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Research article

ANTENATAL THYROID DYSFUNCTION IN RAYALASEEMA REGION: A PRELIMINARY CROSS SECTIONAL STUDY BASED ON CIRCULATING SERUM THYROTROPIN LEVELS

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ABSTRACT

Background: The foetal brain development can be influenced by thyroid gland functioning. Sub normal function of thyroid gland in first trimester of pregnancy leads to miscarriages, stillborn and anomalies of central nervous system in foetus. The environmental factors that will effect thyroid gland functioning are deficit soil iodine, high fluoridation of water and low dietary iodine intake. Rayalaseema is endemic for iodine and most of the communities are suffering from high fluoride levels of water. Therefore study was designed to estimate prevalence of thyroid dysfunction in pregnant women of Rayalaseema region. **Materials and Methods:** 139 first trimester pregnant women randomly selected from Obstetrics and Gynaecology department of Santhiram medical college and General Hospital, Nandyal during the period from April 2013 to June 2013 in respect of inclusion and exclusion criteria. And fasting blood samples of the participants were analyzed for T3, T4 and TSH. Based on the TSH levels subjects were categorised in to euthyroid, hypothyroid, subclinical hypothyroid and hyper thyroid. **Results:** The prevalence of antenatal thyroid dysfunction is 18.70% [10.0% - subclinical hypothyroid, 2.87% - overt hypothyroid, 5.75% - hyperthyroid and 81.29% - euthyroid]. 37.5%- tribal, 10.81% - rural and 21.21% urban antenatal are suffering from thyroid dysfunction. Median maternal age was 25 years and gestational age was 8.5 weeks. Prevalence of pregnancy related risk factors include 26.92% - personnel thyroid history, 11.53% - hypertension, 15.38% - elevated fasting blood glucose, 30.76 % - family thyroid history. **Conclusion:** Subclinical hypothyroidism was highly prevalent among Rayalaseema region antenatal women at first trimester of pregnancy. **Study limitations:** Study will not represent other population varies with iodine intake and ethnic.

Keywords: Antenatal, foetal, Rayalaseema, thyroid dysfunction, thyrotropin.

INTRODUCTION

The development of foetal central nervous system depends on bioavailability of thyroid hormones [T_3 - 3, 5, 3'-L triiodothyronine; T4 - 3, 5, 3'5'-L-tetraiodothyronine] in maternal as well as foetal blood circulation. Foetal thyroid gland starts iodine concentration for the synthesis of thyroid hormones during second trimester (Fisher D.A et al. 1997) [>13 weeks] of gestational period [TRH may released by hypothalamus by the end of first trimester]. In iodine [iodide] endemic areas due to low intake of dietary iodine most of the pregnant women are developing mild hypothyroidism or subclinical hypothyroidism in first trimester due to relative decrease in thyroid hormone synthesis by thyroid gland. This will affect the foetal neuronal development and maturation ultimately lead to neuropsychomotor deficits baby outcome or miscarriages of pregnancy (Hetzel B.S et al, 1989).

MATERIALS AND METHODS

The study was conducted at department of clinical biochemistry, Santhiram medical college and General Hospital, Nandyal during the period from April 2013 to June 2013. The subjects were randomly selected from first trimester antenatal patients who attended Obstetrics and Gynaecology department. Total 139 first trimester pregnant women were taken into this current study in respect to inclusion and exclusion criteria. Most of the subjects enrolled from very poor to below poverty line.

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Inclusion Criteria
Antenatal with less than 13 Week of gestation period, primigravida and multigravida

Exclusion Criteria
Subjects with known severe illness or chronic disorders, multifetal gestation, had previous history of miscarriage.

The required information related to age, gestational age (GA), race, past and present medical history (thyroid, other auto immune disease and diabetes) and family, personal, obstetric history was taken from medical records. The 5 ml of fasting venous blood sample was taken under aseptic conditions and were analysed for Tri iodothyronine (T3), Tetra iodothyronine (T4) and Thyroid stimulating hormone (TSH) or thyrotropin levels. Estimations were done by chemiluminescent immunoassay assay (CLIA).

Criteria for Thyroid Dysfunction
Based on Thyrotropin or Thyroid stimulating hormone (TSH) levels subjects were divided into four groups. The subjects with TSH between o.3-4.0 µIU/mL considered as Euthyroid, TSH levels < 0.3 µIU/mL were considered as overt hypothyroid (OH), TSH > 4.0 µIU/mL with normal T_4 levels – Subclinical hypothyroid (SCH) and > 10 µIU/mL TSH were considered as hyperthyroid.

RESULTS
A total of 139 first trimester antenatal were included in this study. Their age group ranges between 17-35 years old. The median maternal age was 25 years old and gestational (GA) age was 8.5 weeks. Most of the subjects 93 (66.90 %) included in this study are primigravida. Among the 139 subjects 32 (23.02%) were tribal, 74 (53.23%) were rural and 33 (23.74) were enrolled from urban and semi urban population. The total prevalence of antenatal thyroid dysfunction was found to be 18.70% (26 subjects). Based on their TSH levels, 14 (10.0%) subjects were come under subclinical hypothyroid, 4 (2.87%) were considered as overt hypothyroid, 8 (5.75%) as hyperthyroid and 113 (81.29%) subjects were considered as euthyroid. The mean T3 T4 TSH values percentages of prevalence in studied groups were given in Table1 and 2.

Table 1: Mean and Standard Deviation

Parameter	Sub Clinical Hypo	Overt Hypo	Hyper Thyroid	Euthyroid
T_3 ng/dL (MEAN±SD)	43.45±12.35	24.12±11.01	189±21.01	65.87±12.32
T_4 µgr/dL (MEAN±SD)	8.12±2.34	2.01±0.19	18.97±5.14	4.01±1.98
TSH µIU/L (MEAN±SD)	8.15±1.23	69.43±13.65	0.07±0.10	2.30±1.24

Table 2: Thyroid Status among the Studied Subjects

THYROID STATUS	PERCENTAGE
Total thyroid dysfunction	**18.70%**
Subclinical hypothyroid	10.0%
Overt hypothyroid	2.87%
Hyperthyroid	5.75%
Euthyroid	81.29%

The distribution of thyroid dysfunction among tribal was 37.5%, rural 10.81% and in urban and semi urban population it was 21.21%. The pattern of thyroid dysfunction of studied groups was shown in Chart 1. Among the 14 subjects with subclinical thyroid two had previous thyroid dysfunction history, they were on medication and three subjects had elevated fasting blood glucose levels. In overt hypothyroid group among the 4 subjects one had previous medical history of type 2 diabetes mellitus (DM) and hypertension among them one had previous thyroid history. And among 8 subjects with hyperthyroid 4 are having previous history of thyroid dysfunction and were on treatment, two subjects with history of hypertension. Among euthyroid 18 subjects were found with high fasting blood glucose levels. Base line characteristics of the studied population were shown in Table 3.

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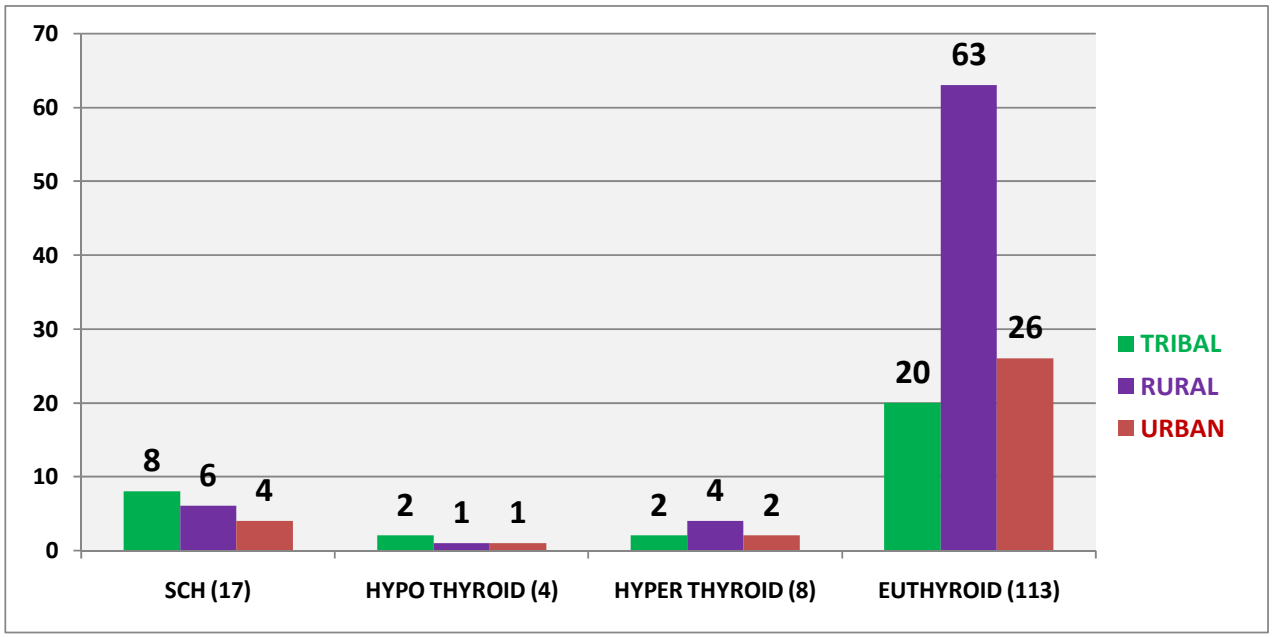

SCH = sub clinical hypothyroid

Chart 1: Distribution of Thyroid Dysfunction among Studied Groups

Table 3: Base Line Characteristics of the studied Subjects

Median maternal age (MA)	25 years
Median gestational age (GA)	8.5 weeks
Minimum/maximum age	17/35 years old
Total subjects studied 139	Tribal 32 (23.02%)
	Rural 74 (53.23%)
	Urban and semi urban 33 (23.74%)
Primigravida	93 (66.90 %)
Multigravida	46 (33.09 %)
Cases with previous thyroid dysfunction	7 among 26 positive cases
Cases with other autoimmune diseases	Not noted
Cases with hypertension	3 among 26 positive cases
Cases with elevated FBS levels	4 among 26 positive cases/15 among 113 total subjects
Subjects with family history of thyroid disorder	8 among 26 positive cases/ 34 among 113 total subjects

DISCUSSION

The previous study (Pandit Vinodh Bandela et al 2012) in Rayalaseema region has shown high prevalence of thyroid dysfunction in female among the gestational age group. The study has also stated that low iodine and high fluoride intake is the main cause for thyroid dysfunction in this region. According to this scenario we have undertaken a preliminary cross sectional study with an aim, prevalence of thyroid dysfunction in pregnant women of Rayalaseema region.

In this present study, the total thyroid dysfunction was noted to be 18.70 %. The major findings are 12.87 % prevalence of first trimester hypothyroidism and most of them (10.0 %) were suffering from subclinical hypothyroidism. This is in accordance with prevalence rate of subclinical hypothyroidism pattern (ranging from 4.8 % to 11 %) in India (Nambiar V et al 2011 and Sahu M.T et al 2010).

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In Western countries, the hypothyroidism prevalence is about 2.5 % (LeBeau S.O et al 2006). According to the latest literature (Dinesh et al 2013) the prevalence of subclinical hypothyroidism in North India was 14.3%. In south India, there are very few literatures are available on this issue. Rao et al (2006) reported 4.12% hypothyroidism in among the non - pregnant women of Hyderabad with recurrent pregnancy loss (RPL) and demonstrated a positive relation between recurrent pregnancy loss and hypothyroidism. Gayathri et al (2007) reported 2.8% of subclinical hypothyroidism among 500 pregnant women of Chennai. Sahu et al (2010) reported 6.47% of subclinical hypothyroidism and 4.85% of overt hypothyroidism (OH) among 633 pregnant women in their second trimester of pregnancy. Casey et al 2005 at USA reported 23% subclinical hypothyroidism among pregnant women with twenty week of gestation period. This high prevalence may because of high fluoridation of water in United States of America (the estimated fluoride exposure dose in 1991 ranges between 1.6 - 6.6 mg/day due to high water fluoridation values may drastically improved to this year). They have noted 3 time high placental abruption and preterm birth complications in this population. Leung et al (1993) reported gestational hypertension [eclampsia, pre-eclampsia, and PIH: pregnancy induced hypertension] at delivery among the women who remained with hypothyroid.

The study has also revealed that high prevalence of pregnancy related risk factors among this population. It has been found that 26.92% pregnant women are having previous thyroid history, 11.53% are having pregnancy induced hypertension (PIH), 15.38% pregnant are having elevated fasting blood glucose (FBS) levels in positive case and it was only 13.27 % in total population, 30.76 % are having family history (first degree relatives) thyroid dysfunction in positive cases where it was 30.08% among the total population studied. The present cross sectional study has noted that subclinical hypothyroidism was highly prevalent among the tribals than in rural, urban and semi urban population. Poverty, insufficient iodine supplementation, fluorinated water are may be the major cause for thyroid dysfunction among pregnant women of this population. Taking this into consideration pregnant women of Rayalaseema region are in high risk group for subclinical hypothyroidism related adverse effects on mother and foetal out come. This study has suggesting thyroid function screening at first trimester of pregnancy among this population using a simple index like estimation of circulating Thyrotropin or Thyroid stimulating hormone (TSH) levels in serum. The American College of Obstetricians and Gynaecologists (ACOG) – 2002, The Endocrine Society – 2007 (Abalovich M et al 2007) and American Association of Clinical Endocrinologists (AACE) guidelines are in contradiction to universal thyroid screening of pregnant women (Petak S.M et al 2008). The current study had an implicit impression that omission of thyroid screening in first trimester pregnant women will affect quality life of Indian population. The study recommends improvement of awareness about consequences of subclinical hypothyroidism, deficiency of iodine intake and adverse effects of high fluoride exposure through educating the women at gestational or reproductive age group and adequate T_4 replacement before planning to pregnancy if needed.

Study limitations: This study is based only on estimation of single thyroid status index parameter (thyroid stimulating hormone). Free tetra iodothyronine (FT_4) estimation was not done. Baseline data was collected from subjects medical records. Finally, this study will not represent only very poor and below poverty line pregnant women and it will not represent other population varies with iodine intake and ethnic.

CONCLUSION

This study concludes that subclinical hypothyroidism was highly prevalent among pregnant women of Rayalaseema region during first trimester. Thyroid screening is advisable among maternal and gestational age group women of this population.

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