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Study of trimester wise effect of hypothyroidism in pregnancy and its materno- fetal outcome

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Abstract

Introduction: Pregnancy is associated with a number of physiological and hormonal changes that result in significant but reversible alterations in thyroid function tests (TFTs). Production of thyroid hormones and iodine requirement each increases by approximately 50% during pregnancy.

Methodology: All the patients coming to OPD for regular antenatal visits, after obtaining the gestational age and informed consent were randomly selected for the study. The patients fulfilled all the inclusion criteria. A detailed history was taken regarding, The symptoms, and signs of thyroid disorders, menstrual history, obstetric history, past medical history, family history and personal history.

Results : In our study , while we analysed , trimester wise effect of hypothyroidism in pregnancy and it's meterno-fetal outcome , we found , mothers who were detected with thyroid disorder in first trimester were more with pregnancy associated complications (45%) as compared to second trimester (21%) and third trimester (only 3%)

Conclusion: From this study , we conclude that maternal hypothyroidism is associated with a variety of neonatal and pregnancy related adverse events like abortion,fetal growth restrictions, Oligohydramnios, gestational hypertension preterm delivery,operative delivery.

Keywords: maternofetal complications, third trimester , hormonal changes , pregnancy

Introduction

Pregnancy is associated with a number of physiological and hormonal changes that result in significant but reversible alterations in thyroid function tests (TFTs). Production of thyroid hormones and iodine requirement each increases by approximately 50% during pregnancy.[1] The various other changes in TFT during pregnancy include - increase in serum free thyroxine (FT4), reciprocal decrease in thyrotropin (TSH) due to the thyrotropic activity of human chorionic gonadotrophin during the first trimester. [1]There is increased sialyation of thyroid hormone, mediated by oestrogens and reduced clearance of thyroxine-binding globulin which results in increased levels of total T4 and T3 [2] . However, many factors such as ethnicity, age, manufacturer's methodology, iodine status of the reference population and calculation method may affect the establishment of reference intervals for TFTs. Since reference range for hypothyroidism needs to be gestational age specific, there is need to establish trimester-specific thyroid levels for its effects on maternal and fetal outcome.In India, limited data is available over trimester-specific thyroid hormones level during pregnancy. [3, 4, 5] With this objective present work was planned to study of

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trimester wise effect of hypothyroidism in pregnancy and its materno fetal outcome.

Methodology

This was a longitudinal study with sample size - Total 114 hypothyroid pregnant females selected for the study. Sample size was determined by taking prevalence as 2%, at 95% CI and acceptable errors of 5%,using WINPEP1 Software Material required - blood sample and syringe 5cc .

The main source of data for the study is patients from DY PATIL MEDICAL COLLEGE, All pregnant women coming for routine antenatal checkups.

Patient selection

Inclusion Criteria

- Singleton Pregnancy
- Primigravida/Multigravida
- Know case of hypothyroidism on treatment
- Cases with Recurrent pregnancy loss

Exclusion Criteria

- known case of hyperthyroidism
- Patients with thyroid tumors

All the patients coming to OPD for regular antenatal visits, after obtaining the gestational age and informed consent were randomly selected for the study. The patients fulfilled all the inclusion criteria.

A detailed history was taken regarding, The symptoms, and signs of thyroid disorders, menstrual history, obstetric history, past medical history, family history and personal history.

A thorough general physical examination followed by examination of Cardiovascular system(CVS), Respiratory system(RS), Central nervous system(CNS), Per abdomen and local thyroid gland examined and findings noted.

Patients are sent for TSH,FT3 and FT4 levels and haematological parameters to be checked. Patients with deranged thyroid function tests are followed up and assessed for maternal and fetal outcome

Ultrasonography is done to monitor fetal growth and development in second and third trimester.

At the end, the trimester wise obstetrics outcome and perinatal outcome of the pregnancy noted.

All the information collected is kept confidential and will be used only for research purposes. Ethical clearance was obtained from the Institutional Ethics Committee.

Results

In present study mean age of patients was 25.56 years, while maximum patients - 97 patients (85%) were in range of 20 – 30 years of age. 11 patients (10%) were above 30 years of age while only 6 patients (5%) were below 20 years of age.

In the present study maximum patients were primigravida; minimum were fourth gravida. 64 patients of 114 were primigravida, 38 patients were 2nd gravida, 10 patients were 3rd gravida, and 2 patients were 4th gravida in our study.

In our present study 89 patients (78%) had no history of previous abortion, while 25 patients (22%) have history of previous abortion.

Among them 22 patients(19%) had previous 1 abortion, 2 patients (2%) had previous 2 abortions, 1 patient(1%) had 3 abortions prior to the present pregnancy.

In this study 111 patients(97%) had singleton pregnancy while 3 patients (3%) had twin gestation.

The study shows that hypothyroidism was detected by screening during the present pregnancy in 35 patients (30.7%); and in 79 patients (69.3%) it was detected prior to present pregnancy. In our study 10 patients (29%) had hypothyroid detected in first trimester,16 patients (46%) during second trimester,and 9 patients (25%) during third trimester in present pregnancy.

In our study we found 87 patients (76%) with overt hypothyroidism and 27 patients (24%) with Subclinical hypothyroidism

Table 1: Table showing distribution of patients according to the complications of pregnancy

Pregnancy complications	Number of patients	Percentage
Cholestasis of pregnancy	1	1
FGR & Oligohydramnios	13	11
GDM	2	2
Oligohydramnios	13	11
Oligohydramnios & PIH	2	2
PIH	5	4

Pregnancy complications	Number of patients	Percentage
Thrombocytopenia of pregnancy & PIH	1	1
No complications	77	68
	114	100

The present study shows that 13 (11%) pregnant hypothyroid women were having Fetal growth restriction and Oligohydramnios; 13 (11%) pregnant hypothyroid women had Oligohydramnios; and 2 (2%) pregnant hypothyroid women has Oligohydramnios and gestational hypertension; 5 (4%) pregnant hypothyroid women had gestational hypertension ; 2 (2%) pregnant hypothyroid women had GDM; 1 (1%) pregnant hypothyroid women had cholestasis of pregnancy and 1 (1%) pregnant hypothyroid women had Thrombocytopenia of pregnancy; while 77 (68%) pregnant hypothyroid women had no associated complications.

Table 2: Labour complications - distribution of patients

Labour complications	Number of patients	Percentage
Prolonged labour	10	9
PPH	7	6
Nil	97	85
	114	100

In the study we saw prolonged labour in 10 (9%) patients; Postpartum hemorrhage in 7 (6%) patients; and 97 (85%)patients had no complications during labour.

Table 3: Fetal outcome - distribution of patients

Fetal outcome	Number of patients	Percentage
Low birth weight	17	15
Normal	97	85
	114	100

85% (n=17)of babies born to hypothyroid mothers has normal weight and 15% (n=97)of babies had low birth weight .

Kalpana Mahadik et al [89] reported, 31.6% had LBW babies, and the association between LBW and hypothyroidism was significant ($p = 0.001$).

Table 4: Neonatal hypothyroidism - distribution of babies

Neonatal hyothyroid	Number of babies	Percentage
YES	2	2
NO	112	98
	114	100

Neonatal hypothyroidism was detected in 2 babies born to hypothyroid mothers, and was not detected in 112 babies.

Table 5: Trimester wise effect of hypothyroidism in pregnancy and it's Materno-Fetal outcome.

Gestational week - Thyroid detected	Pregnancy associated complications (%)	labour complications (%)	Low birth weight	NICU admission (%)
First trimester (N=10)	45	22	30	35
Second Trimster (N=16)	21	15	22	24
Third trimester (N=9)	3	2	4	6

In our study , while we analysed , trimester wise effect of hypothyroidism in pregnancy and it's meterno-fetal outcome , we found , mothers who were detected with thyroid disorder in first trimester were found more with pregnancy associated complications (45%) as compared to second trimester (21%) and third trimester (only 3%) .

Discussion

In the present study a total of 114 hypothyroid pregnant females were recruited and followed up throughout the pregnancy till delivery. The aim was to study the trimester wise effect of hypothyroidism in pregnancy and it's meterno fetal outcome.

In our study , while we analysed , trimester wise effect of hypothyroidism in pregnancy and it's meterno-fetal outcome , we found , mothers who were detected with thyroid disorder in first trimester were found more with pregnancy associated complications (45%) as compared to second trimester (21%) and third trimester (only 3%) .

Similar pattern was observed in labour complications , where in first trimester was seen maximum (22%) , while in second trimester (15%) , while in third trimester only 2% .

When we studied Fetal outcome in hypothyroid mothers,babies born with low birth weight , in first trimester , it was seen in 30% , in second trimester it was 4% , no low birth weight babies were born to mothers detected with hypothyroid in third trimester.

NICU admission required in babies with maternal hypothyroid since first trimester was found in 35% , in the second trimester was reported in 24% , while in third trimester , it was reported only in 6% .

Maraka S et al reported, thyroid harmone treatment was associated with decreased risk of pregnancy loss among women with Subclinical hypothyroidism, however, the increased risk of other pregnancy related adverse outcome calls for additional studies evaluating safety of thyroid harmone treatment in this patient population.[6]

In our study, 17(15%) babies were found with low birth weight, 2(2%) babies were found with neonatal hypothyroid, 44(39%) babies required NICU admission, Neonatal Hyperbilirubinemia was seen in 38(33%) babies.

Kalpana Mahadik et al observed, 31.6% had LBW babies, and the association between LBW and hypothyroidism was significant ($p = 0.001$). NICU admission 42.1% was significantly associated with hypothyroidism ($p = 0.000$). Risk of delivery of LBW babies is 6.3 times higher in women with hypothyroidism (95% CI = 2.03–19.5) than in women with euthyroidism. Risk of NICU admission were 0.14 times (95% CI = 0.048–0.39) higher in babies born to women with hypothyroidism compared to those born to women with euthyroidism. [7]

Fisher DA et al observed that neonatal or fetal hypothyroidism secondary to transplacental transfer of maternal auto-antibodies is very rare,1 in 180,000 neonates or ~2% of babies with congenital hypothyroidism. [8]

In our study , while we analysed , trimester wise effect of hypothyroidism in pregnancy and it's meterno-fetal outcome , we found , mothers who were detected with thyroid disorder in first trimester were more with pregnancy associated complications (45%) as compared to second trimester (21%) and third trimester (only 3%) .

Similar pattern was observed in labour complications , where patients with hypothyroid since first trimester (22%) had labour complications ,in hypothyroid since 2nd trimester (15%) had labour complications, hypothyroid since third trimester, only 2% had complicated labour.

With low birth weight , in first trimester , it was seen in 30% , second trimester was 4% , while no low birth weight babies in third trimester group. [8,9]

NICU admission was required by 35% babies born to hypothyroid mothers since first trimester,while in second trimester , it was reported in 24% , while in third trimester , it was reported only in 6% . In our study, 33% delivery was Vaginal delivery, while 55% were reported as LSCS with 12% reported abortion. While correlation of type of delivery & association of hypothyroid disease, we found higher number of LSCS and abortion were reported in clinically diagnosed cases rather than sub clinical cases. While correlation of type of delivery & association of hypothyroid disease, we found higher number of preterm delivery were reported in clinically diagnosed cases rather than sub clinical cases.

Maraca et al reported, thyroid harmone treatment was associated with decreased risk of pregnancy loss among women with Subclinical hypothyroidism, however, the increased risk of other pregnancy related adverse outcome calls for additional studies evaluating safety of thyroid harmone treatment in this patient population. [10] Thyroid disorders are common in women of childbearing age, and are the most common endocrine disorders after diabetes in these years. The prevalence of thyroid disease in pregnancy and its maternal and child complications in pregnant women varies widely in different regions depending on many factors. To date, there are very few studies of thyroid function and pregnancy in India associated with maternofetal effect.[11] Complications of hypothyroidism during pregnancy, in mother and fetus are well established. For these reasons, it is important to use appropriate strategies to identify women at risk of these side effects and to use

diagnostic tools for early detection and start effective treatment. Thus this study aims to determine the prevalence of thyroid disease during pregnancy and its effects on maternal and child health care in India. Although targeted testing is often made, the latest evidence seems to suggest that universal testing may be a better option.So, routine tests, early confirmation of diagnosis and immediate treatment along with regular postnatal follow-up, is necessary to ensure positive outcomes for both mother and baby. [12]

Conclusion

From this study, we conclude that maternal hypothyroidism is associated with a variety of neonatal and pregnancy related adverse events like abortion,fetal growth restrictions, Oligohydramnios, gestational hypertension preterm delivery,operative delivery.

Conflict of interest: Authors has no any conflict of interest.

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Ethical Clearance: We obtained Institutional Ethics Clearance from our IEC, DYPMC.

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