



Original Research Article

A hospital based prospective comparative study on fetal and maternal outcome among pregnant women with hypothyroidism and euthyroidism.

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Abstract: **Background:** During pregnancy, the daily iodine requirement increases due to effect on the thyroid gland and increased production of the thyroid hormones. In hypothyroidism, these physiological demands are critically affected. While, an euthyroid woman is able to compensate the changes, the hypothyroid woman may lead to adverse maternal and fetal outcomes such as spontaneous abortion, placental abruption, anemia, postpartum hemorrhage, preeclampsia, IUGR, (intrauterine growth retardation) fetal distress and preterm delivery etc. **Objective:** To compare maternal and fetal outcome in women with hypothyroidism and euthyroidism **Methods:** Hospital-based prospective-comparative study was carried out among 120 pregnant women with hypothyroidism and 100 women with euthyroid state in Mallareddy narayana multi-speciality hospital. History, thorough clinical examination with necessary investigations was carried out. All participants were followed till delivery and maternal and fetal outcomes were noted. **Results:** Mean age, gravidity, incidence of previous abortions and of women in hypothyroid group was significantly more compared to women in euthyroid group. But, parity was comparable. Mean gestational age at delivery was significantly more in euthyroid group compared to hypothyroid group ($p < 0.05$). Incidence of complicated maternal outcome was 35.8% in hypothyroidism compared to only 3% in euthyroid and was significant. In hypothyroid group, 64.2% had complications compared to only 2% in euthyroid group which was significant ($p < 0.05$). Incidence of abnormal fetal outcome was 10.8% in hypothyroidism compared to only 1% in euthyroidism and was significant ($p < 0.05$). Mean birth weight was comparable ($p > 0.05$). APGAR score at birth and at five minutes was significantly more in euthyroid group compared to hypothyroid group and was significant ($p < 0.05$). **Conclusion:** Adverse maternal-fetal outcome was significantly more in the hypothyroid group compared to euthyroid group.

Keywords: Hypothyroidism, delivery, euthyroid state, preeclampsia, IUGR

INTRODUCTION

Dysfunction of the thyroid especially hypothyroidism is the most common prevalent after diabetes. It has now gained sufficient attention in the field of clinical endocrinology. It adversely affects the outcome of delivery related to mother and child. Hence, its complete understanding is of utmost importance. In general for an euthyroid woman, pregnancy itself induces physiological changes that continue throughout the pregnancy and after delivery, it comes back slowly to its pre-pregnancy state.¹

Various physiological factors play an important role to help compensate these changes that were due to pregnancy that affect the thyroid gland. There is increase in the loss of renal iodine, increase in the level of thyroxine-binding globulin. There are changes in the metabolism of the hormones of the thyroid gland. There is also a shift that occurs and cause the movement of the iodine towards placenta. The incidence of maternal and the fetal complications in those women with hypothyroidism vary by region.²

It has been estimated that the prevalence of overt

hypothyroidism during the pregnancy is around 3-4.58% and that of subclinical hypothyroidism is about 6.47-9%. Both the varieties of hypothyroidism i.e. overt and subclinical affect around 0.4-1.7% of pregnant women.³

Literature supports the association between hypothyroidism and adverse outcome in mother and child due to hypothyroidism. Various adverse outcomes in mother are sudden abortion, placental abruption, anemia, postpartum hemorrhage, preeclampsia etc. Various adverse outcomes in fetus are intrauterine growth retardation, preterm delivery, stillbirths etc. During pregnancy, the hormones of the thyroid gland undergo a lot of changes. These changes are reversible. Due to pregnancy, there is excessive stimulation of the thyroid gland. It has been stated that the size of the thyroid gland can increase by 10% even in those women who are from the area where the iodide is enough. This rate may increase to 20-40% if the area is deficient of iodide.⁴

The human chorionic gonadotropin and the pregnancy itself account for about 50% enhancement of the hormones of the thyroid gland. To compensate for this increased production of thyroxine and triiodothyronine, a pregnant woman is supposed to have similar 50% more intake of iodine daily. Usually, pregnant women from areas with sufficient iodide are able to compensate these increased demands, but those from deficient areas, will face the problem. All these factors together increase the morbidity associated with hypothyroidism in pregnant women. Mode of delivery also affects the outcome in these cases.⁵

With this background, present study was carried out to compare the maternal-fetal outcomes in women with hypothyroidism and euthyroidism.

Material and methods:

A hospital based prospective comparative study was carried out among 120 pregnant women with hypothyroidism and 100 women with euthyroidism at Department of Obstetrics and Gynecology of Mallareddy narayana multi-speciality hospital over a period of 1 year from January 2023-december 2023. Institutional Ethics Committee permission was obtained. Written informed consent was taken from all eligible study participants.

Considering the incidence of preeclampsia as 14.7% in the hypothyroid group and 5.6% in the euthyroid group (from a previous study) with 80% power and 95% of confidence level, the sample size required in each group was 45. However, we were able to include 120 pregnant women with hypothyroidism and 100 women with normothyroidism.

In both the groups, pregnant women of age 18 and above with or without hypothyroidism and irrespective of gravidity and parity were included. In the hypothyroid group additionally it was confirmed that the women with first time diagnosed hypothyroidism was verified with any previous documents. In case of lack of evidence, thyroid function tests were done. In the euthyroid group, it was confirmed that the women were free from any kind of thyroid disorder. They underwent the thyroid function test for confirmation. Those with other endocrine disorders, multiple morbidities, immunodeficient therapy, steroid therapy and lost to follow up were excluded from the present study.

All eligible women were enrolled at the first and second trimester. After their consent, detailed history and thorough clinical examination with all necessary investigations was carried out to re-confirm the eligibility criteria. At this stage, age, gravidity, parity and history of previous abortions were noted.

All eligible participants were followed till delivery. At each visit, during follow up maternal and fetal well being monitored and relevant investigations were done. At the time of delivery, various maternal outcomes and other parameters like gestational age at delivery, and mode of delivery along with delivery details were noted. After child birth APGAR score was taken immediately and then again at five minutes. Fetal complications if any were also noted.

The data was entered in the Microsoft Excel worksheet. The data was expressed in proportions and means with their standard deviation. The entire data was tested for normality distribution. For comparison of proportion in two groups, chi square test was applied. For comparison of mean in two groups, independent samples t test was used. A p value of less than 0.05 was taken as statistically significant.

RESULTS

The mean age of women in hypothyroid group was slightly more compared to women in the euthyroid group. But, this small difference was statistically significant. In terms of gravidity comparison in two groups, hypothyroid women had more proportion of gravida three and above compared to euthyroid group. But, in terms of parity, both the groups were comparable. In the women with hypothyroidism the incidence of previous abortions was 28.3% which was almost four times more than the euthyroid group. The gestational age at delivery was significantly more in the euthyroid group compared to the hypothyroid group ($p < 0.05$). (Table 1)

Table 1: Comparison of baseline characteristics in two groups

Characteristics		Hypothyroidism (N=120)	Euthyroidism (N=100)	P value
Age (years)	Mean±SD	25.5±3.93	24.2±2.15	0.00343
Gravida	1 - 2	79 (65.8%)	79 (79%)	0.03066
	3 & above	41 (34.2%)	21 (21%)	
Parity	0 - 1	98 (81.7%)	81 (81%)	0.8994
	2 & 3	22 (18.3%)	19 (19%)	
Previous abortions	Yes	34 (28.3%)	7 (7%)	< 0.0001
	No	86 (71.7%)	93 (93%)	
Gestational age at delivery	Mean±SD	37.9±1.66	38.41±1.18	0.01063

Table 2: Comparison of maternal outcome in two groups

Maternal outcome		Hypothyroidism (N=120)	Without hypothyroidism (N=100)	P value
Complications	Yes	43 (35.8%)	3 (3%)	< 0.0001
	No	77 (64.2%)	97 (97%)	
Type of delivery	LSCS/forceps	77 (64.2%)	2 (2%)	< 0.0001
	Normal vaginal	43 (35.8%)	98 (98%)	

The incidence of maternal complications were 35.8% in women with hypothyroidism compared to only 3% in women with euthyroid group and statistically it was found to be statistically significant. The various complications were epilepsy, preclampsia, oligohydramnios, atonic postpartum hemorrhage, thrombocytopenia, premature rupture of membranes, hypertension, obesity, polyhydramnios in 43 cases out of 120 in hypothyroid group. Whereas in the euthyroid group, we found only three cases with oligohydramnios and spontaneous rupture. In the hypothyroid group, mode of delivery 64.2% had lower segment caesarean section and forceps assisted delivery compared to only 2% in the euthyroid group which was statistically significant ($p < 0.05$). (Table 2)

Table 3: Comparison of fetal outcome in two groups

Fetal outcome		Hypothyroidism (N=120)	Euthyroidism (N=100)	P value
Fetal outcome	Abnormal	13 (10.8%)	1 (1%)	0.001464
	Normal	107 (89.2%)	99 (99%)	
Birth weight	Mean±SD	2.87±0.42	2.85±0.35	0.7051
APGAR score at birth	Mean±SD	7.58±0.68	8.15±0.68	< 0.0001
APGAR score at 5 min	Mean±SD	9.05±1.08	9.48±0.7	0.00073

The incidence of abnormal fetal outcome was 10.8% in women with hypothyroidism compared to only 1% in women with euthyroidism and this difference was statistically significant ($p < 0.05$). The mean birth weight was quite comparable in two groups ($p > 0.05$). The APGAR score at birth and at five minutes was significantly more in euthyroid group compared to hypothyroid group and the difference was statistically significant ($p < 0.05$). (Table 3)

Figure 1: Pie chart showing various maternal complications in the hypothyroid group

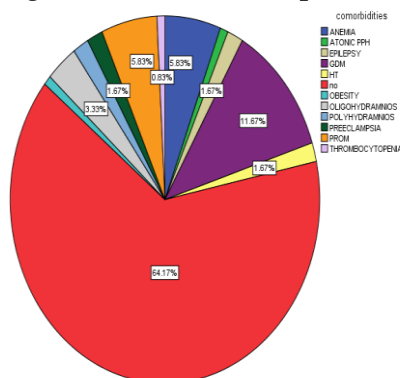
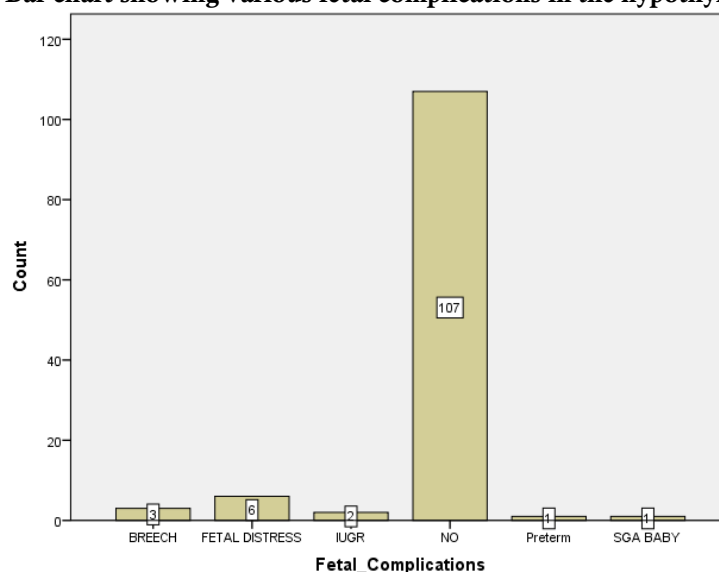


Figure 2: Bar chart showing various fetal complications in the hypothyroid group



DISCUSSION

In the present study, the mean age of women in hypothyroid group was slightly more compared to women in the euthyroid group. But, this small difference was statistically significant. In terms of gravidity comparison in two groups, hypothyroid women had more proportion of gravida three and above compared to euthyroid group. But, in terms of parity, both the groups were comparable. In the women with hypothyroidism the incidence of previous abortions was 28.3% which was almost four times more than the euthyroid group. The gestational age at delivery was significantly more in the euthyroid group compared to the hypothyroid group ($p < 0.05$). The incidence of complicated maternal outcome was 35.8% in women with hypothyroidism compared to only 3% in women with euthyroid and statistically it was found to be statistically significant. The various complications were epilepsy, preclampsia, oligohydramnios, atonic postpartum hemorrhage, thrombocytopenia, premature rupture of membranes, gestational hypertension, obesity, polyhydramnios, in 43 cases out of 120 in hypothyroid group. Whereas in the normothyroid group, we found only three cases with oligohydramnios and spontaneous rupture of membranes. In the hypothyroid group, 64.2% had lower segment caesarean section and forceps assisted delivery compared to only 2% in the euthyroid group which was statistically significant ($p < 0.05$). The incidence of abnormal fetal outcome was 10.8% in women with hypothyroidism compared to only 1% in women with euthyroidism and this difference was statistically significant ($p < 0.05$). The mean birth weight was quite comparable in two groups ($p > 0.05$). The APGAR score at birth and at five minutes was significantly more in normothyroid group compared to hypothyroid group and the difference was

statistically significant ($p < 0.05$).

Sreelatha S et al 6 carried out a study having 100 cases with thyroid disorder in first trimester. They estimated the TSH levels. All cases were followed till delivery to record the fetal and maternal outcomes. The incidence of abortion was 2.1%, pregnancy induced hypertension incidence was 14.7%. Anemia and gestational diabetes was seen in 4.2% of the cases each. 3.1% had preterm labour and the incidence of oligohydramnios was 16.7%. In their study, 22.9% had undergone lower segment caesarean section delivery. 21.9% of the babies had low birth weight. 6.3% had postpartum hemorrhage. 14.6% of the babies required NICU admission. Thus, the authors concluded that the hypothyroidism had negative impact on the maternal and fetal outcomes.

Vamja R et al 7 carried out a prospective study to study the association between the dysfunction of the thyroid with adverse delivery outcomes among 500 euthyroid cases and compared them with 150 hyperthyroid and 250 hypothyroid cases. The risk of preterm birth was 1.8 times more in hypothyroid women compared to euthyroid women. The risk of low APGAR score was 2.5 times more and that of preeclampsia was three times more. The relative risk of postpartum hemorrhage was 1.6 times more in these cases. The risk of venous thromboembolism was 3.1 times more in hypothyroid women compared to euthyroid women. The risk of neonatal hypoglycemia was 1.5 times more in hypothyroid cases compared to the euthyroid cases and that of respiratory distress was 1.4 times more.

Prabha T et al 8 observed from their study that the prevalence of thyroid disorder was 12.6%. The

prevalence of subclinical hypothyroidism was 6.9% and that of overt hypothyroidism was 3.2%. The incidence of oligohydramnios was 5.8%, that of preeclampsia was 13.3%, and 5% had preterm delivery. The incidence of low birth weight was 20.8%, that of NICU admissions was 13.3%. The authors concluded that due to high prevalence and morbidity associated with thyroid dysfunction, the women should undergo testing for thyroid hormones during pregnancy.

Khawale R et al 9 screened 350 pregnant women over a period of two years. In this, the overall prevalence of hypothyroidism was 11.14%. The prevalence of subclinical hypothyroidism was 8% and that of overt hypothyroidism was 3.14%. The age group of 26-30 years was most commonly affected. Incidence was more common in multigravida women. Most common mode of delivery for women with hypothyroidism was LSCS. Fetal distress, low birth weight and intrauterine growth retardation were common as fetal outcomes. Gestational diabetes, perterm labor, anemia, eclampsia, were common outcomes in mother. The authors concluded that early diagnosis and treatment of hypothyroidism can have good outcomes in these cases. Hence, thyroid screening should be a routine part of antenatal care.

Kumar R et al 10 carried out a prospective observational study in 300 antenatal women. They reported a very high prevalence of 31.6% for hypothyroidism. They also noted a statistically significant association between hypothyroidism and complications in mother and fetus. The incidence of preeclampsia was 14.7% in women with thyroid disorder compared to only 5.6% in euthyroid women. Anemia prevalence was also more in hypothyroid women (7.4%) compared to 6.1% in euthyroid women. Abortions were more frequent (7.4%) compared to only 0.5%. The common adverse outcomes in neonates were low birth weight, meconium aspiration syndrome, low APGAR scores and respiratory distress syndrome. They concluded that the prevalence of hypothyroidism was high with significant amount of adverse outcomes. They also recommended universal screening of antenatal women for thyroid dysfunction.

Debbarma R et al 11 estimated the thyroid hormones in 772 antenatal women and found that the prevalence of thyroid dysfunction was 16.5%. The prevalence of subclinical hypothyroidism was 12.5%. In women with hypothyroidism, the positivity of anti-TPO was 41.44%. The incidence of hypertensive disease was 19.23% in women with overt hypothyroidism compared to only 3.1% in women with euthyroid women. It was slightly lesser i.e. 9.27% in women with subclinical hypothyroidism. The risk of preterm and fetal growth retardation was 12.37% and 7.21% respectively in hypothyroid women compared to only

4.9% and 3.1% respectively in euthyroid women. The authors thus concluded that on the same lines as previous authors that the antenatal screening should be made a routine in all antenatal women.

Thimmappa S et al 12 compared the effect of treatment with levothyroxine with on maternal and fetal outcomes. One group was given levothyroxine so that TSH can become normal. Another group was not given TSH. Overall incidence of abortions was 1.2% and that of other complications it was 43.5%. The incidence of low birth weight was 25.3%, that of NICU admission was 20.8%. All these events were found to be significantly associated with attainment of normal TSH levels at third trimester. But, the mode of delivery and APGAR score were not associated. The authors concluded that the levothyroxine supplementation is associated with reduced risk of neonatal and maternal complications. Limitations and strengths of the study:

Present study is limited with being from a single center with a small sample size, thus limiting the generalizability. But, the results are comparable and consistent with other studies. Having a comparison group is the strength of this study.

CONCLUSION

Adverse maternal and fetal outcome was significantly more in the hypothyroid group compared to euthyroid group so early diagnosis, regular followup and early identification of complications, timely decision for delivery with team work is necessary for good maternal and fetal outcome .

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