

Thyroid Dysfunction in Pregnant Women Attending Antenatal Clinic

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ABSTRACT

Background: Thyroid dysfunction during pregnancy can lead to difficulties for both the mother and the fetus. Hypothyroidism during pregnancy is linked to premature birth, fetal cardiovascular diseases, low birth weight, a higher incidence of cesarean delivery, placental difficulties, preeclampsia, gestational hypertension, perinatal mortality and morbidity, along with cognitive impairment.

Objective: The aim of the current work was to study early diagnosis of thyroid dysfunction among pregnant women for better health care.

Patients and method: A prospective cross-sectional study was performed in the Gynecology and Obstetrics Department of Abukabir Central Hospital in co-operation with Gynecology and Obstetrics Department, Zagazig University hospitals on 229 healthy pregnant women with uncomplicated singleton pregnancy and without history of previous thyroid problems. Detailed medical and obstetrical history were taken from all selected participants, and they were subjected to thorough clinical examination. Routine laboratory and ultrasonographic examination were also performed to all of them.

Results: Participants were divided into 4 groups including those with Euthyroid, subclinical hypothyroidism, subclinical hypothyroidism was the most predominant disorder (7.9%) followed by overt hypothyroidism (3.5%) as well as subclinical hyperthyroidism (0.87%). No cases with overt hyperthyroidism were reported. No substantial difference in age was seen among the four groups. Regarding BMI, findings revealed that patients having overt hypothyroidism had substantially higher BMI than those in the other groups. Furthermore, no substantial differences were seen among the various groups concerning gravidity, parity, as well as gestational ages.

Conclusion: It could be concluded that most pregnant women have normal thyroid functions (Euthyroid). The predominant form of thyroid dysfunction among pregnant women is subclinical hypothyroidism.

Keywords: Thyroid, Pregnant Women, Zagazig University.

INTRODUCTION

Thyroid disease frequently impacts women of reproductive age ⁽¹⁾ and is the second most prevalent endocrine problem identified during pregnancy, following gestational diabetes. It is four to six times more prevalent in women than in men, with incidence rising with age ⁽²⁾.

Thyroid physiology plays a major role in pregnancy. The thyroid gland adapts its structure and function to satisfy increasing functional demands. It has reversible physiological alterations, including a 10% increase in size along with enhanced vascularization, attributable to the effects of human chorionic gonadotropin (β -hCG) ⁽³⁾.

Pregnancy is linked to significant alterations in the control of thyroid function. The alterations arise from multiple factors, including elevated thyroxine-binding globulin (TBG) attributed to increased estrogen as well as human chorionic gonadotropin (hCG), heightened renal iodine losses resulting from an increased glomerular filtration rate, changes in the peripheral metabolism of maternal thyroid hormones, along with variations in iodine transfer to the placenta ⁽⁴⁾.

The developing fetus synthesizes thyroid hormones only by the end of the first trimester and, hence, depends on the maternal thyroid hormone for organogenesis, general growth, and development of the central nervous system ⁽⁵⁾. Moreover, thyroid hormones are essential for the maintenance and successful completion of normal pregnancy ⁽⁶⁾.

Insufficient maternal thyroid hormone synthesis, especially in the early stages of gestation when the fetus depends on maternal thyroxine, has been linked to various obstetric and neonatal negative outcomes. Mannisto and Mendola ⁽⁷⁾ including inadequate neuropsychological development in the offspring ⁽⁸⁾.

Pregnancy-induced physiological alterations can mimic thyroid disorders. Symptoms such as heat intolerance, lethargy, fatigue, along with constipation, together with examination findings of tachycardia, edema, along with wide pulse pressure, are prevalent in both pregnancy and thyroid disorders in a similar manner.

During pregnancy, demands on the hypothalamic-pituitary-thyroid axis increases which commonly leads to borderline thyroid abnormalities. Correction of thyroid abnormalities, whether hyper or hypothyroidism, during pregnancy greatly decreases the chance of unfavorable fetomaternal outcomes ⁽⁴⁾.

The main obstetric complications are abortion, preeclampsia, eclampsia, abruption placentae and preterm labor and the fetal complications are prematurity, low birth weight, whereas increased risk of impaired neurological development in fetus still birth and perinatal death ⁽⁹⁾.

The objective of the present study was to study early diagnosis of thyroid dysfunction in pregnant women for better health care.

PATIENT AND METHODS

This prospective cross-sectional study involved 229 healthy pregnant women having uncomplicated singleton pregnancies and no prior history of thyroid disorders, attending at Department of Gynecology and Obstetrics, Abukabir Central Hospital in co-operation with Department of Gynecology and Obstetrics, Zagazig University Hospitals. Between the months of June 2021 and June 2022, this research was carried out.

Ethical consent:

This work received ethical approval from the Research Ethics Committee of Zagazig University and was thereafter submitted to the institution. Each patient provided informed written agreement to participate in the trial. This research has been conducted in compliance with the World Medical Association's Code of Ethics (Declaration of Helsinki) for studies involving human subjects.

Inclusion criteria; Uncomplicated intrauterine singleton pregnancy at any trimester.

Exclusion criteria: Ages < 18 years. History of complicated or multiple pregnancies. History of thyroid diseases, thyroid surgeries, or treatment with anti-thyroid drugs. Family history of thyroid disorders. History of chronic medical diseases, e.g. diabetes mellitus, hypertension, chronic liver disease, chronic kidney disease, cardiac disorders, malignancy, autoimmune collagen diseases etc. History of treatment with immunosuppressive drugs, chemotherapy, or radiotherapy.

All subjects had a comprehensive medical history assessment along with a detailed clinical examination. Participants' body weight and height were recorded while attired in a hospital gown and barefoot.

Ultrasonographic evaluation at any trimester was conducted utilizing an AB 2-7 convex abdominal probe on a Voluson 730 Pro Machine (Ge Healthcare, Austria), encompassing biometric measurements to determine gestational age, fetal growth, and anticipated fetal weight. Investigations include CBC, Serum TSH, T3, as as free T4).

Statistical analysis

The Statistical Package for the Social Sciences, version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA) was used to code, process, and interpret the data that was collected. The Shapiro-Walk test was used to ensure that the data followed a normal distribution. Frequencies and relative percentages were used to represent the qualitative data. The chi square test (χ^2) is used to determine the difference among two or more groups of qualitative variables.

Quantitative data were expressed as mean \pm SD (Standard deviation). Independent samples A t-test was employed to contrast two independent groups.

Normally distributed variables (parametric data). A P value of less than 0.05 was considered substantial.

RESULTS

Table 1 presents that the overall ages of studied groups were ranging from 19 – 35 years with average age of 30.7 ± 3.8 years, 38.4% of them were younger than thirty years. Their BMI was ranging between 18.8 – 28.4 kg/m² with mean BMI 23.3 ± 2.2 kg/m².

Table (1): Basic demographic and obstetrical characteristics of studied group:

Variable	Mean \pm SD/ N(%)
Maternal Age (years):	
- Mean \pm SD	30.7 ± 3.8
- Range	19 – 35
- 18 – 29 years	88 (38.4%)
- ≥ 30 years	141 (61.6%)
BMI (kg/m²):	
- Mean \pm SD	23.3 ± 2.2
- Range	18.8 – 28.4
Resident:	
- Urban	119 (52.0%)
- Rural	100 (48.0%)
Gravidity:	
- Mean \pm SD	2.5 ± 0.2
- Range	1-5
Parity:	
- Mean \pm SD	1.2 ± 0.21
- Range	0 - 4
Trimester:	
- First	112(48.9%)
- Second	66 (28.8%)
- Third	51 (22.3%)
GA at time delivery (weeks):	
- Mean \pm SD	37.7 ± 1.1
- Range	36 - 40
Mode of delivery:	
- Normal Vaginal delivery	97 (42.4%)
- Cesarean delivery	132 (57.6%)

Table 2 presents that TSH level was 2.9 ± 0.61 mIU/l, free T3 level was 2.4 ± 0.5 ng/ dl, and free T4 level 1.2 ± 0.2 ng/dl.

Table (2): Thyroid laboratory findings of studied group:

Variable	Mean \pm SD
TSH (mIU/l)	2.9 ± 0.61
Free T4 (ng/dl)	1.2 ± 0.2
Free T3 (ng/dl)	2.4 ± 0.5

Table 3 presents that there were a statistically significant differences between different groups regarding TSH and free T4. While there was no

statistically substantial difference among them concerning serum free T3 levels.

Table (3): Thyroid function tests in different trimesters:

Variable	First Trimester N = 112	Second Trimester N = 66	Third Trimester N = 51	f-value	p-value
TSH (mIU/l) Mean \pm SD	2.3 \pm 0.42	3.0 \pm 0.61	4.0 \pm 0.91	34.059	< 0.001**
Free T4 (ng/dl) Mean \pm SD	1.1 \pm 0.3	1.4 \pm 0.2	1.4 \pm 0.2	28.61	< 0.001**
Free T3 (ng/dl) Mean \pm SD	2.4 \pm 0.4	2.5 \pm 0.5	2.3 \pm 0.5	2.819	0.062

Table 4 presents the prevalence of thyroid dysfunction among studied group. Results showed that of the 229 pregnant women, 201 (87.73%) had normal thyroid functions results (Euthyroid) along with 28 patients (12.27%) had thyroid dysfunction.

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Table (4): Incidence of thyroid dysfunction among studied group:

	No	Percent
Thyroid function:		
- Thyroid dysfunction	28	12.27 %
- Euthyroid	201	87.73%

Table 5 presents that among those with thyroid dysfunction, our results showed that subclinical hypothyroidism was the most prevalent disorder (7.9%) followed by overt hypothyroidism (3.5%) and subclinical hyperthyroidism (0.87%). No cases with overt hyperthyroidism was reported.

Table (5): Prevalence of types of thyroid disorders among studied group:

Type of thyroid disorder	No	Percent
- Subclinical hypothyroidism	18	7.9 %
- Overt hypothyroidism	8	3.5 %
- Subclinical hyperthyroidism	2	0.87%
- Overt hyperthyroidism	0	0.0 %
Total	28	12.27%

Table 6 presents that there was no statistical substantial difference among studied groups concerning age, BMI, GA, gravidity as well as parity.

Table (6): Comparison between patients with different thyroid function disorders regarding demographic and obstetrical data:

Variable	Euthyroid N = 201	Subclinical hypothyroidism N = 18	Overt hypothyroidism N = 8	Subclinical hyperthyroidism N = 2	f-value	p-value
Age: - Mean \pm SD	30.5 \pm 3.9	31.0 \pm 4.0	33.5 \pm 1.3	30.5 \pm 0.7	1.618	0.186
BMI: - Mean \pm SD	23.2 \pm 2.2	23.1 \pm 2.4	25.3 \pm 0.7	22.7 \pm 0.3	2.462	0.063
GA: - Mean \pm SD	37.7 \pm 1.2	37.8 \pm 0.8	37.5 \pm 0.6	37.5 \pm 0.7	0.144	0.933
Gravidity: - Mean \pm SD	2.5 \pm 0.1	2.7 \pm 0.3	3 \pm 1.8	1.5 \pm 0.3	1.383	0.249
Parity: - Mean \pm SD	1.1 \pm 0.15	1.2 \pm 0.2	2.0 \pm 0.4	0.5 \pm 0.1	2.041	0.109

Table 7 presents that there was a statistically substantial difference among different groups of thyroid dysfunctions as regard TSH, Free T4 and free T3.

Table (7): Comparison among patients having different thyroid function disorders concerning thyroid function tests:

Variable	Euthyroid N = 201	Subclinical hypothyroidism N = 18	Overt hypothyroidism N = 8	Subclinical hyperthyroidism N = 2	f-value	p-value
TSH (mIU/l) Mean ± SD	2.5 ± 0.4	4.6 ± 0.4	8.2 ± 0.4	0.3 ± 0.05	236.9	< 0.001**
Free T4 (ng/dl) Mean ± SD	1.3 ± 0.3	1.3 ± 0.2	0.7 ± 0.1	1.2 ± 0.1	11.15	< 0.001**
Free T3 (ng/dl) Mean ± SD	2.5 ± 0.3	1.4 ± 0.2	1.3 ± 0.2	1.1 ± 0.1	126.9	< 0.001**

DISCUSSION

Regarding demographic data of the studied group, our findings revealed that the overall ages were ranging from 19 – 35 years with average age 30.7 ± 3.8 years, 38.4% of them were younger than thirty years old. Their BMI was ranging between 18.8 – 28.4 kg/m² with mean BMI 23.3 ± 2.2 kg/m². Out of the 229 participants in our study, 119 (52.0%) were resident in urban areas while the other 100 (48%) were resident in rural areas.

Our results concurred with **Dulek et al.**⁽¹⁰⁾ who found that patients with thyroid insufficiency in pregnant women ranged in age from 18 to 45 (mean ± SD = 27.8 ± 5.7). Also, **Karcaaltincaba et al.**⁽¹¹⁾ revealed that the average age of their study group was 30.7 ± 5.1 years.

In the study done by **Abo El-Roose et al.**⁽¹²⁾ they stated that the average age of the study population was 28.5 ± 5 years, with a range of 18 to 39 years. Seventy-two of the women lived in cities.

Regarding obstetrical characteristics, our results showed that 23.6% of our study group (n = 57) were primigravida while, 76.4% (n = 172) were multigravida. Regarding their trimester, our results showed that 48.9% of our participants were in the 1st trimester, 28.8% were in the 2nd trimester as well as 22.3% were in the 3rd trimester. A total of 97 (42.4%) patients were delivered by normal vaginal delivery and 132 (57.6%) patients were delivered by cesarean delivery. At delivery, the average gestational age was 37.7 ± 1.1 weeks. thyroid function findings, our results showed that Mean TSH level was 2.9 ± 0.61 mIU/l, free T3 level was 2.4 ± 0.5 ng/ dl, free T4 level 1.2 ± 0.2 ng/dl.

The fT3 and fT4 levels did not significantly differ between each trimester, according to the mean±SD values for the fT3, fT4, and TSH.

Regarding the prevalence of thyroid dysfunction among studied group, our results showed that of the 229 pregnant women, 201 (87.73%) had normal thyroid

functions results (Euthyroid) and 28 patients (12.27%) had thyroid dysfunction.

In those suffering from thyroid dysfunction, our findings indicated that subclinical hypothyroidism was the most common disease (7.9%) followed by overt hypothyroidism (3.5%) then subclinical hyperthyroidism (0.87%). No cases with overt hyperthyroidism was reported.

Sharma and Sharma⁽¹³⁾ observed same findings in their study including 200 pregnant women, indicating that thyroid dysfunctions were present in 14% of the participants. Among the study participants, 86% were euthyroid. Seven percent of patients exhibited subclinical hypothyroidism, four percent presented with overt hypothyroidism, as well as three percent had subclinical hyperthyroidism. Also, **Dulek et al.**⁽¹⁰⁾ who documented that 76 individuals (13.2%) had aberrant findings while 492 (86.7%) got normal TFT among 573 pregnant women. Subclinical hypothyroidism was also found in 8.9% of the cases. Among those testes, 2.8% exhibited hyperthyroidism while 0.5% exhibited overt hypothyroidism.

Abo El-Roose et al.⁽¹²⁾ contradicted our findings, reporting in their study of 100 pregnant women that 51% exhibited normal thyroid function, while 49% exhibited thyroid disorders. Subclinical hypothyroidism was found as the most common disease, affecting 39% of the whole population, thereafter clinical hypothyroidism at 6% as well as isolated hypothyroxinemia at 4%.

According to their thyroid profile, we subdivided our participants into 4 groups including those with Euthyroid, subclinical hypothyroidism, overt hypothyroidism as well as subclinical hyperthyroidism. We compared between these groups regarding their demographic, obstetrical data and their thyroid function tests. Our results showed that there was no statistically substantial difference between the 4 groups as regard age. Regarding their BMI, our results showed that patients with overt hypothyroidism had significantly higher BMI than those in the other groups. Also, there

was no statistically substantial differences among different groups concerning gravidity, parity, as well as gestational ages.

In agreement with our findings regarding patients' ages was **Dulek *et al.***⁽¹⁰⁾ who documented that there was no statistically substantial difference among different groups concerning their ages, gravidity as well as parity. Also, **Abo El-Roose *et al.***⁽¹²⁾ noticed no statistically substantial difference across different thyroid functions as well as age.

Consistent with our findings on BMI, **Krishnamma *et al.***⁽¹⁴⁾ noted that the mean \pm SD BMI for euthyroid, subclinical hypothyroid, overt hypothyroid, as well as overt hyperthyroid pregnant women were 22.9 ± 1.5 , 23.6 ± 1.4 , 25.2 ± 1.28 , as well as 20.3 ± 0.7 , respectively, and determined that individuals with overt hypothyroidism exhibited a substantially elevated BMI in comparison with the other groups.

CONCLUSION

It can be inferred that the majority of pregnant women have normal thyroid function (euthyroid). Among pregnant women, subclinical hypothyroidism is the most common form of thyroid disorder.

In the examined population, our findings indicated that out of 229 pregnant women, 201 (87.73%) exhibited normal thyroid function (euthyroid), while 28 patients (12.27%) presented with thyroid dysfunction.

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