The Prevalence and Fetal and Maternal Outcome of Overt and Subclinical Hypothyroidism among Pregnant Women; A Cross-sectional Study

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ABSTRACT

Introduction: Maternal thyroid dysfunction during pregnancy and its relationship with pregnancy outcomes has been under consideration in last decades. Hypothyroidism, especially subclinical hypothyroidism, is the most common type of thyroid dysfunction among women in reproductive age. We aimed to evaluate the prevalence and maternal/fetal outcomes of these two conditions among Iranian pregnant women. **Materials and methods:** This cross-sectional study was conducted between January and July 2016 at Baqiyatallah hospital, Tehran, Iran. All pregnant women attending to Baqiyatallah Obstetrics and Gynecology clinic during study period were assessed for eligibility. Demographic information as well as information on parity, repeated abortion, history of infertility, size of thyroid and history of autoimmune diseases were recorded in a pre-designed checklist. TSH and T4 levels were measured by Chemiluminescence method and recorded in related forms. **Results:** Eventually 500 patients with a mean age of 27.77±4 years underwent analysis. Thyroid dysfunctions had a prevalence of 30.2% (151 cases). Of this proportion 143 patients (28.6%) had hypothyroidism from which 56(11.2%) patients had clinical and 59(11.8%) had subclinical hypothyroidism. In this study, 258 individuals had deliveries with one abortion in euthyroid and one in low-TSH group. **Conclusion:** In conclusion our findings showed that hypothyroidism has a prevalence of 28.6% among Iranian pregnant women attending to our hospital. Also we found that subclinical hypothyroidism is more prevalent than overt hypothyroidism. The results showed that thyroid dysfunction is more prevalent in infants with maternal impaired thyroid function tests.

Keywords: Pregnancy; Hypothyroidism; Subclinical hypothyroidism; Prevalence; Overt hypothyroidism.

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INTRODUCTION

Maternal thyroid dysfunction during pregnancy and its relationship with pregnancy outcomes has been under consideration in last decades (1-3). Several adverse outcomes such as abortion, low birth weight, fetal death and preterm delivery and altered neuropsychological development have been counted for mild maternal thyroid dysfunction (4-7). Hypothyroidism is the most common type of thyroid dysfunction among women in reproductive age and overt hypothyroidism is less prevalent than subclinical hypothyroidism (8). The prevalence of thyroid dysfunction in Iranian pregnant women is 18.10% according to a systematic review and metanalysis (9).

A remarkable number of studies have assessed the maternal and fetal complications associated with clinical and subclinical hypothyroidism during pregnancy; however the results are different leading to a variety of recommendations by various societies. Subclinical hypothyroidism has lower adverse effects in comparison with overt hypothyroidism; however recently added literature have reported an increased incidence for fetal distress, preeclampsia, preterm birth and placental abruption (10). Diagnosis of subclinical hypothyroidism is dependent on laboratory evaluation because it has no evident clinical manifestations (8).

There is a shortage of data upon prevalence of overt and subclinical hypothyroidism during pregnancy in Iranian women. Hence, we aimed to evaluate the prevalence and maternal/fetal outcomes of overt and subclinical hypothyroidism among Iranian pregnant women.

MATERIAL AND METHODS

This cross-sectional study was conducted between January and July 2016 at Baqiyatallah hospital, Tehran, Iran. The study protocol was approved at ethics committee of Baqiyatallah University of Medical Sciences. All pregnant women attending to Baqiyatallah Obstetrics and Gynecology clinic during study period were assessed for eligibility and those willing to participate were included. Patients with active malignancy, history of malignancy or thyroid surgery as well as previous or current treatment for hypothyroidism were excluded from the study. Demographic information (e.g. age, weight, height and etc.) as well as information on parity, gravity, repeated abortion, history of infertility, size of thyroid and history of autoimmune diseases were recorded in a pre-designed checklist. TSH and T4 levels were measured by Chemiluminescence method and recorded in related forms. Clinical hypothyroidism was defined as TSH levels more than 2.5 mu/l in first and more than 3mu/l in second and third trimesters. Subclinical hypothyroidism was defined in the same THS range with normal serum levels of thyroid hormones. In addition, patients who had delivery during study were assessed for pregnancy complications such as abortion, intrauterine fetal death (IUFD), preeclampsia, low birth weight, placental decolement and pre-natal mortality.

Data were analyzed using statistical package for social sciences)SPSS) for Windows (version 21, IBM Corp, Armonk, NY). Normal distributed variables (approved by 1-sample Kolmogorov-Smirnov test) were compared using independent sample t test between the groups. The chi square test was used to compare categorical variables in the 2 groups. Mean and standard deviation (SD) were used for describing categorical variables. A p value of less than 0.05 was considered as statistically significant.

RESULTS

Eventually 500 patients with a mean age of 27.77±4 years underwent analysis. Demographic information has been summarized in Table 1. Thyroid dysfunctions had a prevalence of 30.2% (151 cases). Of this proportion 143 patients (28.6%) had hypothyroidism from which 56(11.2%) patients had clinical and 59(11.8%) had subclinical hypothyroidism. Twenty-two (4.4%) patients had high levels of TSH who did not attend for T3 and T4 measurement and so were not categorized as clinical or subclinical hypothyroidism. Size of thyroid was normal in

Table 1. Demographic information of study individuals

Variables \ Categories	Normal N=349	Clinical Hypothyroidism N=56	Subclinical Hypothyroidism N=59	High TSH N=22	Total	P value
Age, year (Mean±SD)	27.67±4.3	28.96±5	26.86±5	27.62±4.3	27.77±4	>0.05
Weight, Kg (Mean±SD)	72.56±11.93	73.91±13.85	73.33±19.36	86±13.78	72.62±12	>0.05
Height, cm (Mean±SD)	162.56±7.34	161.2±5.01	161.67±4.13	162.5±4.88	162.32±6	>0.05
Gestational age, Week (Mean±SD)	24.86±9.2	26.64±9.7	22.16±11.6	32.65±4	24.94±9.6	0.001
Gravity (Mean±SD)	1.69±0.9	1.71±0.9	1.36±0.7	1.9±1	1.66±0.9	0.002
Parity(Mean±SD)	0.4±0.7	0.3±0.5	0.3±0.6	0.6±0.8	0.43±0.64	>0.05
IUFD (Mean±SD)	0.2±0.13	0	0.02±0.132	0.05±0.22	0.2±0.12	>0.05
Abortion (Mean±SD)	0.36±0.48	0.34±0.78	0.03±0.18	0.16±0.37	0.2±0.5	>0.05
Infertility, N	10(2.8%)	8 (14.2%)	0(0%)	1(4.5%)	19	<0.001
Positive Family history	79(22.7%)	31(53.5%)	12(20.3%)	2(9%)	124	<0.001

Table 2. Distribution of maternal and fetal complications

Complication	Normal, N=349	Clinical Hypothyroidism, N=56	Subclinical Hypothyroidism, N=59	High TSH, N=22
Placental abruption, N	1(0.3%)	0(0%)	0(0%)	0(0%)
PROM, N	5 (1.43%)	0(0%)	1(1.69%)	0(0%)
Preeclampsia, N	8 (2.29%)	1(1.78%)	0(0%)	3(13.6%)
GDM, N	8(2.29%)	4(7.14%)	2(3.38%)	2(9.1%)
Depression, N	1(0.3%)	0(0%)	0(0%)	0(0%)
Oligohydramnios, N	4(1.14%)	1(1.78%)	1(1.69%)	0(0%)
Polyhydramnios, N	2(0.57%)	0(0%)	0(0%)	0(0%)
Thrombocytopenia, N	0(0%)	1(1.78%)	0(0%)	0(0%)
Meconium aspiration, N	3(0.85%)	1(1.78%)	2(3.38%)	1(4.52%)
GE Reflux	1(0.3%)	0(0%)	0(0%)	0(0%)
Death after birth	1(0.3%)	0(0%)	0(0%)	0(0%)
Hyperbilirubinemia	71(20.3%)	10(17.85%)	10(17%)	6(27.3%)
Hospitalized for hyperbilirubinemia	15(4.3%)	4(7.14%)	3(5%)	2(9.1%)
Tachypnea	2(0.57%)	0(0%)	0(0%)	0(0%)
Hypoglycemia	2(0.57%)	0(0%)	1(1.69%)	0(0%)

all the patients.

Hyperthyroidism had a prevalence of 1.6% in the present study with one (0.2%) clinical and 4(0.8%) subclinical hyperthyroidism patients. In addition, 3(0.6%) patients had low levels of TSH who did not attend for T3 and T4 measurement and so were not categorized as clinical or subclinical hyperthyroidism.

Among patients with thyroid dysfunctions, 63 (41.7%) had no risk factors such as family history, abortion, infertility, diabetes, radiotherapy or autoimmune diseases. Most (65%) of these patients had subclinical hypothyroidism. Patients with clinical hypothyroidism had more positive family history in comparison with other groups ($p<0.001$). Also these patients had a significantly higher rate of infertility in comparison with other groups ($p<0.001$).

Gravity was significantly lower in patients with subclinical hypothyroidism ($p=0.002$); however there was no statistically significant difference between study groups for parity, abortion and intrauterine fetal death (IUFD) ($p >0.05$).

During the study, 258 individuals had deliveries with one abortion in euthyroid and one in low-TSH group. Distribution of maternal and fetal complications has been summarized in Table 2. Gestational diabetes mellitus (GDM) had a prevalence of 2.29% in euthyroid, 7.14% in clinical hypothyroidism, 3.38% in subclinical hypothyroidism and 9.1% in high TSH group. There was no significant difference between these groups for prevalence of GDM ($p=0.23$).

Infants had a mean birthweight of 3136 gr in clinical hypothyroidism, 3248 gr in subclinical hypothyroidism and 3460 gr in high TSH group ($p=0.042$).

TSH level was measured in 247 infants and 3 had high levels of TSH. Among these patients 2 had clinical hypothyroid mothers and one had euthyroid mother. About 6% of infants with maternal clinical hypothyroidism and 1.1% of infants with euthyroid mothers had impaired thyroid function tests ($p=0.015$).

DISCUSSION

We found that thyroid dysfunction has a prevalence of 30.2% among pregnant women attending to our hospital and that the greatest proportion is related to hypothyroidism. It is notable that subclinical hypothyroidism was more prevalent (65%) than overt hypothyroidism in the present study. On the other hand, hyperthyroidism had a prevalence of 1.6% in this series of patients. Hyperbilirubinemia, gestational diabetes mellitus and preeclampsia were among the most common maternal/fetal complications of hypothyroidism. In our study, maternal thyroid dysfunction was a risk factor for impaired thyroid function test in infants.

Nambiar et al. evaluated the impact of thyroid disorders on maternal outcomes among Asian-Indian mothers in a prospective cohort study. They reported a prevalence of 4.8% for hypothyroidism in their study individuals which is far less than this proportion in the present study (28.6%) (11). They also reported that 40% of hypothyroid patients did not have any high-risk characteristics which is in line with the present study. Nambiar et al. mentioned that hypothyroidism is associated with miscarriage which is not in agreement with the present study.

Zhang et al. in a recently published systematic review and meta-analysis reported that women with subclinical hypothyroidism (SCH) have higher risk of miscarriage in comparison with euthyroid women. They also expressed that there is no significant difference between patients with treated SCH and euthyroid ones which highlights the importance of SCH during pregnancy (8).

Evaluating 4643 women in early pregnancy Carty et al. reported that 1.5% of these patients had TSH level more than 5mu/l and 10.3% had TSH levels between 2.5 and 5mu/l. They reported that women with higher levels of TSH (5 mu/l and higher) delivered infants with lower birthweights in comparison to those with TSH levels lower than 2.5 mu/l (12).

In another similar study Wang et al. evaluated 2899 pregnant women in first trimester of pregnancy. They reported that the prevalence of hypothyroidism was higher in high-risk group in comparison with low-risk group which is in contrast with the present study (13).

In a cohort study, Su et al. evaluated maternal serum TSH levels in the first 20 weeks of pregnancy in 1017 women. They concluded that clinical hypothyroidism is associated with increased fetal loss, low birthweight and congenital circulation system malformations. Preterm delivery, poor vision and neuropsychologic development were more associated with subclinical hypothyroidism (14).

The present study has some limitations. The relatively low sample size is among the limitations. In addition we evaluated serum TSH levels in different pregnancy trimesters which may cause a bias. Evaluating fetomaternal complications is the strength point of the present study.

CONCLUSION

In conclusion our findings showed that hypothyroidism has a prevalence of 28.6% among Iranian pregnant women attending to our hospital. Also we found that subclinical hypothyroidism is more prevalent than overt hypothyroidism. The results showed that thyroid dysfunction is more prevalent in infants with maternal impaired thyroid function tests.

CONFLICT OF INTERESTS

The authors declare there is no conflict of interests.

ABBREVIATIONS

IUFD; intrauterine fetal death, SPSS; statistical package for social sciences, SD; standard deviation, GDM; Gestational diabetes mellitus, SCH; subclinical hypothyroidism.

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