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Original Research Article

## Prevalence of thyroid disorders among pregnant women at a tertiary care hospital in Rajasthan

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### ABSTRACT

**Background:** Hormonal changes and metabolic demands during pregnancy result in profound alterations in the biochemical parameters of thyroid function. Screening for thyroid disorders and initiation of its management at the earliest stage during first trimester is essential as maternal thyroid failure during the first half of pregnancy has been associated with several pregnancy complications and intellectual impairment in offspring. Aim was to evaluate the prevalence of thyroid dysfunction during the first and second trimester of pregnancy among women of Rajasthan state in India.

**Methods:** The study comprised a cohort of 313 consecutive pregnant women in the first and second trimester that attended the OPD and were admitted as pregnant women in Obstetrics and Gynecology Department of the NIMS Medical College and Hospital, Jaipur, Rajasthan. Thyroid stimulating hormone (TSH) levels and free T4 (fT4) were estimated. The subjects were grouped into six groups based on the value of serum TSH and fT4.

**Results:** Out of 313 antenatal women enrolled in the study, 213 (68%) attended antenatal clinic in first trimester of pregnancy and 100 (32%) women in their second trimester. The prevalence of thyroid dysfunction was 15.97% (overt hypothyroidism 1.28%, subclinical hypothyroidism 4.79%, isolated hypothyroxinemia 4.47%, overt hyperthyroidism 1.92%, and subclinical hyperthyroidism 3.51%). The women with overt hypo- or hyperthyroidism and subclinical hypothyroidism were older than euthyroid women. Maternal weight was high in pregnant women with overt hypothyroidism (58.22±6.18 kg) and subclinical hypothyroidism (52.04±2.94 kg). Gravid status was high in pregnant women with overt hypothyroidism, subclinical hypothyroidism and isolated hypothyroxinemia, but low in hyperthyroid group. History of miscarriage was high in pregnant women with subclinical hypothyroidism.

**Conclusions:** With this study, it was concluded that there is high prevalence of thyroid dysfunction in pregnancy predominantly in rural population of Rajasthan. Majority among these being subclinical hypothyroidism and hypothyroxinemia.

**Keywords:** Hyperthyroidism, Hypothyroidism, Pregnant women, Thyroid dysfunction, Thyroid stimulating hormone

### INTRODUCTION

Pregnancy can be viewed as a state in which a combination of events concur to modify the thyroidal economy. 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 pregnancy.<sup>1</sup> Endemic iodine deficiency accounts for most of the cases of hypothyroidism in pregnant women worldwide while chronic autoimmune thyroiditis is the most common cause of hypothyroidism in iodine sufficient parts of the world.<sup>2</sup> The presentation of hypothyroidism in pregnancy is not always classical and may sometimes be difficult to distinguish from the

symptoms of normal pregnancy. Overt maternal thyroid failure during the first half of pregnancy has been associated with several pregnancy complications and intellectual impairment in offspring.<sup>3-6</sup> It is less clear whether milder forms of thyroid dysfunction have similar effects on pregnancy and infant outcomes.<sup>7</sup> Although gestational hyperthyroidism is uncommon (0.2%) but if remains untreated is associated with increased risk of several adverse outcomes, including pre-eclampsia, premature labor, fetal or perinatal death and low birth weight.

Initiation of thyroid management at the earliest stage during first trimester is essential. It is recommended that universal screening for detection of thyroid dysfunction among Indian pregnant women attending routine antenatal clinic to be done compulsorily. Data on the prevalence of thyroid disorders during pregnancy is lacking from Rajasthan state of India. Hence, this study was planned with an objective to find out the prevalence of thyroid disorders in pregnant women in Rajasthan.

## METHODS

The present cross sectional study was conducted in the Department of Obstetrics and Gynecology, NIMS Medical College and Hospital, Jaipur, Rajasthan from July 2011 to December 2012. Study population consisted of 313 pregnant women that attended the OPD, and admitted pregnant women in Obstetrics and Gynecology Department of the NIMS Hospital and also consisted the pregnant women attending the OPD of primary health centre of the same hospital.

### *Inclusion criteria*

All the pregnant women up to 28 weeks of pregnancy, irrespective of age and parity with singleton gestation.

### *Exclusion criteria*

The pregnant women who were diagnosed or treated for thyroid disease and who were known case of hypertension and diabetes mellitus.

Ethical approval was obtained from the Institutional ethical committee. Informed written consent was taken from each women. Detailed history was taken and full clinical examination was done in all cases with special regard to patient's age, parity, gestational age, prior obstetric, medical and surgical history and clinical features suggestive of thyroid dysfunction. Blood samples were collected for TSH and Free T4 estimation with other relevant investigation and sent to central laboratory of the institute.

### *TSH and Free T4 estimation*

Serum TSH and Free T4 (fT4) was estimated in all the cases as initial hormonal investigations. TSH was

estimated by the third generation chemiluminescent immunometric assay (CLIA) (Immulite, analytical sensitivity =0.004  $\mu$ IU/ml, reference range =0.4-4) and fT4 (analytical sensitivity =11.58 pmol/l, reference range =10.3-24.45) was done by competitive analogue-based immunoassay (Immulite). The subjects were grouped based on the value of serum TSH and fT4. The thyroid peroxidase (TPO) antibody estimation was not carried out for cost effectiveness.

Women diagnosed with abnormal hormone values were referred to endocrinology clinic for treatment for thyroid dysfunction. Routine antepartum management was done. Trimester specific reference values for TSH were 0.1-2.5 mIU/l, 0.2-3.0 mIU/l and 0.3-3.0 mIU/l, respectively, in first, second and third trimester of pregnancy. Trimester specific reference value for fT4 were 10.68-16.34 pmol/l, 9.13-13.51 pmol/l, 9.26-13.64 pmol/l, in first, second and third trimester of pregnancy respectively.<sup>8</sup>

Women with TSH and fT4 levels within normal limit were classified as reference population (Group-1). Women with fT4 below the reference range along with elevated TSH were classified as having overt hypothyroidism (Group-2) while those having fT4 in normal range with TSH more than 2.5 mIU/l were diagnosed as having subclinical hypothyroidism (Group-3). Women with TSH levels within normal limit and fT4 levels below the normal lower limit were classified as having hypothyroxemia (Group-4). Women with fT4 above the reference range along with TSH value <0.1 mIU/l were classified as having overt hyperthyroidism (Group-5) while those having fT4 in normal range with TSH<0.1 mIU/l were diagnosed as having sub-clinical hyperthyroidism (Group-6).

### *Data analysis*

The data were compiled and analyzed by using SPSS (Statistical Package for Social Sciences) software version 15. Continuous variables were described as mean (SD) and categorical variables were as percentages. The chi-square test was applied to test the difference between the euthyroid subjects and the subjects with thyroid dysfunction.

## RESULTS

A total of 313 pregnant women were enrolled in the study. The mean age of patients was 25.65 years (SD 4.28 years) which ranged from 18 to 37 years. Out of 313 antenatal women that formed the sample for the study, 213 (68%) attended antenatal clinic first time during first trimester of pregnancy (33 women were found to have thyroid dysfunction and 180 women had normal thyroid function), and 100 (32%) women that attended the first time in their second trimester (17 women were found to have thyroid dysfunction and 83 women had normal thyroid function). The overall prevalence of thyroid dysfunction was 15.97% (50/313).

**Table 1: Thyroid dysfunction in the first and second trimester pregnant women (n=313).**

Thyroid Function	Trimester of pregnancy		Total number of patients	Percentage
	First	Second		
<b>Euthyroid status (group-1)</b>	180	83	263	84.03
<b>Overt hypothyroidism (group-2)</b>	2	2	4	1.28
<b>Subclinical hypothyroidism (group-3)</b>	10	5	15	4.79
<b>Hypothyroxinemia, (group-4)</b>	12	2	14	4.47
<b>Overt hyperthyroidism, (group-5)</b>	3	3	6	1.92
<b>Subclinical hyperthyroidism (group-6)</b>	6	5	11	3.51
<b>Total</b>	213 (68%)	100 (32%)	313	100

It was evaluated that in the clinical characteristics of women enrolled for the study, 37.6% of the pregnant women were primi gravida and 59.1% were multi gravida. The women with overt hypo- or hyperthyroidism and subclinical hypo- or hyperthyroidism are older than euthyroid women. Maternal weight was high in pregnant

women with overt and subclinical hypothyroidism. Gravid status was high in pregnant women with overt hypothyroidism and subclinical hypothyroidism or hyperthyroidism and isolated hypothyroxinemia, but low in hyperthyroid group explained by history of miscarriage in those women.

**Table 2: Clinical characteristics in different groups and comparison to normal subjects of group 1.**

Clinical characteristics	Group 1	Group 2	Group3	Group 4	Group 5	Group 6
<b>Age in years (Mean±SD)</b>	25.54±4.19	29.50±4.93	28.33±4.65	26.21±4.35	27.33±4.45	23.51±5.01
<b>Weight (Kg)</b>	48.98±3.08	58.22±6.18	52.04±2.94	50.06±3.32	48.17±3.92	47.23±3.27
<b>Primigravida</b>	111 (42.96%)	1 (25%)	4 (26.66%)	5 (35.71%)	4 (66.66%)	3 (27.27%)
<b>Multigravida</b>	152 (57.79%)	3 (75%)	11 (73.33%)	9 (64.28%)	2 (33.33%)	8 (72.72%)
<b>History of miscarriage</b>	16 (6.08%)	1 (25%)	5 (33.33%)	2 (14.28%)	1 (16.66%)	1 (9.09%)
<b>Goiter</b>	4 (1.5%)	1 (25%)	0%	0%	1 (16.6%)	0%

## DISCUSSION

The present study found a prevalence of 15.97% of thyroid dysfunction (overt hypothyroidism 1.28%, subclinical hypothyroidism 4.79%, isolated hypothyroxinemia 4.47%, overt hyperthyroidism 1.92%, and subclinical hyperthyroidism 3.51%). This study presents the first data on overt and subclinical thyroid dysfunction among pregnant women predominantly from rural background from Rajasthan state of India. The prevalence of thyroid dysfunction among pregnant women has been quoted as 0.2-3% by various authors over the past three decades.<sup>9-15</sup> Sahu et al reported the prevalence of subclinical hypothyroidism to be 6.47% and of overt hypothyroidism 4.58% in the Indian population, our figures match with these findings.<sup>16</sup> Another study conducted on a cohort of 483 consecutive pregnant women in the Asian-Indian population, Nambiar et al found the prevalence of hypothyroidism 4.8%, Grave's disease 0.6%, gestational transient thyrotoxicosis 6.4%, and thyroid autoimmunity 12.4%.<sup>17</sup> The finding of high prevalence rate in this study could partly be explained by the fact that this study includes all types of thyroid dysfunction (overt hypothyroidism, subclinical

hypothyroidism, isolated hypothyroxinemia, overt hyperthyroidism and subclinical hyperthyroidism) during pregnancy excluding only pregestational documented cases of thyroid dysfunction. Whereas, other studies have included either only hypothyroidism or hyperthyroidism. Subclinical hypothyroidism is predominantly seen in women. Moreover, prevalence of hypothyroidism in India is variable. Bandela et al from Andhra Pradesh reported 10% prevalence of subclinical hypothyroidism.<sup>18</sup> Gayathri et al reported 2.8% prevalence of subclinical hypothyroidism.<sup>19</sup> Possible reasons for such variability could be the geographical variation of iodine content across all regions, differences in dietary habits and upper limit cutoffs used for TSH.

The mean age at presentation was lower (25.65±4.28 years) as compared to Western study.<sup>20</sup> This is attributed to early marriage and early conception prevalent in India. The women with overt hypothyroidism (Group-2) or hyperthyroidism (Group-5) and subclinical hypothyroidism (Group-3) were older as compared to control group. In cohort under study, the delayed age of (successful) conception is attributable to thyroid dysfunction. Maternal weight was high in pregnant

women with overt and subclinical hypothyroidism. This is also explained by hypothyroidism.

Gravid status was high in pregnant women with overt hypothyroidism and subclinical hypothyroidism or hyperthyroidism and isolated hypothyroxinemia, but low in hyperthyroid group explained by history of infertility in those women. History of miscarriage was high in pregnant women with subclinical hypothyroidism, Nambiar et al also reported the same results.<sup>17</sup> Abalovich, et al showed that untreated hypothyroidism, subclinical, or overt, at the time of conception is associated with miscarriage rate of 31.4% compared with 4% in euthyroid subjects at conception.<sup>21</sup>

Our data gives a prevalence of thyroid dysfunction in subjects attending a tertiary care centre in Rajasthan state of India which cannot be generalized to population in other parts of India.

One limitation of our study was that we could not assess the thyroid peroxidase antibody in study population due to cost constraint.

## CONCLUSION

With this study, it is concluded that there is high prevalence of thyroid dysfunction in pregnancy predominantly in rural population of Rajasthan. Majority among these being subclinical hypothyroidism and hypothyroxinemia. As maternal thyroid dysfunction has significant impact on maternal and fetal outcomes, early identification of thyroid dysfunction and timely initiation of treatment is required.

Thus, universal screening of pregnant women in first trimester with TSH should be emphasised, especially in a developing country like India due to the high prevalence of undiagnosed thyroid dysfunction.

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