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Original Article

Prevalence of Sub-Clinical Hypothyroidism Among Pregnant Women During First Trimester: Cross-Sectional Study

Mamdouh Elsemary Ayed , Amira Moustafa Mahmoud , Sabry Mahmoud Mohamed , Amr Othman Abdelkareem

- Department of Obstetrics and Gynecology, Faculty of Medicine, Sohag University, Sohag, Egypt

Abstract

Background: Current guidelines differ between an aggressive case finding approach versus testing only symptomatic women or those with a history of thyroid disease or other associated medical condition. Thus, the aim of this work was to assess the prevalence of subclinical hypothyroidism (SCH) among women attending the outpatient obstetrics and gynecology clinic for their 1st antenatal care visit in 1st trimester. The ultimate goal was to determine whether routine thyroid-stimulating hormone (TSH) testing during the booking visit of antenatal care is indicated or not.

Methods: This cross-sectional observational study was conducted on 104 pregnant women (gestational age ≤12+0 weeks). Participants underwent detailed history-taking, physical examination, and ultrasonography to confirm gestational age. Blood samples were collected to assess TSH levels. Free serum thyroxin (T4) levels were measured only in cases with abnormal TSH values (≥2.5 mIU/L).

Results: Among the 104 participants, 15 (14.4%) had elevated TSH levels, 7 (6.7%) had low TSH levels, and 82 (78.8%) had normal TSH levels. Free T4 analysis in SCH cases showed that 92.85% had normal free T4 levels, while 7.14% had low free T4 levels. No significant associations were found between SCH and demographic factors, gestational age, gravidity, parity, iodine intake, or medical comorbidities. Logistic regression analysis confirmed no significant predictors for SCH

Conclusions: The prevalence of SCH among pregnant women in the first trimester attending Sohag University Hospital outpatient clinic is relatively high (14.4%) and is 1.5 to 5 folds more than other communities. Routine SCH screening in the first trimester might be considered.

Keywords: Subclinical hypothyroidism, Pregnancy, Thyroid-stimulating hormone, First trimester, Prevalence.

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Corresponding Author: Mamdouh Elsemary Ayed **E.mail**: mamdouhelsemary1978@gmail.com

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Introduction:

Pregnancy has a profound impact on the thyroid gland and its function and subclinical hypothyroidism (SCH) is the commonest form of hypothyroidism in pregnancy. [1]

During pregnancy the thyroid gland must generate 50% more of thyroid hormone for euthyroid state to be maintained and to deliver enough thyroid hormone for the growing fetus. Simultaneously, the normal range of thyroid function is markedly altered by the physiological changes that coincide with pregnancy, specifically due to a cross-reaction between the thyroid-stimulating hormone (TSH) receptor and human chorionic gonadotropin, which peaks in the first trimester. [2]

According to the European thyroid association, the upper limit of normal TSH during the first trimester is 2.5 mIU/L. [3]

When a pregnant woman has SCH, it means that her TSH concentration is higher than the upper limit of the pregnancy-related reference range and her serum thyroxin (T4) concentration is normal. [3]

There is a wide variation in the prevalence of SCH in different geographical regions, for example, it ranges between 2-2.5% in some regions [4] up to 9.6% [5] - 11% [5,6]and reaching up to 36% in Bengal regions.

2.5 mIU/L in the first trimester and 3.0 mIU/L in the second and third trimesters was established as the maximum reference limit for serum TSH levels during pregnancy. [3] Concerns over the possibility that marginal degrees of thyroid malfunction, in particular SCH, may potentially be related to preterm labor, miscarriage, premature rupture of membranes, and diminished cognitive function in the offspring have grown recently. [7]

To date, studies evaluating the question of whether routine SCH screening in first trimester is recommended or not, appear to demonstrate mixed conclusions. Several ongoing investigations will shed further light on this difficult question. [2]

Thus, the necessity of routine screening for thyroid problems during pregnancy is still up for controversy. Current guidelines differ between an aggressive case finding approach [8] versus testing only symptomatic women or those with a personal history of thyroid disease or other associated medical condition . [2]

Thus, the aim of this work was to assess the prevalence of SCH among women attending at the outpatient Obstetrics and Gynecology clinic for their 1st antenatal care visit in the 1st trimester. The ultimate goal was to determine whether routine TSH testing during the booking visit of antenatal care is indicated or not.

Patients and Methods:

This cross-sectional observational study was conducted on 104 women. All women aged 18–45 years attending Sohag University Hospital outpatient Obstetrics and Gynecology clinic who were in their first trimester of pregnancy (≤12+0 weeks of gestation) were included. The research was conducted between April 1st 2023 and December 31st 2023, following the approval from Sohag University Hospital's ethical committee (IRB registration number: Soh-Med-23-03-02MS). The patients provided informed written consent.

The exclusion criteria for this study included women with known thyroid disorders or a history of previous thyroidectomy, pregnant women diagnosed with hyperemesis gravidarum, and those with a molar pregnancy.

Eligible patients who attended their first antenatal care visit were subjected to comprehensive history taking, including questions about the frequency of iodized food intake, followed by general, head and neck, and abdominal examinations, as well as ultrasonographic evaluation (Albinion , Ecube5). Gestational age was determined based on the date of a reliable last menstrual period or, in cases where this could not be provided, by measuring the crown-rump length using transvaginal ultrasound.

The attending physician explained the nature of the study to the participants, and after obtaining signed informed consent, blood samples were collected at the outpatient laboratory of Sohag University Hospital. These samples were used to assess TSH levels in addition to routine antenatal screening investigations, which included a complete blood count (CBC), random blood sugar, and testing for HBV and HIV (electrochemiluminescence, Roche Cobas E411). When TSH levels were found to be abnormal (≥2.5 mIU/L).[3] free T4 levels were assessed from the same sample, with its normal reference range being 0.8–1.2 ng/dL (automated ELISA technique

on a Cobas E411 device, and the Roche TSH kit was used for analysis).

Statistical analysis

Data was analyzed using STATA version 17.0 (Stata Statistical Software: Release 17.0 College Station, TX: StataCorp LP.). The Kolmogorov–Smirnov test was used to determine the distribution of different variables. Quantitative data was represented as mean ± standard deviation, median and range. Data was analyzed using student t-test to compare the means of two groups if normally distributed. When the data was not normally distributed, the Mann-Whitney test was used. Qualitative data was presented as number and percentage and compared using either Chi square test or fisher's exact test. Odds ratios were obtained from logistic regression analysis. Graphs were produced using Microsoft Excel or STATA program. P value was considered significant if it was less than 0.05.

Results

The studied population came from different residential areas in Sohag governorate with the biggest proportion coming from Sohag city (29 case, 27.8%). Detailed distribution of study participants' residence, age, gestational age, gravidity, parity, number of previous miscarriages and duration since last delivery are shown in (Table 1).

The median frequency of sea-food meals intake was twice per month. The majority of cases had no medical co-morbidities. However, the most frequently encountered co-morbidity was rheumatic heart diseases which was reported in 3 patients (Table 1).

Table 1: Demographics of studied population

Variables	Summary statistics
Age/year	
Mean ± SD	27.40±5.44
Median (range)	27 (17:40)
Residence: N (%)	
Sohag	29 (27.88%)
Akhmeem	25 (24.04%)
Almonshaa	10 (9.62%)
Almaragha	7 (6.73%)
Dar-alsalam	4 (3.85%)
Saqulta	17 (16.35%)
Gerga	6 (5.77%)
Tahta	1 (0.96%)
Tema	2 (1.92%)
Albaliana	1 (0.96%)
Gestational age(weeks)	
Mean ± SD	8.95±1.69
Median (range)	9 (6:12)
Gravidity	
Mean ± SD	4.19±2.60
Median (range)	4 (1:11)
Parity	
Mean ± SD	1.57±1.51
Median (range)	0 (0:5)
Abortion	
Mean ± SD	1.63±1.67
Median (range)	1 (0:6)
Time since last delivery (years)	
Mean ± SD	2.36±2.62
Median (range)	1.75 (0:13)
Time since last abortion (years)	
Mean ± SD	1.94±1.45
Median (range)	1.5 (0.17:7)

Data are presented as mean ± SD or median (IQR) or frequency (%). BMI: Body mass index. DM: Diabetes mellitus. HTN: Hypertension.

Among the studied population 82 cases (78.85%) had normal TSH levels, 15 cases (14.42%) cases had high TSH levels, and 7 cases (6.73%) had low TSH levels. (Table 2)

Table 2: Distribution of studied population according to TSH and Free T4 results

Variables	Summary statistics N (%)
TSH level	
Normal	82 (78.85%)
High	15 (14.42%)
Low	7 (6.73%)
Free T4 level in 14 women with high TSH	
Normal	13 (92.85 %)
Low	1 (7.14%)

Data are presented as frequency (%). TSH: Thyroid-stimulating hormone. Free T4: Free thyroxine level.

FT4 level was assessed in 20 out of 22 patients who had abnormal TSH levels. The 2 patients who weren't evaluated had a missed abortion before doing the test.

There was no significant difference between the 2 groups regarding residence, age, gestational age at the time of TSH testing, gravidity, parity, number of previous miscarriages, duration since the last delivery and duration since the last abortion (Table 3). Also, there was no significant difference between the 2 groups regarding number of sea-food meals/month and medical co-morbidities (Table 3).

Table 3: Comparison between patients with normal TSH and SCH

Variables	Normal TSH N=82	SCH N=15	P value
Age/year			0.43*
Mean ± SD	27.62±5.59	26.4±4.71	
Median (range)	27 (17:40)	26 (20:35)	
Residence			0.35#
Sohag	22 (26.83%)	5 (33.33%)	
Akhmeem	22 (26.83%)	2 (13.33%)	
Almonshaa	7 (8.54%)	3 (20.00%)	
Almaragha	7 (8.54%)	0	
Dar-alsalam	1 (1.22%)	2 (13.33%)	
Saqulta	12 (14.63%)	2 (13.33%)	
Gerga	5 (6.10%)	1 (6.67%)	
Guhaina	1 (1.22%)	0	
Tahta	2 (2.44%)	0	
Tema	2 (2.44%)	0	
Albaliana	1 (1.22%)	0	
BMI			0.23*
Mean ± SD	26.25±4.51	27.93±6.86	
Median (range)	26.30 (18.26:38.10)	27.78 (17.01:40.06)	

Data are presented as mean ± SD or frequency (%). BMI: Body mass index. DM: Diabetes mellitus. HTN: Hypertension. TSH: Thyroid-stimulating hormone. SCH: Subclinical hypothyroidism. * Independent sample t test **Mann Whitney test # chi square test

Using univariate logistic regression analysis to test for the possible link between different potential etiological factors and the occurrence of SCH which included: residence, age, gestational age, gravidity, parity, number of previous miscarriages, duration since last delivery and duration since last abortion, no link could be found between any of those factors and the occurrence of SCH in our study population (Table 4).

Table 4: Univariate logistic regression of factors predicts SCH compared to normal

Variables	Odds ratio (95% confidence interval)	P value
Age/year	0.96 (0.86:1.07)	0.43
Residence		
Sohag	Reference	
Akhmeem	0.4 (0.07:2.28)	0.30
Almonshaa	1.88 (0.36:9.97)	0.46
Almaragha	Couldn't be calculated.*	
Dar-alsalam	8.8 (0.66:117.23)	0.10
Saqulta	0.73 (0.12:4.37)	0.73
Gerga	0.88 (0.08:9.29)	0.92
Guhaina	Couldn't be calculated. *	
Tahta	Couldn't be calculated. *	
Tema	Couldn't be calculated. *	
Albaliana	Couldn't be calculated.*	
BMI	1.07 (0.96:1.19)	0.23
Gestational age (weeks)	1.007 (0.73:1.39)	0.97
Gravidity	0.94 (0.76:1.18)	0.62
Parity	0.96 (0.66:1.39)	0.83
Abortion	0.90 (0.64:1.28)	0.56
Last delivery/year	1.08 (0.90:1.31)	0.39
Iodized food/month	0.52 (0.26:1.04)	0.06
Any medical co-morbidity	0.77 (0.09:6.71)	0.81

BMI: Body mass index. * Number of patients is too small for odds ratio to be calculated.

Discussion

Hypothyroidism and SCH can have serious effects on both the mother and the fetus. [9]. Currently, many of the scientific societies world-wide do not include thyroid function testing as a part of the routine investigations during the first antenatal care visit, such as: The World Health Organization. [10] The Royal College of Obstetricians and Gynecologists .[11] American College of Obstetricians and Gynecologists, [12] American Thyroid Association [2] and Royal Australian and New Zealand College of Obstetricians. [13] On the other hand, other societies such as Brazilian Federation of Gynecology [14] and Ministry of health in India [15] , advocate thyroid function testing as a part of their routine screening in the 1st antenatal care visit. Up till now there is no consensus or a guideline in Egypt whether to include such testing during antenatal care or not. This difference is probably driven from the difference in the prevalence of SCH in different settings.

In the sample of women tested in the current study, the prevalence of SCH during first trimester was 14.4% (15 out of 104). This percentage of women is much higher than that previously reported by Casey et al. [4] who enrolled 17,298 American women and reported a prevalence of SCH of about 2.5% during early pregnancy.

On the other hand, a higher prevalence in pregnant women was reported in a number of studies. A study from India found the prevalence of SCH during pregnancy ranging from 4.8% to 11%. [6] Additionally, in China, a large study that included 2,899 pregnant women reported a significantly higher prevalence of hypothyroidism in the high-risk group compared to the non-high-risk group (10.9% vs. 7.0%, p = 0.008) [16]. In that study, SCH even in the low-risk group was still higher than other regions in the world.

In a different study done in the Southern West Bengal region, 168 out of 510 pregnant women had TSH value >2.5 μIU/ml (32.94%) with normal FT4 and they were diagnosed as SCH, and

even when TSH level of >4.5 mIU/ml was used as a cut-off level, SCH was found in 71 (13.92%) of the cases [17]. TPO Ab was positive in 57 cases of SCH (33.93%), 5 cases of euthyroid cases (1.47%) and 50 cases (70.42%) with TSH >4.5. [17] According to the authors, South Bengal has a high frequency of SCH, and in order to lower the social and financial burden that SCH causes, routine thyroid screening should be performed at the first antenatal visit.

The present study showed no significant differences between the two studied groups as regard age, residence, parity, number of living children, duration since last delivery, duration since last abortion and number of previous miscarriages, also, we found that the mean number of seafood meals consumption as a source of iodine in the normal TSH group was higher than that in the high TSH group. Although this difference was not statistically significant, it shows a trend toward higher consumption of iodide rich food in euthyroid patients.

The TSH cutoff level during the 1st trimester is controversial and it has been suggested that different reference values should be used due to different factors including ethnicity. [3] In the current study, we used a TSH of 2.5 mIU/L or more as a cut off level for diagnosis of SCH which has been widely used by many researchers and is considered by some as a target level for successful treatment of SCH in the 1st trimester .[14] However, even if the new ATA guidelines suggested normal upper TSH limit of 3.6 mIU/L had been used. [18] there still would be a relatively high SCH prevalence in our patients (5cases ,4.8%).

Based on our data, SCH prevalence in our setting falls in close range to that of places like India, China and Brazil where routine testing for TSH in the 1st antenatal care visit is adopted. Therefore, such a policy seems a reasonable choice given the possible complications that may occur due to untreated SCH. Early detection and treatment of SCH women can lead to a comparable obstetric outcome to those who are euthyroid. [5]

Up to our knowledge this is the first study to assess the prevalence of SCH among pregnant ladies during first trimester in Sohag governorate. Previous similar studies in Egyptian universities shows variable results with SCH prevalence ranging from 7.9% to 39% .[19, 20] Interestingly, another study done in Upper Egypt in El Minia University reported a prevalence of 13.9 % of SCH in pregnant women which is almost similar to our results. However, in that study, all women with SCH were among those who are considered as high risk for thyroid dysfunction (unpublished data).

Through regression analysis, none of the potential etiological factors that were used in the regression model were found to be statistically relevant to whether the woman was euthyroid or hypothyroid. This goes against the proposed strategy of selective rather than universal screening. Interestingly, in a multi-center study [21] done in Brazil that included 301 pregnant women, 17 patients (5.7%) had SCH, of which 7 (41.2%) belonged to what was considered low-risk group.

Our study is limited by being conducted for specific group of patients who were attending at Sohag University Hospitals outpatient clinic, and a more wide base study may show different results. Another limiting factor was that the diet collected information were based on retrospective data which may be biased or inaccurate.

Although it was not one of our primary outcomes, we communicated with patients who had higher TSH levels. Of those who responded (10 cases), 8 cases had normal progress of pregnancy until delivery at term, 1 case had missed abortion (didn't receive treatment), and 1 case of preterm labor (discontinued treatment).

In conclusion, given the seriousness of consequences of un-treated hypothyroidism and SCH, routine testing may be a better strategy in communities where those condition are more prevalent. The prevalence of SCH among pregnant women in the first trimester attending Sohag University Hospital outpatient clinic is relatively high (14.4%). Larger epidemiological studies are required for gathering more accurate information about the prevalence of SCH. This will help health policy makers in planning effective strategies for early detection and treatment of SCH.

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References:

1. Abalovich, M., Gutierrez, S., Alcaraz, G., Maccallini, G., Garcia, A. & Levalle, O. 2002. Overt and subclinical hypothyroidism complicating pregnancy. Thyroid, 12**,** 63-68.

2. Alexander EK, Pearce EN, Brent GA, Brown RS, Chen H, Dosiou C, et al. 2017 Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and the postpartum. Thyroid. 2017;27:315-89.

3. Lazarus J, Brown RS, Daumerie C, Hubalewska-Dydejczyk A, Negro R, Vaidya B. 2014 European thyroid association guidelines for the management of subclinical hypothyroidism in pregnancy and in children. Eur Thyroid J. 2014;3:76-94.

4. Lazarus J. Thyroid function in pregnancy. Br Med Bull 2011; 97: 137-148.

5. Blumenthal NJ, Eastman CJ. Beneficial effects on pregnancy outcomes of thyroid hormone replacement for subclinical hypothyroidism. J Thyroid Res. 2017;2017:4601365.

6. Marwaha RK, Chopra S, Gopalakrishnan S, Sharma B, Kanwar RS, Sastry A, et al. Establishment of reference range for thyroid hormones in normal pregnant Indian women. Bjog. 2008;115:602-6.

7. Velasco I, Taylor P. Identifying and treating subclinical thyroid dysfunction in pregnancy: emerging controversies. Eur J Endocrinol. 2018;178:D1-d12.

8. Reid SM, Middleton P, Cossich MC, Crowther CA, Bain E. Interventions for clinical and subclinical hypothyroidism pre-pregnancy and during pregnancy. Cochrane Database Syst Rev. 2013:Cd007752.

9. Kahaly GJ, Bartalena L, Hegedüs L, Leenhardt L, Poppe K, Pearce SH. 2018 European Thyroid Association Guideline for the management of graves' hyperthyroidism. Eur Thyroid J. 2018;7:167-86.

10. Organization WH. WHO recommendations on antenatal care for a positive pregnancy experience: World Health Organization; 2016.

11. Dhillon-Smith RK, Boelaert K, Jeve YB, Maheshwari A, Coomarasamy A. Subclinical hypothyroidism and antithyroid autoantibodies in women with subfertility or recurrent pregnancy loss: Scientific Impact Paper No. 70 June 2022: Scientific Impact Paper No. 70 June 2022. Bjog. 2022;129:e75-e88.

12. Thyroid Disease in Pregnancy: ACOG Practice Bulletin, Number 223. Obstet Gynecol. 2020;135:e261-e74.

13. White S., Subclinical hypothyroidism and hypothyroidism in pregnancy. 2022 [Available from: https://ranzcog.edu.au/wp-content/uploads/Hypothyroidism.pdf.]

14. Solha STG, Mattar R, Teixeira P, Chiamolera MI, Maganha CA, Zaconeta ACM, et al. Screening, diagnosis and management of hypothyroidism in pregnancy. Rev Bras Ginecol Obstet. 2022;44:999-1010.

15. Mishra CK., Kumar R, Bhushan H, Baswal D, Malhotra M, Seshiah V, et al. .National Guidelines for Screening of Hypothyroidism during Pregnancy. 2014 [Available from: https://nhm.gov.in/images/pdf/programmes/maternal-health/guidelines/National_Guidelines_of_Hypothyroidism_during_Pregnancy.pdf].

16. Wang S, Teng WP, Li JX, Wang WW, Shan ZY. Effects of maternal subclinical hypothyroidism on obstetrical outcomes during early pregnancy. J Endocrinol Invest. 2012;35:322-5.

17. Mandel SJ, Cooper DS. The use of antithyroid drugs in pregnancy and lactation. J Clin Endocrinol Metab. 2001;86:2354-9.

18. Morais N, Assis ASA, Corcino CM, Saraiva DA, Berbara T, Ventura CDD, et al. Recent recommendations from ATA guidelines to define the upper reference range for serum TSH in the first trimester match reference ranges for pregnant women in Rio de Janeiro. Arch Endocrinol Metab. 2018;62:386-91.

19. El Behery MM, AbdAlsalam HS, Mohamed AAA, El Katawy AM. Thyroid dysfunction in pregnant women attending antenatal clinic. Egypt J Hosp Med. 2022;89:5796-800.

20. Aboelroose AA. Assessment of thyroid function in pregnant women attending Suez Canal University Hospitals. Evid Based Womens Health. 2019;10:181-7.

21. Berbara T, Morais NS, Saraiva DA, Corcino CM, Schtscherbyna A, Moreira KL, et al. Selective case finding versus universal screening for detecting hypothyroidism in the first trimester of pregnancy: a comparative evaluation of a group of pregnant women from Rio de Janeiro. Arch Endocrinol Metab. 2020;64:159-64.