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Original Research Article

The prevalence of thyroid dysfunction in early pregnancy

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Abstract

Background: Thyroid dysfunction is one of the most common endocrine disorders affecting women of reproductive age group including pregnancy. Over the past several years it has been proved that maternal thyroid disorder influences the outcome of the mother and fetus, during and also after pregnancy.

Methods: A total of 385 pregnant women satisfying selection criteria attending the antenatal care during the first trimester were studied. The demographic details were collected and TSH, free thyroxine and free triiodothyronine were estimated.

Results: The present study showed a higher prevalence of thyroid abnormalities which is 33.51% in pregnant women during the first trimester.

Conclusion: The prevalence of thyroid abnormalities was significantly high in women with family history of thyroid abnormalities whereas no statistically significant difference was noted with maternal age and parity. Screening of women in early pregnancy for thyroid disorders is beneficial in preventing adverse fetal and maternal outcome.

Keywords: Thyroid disorders, hypothyroidism, pregnancy

Introduction

The most frequent Thyroid disorder in pregnancy is maternal hypothyroidism. It is associated with fetal loss, placental abruptions, pre-eclampsia, preterm delivery and reduced intellectual function in the offspring [1]. In pregnancy, overt hypothyroidism is seen in 0.2% cases and sub-clinical hypothyroidism in 2.3% cases [2, 3]. The incidence of hyperthyroidism in Pregnant women has been estimated at 0.2% [4].

Pregnancy poses an important challenge to the maternal thyroid gland as hormone requirements are increased during gestation. Fetal loss, fetal growth restriction, pre-eclampsia and preterm delivery are the usual complications of overt hyperthyroidism (low thyroid stimulating hormone [TSH] and high free Triiodothyronine [fT3], free thyroxine [fT4]) seen in 2 of 1000 pregnancies whereas mild or sub clinical hyperthyroidism (suppressed TSH alone) is seen in 1.7% of pregnancies and not associated with adverse outcomes [5]. Autoimmune positive euthyroid pregnancy shows doubling of incidence of miscarriage and preterm delivery. Worldwide more than 20 million people develop neurological sequel due to intra uterine, iodine deprivation [6].

Other problems of thyroid disorders in pregnancy are post-partum thyroiditis, thyroid nodules and cancer, hyper emesis gravidarum. Debates and disputes persist regarding several protocol and management plan in this specific spectrum of diseases.

Subclinical hypothyroidism is diagnosed in asymptomatic women when the TSH level is elevated and the T4 level is within the reference range. Thyroid hormones, specifically T4, are essential for normal fetal brain development. Before 12 weeks of gestation, a time when the fetal thyroid begins to concentrate iodine and synthesize T4, the fetus is entirely dependent on maternal transfer of thyroid hormones.

Brain development begins during this period of fetal dependency in the first trimester and continues throughout pregnancy and onto infancy. In case of pregnant women who are iodine-deficient, in which thyroxine production in both mother and fetus is insufficient throughout pregnancy, the impact on neurodevelopment of offspring can be dramatic [7].

During normal pregnancy, changes in thyroid function are well-documented. There is an increased thyroid demand and increased iodine uptake and synthesis of thyroid hormones. Estrogen induces a rise in serum thyroxine-binding globulin (TBG) and the placenta releases several thyroid stimulatory factors in excess like human chorionic gonadotropic (hCG). Alpha subunit of hCG is identical to that of TSH and has weak thyrotropic activity. Hence pregnancy is associated with very mild hyperthyroxinemia [8].

However, despite of the known complications and adverse events due to thyroid abnormalities, there is ongoing debate regarding the need for universal screening for thyroid dysfunction during pregnancy. Current guidelines differ between an aggressive case finding [9, 10] approach versus testing only symptomatic women or those with a personal history of thyroid disease or other associated medical

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condition [11, 12]. Taking these factors into consideration, present study was undertaken to find out the prevalence of thyroid dysfunction during early pregnancy (first trimester).

Objectives

The objective of the present study was to find out the prevalence of thyroid dysfunction during early pregnancy (first trimester).

Methodology

The present study was conducted at Lourdes Hospital, Kochi, Kerala for a period of six months after obtaining Ethical Clearance from the Institutional Ethics Committee.

Study design: The study design was a cross-sectional study.

Study period and place: This study was carried out at the Department of Obstetrics and Gynaecology, Lourdes Hospital, Kochi, Kerala for a period of six months.

Source of data: Pregnant women attending for antenatal care during the first trimester of pregnancy at Department of Obstetrics and Gynaecology, Lourdes Hospital, Kochi, Kerala with various complaints were included in the study. A written informed consent was obtained prior to the enrolment**.** Pregnant women with gestational age of ≤ 16 weeks, Women with singleton/multiple pregnancy, Primi/multigravida, High risk pregnancies with history of recurrent abortion, PIH, infertility, diabetes or other autoimmune disorder were included in the study. Pregnant women with thyroid nodule and cancer, Hyperemesis gravidarum or women already taking treatment for thyroid dysfunction were excluded.

Data collection: After obtaining written informed consent, demographic data such as age, obstetric history, personal history, family history was obtained and recorded on predesigned and pretested proforma.

Investigations: The selected women were subjected to TSH, free thyroxine and free triiodothyronine. Under aseptic precautions 2 ml of venous blood was drawn from the cubital vein. All samples were sent to the laboratory for TSH, free thyroxine and free triiodothyronine estimation. Sample was centrifuged at 3000 rpm for 10min and serum was separated. The estimation of TSH was done by chemiluminescence immunoassay (CLIA) method. In case of abnormal TSH levels free thyroxine and free triiodothyronine were assessed.

Sample size: A total of 385 pregnant women during the first trimester of pregnancy were studied.

Results

A total of 385 pregnant women satisfying selection criteria attending Department of Obstetrics and Gynaecology for antenatal care during the first trimester (gestational age ≤ 16 weeks) of pregnancy were studied. The mean gestational age of the women was 12.60 ± 2.08 weeks. The data obtained was coded and entered into the Microsoft excel spreadsheet and Master chart was prepared.
The data was analyzed and the final results and observations were tabulated as below.

Table 1: Age distribution

Age Group (Years)	Distribution (N=385)	
	Number	Percentage
21 or less	14	3.64
22 to 25	141	36.62
26 to 28	173	44.94
>28	57	14.81
Total	385	100.00

Table 2: Parity in this study 71.17% of the women had primi parity while 28.83% had multi parity

Parity	Distribution (n=385)	
	Number	Percentage
Primi	274	71.17
Multi	111	28.83
Total	385	100

In this study 25.19% of the women had sub-clinical hypothyroidism and 5.97% had over hypothyroidism. The overt hyperthyroidism was present in 1.56% of the women and 0.78% had sub-clinical hyperthyroidism.

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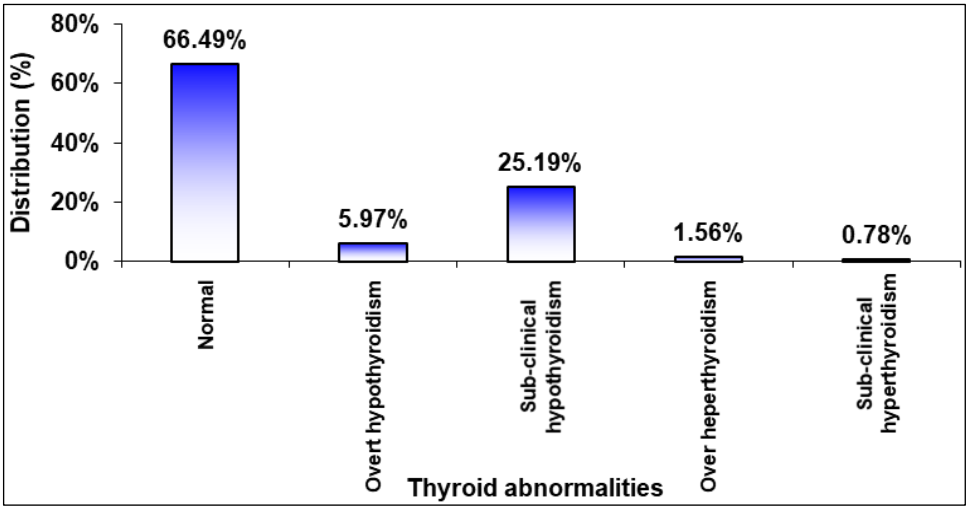

Graph 1: Thyroid abnormalities

Discussion

The role of the thyroid gland in pregnancy and the impact of thyroid disorders on the course of pregnancy and development of the offspring have drawn a considerable interest in the recent years, both in the medical and in the general society. Dysfunction of the maternal thyroid in pregnancy adversely affects the course of pregnancy and the psychomotor development of the offspring [13, 14]. If unrecognized and untreated, late postpartum thyroid dysfunction, in most cases SH or OH may have a long term negative effect not only on the mother´s health, but also on the next pregnancies.

The developing foetus is dependent upon the maternal thyroid hormone synthesis up to the 14th to 16th gestational weeks. Afterwards, its´ own thyroid gland starts to synthesize thyroid hormones, albeit in insufficient quantities. Thus, the first trimester of pregnancy is crucial in terms of adequate supply of maternal thyroid hormones to the embryo. Numerous retrospective and case-controlled studies confirmed detrimental effects of maternal OH on the course of pregnancy and on foetal health. Severe deficit of thyroid hormones leads to irreversible changes in foetal development. Impairment of neuronal differentiation leads to inadequate development of the central nervous system with resulting mental retardation. It may also lead to somatic defects including congenital cardiac defects and disrupted bone growth. These changes are most prominent in untreated congenital hypothyroidism (cretinism). Moderate thyroid hormone deficit may lead to less pronounced neurocognitive dysfunction [15].

Apart from neurocognitive foetal impairment, maternal untreated OH is associated with the risk of foetal loss in up to 60% and the risk of gestational hypertension in 22%, which was higher than in euthyroid women of women with subclinical hypothyroidism. According to Allan *et al*., women with OH have also an increased risk of foetal death. Thus, it is of no doubt that untreated maternal OH may be detrimental for the maternal-foetal unit in the short-term and in the long-term sense. Although maternal autoimmune thyroid disorders (AITD) fulfill many criteria used for identification of diseases subject to universal screening, this issue has been highly controversial.

The main arguments for implementation of universal screening are the impact of maternal hypothyroidism on the course of pregnancy and the health of offspring has been well described and the treatment is effective and simple; the prevalence of hypothyroidism in pregnancy is comparable with other universally screened diseases; the method of screening (laboratory measurement of thyroid parameters) is relatively simple and inexpensive-the financial costs depending on the choice of thyroid parameters screened; it is cost-effective (on condition that not only OH, but also SH decreases the offspring´s IQ; the risk-benefit ratio of the screening for each individual is acceptable [15].

In the past, some authorities recommended universal screening but not the American Thyroid Association or the Association of American Obstetricians and Gynaecologists, who have consistently advocated a case finding screening strategy focused on high-risk women.

Thyroid disorders in pregnant women during the first trimester are at risk of adverse maternal and neonatal pregnancy outcomes. The present study was aimed to find out the prevalence of thyroid dysfunction during early pregnancy (first trimester).

In our present study most of the women (44.94%) were aged between 26 to 28 years and mean age of the study population was 26.16 ± 3.28 years. The mean gestational age of the women was 12.60 ± 2.08 weeks. 71.17% of the women had primi parity while 28.83% had multi parity. History of infertility and thyroid disorders was present in 4.16% of the women each and history of other illness was noted in one woman (0.26%). Family history of thyroid disorders was noted in 2.86% of the women. Abnormal TSH levels were noted 33.51% of the women with mean TSH levels of 2.49 ± 2.20 ng/dL. The free T3 levels were found to be abnormal in 8.05% of the women and abnormal free T4 levels were noted in 7.53% of

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the women. Most of the women (25.19%) had sub-clinical hypothyroidism and 5.97% had over hypothyroidism. The overt hyperthyroidism was present in 1.56% of the women and 0.78% had sub-clinical hyperthyroidism. Maximum women (40.35%) had thyroid abnormalities who were aged more than 28 years (p=0.674) and less in women with primi parity (32.48%) compared to women who had multi parity (36.04%) (p=0.503). Significantly higher number of women (72.73%) had thyroid abnormalities who had family history of thyroid disorders (p=0.005) showing strong association between thyroid abnormalities and family history of thyroid disorders.

Conclusion

The present study showed higher prevalence of thyroid abnormalities that is 33.51% in pregnant women during the first trimester. The sub-clinical hypothyroidism was the commonest thyroid abnormality noted in 25.19% of the women and 5.97% had over hypothyroidism. The overt hyperthyroidism was present in 1.56% of the women and 0.78% had sub-clinical hyperthyroidism. The prevalence of thyroid abnormalities was significantly high in women with family history of thyroid abnormalities whereas no statistically significant difference was noted with maternal age and parity.

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