Original article:

Frequency of Subclinical Gestational Thyroid Function Abnormalities It's Impact on Obstetrical Outcomes

Nupur Nandi Malti

Assistant Professor, Department of Obstetrics and Gynaecology, KPC Medical College Jadavpur, Calcutta, West Bengal, India.

Corresponding Author: Dr. Nupur Nandi Malti, Assistant Professor, Department of Obstetrics and Gynaecology, KPC Medical College Jadavpur, Calcutta, West Bengal, India.

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Abstract

Introduction: This study aims to find the frequency of subclinical gestational thyroid function abnormalities its impact on obstetrical outcomes in north Indian woman.

Materials and Methods: 200 pregnant women with pregnancy, irrespective of the period of gestation were enrolled in this study by random sampling method. Thyroid dysfunction classified on the basis of TSH, fT3 and fT4 level according to American Thyroid Associations Guidelines during pregnancy as subclinical hypothyroidism if high TSH (2.5- 10.0mIU/L) with normal fT4 value (0.7 - 1.8 ng/dL) and subclinical hyperthyroidism as low TSH (<0.1mIU/L) with normal fT4 (0.7 - 1.8 ng/dL).

Result: Mean age of pregnant women was noted to be 26.34 + 3.14 years. Out of 200 females 146 (73%) were never receive antenatal care in previous pregnancies. Mean TSH level was 4.42±2.1mIU/l , fT3 level was 2.64+ 1.0 ng/ dl, fT4 level 1.48±0.73 ng/dl and (Table 1). There were total 84 (42%) pregnant women who were diagnosed with thyroid dysfunction and 116 (58%) were euthyroid.

Conclusion: Subclinical thyroid dysfunction frequency is high in our population. In our population Good prevention and treatment strategies must be implemented to reduce the frequency of prevalence of subclinical thyroid dysfunction during pregnancy.

Keywords: thyroxin (T4), and tri-iodothyronine (T3), hypothyroidism, hyperthyroidism, thyroid dysfunction.

INTRODUCTION

Pregnancy is associated with profound modifications in the regulation of thyroid function. These changes are the result of various factors like an increase of thyroxine-binding globulin (TBG) due to elevated estrogen and human chorionic gonadotropin (hCG), increased renal losses of iodine due to increased glomerular filtration rate, modifications in the peripheral metabolism of maternal thyroid hormones, and modification in iodine transfer to the placenta. [1]Modern studies describe thyroid disease as the second most frequent endocrine disorder that can affect women in their reproductive age. When thyroid disease remains untreated in a pregnant woman some disorders can appear. This include increased risk of miscarriage, hypertension, growth restriction, and placental abruption, and preterm births.[2]

Thyroid gland undergoes major change in its function during pregnancy. This has been reflected by 50% increase in production of thyroxin (T4) and tri-iodothyronine (T3) with an increase in iodine requirement. So euthyroid mother in the beginning of pregnancy became hypothyroid in later part that had iodine deficiency.[3] Thyroid is a very important part of the normal functioning of the body and thyroid dysfunction, if present in pregnancy, has myriad adverse impacts on both the mother and her fetus. Autoimmune thyroid disease has very high risk of resulting in irreversible neurological deficit in the newborn and Grave's Disease is known to cause recurrent pregnancy loss as well as fetal thyroid dysfunction.

There is change in the level of thyroxine-binding globulin, total thyroid-hormone level and change in the level of thyroid stimulating hormone (TSH) during normal pregnancy1. Thyroid disorder (TD) may be overlooked in pregnancy because of the nonspecific symptoms and hyper metabolic state of normal pregnancy.

Prevalence of thyroid disorder during pregnancy has a wide geographic variation. Western literature shows a prevalence of hypothyroidism in pregnancy of 2.5% and hyperthyroidism in pregnancy has prevalence of 0.1 to 0.4%.[4] There is paucity of data on prevalence of thyroid disorders in Indian pregnant women, few reports show a prevalence of 4.8% to 11% amongst Indian pregnant population. [5]In view of adverse maternal and fetal outcome in pregnant women with thyroid disorder and obvious benefits of early diagnosis and treatment, some expert panels all around the world have suggested routine thyroid function screening of all pregnant women.

The fetal thyroid gland begins synthesizing thyroid hormone after 12 weeks of gestation. Thyroid hormone is supplied to the fetus by the mother before this time, and it is at this time that thyroid hormones are most important for fetal brain development. However significant fetal brain development continues beyond first trimester, making thyroid hormone also important in later gestation.[6] There is a dearth of studies showing the prevalence of thyroid dysfunction in pregnant women moreover, the few studies that were conducted were performed in foreign countries. Due to a paucity of information and studies on the Indian population, our study is a sincere effort to throw some light in this direction. With this background, this study aims to find the frequency of subclinical gestational thyroid function abnormalities its impact on obstetrical outcomes in north Indian woman.

MATERIALS AND METHODS

This cross sectional study was conducted in the department of Obstetrics & Gynaecology in KPC Medical College, Jadavpur, Calcutta, West Bengal, India. Using non-probability; convenient sampling technique 200 pregnant women were recruited. Patients included in study were all pregnant women of age 20-40 years with, Multiple gestation, Known history of thyroid dysfunction, Gestational trophoblastic diseases, Women who are taking medications for thyroid diseases, Other medical disorders of pregnancy eg ;- Parathyroid or Pituitary disorders. Diabetes mellitus, Hypertension, Bad obstetric History. Patients excluded from study were those with previous history of thyroid surgery, on antipsychotic drugs, beta blockers, thyroxin, neomercazol, and patients with twin pregnancy.

Blood samples were collected after obtaining the consent from them. The patients then selected were studied as per the proforma formulated. A detailed history was taken with regard to age, marital status, educational qualification, occupation, religion, personal hygiene, period of gestation and parity. Past history of Thyroid disorder, tuberculosis, hypertension and diabetes mellitus if any, were recorded.

Nutritional status was assessed by body mass index, pallor, and by thyroid enlargement (goiter). Samples were sent to laboratory of the hospital for assessment of free T3, free T4 and TSH level on commercially available radioimmunoassay kit (Beckman Caulter). Reports were interpreted by Pathologist to evaluate for presence of thyroid dysfunctions. Thyroid dysfunction classified on the basis of TSH, fT3 and fT4 level according to American Thyroid Associations Guidelines during pregnancy as subclinical hypothyroidism if high TSH (2.5- 10.0mIU/L) with normal fT4 value (0.7 - 1.8 ng/dL) and subclinical hyperthyroidism as low TSH (<0.1mIU/L) with normal fT4 (0.7 - 1.8 ng/dL). All women were followed until delivery.

RESULTS

200 females were enrolled in this study to evaluate the thyroid dysfunction, mean age of pregnant women was noted to be 26.34 + 3.14 years. Out of 200 females 146(73%) were never receive antenatal care in previous pregnancies. Mean TSH level was 4.42±2.1mIU/l ,fT3 level was 2.64+ 1.0 ng/ dl, fT4 level 1.48±0.73 ng/dl and (Table 1). There were total 84 (42%) pregnant women who were diagnosed with thyroid dysfunction and 116 (58%) were euthyroid (Table 2, Fig.1). Out of 126 pregnant women with thyroid dysfunction subclinical hypothyroidism was noted in 82(65.1%) of women, and subclinical hyperthyroidism among 44(34.9%) women with Hyperthyroidism. (Table 3, Fig. 2).

Table 1: TSH, fT4, fT3 concentrations in women with Bad Obstetrical History.

	TSH (mIU/L)	**fT3 (ng/dL)**	**fT4 (ng/dL)**
Mean±Standard deviation	4.42 ±*2.1*	2.64 ±*1.0*	1.48 ±*0.73*

Table 2: Frequency of thyroid dysfunction among women

Thyroid Dysfunction	**No of patients**	**Percent**
Yes	84	42%
Euthyroid	116	58%

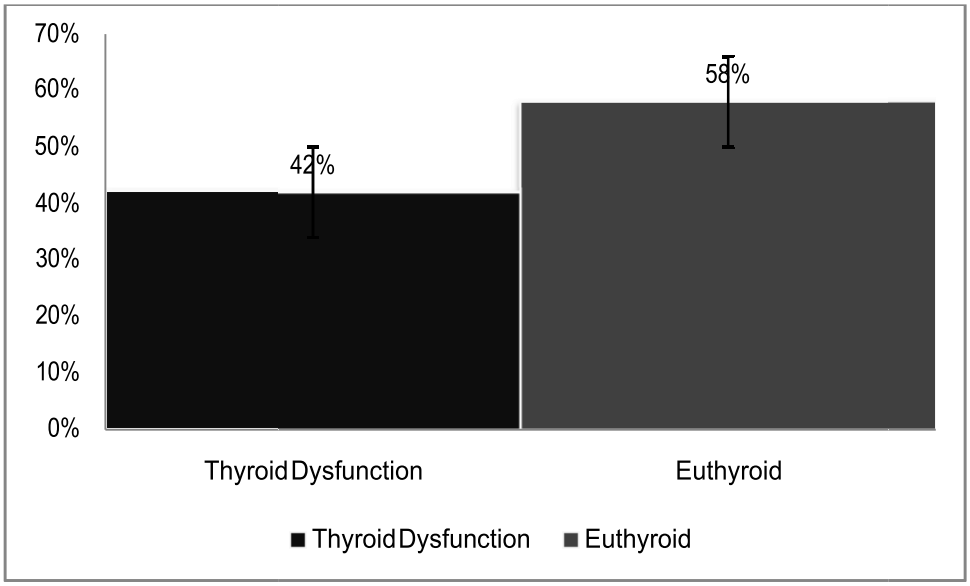

Figure 1: Frequency of thyroid dysfunction among women

Table 3: Frequency of subclinical thyroid dysfunction among pregnant women.

Thyroid Dysfunction	No of Patients	Percent
Hypothyroidism	54	64.3
Hyperthyroidism	30	35.7

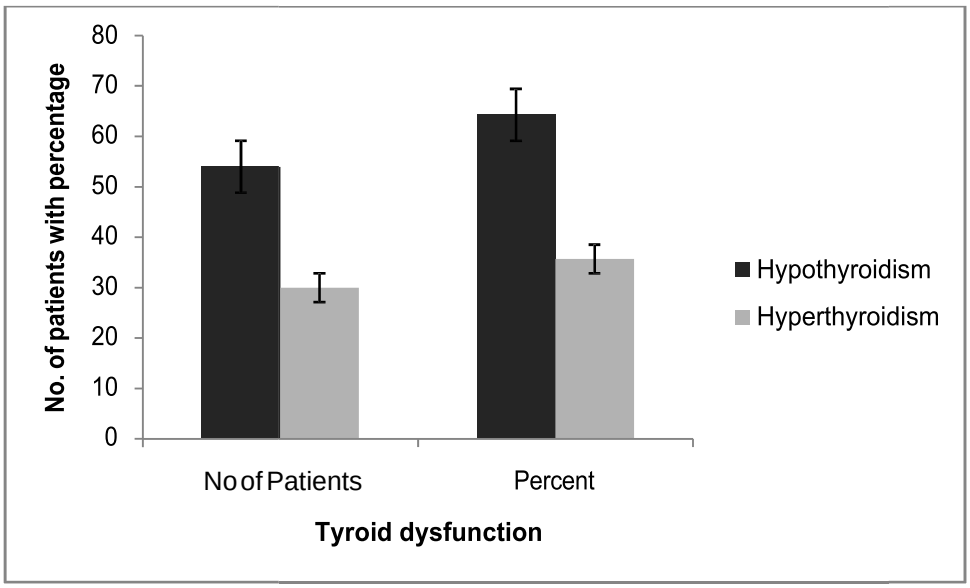

Figure 2: Frequency of subclinical thyroid dysfunction among pregnant women.

DISCUSSION

Screening for thyroid dysfunction in a woman who is pregnant or wants to be pregnant is important because thyroid hormone status is directly related to fetal brain development. In our study Out of 200 females 146(73%) were never receive antenatal care in previous pregnancies. Mean TSH level was 4.42±2.1mIU/l ,fT3 level was 2.64+ 1.0 ng/ dl, fT4 level 1.48±0.73 ng/dl and. There were total 84 (42%) pregnant women who were diagnosed with thyroid dysfunction and 116 (58%) were euthyroid. Out of 126 pregnant women with thyroid dysfunction subclinical hypothyroidism was noted in 82(65.1%) of women, and subclinical hyperthyroidism among 44(34.9%) women with Hyperthyroidism.

The Rotterdam study[7] found a 10.8 % prevalence of subclinical hypothyroidism among elderly women and The Frementle Diabetes study found a 8.6% prevalence among women with type 2 diabetes.[8]

The prevalence of hypothyroidism in this cohort is 4.8% which is higher than that in the western literature (2.5%),[9] (2.6%)[10] and a previous Indian study (3.69%).[11]

The higher prevalence in our study could be due to the higher prevalence of TAI in our cohort (12.4% versus 6.5%[9] and 8%).[11] Studies systematically assessing the prevalence of TAI during pregnancy, however, have not been reported from India. Iodine deficiency could be a contributory cause, but this information cannot be generated from our study as urinary iodine estimation was not done. The percentage of households consuming iodised salt in India as per the Iodine Network Global score card 2010 is 51%.[12]

A study done by Vaidya et al., reported that by targeted thyroid screening testing of only the high-risk group would miss about one third of pregnant women with overt/subclinical hypothyroidism.[12] Sahu et al. have done thyroid function during second trimester in high-risk pregnant women and reported that prevalence of thyroid disorders, especially overt and subclinical hypothyroidism, was 6.47%. Further, significant adverse effects on maternal and fetal outcome were seen emphasizing the importance of routine antenatal thyroid screening.[6]

Study done by Rao et al. demonstrates that hypothyroidism has a statistically significant relationship with recurrent pregnancy loss in the first trimester and suggests that diagnosis of hypothyroidism could help couples with recurrent pregnancy loss to have a successful outcome in subsequent pregnancies.[13,14]

Subclinical Hypothyroidism in pregnancy has been associated with adverse maternal outcomes in observational studies including eclampsia, pre-eclampsia, placental abnormalities, miscarriages, preterm labor, and low birth weight.[15-19]

Fetal loss was 16.6-fold greater in the pregnant women with overt hypothyroidism compared with those from the euthyroid group.

Allan et al.[20] showed that TSH levels greater than 6 mU/liter were significantly associated with a higher frequency of stillbirth. Benhadi et al.[21] found that high maternal TSH levels were associated with an increased risk of pregnancy loss. Because TSH is inversely related to hCG levels, women with low hCG levels are at a greater risk of child loss. Although hyperthyroidism in pregnancy is uncommon, effects on both the mother and child are critical. However, in this study, no significant finding was seen as the sample size was small and the disease is comparatively infrequent.

CONCLUSION

Subclinical thyroid dysfunction frequency is high in our population. In our population Good prevention and treatment strategies must be implemented to reduce the frequency of prevalence of subclinical thyroid dysfunction during pregnancy. Screening of all high risk patients should be encouraged including thyroid function testing, thyroid peroxidase auto antibodies testing and urinary iodide concentration, for effective prevention.

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