ORIGINAL ARTICLE

Thyroid Dysfunction among Pregnant Women and its Effect on Maternal and Neonatal Outcome

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Abstract

Background: ***For women with a small thyroid reserve, the stress of pregnancy might cause hypothyroidism, either clinically or subclinically. To account for the physiological changes in thyroid function during pregnancy, reference ranges of TSH or free thyroxine (fT4) derived from non-pregnant populations are adjusted for pregnant women.***

Aim and objectives: ***To explore whether or not women with thyroid dysfunction had similar pregnancy outcomes as women without such a problem.***

Subjects and methods: ***Using 120 pregnant women enrolled between December 2023 and January 2025, researchers at Al-Azhar University Hospitals (Al-Hussein and Bab Al-Sheria) randomly assigned 40 to an exposed group and 80 to a non-exposed group.***

Results: When it came to neonatal outcomes, such as Apgar score (5 minutes) and sepsis, the groups were not significantly different. However, ***when it came to birth weight, neonatal jaundice, respiratory distress syndrome, asphyxia at birth, and NICU admission, there were significant differences.***

Conclusion: ***There is a high prevalence of thyroid dysfunction in pregnancy with associated slight adverse short-term effects on both maternal and fetal outcomes. Association of presence of low Birth weight (LBW) babies, low Apgar score, neonatal jaundice, respiratory distress syndrome, birth asphyxia and increased number of NICU admission; is a major finding of this study.***

Keywords: Thyroid dysfunction; Neonatal outcome; Maternal outcome; Pregnant women

1. Introduction

In pregnancy, thyroid dysfunction ranks second among endocrinological disorders, right behind diabetes. Not only that, but it has recently been the clinical endocrinology field's top research priority. Due to its established impact on fetal-maternal outcomes, thyroid function assessment is relevant throughout pregnancy.[1]

The thyroid gland undergoes substantial structural and functional changes during pregnancy to accommodate the increasing metabolic demands of the developing baby. A person's iodine needs rise as their thyroid enlarges by 0% to 30% of its original size, based on their iodine storage at birth. When estrogen levels in the blood rise, thyroid-binding globulins (TBG) and other thyroid-binding proteins are two to three times more abundant.[2]

When this happens, the thyroid gland has to crank out more thyroid hormones to keep thyroid hormone levels free and where they should be. Another thing that happens early on in a pregnancy is the secretion of human chorionic gonadotropin (HCG). It suppresses TSH early in pregnancy because its alpha subunit is identical to that of thyroid-stimulating hormone (TSH), which stimulates the thyroid gland directly to produce more free thyroid hormone.[3]

Iodine shortage causes hypothyroidism, which in turn causes reduced intellectual function in the kids, congenital abnormalities, and cretinism. These problems are especially prevalent in newborns born to women with such problems. Because of this, it is critical to test for risk factors early and start treatment for women when they are at risk.[4]

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Assessing thyroid disorders during pregnancy is crucial for the mother's well-being, the pregnancy's outcome, and the child's future growth and development. Fetal brain development is negatively impacted, and mental impairment and cretinism can result from maternal hypothyroidism in the first trimester. Impairment of mental and physical development is a part of it.[5]

The researchers set out to determine if pregnant women with thyroid dysfunction fared any better or worse than those without the condition.

2. Patients and methods

Twelvety pregnant women who visited the OB/GYN departments at Al-Hussein and Bab Al-Sheria, two campuses of Al-Azhar University, between December 2023 and January 2025 were the subjects of this retrospective cohort study.

Sample Size:

Two groups were formed from the patients:

First group (exposed group): includes 40 pregnant women with thyroid dysfunction; second group (unexposed group): for each case diagnosed with thyroid dysfunction, two cases with normal pregnancy were chosen to represent the unexposed group (80 women). For each woman of the exposed group another two unexposed women were chosen through systematic random sampling technique (every 3rd case) using patient records\files pertaining the same inclusion and exclusion criteria.

The sample contains females (and their offspring) who have already given birth or are waiting for delivery in the maternity ward. Information related to the mother and her offspring was collected from both maternity and fetal medical records and through face-to-face interviews with the mothers in their rooms when their conditions permitted.

Inclusion criteria:

Pregnant women who have complete medical records documenting their pregnancy status and outcome (if interviewed after birth), aged 20-40 years old, and primigravida or multigravida.

Exclusion criteria:

Patients with gestational trophoblastic disease, multiple pregnancies, chronic diseases (such as hepatic, renal, chronic/gestational diabetes mellitus, or any other endocrine problems), thyroid-affecting drugs (such as iodine), smokers, women whose membranes ruptured more than 12 hours before labor pains began, and patients who had uterine operations (such as cesarean sections, myomectomy, vaginal repairs, etc.) are not eligible for this procedure.

Instruments &Tools:

A predesigned constructed questionnaire was used to collect the following data pertaining to participant characteristics, pre-labor, labor, fetal outcome, and postpartum data. It includes the following:

Medical and surgical history, symptoms, and family history of chronic diseases are all part of the participant's sociodemographic data. This includes vital indicators such as temperature, pulse, respiration rate, blood pressure, and any abnormalities in color, skin tone, or the size of the lymph nodes. Method of delivery, problems, maternal health after giving birth, the outcome of the delivery, the fetal health and anthropometric measurements, and the mother's and fetus's status during the first postnatal visit within the first two weeks after giving birth.

Data collection:

Gathering data on the participants' clinical and sociodemographic traits. Age, place of residence, level of education, number of children, patient's booking status, and results of clinical and obstetrical examination were all part of the comprehensive history. Every single routine and specific investigation has its readings recorded.

Biochemical data such as TSH, T3, and T4 levels were documented. Thyroid disorders, their types, the average TSH levels, and the time it took to diagnose them in pregnant women were all documented in addition to the results for both the mother and the unborn child, the path of the labor and delivery process.

These outcomes include two parts:

Immediate feto-maternal outcome. Evaluation of the mother and neonatal condition within 2 weeks after birth is needed to assess the presence of any adverse early problems.

Administrative Approvals:

The implementation of this research required the approval of: Dean of Faculty of Medicine, Al-Azhar University, General Manager of Hospitals, Managers of Al-Hussein and Bab Al-Shearia Hospitals, and Chairman of Community Medicine and Public Health department. We were sure to get patients' written, informed consent.

Patient interviews:

Each participant was interviewed to gather additional details relevant to the study problem. In addition, observation was done to detect the general condition or the presence of an immediate adverse condition.

Neonatal assessment:

A detailed evaluation of neonatal outcomes, including APGAR score, all anthropometric measurements (birth weight, head circumference, infant length), and any congenital anomalies and the need for special care, was documented for both groups.

Postpartum assessment within the first 2 weeks:

For both mother and infant, at the first postpartum visit, evaluate their conditions and

exclude the presence or absence of early complications.

Statistical Analysis:

After data entry was complete, it was double-checked for inaccuracies or missing information. This study used SPSS (the statistical tool for the social sciences), version 26, to analyze the data. In order to analyze the data, we used: The range, standard deviation (±SD), and mean for numerical data that is parametric. Frequency and percentage of non-numerical data. To determine whether the difference between the two groups' means was statistically significant, the Student T-Test was employed. The likelihood ratio, fisher's exact test, continuity correction, and Chi square (x2) test were used to compare categorical data. The level of significance is indicated by the P-value: NS when P>0.05, S when P<0.05, and HS when P<0.01.

3. Results

Table 1. Sociodemographic characteristics among the studied groups.

	EXPOSED GROUP (N=40)	NON EXPOSED GROUP (N=80)	TEST	P-VALUE
AGE (YEARS)				
MEAN±SD	30.47±5.8	30.33±5.6	T=0.128	0.898
RESIDENCE				
RURAL	12(30%)	22(27.5%)		0.774
URBAN	28(70%)	58(72.5%)	X2=1.459	
EDUCATION LEVEL				
SECONDARY SCHOOL	4(10%)	6(7.5%)		0.836
HIGH SCHOOL	9(22.5%)	21(26.25%)	X2=0.836	
UNIVERSITY	27(67.5%)	53(66.25%)		

P-value <0.05 indicates significance, P-value <0.001 indicates high significance, and P-value >0.05 indicates non-significant. SD stands for standard deviation

In terms of age, place of residence, and educational attainment, there was not a statistically significant distinction between the groups under study. Anthropometric data showed that the groups under study did not differ statistically significantly in terms of height, weight, or BMI, (table 1; figure 1).

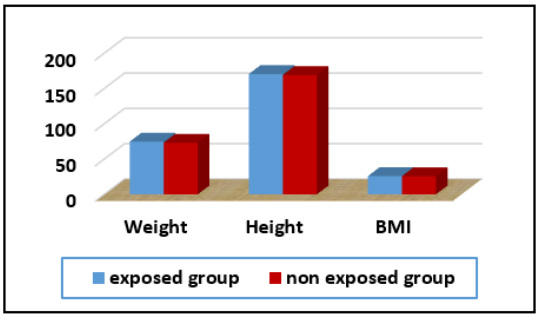

Figure 1. Anthropometric data among studied groups.

Table 2. Data concerning previous and current pregnancy among the studied groups.

	EXPOSED GROUP (N=40)	NON EXPOSED GROUP (N=80)	TEST	P-VALUE
GRAVIDITY				
MEAN ± SD	2.42±1.12	2.35±1.14	T=0.321	0.750
PARITY				
PRIMIGRAVIDA	21(52.5%)	30(37.5%)	X2=2.455	0.117
MULTIGRAVIDA	19(47.5%)	50(62.5%)		
GESTATIONAL AGE AT DELIVERY				
<28 WEEKS	5(12.5%)	1(1.25%)		
(28-36) WEEKS	20(50%)	18(22.5%)	X2=19.44	<0.001
>36 WEEKS	15(37.5%)	61(76.25%)		

P-value>0.05: non-significant; P-value<0.05: Significant; P-value<0.001: Highly significant. SD: standard deviation

According to patient's characteristic, there was no statistically significant difference between studied groups as regard gravidity and parity while there was highly statistically significant difference between studied groups as regard gestational age at delivery, (table 2).

Table 3. Maternal complication among the studied groups.

	EXPOSED GROUP (N=40)	NON EXPOSED GROUP (N=80)	P-VALUE	RELATIVE RISK (RR)
PRETERM LABOR				
YES	24(60%)	18(22.5%)	<0.001	2.785
NO	16(40%)	62(77.5%)		
ANEMIA				
YES	6(15%)	4(5%)	0.06	
NO	34(85%)	76(95%)		1.941
MECONIUM-STAINED LIQUOR				
YES	2(5%)	2(2.5%)	0.47	1.52
NO	38(95%)	78(97.5%)		
AMNIOTIC FLUID ABNORMALITIES				
YES	2(5%)	1(1.25%)	0.21	
NO	38(95%)	79(98.75%)		2.05
PREMATURE RUPTURE OF MEMBRANES				
YES	4(10%)	2(2.5%)	0.07	2.11
NO	36(90%)	78(97.5%)		

P-value <0.05 indicates significance, P-value <0.001 indicates high significance, and P-value >0.05 indicates non-significant. SD stands for standard deviation

According to maternal complication, there was no statistically significant difference between studied groups as regard anemia, meconium-stained liquor, amniotic fluid abnormalities and premature rupture of membranes while there was statistically significant difference between studied groups as preterm labor, (table 3).

Table 4. Maternal complication among hyper and hypothyroidism patients.

	HYPERTHYROIDISM (N=3)	HYPOTHYROIDISM (N=37)	X2 TEST	P-VALUE
PRETERM LABOR				
YES	2(66.5%)	22(60%)	0.06	0.81
NO	1(33.5%)	15(40%)		
PREMATURE RUPTURE OF MEMBRANE				
YES	1(33.5%)	3(8%)	1.962	0.16
NO	2(66.5%)	34(92%)		

P-value <0.05 indicates significance, P-value<0.05 indicates non-significant, and P-

value<0.001 indicates highly significant.

Regarding premature rupture of membranes, there was no statistically significant distinction between individuals with hyperthyroidism and those with hypothyroidism, according to maternal complications, (table 4).

Table 5. Fetal outcome among the studied groups.

	EXPOSED GROUP (N=40)	NON EXPOSED GROUP (N=80)	X2 TEST	P-VALUE
FETAL OUTCOME				
LIVE	35(87.5%)	79(98.7%)	7.105	0.007
ABORTED	5(12.5%)	1(1.3%)		
INTRAUTERINE FETAL DEATH				
YES	6(15%)	3(3.75%)	1.22	0.02
NO	34(85%)	77(96.25%)		

P-value>0.05: non-significant; P-value<0.05: Significant; P-value<0.001: Highly significant. SD: standard deviation

According to fetal outcome, there was statistically significant difference between studied groups as regard fetal outcome and intrauterine fetal death, (table 5; figure 3).

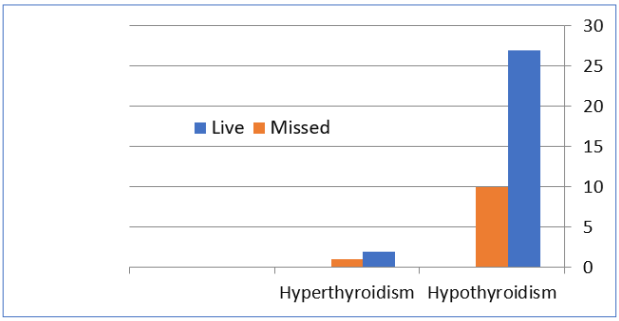

Figure 3. Distribution of fetal outcome among the exposed group.

Table 6. Distribution of neonatal outcome between living birth.

	EXPOSED GROUP (N=29)	NON EXPOSED GROUP (N=76)	P-VALUE	RELATIVE RISK (RR)
BIRTH WEIGHT (KG)				
VERY LOW BIRTH WEIGHT (<1.5 KG)	3(12.5%)	6(7.5%)		-
LOW BIRTH WEIGHT (<2.5 KG)	5(17.5%)	19(25%)	<0.001	-
NORMAL (2.5–4.0 KG)	20(69%)	50(65%)		-
MACROSOMIA (>4 KGS)	1(2.5%)	1(1.25%)		-
APGAR SCORE (5 MIN)				
<7	4(12.5%)	6(7.5%)	0.35	-
≥7	25(85%)	70(92.5%)		-
NEONATAL JAUNDICE				
YES	4(12.5%)	1(1.25%)	0.007	2.714
NO	25(87.5%)	75(98.75%)		
RESPIRATORY DISTRESS SYNDROME				
YES	3(10%)	1(1.25%)	0.02	2.555
NO	26(90%)	75(98.75%)		
SEPSIS				
YES	2(5%)	1(1.25%)	0.21	2.052
NO	27(95%)	75(98.75%)		
BIRTH ASPHYXIA				
YES	4(12.5%)	1(1.25%)	0.007	2.714
NO	25(87.5%)	75(98.75%)		
NICU ADMISSION				
YES	8(27.5%)	3(3.75%)	<0.001	2.871
NO	21(72.5%)	73(96.25%)		

P-value <0.05 indicates significance, P-value <0.001 indicates high significance, and P-value >0.05 indicates non-significant. SD stands for standard deviation

According to neonatal outcome, there was no statistically significant difference between studied groups as regard Apgar score (5min) and sepsis, there was statistically significant difference between studied groups as regard Birth weight, neonatal jaundice, respiratory distress syndrome, birth asphyxia and NICU admission, (table 6).

4. Discussion

In terms of sociodemographic traits, the current study found no statistically significant differences between the groups under investigation in terms of age, place of residence, and educational attainment.

This goes in agreement with Ajmani et al.,[6] They want to learn how common thyroid dysfunction is among healthy pregnant women and how it affects the health of both mother and child. According to their findings, there was no discernible age difference among the groups that were tested.

In terms of complications during pregnancy, this study found no statistically significant difference between the groups in terms of anemia, amniotic fluid abnormalities, meconium-stained liquor, or premature membrane rupture; however, there was a statistically significant difference in terms of preterm labor.

To back up this research Saki et al.,[7] who set out to assess the frequency of thyroid disorders during pregnancy and their effects in southern Iran showed that the groups they examined differed significantly with respect to the incidence of preterm birth (P=0.045).

When compared to this research, Mahadik et al.,[8] found that among women with hypothyroidism, 26.3% also had anemia, and that there was a statistically significant link between the two conditions (p=0.008), as part of their study on the prevalence of thyroid disorders during pregnancy and their effects on both the mother and the unborn child. There was no statistically significant correlation between hypothyroidism and preterm delivery, which happened in 5.3% of cases. Hypothyroidism increases a woman's risk of anemia by 4.8 times compared to euthyroidism. Hypothyroidism may exacerbate anemia to a greater degree than it already is.

Reduced levels of thyroid hormones (tT3 and tT4) in the blood can be the result of an iron deficit, which hinders the heme-dependent enzyme thyroid peroxidase. Possible reversal of hypothyroidism with iron repletion.[9]

Pregnancy complications for both mother and child are linked to thyroid disorders. Since

hyperthyroidism is relatively rare and the sample size was small, the statistics on hypothyroidism were more conclusive than those on hyperthyroidism.

The current study found no statistically significant distinction between hyperthyroidism and hypothyroidism individuals in terms of maternal complications, such as preterm labor or premature rupture of membranes.

In contrast with Gaberščcek et al.,[10] the study revealed that hyperthyroidism negatively impacts pregnancy outcomes in numerous ways, including but not limited to miscarriage, stillbirth, premature delivery, intrauterine growth retardation, preeclampsia, and hyperthyroidism.

There was a statistically significant difference between the groups in this study with respect to foetal outcome and foetal mortality in the womb.

All of these results are compatible with Saki et al.,[7] came to the conclusion that hypothyroidism was significantly linked to IUGR and fetal outcome (P=0.028).

This study found no statistically significant difference between the groups when it came to Apgar score (5 minutes) and sepsis, but there were significant differences when it came to birth weight, neonatal jaundice, respiratory distress syndrome, asphyxia at birth, and admission to the neonatal intensive care unit (NICU).

In supporting with Mahadik et al.,[8] discovered that 31.6% of the LBW newborns had hypothyroidism, and that there was a statistically significant connection between the two (p=0.001). There was a substantial association between hypothyroidism and NICU admissions at 42.1% (p=0.000).

Hypothyroidism is linked to preeclampsia, which in turn causes a low birth weight. The development of the newborn's pituitary-thyroid axis, the secretion of fetal pituitary growth hormone, the responsiveness and maturation of the blood vessels, and the maintenance of cardiovascular homeostasis during pregnancy can all be affected by reduced fetal thyroxin.[11]

Statistical analysis of neonatal outcomes showed that patients with hyperthyroidism and those with hypothyroidism did not differ significantly with respect to neonatal jaundice or respiratory distress syndrome, but there was a statistically significant difference with respect to NICU admission.

In agreement with Kiran et al.,[12] found that 37.6% of newborns with hypothyroidism had jaundice between days 1 and 3, and nearly half of those babies had total bilirubin levels between 85.0 and 170.0 mmol/L. Additionally, there was a statistically significant difference in the number of neonates admitted to the neonatal intensive care unit (NICU) between those with hyper and hypothyroidism.

Limitations: Lack of some information, such as laboratory and imaging scans. Limited number of women with thyroid dysfunction (exposed group) during study period. No information was available about strict treatment during and before pregnancy. No information was available about the time between thyroid dysfunction diagnosis and pregnancy.

4. Conclusion

There is a high prevalence of thyroid dysfunction in pregnancy, with associated slight adverse short-term effects on both maternal and fetal outcomes. Association of the presence of low Birth weight (LBW) babies, low Apgar score, neonatal jaundice, respiratory distress syndrome, birth asphyxia, and increased number of NICU admissions is a major finding of this study.

Disclosure

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Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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