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ORIGINAL RESEARCH

STUDY OF PREVALENCE & FETO-MATERNAL OUTCOME IN THYROID DISORDERS COMPLICATING PREGNANCY IN A TEACHING HOSPITAL

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ABSTRACT

Background: Pregnancy is commonly associated with thyroid disorders which have an impact on the fetal and maternal outcome. Among the various thyroid disorders, hypothyroidism is the commonest. There is a wide geographic variation in the prevalence of hypothyroidism. It varies from 2.5% in the west to 11% in India. Prevalence of hypothyroidism was found to be more in Asian countries compared with the west. Therefore the present study was carried out to study the prevalence of thyroid disorders in pregnancy in our hospital. To study the prevalence and fetal and maternal outcome in thyroid disorders complicating pregnancy in a teaching hospital.

Materials and Methods: Prospective observational study was done in the department of Obstetrics & Gynaecology at Shadan Institute of Medical Sciences and Research Centre for duration of one year i.e., (April 2021- March 2022) which included thousand pregnant women.

Results: In our study, the prevalence of thyroid disorders was 10.6%. The incidence of Subclinical hypothyroidism was 9.1% and Overt Hypothyroidism was 1.1%, Sub-clinical hyperthyroidism was 0.3% and Overt Hyperthyroidism was 0.1%. The incidence of Pre-eclampsia was 15.09%, Anaemia 16.04%, Pre- term delivery 9.43%, LBW 11.32%, IUFD 2.83% and Caesarean deliveries 15.09% in 106 pregnant women with thyroid disorders.

Conclusion: Our study showed high prevalence of thyroid disorders 10.6%. Thyroid disorders in pregnancy are significantly associated with fetal and maternal complications. Universal screening of pregnant women for thyroid disorders should be

considered in a country like India where there is a high prevalence of undiagnosed thyroid disorders.

Keywords: Subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, overt hyperthyroidism, Pre-Eclampsia (PE), Intra Uterine growth restriction (IUGR), Caesarean delivery (CD), Intra-Uterine fetal death (IUFD), Low birth weight (LBW), Pre-term Delivery (PTD).

INTRODUCTION

Thyroid disease is more common in women than in men. Most thyroid disorders are autoimmune in nature and females have an increased susceptibility to autoimmune diseases. Thyroid physiology plays an important role in pregnancy. Thyroid disorders contribute to one of the most common endocrine disorders of pregnancy.

Pregnancy is a stress for thyroid resulting in hypothyroidism in woman.[1] Developing foetus synthesises thyroid hormone only by the end of first trimester and depends on the maternal thyroid hormone for organogenesis, general growth and development of CNS. Thyroid hormones are also essential for the completion of normal pregnancy.

Maternal thyroxine is transferred to the foetus throughout pregnancy.[2] Maternal thyroxine is important for normal fetal brain development especially before onset of fetal thyroid gland function. Maternal sources amount for 30% of thyroxine in fetal serum at term.[3] Maternal thyroid changes are substantial and normally altered gland structure and function are sometimes confused with thyroid abnormalities. TRH levels do not rise during normal pregnancy but TRH crosses the placenta and may serve to stimulate the fetal pituitary to secrete TSH.[3] The thyroid undergoes physiological changes during pregnancy, such moderate enlargement of the gland and increasing of vascularization.[4] But there is no significant thyromegaly (goitre) in a normal pregnancy. Mean thyroid volume increases from 12 ML in the first trimester to 15 ML at term.[5]

Most thyroid disorders are linked to auto antibodies against nearly 200 thyrocyte components. Thyroid stimulating auto antibodies also called thyroid stimulating Immuno globulins (TSIs) bind to the TSH receptor and activate it causing thyroid hyper function and growth. Thyroid peroxidase antibodies directed against Thyroid peroxidase (TPO) and have been associated with early pregnancy loss and Preterm birth.

In a study with more than 1000 TPO antibody positive pregnant woman, the risk of placental abruption was greater,[6] and also at risk for postpartum thyroid dysfunction and lifelong risk of permanent thyroid failure.[7] Thyroid dysfunction maybe overlooked in pregnancy as the physiological changes of pregnancy simulate thyroid disease. Fatigue, sluggishness, constipation, oedema may simulate hypothyroidism. Heat intolerance, wide pulse pressure may simulate hyperthyroidism. Maternal complications of hypothyroidism are spontaneous abortion, pedal oedema, cardiac dysfunction, placental abruption, PPH, puerperal sepsis and prolonged hospital stay. Fetal complications include pre-term delivery, low birth weight, IUGR, fetal distress, fetal death, low APGAR scores at 1 min and 5 min, perinatal death and neonatal hypothyroidism. Maternal and fetal complications of hyperthyroidism include congestive cardiac failure, thyroid storm, preterm delivery, fetal growth restriction, stillbirth, fetal and neonatal thyrotoxicosis.[8] Prevalence of thyroid disorders during pregnancy has a wide geographic variation. In western literature, prevalence of hypothyroidism in pregnancy

was 2.5% and hyperthyroidism in pregnancy was 0.2–1.7% whereas prevalence of thyroid disorders in Indian woman according to few reports was 4.8% to 11%.

Aims and objectives

1. To know the prevalence of overt and subclinical thyroid disorders in Indian pregnant woman in a tertiary care hospital
2. To know the effect of overt and subclinical thyroid dysfunction on maternal and fetal outcome.

MATERIALS & METHODS

Ethical institutional permission was taken. Thousand antenatal women attending the outpatient department of tertiary care centre Obs & Gyn Department of Shadan Hospital, Peerancheru, Hyderabad from (April 2021-March 2022) for the duration of one year were included in the study. Prospective study done in 1000 pregnant woman.

Inclusion criteria

1. Singelton pregnancy
2. Primi / multi gravida at any gestational age
3. Women with history of thyroid disorders and women who are on treatment of thyroid disorders.

Exclusion criteria

1. Multi fetal gestation
2. Known chronic diseases of DM, HTN
3. Had previous bad obstetric history

Methodology: Detailed history including menstrual and obstetric history was taken and thorough examination done. Routine investigations were done. Specific investigations included serum TSH, free T3 and free T4 levels, anti TPO antibody levels.

Normal range for serum TSH was taken as per ATA recommendation, First trimester 0.1 to 2.5 mIU/L

Second trimester 0.2 to 3.0 mIU/L

Third trimester 0.3 to 3 mIU/L

Subclinical hypothyroidism was increased TSH in the presence of normal FT3 and FT4.

Normal range for free T4 levels was taken as 0.7 to 1.8 pg/ml and free T3 levels as 1.7 to 4.2 pg/ml. Anti TPO antibodies levels < 35 IU/ml was taken as normal.

Depending on hormonal values patients were classified as:

Subclinical hypothyroidism: High serum TSH level with normal FT3 and FT4 level.

Overt hypothyroidism: High serum TSH level with FT3 and FT4 less than normal range or serum TSH >10 mIU /litre irrespective of FT3 and FT4 levels.

Subclinical hyperthyroidism: Low serum TSH levels with normal FT3 and FT4 level.

Overt Hyperthyroidism: Low serum TSH level with FT3 and FT4 more than normal range.

Subclinical and overt hypo thyroid patients were given thyroxine replacement. Subclinical and overt hyper thyroid patients were given Propylthio uracil.

Every four weeks, TSH levels were estimated and the dose of drugs adjusted. Women were followed up throughout pregnancy and monitored. Outcome of the pregnancy was documented.

Maternal outcome was noted in terms of

1. Pre-eclampsia
2. Anaemia
3. Preterm delivery
4. Caesarean deliver

Fetal outcome was noted in terms of

1. IUGR
2. Low birth weight
3. IUFD.

RESULTS

Table 1: Prevalence of Thyroid disorders in Pregnant Women

No of pregnant Women screened	No of Normal Pregnant women	No of Pregnant women with thyroid problems	Prevalence of thyroid disorders in pregnant women
1000	887	106	10.6%

Out of the 1000 pregnant women screened, 106 had thyroid disorder. Thus, the prevalence of thyroid disorders in this study was 10.6% 66.9% of the women with thyroid dysfunction were between 21-25 years. 90 out of 106 women with thyroid dysfunction were newly diagnosed during screening. 16 women were known cases of thyroid disorders. 3 out of 97 with newly diagnosed thyroid dysfunction had family history of thyroid disease.

Table.2. Age distribution

Age (in years)	No of total pregnant women	No. of (n=106) pregnant women with thyroid dysfunction	Percentage	Prevalence
15-20	64	7	6.60%	10.93%
21-25	637	71	66.10%	11.14%
26-30	291	26	24.50%	11.40%
31-35	8	2	1.06%	25%

Table 3: Prevalence of types of thyroid disorders among 1000 pregnant women screened

Type of disorder	No of cases	Percentage
Sub clinical hypothyroidism	91	9.1%
Overt hypothyroidism	11	1.1%
Sub clinical hyperthyroidism	3	0.3%
Overt hyperthyroidism	1	0.1%
Total	106	10.6%

In the present study serum TSH was < 0.34 IV/ML, in 4 women > 0.34 IV/ml in 102 women. Anti TPO Ab was positive in 11 cases of hypothyroidism. The prevalence of SCH, overt hypothyroidism, subclinical-hyperthyroidism, overt-hyperthyroidism, was 9.1%, 1.1%, 0.3% and 0.1% respectively. Out of 1000 pregnant women screened 91 had sub clinical

hypothyroidism, thus, sub clinical hypothyroidism was the thyroid disorder with the highest prevalence rate in pregnant women. Only one pregnant woman had overt hyperthyroidism which has least prevalence of 0.1%.

Table 4: Maternal and Fetal complications among 91 cases of Subclinical Hypothyroidism

Complications	Number of cases	Percentage
Pre-eclampsia	13	14.2%
Preterm delivery	06	6.5%
Anemia	15	16.4%
Caesarean delivery	13	14.2%
IUGR	04	4.3%
LBW	09	9.8%
IUFD	02	2.1%

Out of 91 cases of SCH, 15 cases had anemia (16.4%), 13 cases had Pre-Eclampsia (14.2%), 6 cases had pre-term delivery (6.59%) and 13 cases had caesarean delivery 14.28 Out of 91 cases of SCH, 9 cases LBW babies (9.89%) 4 cases had IUGR (4.39%) and 2 cases had IUFD (2.19%), 3 cases of IUGR had pre-eclampsia and 1 case of IUFD had Abruptio placenta and pre-eclampsia.

Table 5: Maternal and fetal complications and caesarean delivery among 11 cases of overt hypothyroidism

Complications	No of Cases	Percentage
Pre-eclampsia	2	18.18%
Preterm delivery	2	18.18%
Anemia	3	27.27%
Caesarean delivery	2	18.18%
IUGR	2	18.18%
LBW	3	27.27%
IUFD	1	9.09%

Among 11 cases of overt hypothyroidism, anemia was seen in 3 cases (27.27%) PE in 2 cases (18.18%), PTD in 2 cases (18.18%), and 2 had caesarean delivery (18.18%). Among 11 cases of overt hypothyroidism 3 cases were low birth weight (27.27%), 2 cases had IUGR babies (18.18%), and IUFD was seen in 1 case (9.09%), Pre-eclampsia was present in both cases of IUGR and cause of IUFD was congenital anomalies.

Table 6: Maternal and Fetal complications and incidence of caesarean delivery among 3 cases of subclinical hyperthyroidism

Complications	No of Cases	Percentage
Pre-eclampsia	1	33.33%
Preterm delivery	1	33.33%
Caesarean delivery	1	33.33%
IUGR	1	33.33%
IUFD	0	
LBW	0	

Out of 3 cases of subclinical hyperthyroidism, 1 case had pre-eclampsia, 1 case delivered preterm and 1 delivered by caesarean section. 1 patient had IUGR and no IUFD's were noted.

Table 7: Complications of Hypo & Hyperthyroidism

Hypothyroidism				
Complications	**No of cases of Sub clinical(n=91) Hypothyroidism**	**No of cases of Overt(n=11) Hypothyroidism**	**Total**	**Percentage**
Pre-eclampsia	13	2	15	14.7%
Anemia	15	2	17	16.7%
Preterm	6	3	9	8.8%
IUGR	4	2	6	5.9%
LBW	9	3	12	11.8%
IUFD	2	1	3	2.9%
Caesarean delivery	13	2	15	14.7%

Hyperthyroidism				
Complications	**No of cases of Subclinical(n=3) Hyperthyroidism**	**No of cases of Overt Hyperthyroidism(n=1)**	**Total**	**Percentage**
Pre-eclampsia	1	0	1	25%
Anemia	0	0	0	0
Preterm	1	0	1	25%
IUGR	1	0	1	25%
LBW	0	0	0	0
IUFD	0	0	0	0
Caesarean delivery	1	0	1	25%

Among 102 pregnant women with hypothyroidism both overt and subclinical together, pre-eclampsia was seen in 14.7%, Anemia was seen in 16.7%, preterm deliveries were seen 8.8%, IUGR in 5.9%, LBW in 11.8%, IUFD in with2.9 and 13 women delivered by Caesarean delivery at14.7%. Among 4 pregnant women hyperthyroidisms both overt and subclinical, 1 had pre- eclampsia (25%), 1 had preterm delivery (25%), 1 had IUGR (25%) and 1 delivery by caesarean section (25%).

Table – 8: ?

Complications	**Total thyroid disorders(n=106)**	**percentage%**
Pre-eclampsia	16	15.09%
Anemia	17	16.04%
Preterm	10	9.43%
IUGR	7	6.60%
LBW	12	11.32%
IUFD	3	2.83%
Caesarean delivery	16	15.09%

The p value was less than .000001 making the association of complications in thyroid disorders significant. Maternal and Fetal complications and caesarean delivery in 106 pregnant women with thyroid disorders. Pre-eclampsia 16 (15.09%), Anemia 17 (16.04%), Preterm 10 (9.43%), IUGR 7 (6.60%), LBW 12 (11.32%), IUFD 3 (2.83%) and Caesarean deliveries 16 (15.09%).

Pre-eclampsia: - 13 cases with, SCH, 2 cases with Overt Hypothyroidism, and 1 case with subclinical Hyperthyroidism developed pre-eclampsia with an incidence of 15.09%.

Anemia: - 15 cases with SCH, 2 with overt hypothyroidism had Anemia. With an incidence of 16.04%.

Preterm delivery: - 6 cases with SCH, 3 cases with overt hypothyroidism and 1 case of subclinical hyperthyroidism had preterm delivery. The incidence of preterm delivery was 9.43%.

Caesarean delivery: - 13 cases SCH, 2 cases of overt hypothyroidism and 1 case of subclinical hyperthyroidism had caesarean delivery making the incidence 15.09%.

In 106 pregnant women, with thyroid disorders incidence of Anemia, pre-eclampsia and preterm delivery was 16.04%, 15.09%, and 9.43% respectively. So, Anemia and pre-eclampsia were the most common complications associated with thyroid disorders.

Incidence of Caesarean delivery was 15.09%.

IUGR: - 4 cases of SCH, 2 cases of overt hypothyroidism and 1 case of subclinical hyperthyroidism had IUGR. Incidence of 6.60%

IUFD: - 2 cases of SCH, 1 case of overt hypothyroidism had IUFD, with incidence of 2.83%.

LBW: - 9 cases of SCH, 3case of overt hypothyroidism had LBW with incidence of 11.32%.

LBW was the most fetal complication observed.

DISCUSSION

The present study is a prospective study done at Shadan Hospital, Hyderabad. Thousand Ante-natal women of all gestational ages were screened for Serum TSH. In the present study, universal screening was done. ATA recommends Ante-natal screening for Thyroid disorders only in women with high risk factors. Study done by Dave et al concluded that there is significant correlation between risk factors and hypothyroidism. But screening only high-risk women failed to detect the majority of pregnant women with thyroid disorders. In this study, the normal range of serum TSH was taken as per ATA recommendations, first trimester: 0.1 - 2.5 mIU/L, second trimester: 0.2 - 3.0 mIU/L and third trimester: o.3-3 mIU/L. Study done by Stricker et al, concluded that interpretation of serum TSH value using non pregnant reference intervals could potentially result in misclassification of a significant percentage of results. The prevalence of thyroid disorders in pregnancy and the maternal and fetal complications in the pregnant women with thyroid disorders varies greatly in different regions depending upon many factors and it is difficult to derive at a single figure.

Table 9: Comparison of prevalence of thyroid disorders in different studies

S.no	Study	Prevalence
1	Present Study	10.6%
2	Vikas Yadav et al	11.07%
3	Preeti Gupta	10.40%
4	Kalpana Mahadik et.al	11%
5	Amritha Singh et al	6.8%
6	Ajmani. Et al	13.25%

Prevalence of thyroid disorder in pregnancy in the present study was 10.6% which is comparable to the studies conducted by Kalpana Mahadik et.al (11%),[12] Amritha Singh (6.8%),[13] Ajmani et.al (13.25%),[14] Vikas Yadav et.al,[10] conducted Meta-Analysis on the prevalence of hypothyroidism among pregnant women in India. The pooled estimate of hypothyroidism in pregnant women was 11.07%.

Table -10: Comparison of prevalence of SCH & Overt- Hypothyroidism in different studies

Sub-Clinical Hypothyroidism			Overt- Hypothyroidism		
S. No	Study	Prevalence	S.No	Study	Prevalence
1	Present study	9.10%	1	Present study	1.10%
2	Kalpana Mahadik et al	5.60%	2	Kalpana Mahadik et al	3.50%
3	Amritha Singh et al	6.10%	3	Amritha Singh et al	0.70%
4	Vikas Yadav et al	9.51%	4	Vikas Yadav et al	2.74%
5	Preeti Gupta et al	5.50%	5	Preeti Gupta et al	0.92%

Prevalence of Subclinical Hypothyroidism in pregnancy in the presentation study was 9.1%, which is similar with the other studies conducted by Vikas Yadav et al,[10] which was 9.5%, Kalpana Mahadik et al.[12] 5.6%, Amritha Singh et al.[13] 6.10%, Preeti Gupta et al.[11] 5.5%.

Prevalence of overt hypothyroidism in pregnancy according to the present study was 1.1%, which is consistent with studies conducted by Preeti Gupta et al.[11] 0.92% and Amrita Singh et al,[13] 0.70%. Prevalence of Subclinical hyperthyroidism in the present study was 0.3%, which is less than the study conducted by Kalpana Mahadik et al.[12] which was 1.5% and Ajmani et al.[14] which was 0.75%. Prevalence of overt hyperthyroidism according to the present study was 0.1% which is slightly less than that of study conducted by Rajput et al (0.4%),[15] and Ajmani et al,[14] (0.5%).

Table: 11 Comparison of Incidence of Complications and Caesarean Delivery in Pregnant women with SCH in different studies.

Study	PE	Anaemia	PTD	IUGR	LBW	IUFD	CD
Present Study	14.2%	16.4%	6.5%	4.3%	9.8%	2.1%	14.2%
Aditi P. Kaundinya et al	8.5%	-	8.5%	2.85%	8.5%	-	-
Ajmani et al	22.3%	14.1%	5.8%	4.9%	12%	1.7%	16.6%
Rooplekha et al	26.8%	-	9.8%	-	19%	2.3%	22.5%

In present study of patients with SCH, Pre-eclampsia was 14.2% when compared to the studies done by Aditi et al,[16] and Ajmani et al,[14] 8.5% and 22.3% respectively. Incidence of Anaemia in Pregnant Women with Subclinical Hypothyroidism was 16.4%, when compared to the study by Ajmani,[14] which was 14.1%.Incidence of Preterm Delivery in Pregnant Women with SCH was 6.5% as compared to 5.8% and 8.5% in studies conducted by Ajmani et al,[14] and Aditi P. Kaundinya et al,[16] respectively.

Incidence of IUGR in pregnant women with SCH in present study was 4.3% as compared to 2.85% and 4.9% in studies conducted by Aditi P. Kaundinya et al,[16] and Ajmani et al,[14] respectively. Incidence of LBW in Pregnant Women with SCH in present study is 9.8% as compared to 8.5% and 12% in studies conducted by Aditi P. Kaundinya et al,[16] and Ajmani et al,[14] respectively. Incidence of IUFD in Pregnant Women with SCH in present study was 2.1% as compared to 1.7% and 2.3% in studies conducted by Ajmani et al,[14] and Rooplekha et al,[17] respectively. Incidence of Cesarian Delivery in Pregnant Women with SCH was 14.2% as compared to 16.6% and 22.5% in studies conducted by Ajmani et al,[14] and Rooplekha et al,[17] respectively.

Table -12 Comparison of incidence of Complications and Caesarean Delivery in Pregnant Women with Overt Hypothyroidism.

Study	PE	Anaemia	PTD	IUGR	LBW	IUFD	CD
Present Study	18.1%	27.2%	18.1%	18.1%	27.2%	9.0%	18.1%
Ajmani et al	16.6%	8.3%	33.3%	25%	50%	16.6%	41.6%
Rooplekha et al	60%	60%	20%		80%		60%

The incidence of PE in Pregnant Women with Overt Hypothyroidism in the present study was 18.1% as compared to 16.6% and 60% in studies conducted by Ajmani et al,[14] and Rooplekha et al,[17] respectively. The incidence of Anaemia in Pregnant Women with Overt Hypothyroidism in the present study was 27.2% as compared to 8.3% and 60% in studies

conducted by Ajmani et al,[14] and Rooplekha et al,[17] respectively. The incidence of PTD in Pregnant Women with Overt Hypothyroidism in the present study was 18.1% as compared to 33.3% and 20% in studies conducted by Ajmani et al,[14] and Rooplekha et al,[17] respectively. The incidence of IUGR in Pregnant Women with Overt Hypothyroidism in the present study was 18.1% as compared to 25% in study conducted by Ajmani et al.[14] The incidence of LBW in Pregnant Women with Overt Hypothyroidism in the present study was 27.2% as compared to 50% and 80% in studies conducted by Ajmani et al,[14] and Rooplekha et al,[17] respectively. The incidence of IUFD in the present study of Pregnant Women with Overt Hypothyroidism was 9.0% as compared to 16.6% in study conducted by Ajmani et al.[14]

The incidence of Cesarian Deliveries in Pregnant Women with Overt Hypothyroidism in the present study was 18.1% as compared to 41.6% and 60% in studies conducted by Ajmani et al[14] and Rooplekha et al,[17] respectively.

In the present study, the incidence of Pre-eclampsia among patients with Hypothyroidism was 14.7% when compared to a recent study conducted by Kalpana Mahadik et al,[12] which was 15.8%. Anaemia constituted 16.6% of Pregnant Women with Hypothyroidism as compared to 26.3% in a recent study conducted by Kalpana Mahadik et al.[12] The incidence of Preterm Delivery, Cesarean Delivery, LBW, in Pregnant Women with Hypothyroidism in our study was 8.8%, 14.7%, 11.7% respectively as compared to 5.3%, 26.3%, 31.6% in a recent study conducted by Kalpana Mahadik et al.[12] respectively comparison of incidence of complications in pregnant women with hyperthyroidism. In the present study Subclinical hyperthyroidism was associated with complications like PE (33.3%), PTD (33.3%), IUGR (33.3%), CD (33.3%) when compared to Saki et al,[18] study in which the incidence of IUGR in pregnancy with hyperthyroidism was 22.2%.The incidence of CD in the study conducted by Ajmani et al,[14] was 50%.

CONCLUSION

This study showed a high prevalence of thyroid disorders in pregnancy (10.6%), Hypothyroidism (10.2%) was more common in Pregnant Women with prevalence of Subclinical Hypothyroidism being 9.1% and overt hypothyroidism being 1.1%. Hyperthyrodism in pregnancy was less common (0.4%). Thyroid disorders in pregnancy are significantly associated with both maternal and fetal complications and adversely affect the outcome of pregnancy. The most common maternal complication was anemia (16.04%) followed by Pre-eclampsia (15.09%) and PTD (9.43%). LBW (11.32%) was the most common fetal complication followed by IUGR (6.60%) and IUFD (2.83%). Hence early identification of thyroid disorder and timely initiation of treatment is essential. Universal screening of pregnant woman for thyroid disorders should be considered especially in a country like India where there is high prevalance of undiagnosed thyroid disorder. Screening has to be done at the earliest preferably in first trimester but even if missed in 1st trimester it should be considered in later gestation also as maintainance of thyroid hormones in normal range atleast in later gestation also decreases the incidence of complications. Antenatal women with known thyroid disorder should also be monitored regularly with serum TSH or free T4 levels, as thyroid hormone requirement changes with gestation.

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