.2% worldwide⁴

Women with thyroid dysfunction, both overt and subclinical are at an increased risk of pregnancy related complications such as threatened abortion, preeclampsia, preterm labour, placental abruption and postpartum haemorrhage. Fetal complications include low birth weight, first trimester spontaneous abortions, preterm delivery, fetal or neonatal deaths, neonatal hypothyroidism and an increased perinatal mortality².

Pregnancy also influences thyroid function in multiple ways.

II. Aims And Objectives

1. Determine the incidence of hypothyroidism in pregnancy in Goa medical college
2. To determine the incidence of hypothyroidism in pregnancy in Goa Medical College.
3. To study and compare pregnancy outcomes of:
 - i) Patients with well controlled thyroid disorder with those not having any thyroid disorder.
 - ii) Patients with thyroid disorder who were well controlled as opposed to those who were uncontrolled.

III. Materials And Methods

The present study was conducted over a period of two years in the Department of Obstetrics and Gynaecology, Goa Medical College from September 2012-September 2014 with patient recruitment from December 2012-December 2013. This study was commenced following approval by the ethics committee of Goa Medical College and after taking necessary patient consent.

IV. Study Design

This was a prospective observational study in which 500 pregnant patients in the first trimester of pregnancy, attending the O.P.D were included.

These patients were divided into 2 groups:

- * The patients with normal thyroid function tests in first trimester were classified as **Group A.**
- * Those with an abnormal thyroid function test in the first trimester were classified as **Group B.**

* We also studied a small cohort comprising of 50 additional patients who presented in the later half of pregnancy (2nd & 3rd Trimester) mostly referred patients with uncontrolled thyroid disorders as **Group C**.

Patients with multifetal gestation, known chronic disorders i.e:diabetes mellitus and hypertension,previous bad obstetric history with known cause,those who planned to deliver in another hospital were excluded from the study . After detailed history and examination patients were included in the group.TSH,FT3,FT4,T4 values were studied using the 'Architect TSH Assay' which is a chemiluminescent microparticle immunoassay(CMIA).Depending upon their results patient's were classified as **Subclinical hypothyroidism** - TSH >2.5 and FT3,FT4 were normal.

Overt hypothyroidism - FT3,FT4 were low or TSH>10 with normal FT3 and FT4.

Subclinical hyperthyroidism-TSH<0.10.1 μ IU/ml and FT3 & FT4 were normal.

Overt Hyperthyroidism -TSH was less than 0.1 μ IU/ml and and FT3 and/or FT4 were raised.

If subclinical/overt hypothyroidism was detected thyroxine was started.If subclinical/overt hyperthyroidism was detected PTU was started in first trimester followed by methimazole subsequently.Every 6 weeks TSH was estimated and dose of the drug was adjusted accordingly .Pregnancy outcome ie: abortion,preeclampsia,IUGR, abruptio placentae, preterm delivery,low birth weight,stillbirths were studied.

Chi square test was used for qualitative data to calculate p value for statistical analysis(SPSS version 11.5)

V. Results

Of all the patients coming to OPD in first trimester for regular antenatal visits, 500 were selected randomly after meeting the afore mentioned inclusion and exclusion criteria.

66 patients were detected with thyroid disorder, prevalence being 13.2 Out of which 54(81.81%) patients were hypothyroid amongst which 35(7%) were subclinical and 19(3.8%) were overt hypothyroid.12(18.18%) patients were hyperthyroid amongst which 8(1.6%) were subclinical and 4(0.8%) were overt hyperthyroid.

Mean age of patients with normal thyroid function was 23.8 years, subclinical hypothyroidism was 26.2 years, overt hypothyroidism was 28.5 years, subclinical hyperthyroidism was 25.1 years, overt hyperthyroidism was 29.4 years.

Mean TSH in those with subclinical hypothyroidism was 4.28 μ IU/ml, overt hypothyroidism was 8.69 μ IU/ml, subclinical hyperthyroidism was 0.08 μ IU/ml and overt hyperthyroidism was 0.018 μ IU/ml.

Mean TSH in the total population was 1.55 μ IU/ml.

Group A: Patients without thyroid disorder had the following maternal and fetal complications.

33 patients (7.6%) of these developed preeclampsia,3 patients (0.69%) of these had abruptio placentae,34 patients (7.83%) of these had preterm delivery,10 patients (2.3%) of these had spontaneous abortions,15 patients (3.45%) of these patients had IUGR babies,30 patients (6.9%) of these patients had low birth weight babies,2 patients (0.46%) of these patients gave birth to stillborns.

Group B: Patients with abnormal thyroid function.

In the patients with subclinical hypothyroidism ,3 patients (8.5%) developed preeclampsia , none of these patients had abruptio placentae, 3 patients (8.5%) had preterm delivery,2 patients (5.71%) spontaneous abortions. 1 patient (2.85%) had an IUGR baby,3 patients (8.5%)o had low birth weight babies. None of these patients gave birth to a stillborn.

In the patients with overt hypothyroidism, 2 patients (10.5%) developed preeclampsia ,none of these patients had abruptio placentae, 2 patients (10.5%) had preterm delivery, 2 patients (10.5%) had spontaneous abortions, 1 patient (5.2%) had an IUGR baby, 2 patients (10.5%) had low birth weight babies .None of these patients gave birth to a stillborn.

In the patients with subclinical hyperthyroidism, 1 patient (12.5%) developed preeclampsia, none of these patients had placental abruption, none of these patients had preterm delivery, 1 patient (12.5%) had a spontaneous abortion. None of these patients had an IUGR baby, 1 patient (10.5%) had a low birth weight baby, none of these patients gave birth to a stillborn.

In the patients with overt hyperthyroidism, 1 patient (25%) developed preeclampsia ,none of these patients had an IUGR baby,1 patient(25%)had a low birth weight baby, none of these patients gave birth to a stillborn, none of these patients had abruptio placentae or preterm delivery.

Group C: A small cohort comprising of 50 additional patients who presented in the later half of pregnancy (second and third trimester) who were mostly referred patients with uncontrolled thyroid disorders. 40 patients were hypothyroid and 10 were hyperthyroid. Out of the 40 hypothyroid patients, 23 patients had subclinical

hypothyroidism and 17 patients had overt hypothyroidism Out of the 10 hyperthyroid patients, 6 patients had subclinical hyperthyroidism and 4 patients had overt hyperthyroidism Amongst these 50 patients maternal and fetal complications were observed in each of the subgroups.

In the patients with subclinical hypothyroidism ,3 patients (13.04%) developed preeclampsia , none of these patients had abruptio placentae, 3 patients (13.04%) had preterm delivery,1 patient (4.3%) had a spontaneous abortion. 1 patient (4.34%) had an IUGR baby,2 patients (8.6%) had low birth weight babies

None of these patients gave birth to a stillborn.

In the patients with overt hypothyroidism, 4 patients (23.5%) of these developed preeclampsia,1 patient (5.8%) had abruptio placentae, 3 patients (17.6%) of these had preterm delivery, 2 patients (10.5%) had spontaneous abortions, 2 patients(10.5%) had an IUGR baby, 4 patients (23.52%) had low birth weight babies,none of these patients gave birth to a stillborn.

In the patients with subclinical hyperthyroidism, 1 patient (16.6%) developed preeclampsia, none of these patients had placental abruption, none of these patients had preterm delivery, abruption placenta or spontaneous abortions,1(16.6%)patient had an IUGR baby, 1 patient (16.6%) had a low birth weight baby, none of these patients gave birth to a stillborn.

In the patients with overt hyperthyroidism, 2 patients (50%) developed preeclampsia,1 (25%) patient had placental abruption ,1 patient (25%) had a spontaneous abortion, none of these patients had a preterm delivery,1(25%)patient had an IUGR baby, 1(25%) 5%55patient had a low birth weight baby ,1 patient (25%) gave birth to a stillborn.

VI. Discussion

Prevalence of thyroid disorders in 500 patients visiting the antenatal out patient department in Goa Medical College was found to be 13.2% which was consistent with the study done by Sahu et al(12.79%), Dhanwal et al⁵(14.6%),Ajmani et al⁶ (13.25%), however it was not consistent with that of western literature ie: Casey et al⁷(4.5%),Vaidya et al⁸(4.5%),these differences could be attributed to nutritional and demographic features.

Prevalence of subclinical hypothyroidism was found to be 7% which was comparable to studies done by Sahu et al³(6.47%),Ajmani et al⁶ (9%),Vaidya et al⁸(6.3%)

Prevalence of overt hypothyroidism was found to be 3.8% which was comparable to studies performed by Sahu et al³(4.58%),Ajmani et al⁶(3%).

Prevalence of subclinical hyperthyroidism was 1.6% which was consistent with studies performed by Sahu et al³(0.94%),Casey et al⁷(1.7%),Vaidya et al⁸(1.2%)

Prevalence of overt hyperthyroidism was 0.6% which was comparable to studies performed by Sahu et al³(0.78%),Casey et al⁷(0.4%),Vaidya et al⁸(0.7%)

Mean TSH in our study population was group5 mIU/l which was comparable to studies performed by Marwaha et al⁹(2.42%),Jungare et al¹⁰(1.61%),Mansouri et al¹¹(1.31%).

Comparison of complications :

1. Subclinical Hypothyroidism

The incidence of preclampsia was 7.6% in Group A, which was similar to that of patients having subclinical hypothyroidism in Group B (8.5%),Group C had a higher incidence (13.04%) this higher incidence was not statistically significant ,however it was consistent with the incidence of pre eclampsia in studies conducted by Sahu et al³(9.8%),Leung et al¹²(15%).

The incidence of abruption was 0.69% in Group A, however we did not get any cases of abruption in Group B and Group C.

The incidence of preterm delivery was 7.83% in Group A which was similar to that of patients having subclinical hypothyroidism in Group B (8.5%),Group C had a comparatively higher incidence (13.04%) this higher incidence was not statistically significant however it was consistent with the incidence of preterm delivery in studies conducted by Casey et al⁷(13.5%),Sahu et al³(10.3%).

The incidence of abortions was 2.3% in group A which was similar to that of patients having subclinical hypothyroidism in Group B (5.71%) and Group C(4.34%) .This higher incidence in Group B and Group C was not statistically significant but it was comparable to studies conducted by Nambiar et al²(7.5%).

The incidence of IUGR was 3.45% in Group A which was similar to that of patients having subclinical hypothyroidism in Group B (2.8%),Group C had a comparatively higher incidence (4.34%) this higher incidence was not statistically significant however it was consistent with the incidence of IUGR in studies conducted by Ajmani et al⁶(4.9%),Sahu et al³(2.4%).

The incidence of low birth weight was 6.9% in Group A which was similar to that of patients having subclinical hypothyroidism in Group B (5.71%), Group C had a comparatively higher incidence (8.69%) this

higher incidence was not statistically significant however it was consistent with the incidence of low birth weight in studies conducted by Leung et al¹²(9%),Casey et al⁷(8.5%).

The incidence of stillbirth was 0.46% in patients belonging to Group A. However there were no cases of stillbirths in those with subclinical hypothyroidism in Group B and Group C.

Table 36: Incidence Of Complications In Subclinical Hypothyroidism

SB	LBW	IUGR	AB	PTD	AP	PE	Study
2.5%	-	2.4%	-	10.3%	-	9.8%	Sahu et al ³
0.5%	8.5%	-	-	13.5%	1%	11%	Casey et al ⁷
1.7%	12.1%	4.9%	2.39%	5.8%	-	22.3%	Ajmani et al ⁶
5%	-	-	7.5%	10%	-	-	Nambier et al ²
-	9%	-	-	9%	-	15%	Leung et al ¹²
OUR STUDY							
0.46%	6.9%	3.45%	2.3%	7.83%	0.69%	7.6%	GROUP A
-	5.71%	2.85%	5.71%	8.5%	-	8.5%	GROUP B
-	8.69%	4.34%	4.34%	13.04%	-	13.04%	GROUP C

VII. Overt Hypothyroidism

The incidence of preeclampsia was 7.6% in Group A, which was similar to that of patients having overt hypothyroidism in Group B (10.5%),Group C had a higher incidence (23.5%) this higher incidence was statistically significant(p value <0.05) and it was consistent with the incidence of pre eclampsia in studies conducted by Sahu et al³(20.7%),Leung et al¹²(22%).

The incidence of abruption in Group A was 0.69%,no cases of abruptioplacentae were seen in patients having overt hypothyroidism in Group B, Group C patients had a higher incidence (5.8%),this was however not statistically significant.

The incidence of preterm delivery was 7.83% in Group A which was similar to that of patients having overt hypothyroidism in Group B (10.5%),Group C had a comparatively higher incidence (17.6%) this higher incidence statistically significant(p value<0.05).

The incidence of abortions was 2.3% in group A which was lower as compared to that of patients having overt hypothyroidism in Group B (10.5%) and Group C(10.5%) .This higher incidence in Group B and Group C was statistically significant (p value<0.05).

The incidence of IUGR was 3.45% in Group A which was similar to that of patients having overt hypothyroidism in Group B (5.2%),Group C had a comparatively higher incidence (11.76%) this higher incidence was statistically significant and it was consistent with the incidence of IUGR in studies conducted by Sahu et al³(13.8%).

The incidence of low birth weight was 6.9% in Group A which was similar to that of patients having overt hypothyroidism in Group B (10.5%),Group C had a comparatively higher incidence (23.52%) this higher incidence statistically significant and it was consistent with the incidence of low birth weight in studies conducted by Leung et al¹²(22%).

The incidence of stillbirth was 0.46% in patients belonging to Group A. However there were no cases of stillbirths in those with overt hypothyroidism in Group B, Group C had a higher incidence of still births 5.88%.This higher incidence was statistically significant and consistent with studies conducted by Leung et al¹² (4%).

SB	LBW	IUGR	AB	PTD	AP	PE	Study
13%	-	13.8%	-	-	-	20.7%	Sahu et al
16.6%	50%	25%	16.6%	33.3%	16.6%	16.6%	Ajmani et al
-	-	-	21.4%	5.9%	-	-	Nambiar et al
4%	22%	-	-	-	-	22%	Leung et al
Our Study							
0.46%	6.9%	3.45%	2.3%	7.83%	0.69%	7.6%	GROUP A
-	10.5%	5.2%	10.5%	10.5%	-	10.5%	GROUP B
5.88%	23.52%	11.76%	10.5%	17.6%	5.8%	23.5%	GROUP C

Subclinical And Overt Hyperthyroidism

The incidence of preeclampsia was 7.6% in Group A, which was lower than that of patients having subclinical and overt hyperthyroidism in Group B (16.66%),Group C had a much higher incidence (30%) this higher incidence was statistically significant(p value <0.05) and it was consistent with the incidence of preeclampsia in studies conducted by Kriplani et al¹³(22%).

The incidence of abruption in patients with subclinical and overt hyperthyroidism in Group C was 10% which was higher than that of Group A (0.69%) which was statistically significant. No cases of abruption were seen in Group B patients.

The incidence of preterm delivery in patients with subclinical and overt hyperthyroidism in Group C was 10%, which was higher than that of Group A (7.83%), this higher incidence was not statistically significant however it was consistent with studies conducted by Nambiar et al²(9.1%).

The incidence of abortions was 2.3% in group A which was lower as compared to that of patients having subclinical and overt hyperthyroidism in Group B (16.66%). This higher incidence in Group B was statistically significant (p value<0.05). No cases of abortions were seen in Group C patients.

The incidence of IUGR was 3.45% in Group A which was lower than that of patients having subclinical and overt hyperthyroidism in Group C(20%), this higher incidence in Group C was statistically significant and it was consistent with the incidence of IUGR in studies conducted by Kriplani et al¹³(13%). No cases of IUGR were seen in Group B patients.

The incidence of low birth weight was 6.9% in Group A which was lower than that of patients having subclinical and overt hyperthyroidism in Group B (16.66 %) and Group C(20%), this higher incidence was statistically significant.

The incidence of stillbirths in patients with overt and subclinical hyperthyroidism in Group C was 10% which was higher than that of patients in Group A(0.46%). This higher incidence in Group C was statistically significant. No cases of stillbirths were seen in Group B patients

SB	LBW	IUGR	AB	PTD	AP	PE	Study
-	-	13%	-	25%	-	22%	A. Kriplani et al ¹³
-	-	-	4.5%	9.1%	-	-	Nambiar et al ²
Our Study							
0.46%	6.9%	3.45%	2.3%	7.83%	0.69%	7.6%	GROUP A
-	16.66%	-	16.66%	-	-	16.66%	GROUP B
10%	20%	20%	-	10%	10%	30%	GROUP C

On comparing the various outcomes it was observed that patients with uncontrolled hypothyroidism(overt and subclinical) and uncontrolled hyperthyroidism(overt and subclinical) had higher incidence of complications ie: preeclampsia, abruption, preterm delivery, IUGR, low birth weight and stillbirths. On the other hand patients with treated and well controlled thyroid disorders had similar incidence of complications as compared to the patients without thyroid disorder.

However patients with treated and well controlled thyroid disorders had higher incidence of abortions as compared to patients without thyroid disorders, this could imply that congenital anomalies may play a role a major role in their etiology as also the fact that treatment for thyroid dysfunction once started may not have sufficient time to prevent first trimester abortion(of thyroid cause).

VIII. Conclusion

As seen in our study there is a high prevalence of thyroid dysfunction, especially subclinical and overt hypothyroidism among pregnant women visiting the outpatient department in Goa medical college in the first trimester of pregnancy.

It was also seen that thyroid disorders if left untreated can lead to adverse maternal and fetal outcome. Early initiation and prompt treatment ensures maintenance of normal level of thyroid hormones and significantly minimizes the risk of maternal and fetal complications and makes it possible that the pregnancy maybe carried to term without severe complications.

At present there is no available recommendation for screening of thyroid dysfunction among Indian pregnant women. Recent consensus guideline do not advocate universal thyroid function screening in pregnancy, however they recommend screening for high risk women (women with personal/family history of thyroid or other autoimmune disorders). However a large number of patients having thyroid dysfunction could be missed by this approach.

Through our study we have shown the need for universal thyroid screening, at the earliest, preferably in the first trimester of pregnancy or prior to conception, because thyroid disorders satisfy most of the criteria for a disease to warrant population screening. They are common, treatable and to some extent preventable conditions which produce morbidity and pose special risks for pregnancy and the developing fetus. The TSH value to initiate treatment recommended by us is 2.5 µIU/ml (in the first trimester).

This study was approved by the institutional ethical committee and there was no conflict of interest.

References

- [1]. 1.Thyroid disorders during pregnancy. LeBeau SO, Mandel SJ *Endocrinol Metab Clin North Am.* 2006 Mar; 35(1):117-36, vii.
- [2]. 2.Nambiar V, Jagtap VS, Sarathi V, Lila AR, Kamalanathan S, Bandgar TR, et al. Prevalence and impact of thyroid disorders on maternal outcome in Asian-Indian pregnant women. *J Thyroid*
- [3]. 3.Sahu MT, Das V, Mittal S, Agarwal A, Sahu M. Overt and subclinical thyroid dysfunction among Indian pregnant women and its effect on maternal and fetal outcome. *Arch Gynecol Obstet.* 2010;281:215–20
- [4]. 4.Mestman J, Goodwin TM, Montoro MM. Thyroid disorders of pregnancy. *Endocrinol Metab Clin N Am* 1995;24:41-71
- [5]. Dhanwal DK, Prasad S, Agarwal AK, Dixit V, Banerjee AK. High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. *Indian J Endocr Metab* 2013;17:281-4.
- [6]. Ajmani Sangita Nangia, Aggarwal Deepa, Bhatia Pushpa, Sharma Manisha, Sarabhai Vinita, Paul Mohini. Prevalence of Overt and Subclinical Thyroid Dysfunction Among Pregnant Women and Its Effect on Maternal and Fetal Outcome. *The Journal of Obstetrics and Gynecology of India; March-April 2014; 64(2); 105-110.*
- [7]. Brian M. Casey, Jodi S. Dashe, C. Edward Wells, Donald D. McIntire, William Byrd, Kenneth J. Leveno and F. Gary Cunningham. Subclinical Hypothyroidism and Pregnancy Outcomes. *Obstetrics & Gynecology.* VOL. 105, NO. 2, FEBRUARY 2005.
- [8]. Bijay Vaidya, Sony Anthony, Mary Bilous, Beverly Shields, John Drury, Stewart Hutchison, Rudy Bilous. Detection of thyroid dysfunction in early pregnancy. Universal Screening or Targetted High- Risk Case finding? *Journal of Clinical Endocrinology Metab,* January 2007, 92(1):203-207.
- [9]. Marwaha R, Chopra S, Gopalakrishnan S, Sharma B, Kanwar R, Sastry A, Singh S. Establishment of reference range for thyroid hormones in normal pregnant Indian women. *BJOG* 2008;115:602–606.
- [10]. Shamila Jungare, Sanjay Sonune. Study of Thyroid Profile in First Trimester of Pregnancy. *International Journal of Recent Trends in Science and Technology;* Vol 9, Issue 2; 2013;p 171-173.
- [11]. Mansourian a r , Ahmadi a r , Mansourian h r , Saifi a, Marjani a, Veghari g r .Ghaemi e . Maternal Thyroid Stimulating Hormone levels during the first Trimester of Pregnancy at the south-east of the Caspian sea in Iran. *Journal of Clinical and diagnostic research;* 2010 june; 4:2472-2477
- [12]. Leung AS, Millar CK, Koonings PP, et al. Perinatal outcome in hypothyroid pregnancies. *Obstet Gynecol* 1993;81:349.
- [13]. A. Kriplani, K. Buckshe, V.L. Bhargavaa, D. Takkara, A.C. Ammini- Maternal and perinatal outcome in thyrotoxicosis complicating pregnancy *European Journal of Obstetrics & Gynecology and Reproductive Biology* 54 (1994) 159-163