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ORIGINAL ARTICLE

Subclinical Hypothyroidism (SCH) in the First Trimester of Pregnancy: A Cross-Sectional Study at a Tertiary Care Hospital in Lahore

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ABSTRACT

Aim: To evaluate and assess the prevalence along with its related complications of subclinical hypothyroidism in pregnant ladies during the 1st trimester of pregnancy in Pakistani population.
Study design: Cross sectional study
Place and duration of study: Department of Medicine, Unit-1 of Lahore General Hospital, Lahore, Pakistan from 11th February 2019 to 29th December 2019.
Methodology: Four hundred and fifty seven pregnant women with a gestational age up to 12th week with an age group between 18-45 years were included in this study. Blood samples were collected for free triiodothyronine, free thyroxine and thyroid stimulating hormone levels. Patients were regularly followed at an interval of 4 weeks for their entire pregnancy period. Adverse events and complications were noted.
Results: One hundred and sixty nine subjects had TSH levels above the normal range i.e., 4.6-10mIU/L. 288 subjects were having TSH below 4 mIU/L levels. The overall prevalence of subclinical hypothyroidism (SCH) was found to be 37% in pregnant women during their first trimester of pregnancy. Pregnant women having subclinical hypothyroidism (SCH) were having higher risks of loss of pregnancy, abruptio placentae and neonatal death rates as compared to euthyroid pregnant women.
Conclusion: Higher prevalence of subclinical hypothyroidism (SCH) in the first trimester of pregnancy indicates that these women are at increased risks of loss of pregnancy, placental abruption and neonatal death as compared to euthyroid pregnant women.
Keywords: First trimester; pregnancy; subclinical hypothyroidism

INTRODUCTION

Subclinical hypothyroidism (SCH) is defined as increased thyrotropin levels (TSH) with normal tetra iodothyronine (T4) levels in the serum. Recent guidelines define the upper limit of TSH in third trimester of pregnancy to be 4.6 mIU/L.[1,2] Pakistan is one of the developing countries with many families living below the poverty line and suffering from many nutritional deficiencies. It has various negative outcomes in maternal and fetal health such as loss of pregnancy and intrauterine death. Other adverse outcomes include premature labor, gestational hypertension, placenta previa and intrauterine growth restriction (IUGR)[3].

A systematic review on adverse effects of subclinical hypothyroidism (SCH) on feto-maternal health was done by Van Den Boogaard[4]. It was a meta-analysis and included 38 articles and in this review, he tried to assess the impact of SCH with various negative outcomes in maternal and fetal health. It was concluded that it is one of the leading cause miscarriage, recurrent miscarriages, premature labor, placenta previa and maternal postpartum thyroiditis. We needed a study to assess and confirm the findings of Boogaard in our population.

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During the first trimester of pregnancy, most of the fetal hormones are synthesized by maternal thyroid cells which diffuse to the fetus through placenta and perform various neurophysiological functions there causing growth and development of different systems of the fetus. Because of the sole dependency of fetus on maternal thyroid hormones during the first trimester of pregnancy, subclinical hypothyroidism (SCH) at this crucial stage of development may cause multiple fetal health problems such as premature labor, gestational hypertension, placenta previa and intrauterine growth restriction (IUGR)[5,6].

This study was conducted to evaluate the possible prevalence of subclinical hypothyroidism (SCH) in Pakistani pregnant female population and it also highlights the complications associated with SCH in pregnant population in their 1st trimester of pregnancy. Currently, there is limited existing literature indicating possible prevalence of subclinical hypothyroidism (SCH) in Pakistani pregnant female population.

MATERIALS AND METHODS

This cross-sectional study was carried out at Medicine Unit-1, Lahore General Hospital, Lahore, Pakistan from 11th February 2019 to 29th December 2019. A total of 457

pregnant ladies in their first trimester with age group between 18-45 years were included in this study. ELISA technique was performed for thyroid functions tests (TFTs) for estimation of serum free T3, T4 and serum TSH. Patients were followed for their entire pregnancy period. Adverse events and complications were noted.

SPSS version 22 was used to analyze the data. p value of less than 0.05 was considered statistically significant. We used student t-test to relate arithmetic means and parameters and Chi square test for categorical variables and Odds Ratio were calculated for different adverse events and complications.

RESULTS

Three hundred and thirteen patients were the housewives, 108 were laborers and 36 were office working ladies. 319 patients were uneducated, 118 studied till matriculation level while only 20 subjects studied till graduation or above. Mean age was 27±4.6 years. One hundred sixty nine had TSH levels well above 4.6-10mIU/L. Two hundred eighty eight subjects were having TSH below 4mIU/L levels. The overall prevalence of subclinical hypothyroidism (SCH) was found to be 37% in pregnant women during their first trimester of pregnancy. In comparison to euthyroid pregnant ladies, pregnant women having subclinical hypothyroidism (SCH) were having higher risks of loss of pregnancy [R.R 2.03{Confidence Interval (CI) 1.67-2.47}; I^2=0], placental abruption [R.R 2.43 {Confidence Interval (CI) 1.66-2.48}; I^2=0], and death of neonates [R.R 2.57{Confidence Interval (CI) 1.47-4.37}; I^2=0]. We did not find any association between SCH and pregnancy loss, preterm labor, placental abruption and placenta previa.

Table1: Relative Risk ratios with confidence interval of 95% showing comparison of pregnant women in first trimester to euthyroid pregnant women for various pregnancy outcomes

Various outcomes of pregnancy	Relative Risk [CI 95%]	I^2 (%)
Pregnancy loss	2.03 [1.67–2.47]	0
Preterm labor	0.94 [0.57–1.53]	0
Preterm delivery	1.30 [0.91–1.34]	39
Gestational hypertension	1.13 [0.74–1.12]	52
Placental abruption	2.43 [1.57–2.37]	0
Placenta previa	0.68 [0.18–3.19]	0
IUGR	1.60 [0.73–2.90]	47
Neonatal death	2.58 [1.41–4.73]	0

RR=Relative risk; CI=Confidence interval; IUGR= Intrauterine growth restriction

DISCUSSION

Pakistan is one of the developing countries with many families living below the poverty line and suffering from many nutritional deficiency disorders. Subclinical hypothyroidism (SCH) which may be caused by iodine deficient meals or lack of iodine supplementation in the form of iodized salt is one of these deficiencies. 250 micrograms intake of iodine on daily basis is highly recommended during the entire pregnancy.[7,8] Increased placental uptake, hemodilution, elevated thyroid binding globulins (TBG) and urinary loss during pregnancy lead to 30-35% increased requirement for T3 and T4. As discussed earlier, during the 1st trimester of pregnancy, fetus is totally dependent on maternal thyroid hormones as most of the fetal hormones are synthesized by maternal thyroid glands which cross the placenta to perform various neurophysiological functions in fetus. During pregnancy, iodine deficiency caused by iodine deficient meals or lack of iodine supplementation in the form of iodized salt, hemodilution and urinary loss of iodine make feto-placental unit an iodine deficient unit[9-12].

The number and severity of complications depend upon the severity of hypothyroidism in pregnancy as well as the trimester of pregnancy as feto-placental unit needs more iodine during the 1st trimester. The severity of complications defines type and urgency of treatment as well. Early diagnosis followed by appropriate treatment decreases the frequency of various adverse outcomes such as loss of pregnancy from miscarriage and intrauterine death, premature labor, gestational hypertension, placenta previa and intrauterine growth restriction (IUGR)[13].

Pregnant women with previous history of miscarriages should be treated immediately and appropriately if the TSH antibodies are positive or when TSH is around or above upper limit of normal.

As there is 30-35% increased need for thyroid hormones, patients with SCH cannot cope up with fetal requirements of thyroid hormones and various complications arise. A study conducted by Negro et al showed the increased incidence of miscarriages by around 15% for every 1 mIU/L rise in serum TSH levels[14].

Our data shows that an overall prevalence of subclinical hypothyroidism (SCH) was found to be 37% in pregnant women during their first trimester of pregnancy. In comparison to euthyroid pregnant ladies, pregnant women with subclinical hypothyroidism (SCH) were having statistically significant risks of loss of pregnancy, placental abruption and death of neonates (Table 1). We did not find any association between SCH with gestational hypertension, preterm labor, premature delivery or miscarriage, placenta previa and intrauterine growth restriction (IUGR) in our study and this finding is also supported by a meta-analysis done by Spyridoula et al[15] In this meta-analysis he found out associations of complications with SCH but it is not always the case as one of the study of this meta-analysis compared high risk pregnant women who received levothyroxine to those who did not and did not find any significant decrease in the rate of complications.

CONCLUSION

Overall prevalence of subclinical hypothyroidism (SCH) in Pakistan in pregnant women during their first trimester of pregnancy was found to be 37% which is significantly high. Pregnant women having subclinical hypothyroidism (SCH) are at higher risks of loss of pregnancy, placental abruption and neonatal death rates as compared to euthyroid pregnant women. In the light of these findings, we recommend routine screening and repeated checking for TSH, free T3 and free T4 during pregnancy especially during the 1st trimester.

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