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Prevalence and Impact of Thyroid Dysfunctions on Pregnancy Outcome-A Prospective Observational Study

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Abstract

Thyroid dysfunction has varied impact on pregnancy outcome. Hence the present study was undertaken to determine the prevalence of thyroid dysfunction in pregnant women and its impact on pregnancy outcome. This study was conducted in a teaching Hospital in central Mumbai. It included screening of 540 pregnant women coming to routine antenatal check at first visit. TSH level was estimated. If TSH was deranged, then FT3, FT4 level estimation was done. The prevalence of thyroid dysfunctions was 10.19% (55/540) with a CI of 8.51-14.71%. Subclinical hypothyroidism was found in 42 (7.78%) patients among them, 29(69.05%) had associated obstetric problems; most common were gestational diabetes mellitus (GDM) (34.48%) and hypertensive disorders of pregnancy (gestational hypertension, preeclampsia) (34.48%). Overt hypothyroidism was found in 10 (1.85%) patients of these 7 patients (70%) were found complications; most common were hypertensive disorders of pregnancy (57.14%) and preterm labour (42.86%). Subclinical hyperthyroidism was found in only one patient, which was associated with IUGR. Overt hyperthyroidism was found in two patients which was associated with recurrent miscarriage in one patient and abruption in another. Out of 52 babies born, 26 babies (50%) were admitted in NICU. Most common reason for NICU admissions were prematurity-9(34.62%), Low birth weight- 8(30.77%), Hyperbilirubinemia -7(26.92%), Fetal Distress- 3(11.54%), Meconium aspiration-2(7.69%). In view of the high prevalence of thyroid dysfunctions in our population, especially subclinical and overt hypothyroidism among Indian pregnant women and its association with adverse pregnancy outcome, we recommend routine screening for thyroid dysfunctions in pregnancy.

Keywords: Thyroid, Dysfunction, Pregnancy, Hypothyroidism, Hyperthyroidism, Hyperbilirubinemia, Meconium aspiration.

Introduction

Thyroid dysfunction is common in women of childbearing age group. Understanding of thyroid

physiology in pregnancy, and association between thyroid dysfunction and adverse obstetrical outcome is necessary. Thyroxin is an essential hormone. Deficiency or excess of this hormone affect almost every system of body. Prevalence and incidence of thyroid disorder in pregnancy as per western literature is around 2.5 % [1]. Recent publication from Department of Endocrinology of KEM hospital, Mumbai showed that thyroid dysfunction in Indian pregnant woman to be 4.8% in the first trimester [2]. In our observation, thyroid dysfunction in pregnancy among all trimesters of pregnancy appears to be much more. It is known that thyroid disorder in pregnant woman may lead to preterm labour, recurrent miscarriage, intrauterine growth restriction (IUGR), and preeclampsia [3, 4]. Pregnancy influences thyroid dysfunction and untreated thyroid dysfunction is associated with increase rate of these adverse outcome. Moreover, the development of maternal thyroid disorders during early pregnancy can influence the pregnancy outcome and fetal development. Maternal hypothyroidism in the first trimester may be harmful for the fetal brain development and lead to mental retardation [5, 6]. In view of the high prevalence and potential adverse outcomes associated with maternal thyroid disorders and obvious benefits of treatment, some expert panels have suggested routine thyroid function screening in all pregnant women. This has been the standard of care being followed in our obstetric unit. We screen all pregnant patients attending antenatal clinic at their first visit for thyroid dysfunction. Data on the prevalence and impact of thyroid disorder during pregnancy in our population is lacking. Hence the present study was planned to establish prevalence of thyroid dysfunction and note its effect on pregnancy with treatment and to evaluate pregnancy and neonatal outcome.

Materials and Method

A prospective observational study was conducted in a teaching hospital in central Mumbai over a period of one year in which 570 pregnant women's were enrolled and screened for thyroid dysfunction by evaluating serum TSH. Inclusion criteria were all pregnant patients registering in antenatal OPD and unregistered patients not in labour admitted in antenatal ward as an emergency. Patient those who registered in study and not delivered in our hospital delivered elsewhere was excluded. If serum TSH is found abnormal as per trimester specific ranges (Table 1), then patients free T3, free T4 levels were done. 30 patients lost follow up hence total 540 patients included in the study.

Table 1: The trimester specific TSH ranges

TSH Limit	1st Trimester	2nd Trimester	3rd Trimester
Upper Limit	2.5 mIU/L	3 mIU/L	3 mIU/L
Lower Limit	0.1 mIU/L	0.2 mIU/L	0.3 mIU/L

If TSH is abnormal, Levels of FT3, FT4 were estimated and patients were referred to Endocrinology Department of Medical College Hospital for further investigation and treatment. Treatment was given as per advice of Department of Endocrinology; If TSH was above or below the recommended levels. Participants were classified as having a thyroid dysfunction in following sub groups and treated according to guidelines recommended by American Thyroid association (ATA) guidelines,

1. Subclinical Hypothyroidism means increase in TSH (>2.5m IU/ml in first trimester,>3 m IU/ML in second and third trimester) with normal FT3, FT4, (normal FT3 levels- 1.7 to 4.2 pg/ml, FT4 levels- 0.7 to 1.8pg/ml)
2. Overt hypothyroidism means increase in TSH with decrease in FT3 & FT4 (FT3< 1.7pg/ml, FT4 <

0.7pg/ml)

3. Subclinical hyperthyroidism is defined as serum TSH concentration below the lower limit of reference range (<0.1m IU/ml in first trimester, <0.2 m IU/ml in second trimester, <0.3 m IU/ml in third trimester) withFT3 & FT4 concentration within normal range. (FT3-1.7 to4.2 pg/ml, FT4 levels 0.7to 1.8pg/ml) [7].
4. Overt hyperthyroidism is defined as serum TSH concentration below the lower limit of reference range, with increase infT3 & fT4 concentration, (FT3 >4.2pg/ml, FT4> 1.8pg/ml

Management of hypothyroidism

Laboratory assessment of hypothyroidism made using TSH and free hormone levels assessment. Total T3 & T4 measurements were not done because of increase in TBG concentration. TSH monitored closely and the doses of thyroid replacement to be adjusted to maintain TSH in reference interval, following Trimester specific reference ranges for TSH were applied, first trimester 0.1–2.5mIU/L; second trimester 0.2–3.0mIU/L third trimester 0.3–3.0m IU/L. Doses of thyroid replacement therapy were lowered to pre-pregnancy levels at parturition [7].

The starting dose of levothyroxine was 1-2µg/kg/day. It was adjusted every 4 weeks to keep TSH at lower end of normal. Women who were on levothyroxine at the beginning of pregnancy, their dose increased approximately 30% as soon as pregnancy was confirmed. Levothyroxine & ferrous sulfate doses spaced at least 4hrs apart, to prevent inadequate intestinal absorption of levothyroxine by giving leothyroxine early in morning before breakfast. After delivery, levothyroxine therapy returned to pre-pregnancy dose, in patients with overt and pregestational hypothyroidism. Patients who diagnosed subclinical hypothyroidism in pregnancy thyroxine replacement stopped after delivery and TSH checked 6wks postpartum. If TSH after 6 weeks found abnormal these patients were treated accordingly. Those patients in which TSH after delivery were found normal Periodic monitoring with annual serum TSH concentration for the mothers is generally recommended [8]. All women with hypothyroidism, the goal of LT4 treatment was to normalize maternal serum TSH values within the trimester-specific pregnancy reference range. LT4 dose was increased by 25–30% upon a missed menstrual cycle in patients with pre-gestational hypothyroidism this adjustment was accomplished by increasing LT4 by additional 2 tablets of LT4 per week. Further adjustments were individualized as they are dependent on the etiology of maternal hypothyroidism, as well as the preconception level of TSH. Serum thyroid function tests was monitored closely, Hypothyroid patients (receiving LT4) who are planning pregnancy should have their dose adjusted by their provider in order to optimize serum TSH values to <2.5 mIU/L preconception.

Management of hyperthyroidism-

Laboratory assessment of serum TSH and FT3 & FT4 which show suppressed serum TSH with elevated FT3 & FT4 is diagnostic of hyperthyroidism. Thionamides like prophylthiouracil (PTU), methimazole (MMI) were used for the treatment of hyperthyroidism during pregnancy. PTU of dose 100-150mg was given 8hrly in first trimester and MMI - 10-20mg daily. In divided dosage, in second trimester, Dose was adjusted so as to maintain the acceptable level of TSH <0.1mIU/L. The goal of the treatment was to keep the patient in euthyroid state, with fT4 levels in the upper limit of normal range so as not to cause fetal or neonatal hyperthyroidism. It takes 2-4 weeks from the start of

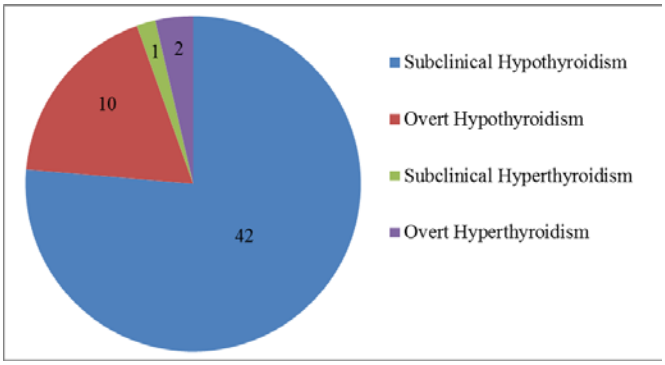
treatment to see clinical change. TSH, FT3 & FT4 were monitored after 4 weeks. After achieving euthyroid state, the dosage of PTU was tapered to minimize fetal exposure to thionamides. If PTU & MMI were contraindicated β- blockers was used to control adrenergic symptoms of thyrotoxicosis particularly tachycardia. In addition β-blockers block the peripheral conversion of T4 to T3. Propanalol 20-40 mg 2-3times a day was used. Surgery must be reserved for the most severe cases.

During course of treatment patients were followed up and evaluated for any obstetric problem (IUGR, preterm labour, miscarriage), symptomatology if any, up to delivery of baby and discharge of both mother and baby from the hospital. Babies born to patients having thyroid dysfunctions were screened for thyroid abnormality if any, by doing TSH and FT3, FT4 levels after 72 hours of delivery. At the end of study at discharge of both mother and baby all ANC records evaluated and recorded.

Results

Total 540 patients were screened for thyroid dysfunctions, among them 55 patients had thyroid dysfunctions; hence prevalence of thyroid dysfunctions was 10.19% (95% CI 8.51-14.71). The prevalence of different thyroid disorders among screened women is depicted in figure 1. 9 patients (16.36%) were diagnosed thyroid dysfunction before pregnancy and 9 (16.36%) were diagnosed thyroid dysfunction in 1st trimester. In our country woman even today register late for antenatal care, hence 24 (43.64%) and 13 patients (23.64%) were diagnosed to have thyroid dysfunctions in second and third trimester respectively.

Figure 1: Prevalence of different Thyroid Disorders



Thyroid disorders were classified in above sub groups for diagnosis of these disorders and the mean TSH levels in different thyroid dysfunctions are shown in table 2.

Table 2: Mean TSH levels in different thyroid dysfunctions

Neonatal TSH	No. of patients	Mean ± SD
Subclinical Hypothyroidism	40	4.64±2.65
Overt Hypothyroidism	09	5.93±1.61
Subclinical Hyperthyroidism	01	5.80±0.00
Overt Hyperthyroidism	02	7.20±0.00

Patients complained of general weakness in 16 patients (48.48%), palpitations in 2 patients (6.06%) and general oedema in 1 patient (3%). Most patients had no signs of thyroid disorders. On general examination the most common sign detected was thyromegaly in 12 patients (36.36%), Multinodular goiter was present in 2 patients (6.06%). previous adverse pregnancy outcome like recurrent abortions, preterm labour, IUFD, neonatal death was present in 4 patients (12.12%), (Table 3).

Table 3: Distribution of study group as per signs and symptoms in symptomatic patients (33; 60%)

Signs and Symptoms	No.of patients	Percentage
Generalized weakness	16	48.48
Thyromegaly	12	36.36
Bad obstetric history (Adverse Pregnancy Outcome)	04	12.12
Multinodular goiter	02	6.06
Palpitation	02	6.06
Generalized oedema	01	3.03
Combined signs and symptoms	05	15.15

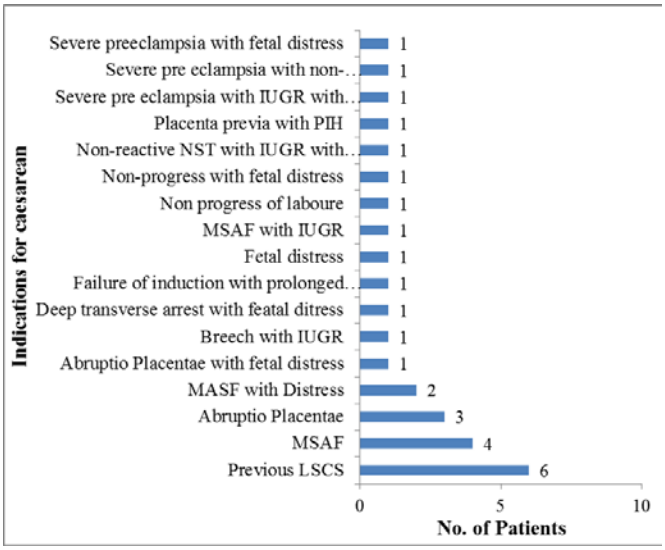
Subclinical hypothyroidism was found in 42 (7.78%) patients among them, 29 (69.05%) had associated obstetric problems; most common were gestational diabetes mellitus (GDM) and hypertensive disorders of pregnancy (gestational hypertention, preeclampsia) occurred in 10 patients (34.48%) each. Overt hypothyroidism was found in 10 (1.85%) patients of these 7 patients (70%) were found complications; most common were hypertensive disorders of pregnancy (57.14%) and preterm labour (42.86%) as shown in Table 4.

Table 4: Associated obstetrics problems in subclinical and overt hypothyroidism

Associated obstetric problems	Frequency (%)	
	Subclinical Hypothy.	Overt Hypothy.
Gestational Diabetes Mellitus	10 (34.48%)	02 (28.57%)
Hypertensive disorder of Pregnancy (PE / HT)	10 (34.48%)	04 (57.14%)
IUGR	09 (31.03%)	02 (28.57%)
Combined problems	06 (20.68%)	03 (42.85%)
Abruption	03 (10.34%)	00 (00.00%)
Anemia	03 (10.34%)	00 (00.00%)
Recurrent Miscarriage	03 (10.34%)	01 (14.29%)
Preterm labour	01 (3.44%)	03 (42.85%)

Amongst the 55 patients with thyroid dysfunctions, 28 patients (50.91%) were delivered by caesarean section and 24 (43.64%) were delivered vaginally, 3 patients had an abortion (5.45%). In caesarean section most common indication for caesarean was previous LSCS (21.43%), meconium stained amniotic fluid (MSAF) (14.28%), abruption (10.7%), severe preeclampsia (10.7%), fetal distress (7%) and non-progress of labour (7%), (Figure 2). Number of term deliveries were 41(78.85) and 11 had (21.15%) preterm deliveries.

Figure 2: Distribution of study group as per indication for caesarean section (n=28)



Among 52 babies born, 17 patients (32.69%) had low birth weight babies (LBW) (weight < 2.5 kg), of these severe LBW (weight <1.5kg) were found in 4 patients (7.69%). None of the babies were extremely LBW (weight <1 kg). In 17 newborns (32.69%) birth weight was 3 to 3.5 kg, 16 babies (30.77%) birth weight was 2.5 to 3 kg. Out of 52 babies born total 26 babies (50%)

were admitted in NICU. Most common reason for NICU admissions was prematurity- 9 Babies (34.62%), low birth weight- 8 babies (30.77%) and hyperbilirubinemia -7 babies (26.92%). TSH, FT3, FT4 levels were evaluated after 72 hours of birth in all babies and all these parameters were within normal limit in all babies, (Table 5).

Table 5: Neonatal outcome

Neonatal Outcome		Frequency	Percentage
Birth Weight (In gram)	3001-3500	17	32.69
	2501-3000	16	30.77
	2001-2500	08	15.38
	1501-2000	05	9.62
	Upto 1500	04	7.69
	Above 3501	02	3.85
Admitted to NICU	Yes	26	50
	No	26	50
Reason for NICU Admission	Preterm	09	34.62
	Low birth weight	08	30.77
	Hyperbilirubinemia	07	26.92
	Distress	03	11.54
	Others	03	11.54
	Meconium aspiration	02	7.69
TSH levels	Thyroid dysfunction	Mean	-
Mean TSH levels Among neonates mIU/ml	Subclinical Hypothyroidism	4.64	-
	Overt Hypothyroidism	5.93	-
	Subclinical Hyperthyroidism	5.8	-
	Overt Hyperthyroidism	7.2	-

Discussion

The prevalence of thyroid disorders in current study was 10.19%. The prevalence of subclinical and overt hypothyroidism was 7.78% and 1.85% respectively while the prevalence of subclinical and overt hyperthyroidism was 0.19% and 0.37% respectively. These findings are comparable with the study done by Saraladevi et al [9] and Sahu et al [10]. In Sahu et al [10] study, the prevalence of subclinical and overt hyperthyroidism was 0.9% and 0.7% respectively. This suggests that prevalence of subclinical and overt hyperthyroidism is higher in western population. The mean gestational age we found was 20 weeks indicating that most of the pregnant women in India do not visit the antenatal clinic during the first trimester (12 weeks) of pregnancy. 9 patients (16.36%) were pre-gestational diagnosed thyroid disorders while the remaining 46 patients (83.64%) were diagnosed during antenatal screening. It is noted that pregnancy related changes in body mimic symptoms and signs of thyroid dysfunctions; hence diagnosis of thyroid dysfunction based on symptoms and signs is difficult in pregnancy. 22-patients (40%) were asymptomatic for thyroid dysfunctions. On asking leading questions patients complained of general weakness in 16 patients (33.33%), palpitations in 2 patients (6.06%), and general oedema in 1 patient (3%). Most patients had no signs of thyroid disorders; on general examination the most common sign detected is Thyromegaly in 12 patients (36.36%).

Patients with subclinical hypothyroidism associated

with the complications like gestational diabetes mellitus (GDM) (34.48%), hypertensive disorders of pregnancy (34.48%), IUGR (31.03%), abruption (10.34%), recurrent abortions (10.34%), anemia (10.34%), preterm labour (3.44%) and 6 patients were having combined problems (20.68%). In a study done by Pokhanna et al [12] the incidence of complications in cases of subclinical hypothyroidism were preeclampsia in (30%), anemia (13.3%), placental abruption (3.3 %), GDM (3.3 %), and PPH (6.6 %). Similarly in a study conducted by Saraladevi et at [9] complications like preclampsia (9.37%), preterm delivery (7.81%), abortions (4.68%) and abruptio placenta (1.56%) were seen in cases of subclinical hypothyroidism. In previous studies [10, 13] there was no incidence of abruption placenta and abortion, but in current study we found 3 patients with abruption (10.34%) and 3 patients with recurrent abortions (10.34%). Among patients with overt hypothyroidism 10 patients had complications like hypertensive disorders of pregnancy (57.14%), preterm labour (42.86%), IUGR (28.57 %), gestational diabetes mellitus (28.57%) and abortion in 1 patient (14.29%). These findings are correlated with the previous studies [10, 13 and 14]. The incidence of complications in cases of overt hypothyroidism varied amongst these studies but incidences of some complications like IUGR, hypertensive disorders of pregnancy are comparable with our study. The incidence of gestational diabetes mellitus in overt hypothyroidism was 28.57%; this has not been seen in other studies [10, 13, and 14]. Subclinical hyperthyroidism was found in only one patient, which was associated with IUGR. Overt hyperthyroidism was found in two patients which was associated with recurrent miscarriage in one patient and abruption in another. The incidence of complications in patients with subclinical hyperthyroidism was varied in different studies [15-18]. Some studies have not classified the cases into sub clinical and overt hyperthyroidism.

Out of 52 babies' borns, 26 babies (50%) were admitted in NICU. Most common reason for NICU admissions were prematurity-9 (34.62%), low birth weight- 8 (30.77%), hyperbilirubinemia -7 (26.92%), fetal distress -3 (11.54%), meconium aspiration- 2 (7.69%). Hyperbilirubinemia was found significant reason for NICU admission in patients with thyroid dysfunctions [19]. In all these babies, levels of TSH and FT3, FT4 were within normal limit probably because, we had treated these mothers for thyroid dysfunctions. Levels of TSH in neonates of different thyroid disorder were analyzed and this suggest that with subsequent treatment of thyroid dysfunction in pregnancy, neonatal TSH was found normal reference ranges. At present there are no available recommendations for detection or screening of thyroid dysfunction among Indian pregnant women. Recent, guidelines do not advocate universal thyroid function screening during pregnancy, but recommend testing for high risk women with personal history of thyroid or other autoimmune disorders or with a family history of thyroid disorders.

Conclusion

The present study shows high prevalence of thyroid dysfunction in our population, especially subclinical and overt hypothyroidism among Indian pregnant women and these dysfunctions are significantly associated with adverse pregnancy outcome. Based on these results, it may be recommended that Universal screening for thyroid dysfunction in pregnancy is necessary.

References

1. Lebeau SO and Mandel SJ. Thyroid disorders during pregnancy. Endocrinology and Metabolism Clinics of North America 2006; 35(1):117-136.
2. Nambiar V, Jagtap V, Shah N et al. Prevalence and impact of thyroid disorders on maternal outcome in Asian-Indian pregnant woman. Journal of thyroid research 2011; 90(2):489-495.
3. Casey BM, Dashe JS, Well CE et al. Subclinical hypothyroidism and pregnancy outcomes. Obstet . Gynecol 2005; 10(5):239-245.
4. Toth B, Jeschke U, Rogenhofer N, Scholz C et al. Recurrent miscarriage: current concept in diagnosis and treatment. J Reprod Immunology 2010; 8:25-32.
5. Haddow JE, Palomaki GE, Allan WC, Williams JR, Knight GJ, Gagnon J, O'Heir CE, Mitchell ML, Hermos RJ,Waisbren SE, Faix JD & Klein RZ. Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. New England Journal of Medicine 1999 341 549–555.
6. Pop VJ, Brouwers EP, Vader HL, Vulsma T, van Baar AL & de Vijlder JJ. Maternal hypothyroxinaemia during early pregnancy and subsequent child development: a 3-year follow-up study. Clinical Endocrinology 2003 59 282–288.
7. Fantz CR, Dagogo-Jack S, Ladenson JH et al. Thyroid function during pregnancy. Clinical Chemistry 1999;45(12):2250-2258.
8. EI Baba KA, Azar ST. Thyroid dysfunction in pregnancy. Int J Gen Med.2012;5:227-30.
9. Saraladevi R, Nirmala Kumari T, Shreen B, Usha Rani V. Prevalence of thyroid disorder in pregnancy and pregnancy outcome. IAIM, 2016; 3(3): 1-11.
10. Sahu MT et al. Overt and subclinical thyroid dysfunction among Indian pregnant women and its effect on maternal and fetal outcome. Archives of gynecology and obstetrics. 2010; 281(2):215-220.
11. Leung AS, Millar L.K, Kooning PP, Montorom, Mestman J. Perinatal outcomes in hypothyroid pregnancies Obstet Gynecol 1993;81(3):349-353.
12. Pokhanna J, Gupta U, Alwani M, Tiwari SP. Prevalence of thyroid dysfunction and impact on maternal and fetal outcome in Central Indian pregnant women. Int J Reprod Contracept Obstet Gynecol 2017;6:4666-70.
13. Leung AS, Millar L.K, Kooning PP, Montorom, Mestman J. Perinatal outcomes in hypothyroid pregnancies Obstet Gynecol 1993;81(3):349-353.
14. Vaidya B, Antony S. Bilousm et al. Detection of Thyroid dysfunction in early pregnancy. Universal screening or high risk targeted case finding ? J Clin Endocronol. Metab 2007; 92(1): 203-207.
15. Tuija Mannisto , Marja Vaarasmaki et al. Thyroid dysfunction and maternal morbidity. J Clin Endocrinol Metab,2010;95(3):1084-1094
16. Robert Negro, Alan Schwartz et al. Detection and treatment of thyroid in pregnancy. J Clin Endocrinol Metab,2010;95(4):1699-1707.
17. Millar LK, Wing DA, Low birth weight and preeclampsia in pregnancies complicated by hyperthyroidism.Obstet Gynecol. 1994;84(6):946-949.
18. Kriplani A, Buckshee K et al Maternal and perinatal outcome in thyrotoxicosis complicating pregnancy. Eur J Obstet Gynecol Reprod Biol. 1994;54(3):159-163.
19. Desai M , Menon P et al:thyroid disorders in newborn,Paediatric Endocrine Disorder. 2nd edition,2008;289-290.