



## **A Study of Thyroid Dysfunction in Antenatal Women Attending the Antenatal Clinic in a Tertiary Care Centre**

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### **ABSTRACT**

Thyroid disorders are one of the most common endocrine disorders affecting women of reproductive age. The present study was carried out with an aim to study prevalence of thyroid dysfunctions during pregnancy and its association with pregnancy complications. A cross-sectional study was conducted in the Department of Obstetrics and Gynaecology of Era's Lucknow Medical College, Lucknow. This study was conducted from 1<sup>st</sup> Jan 2013 to 30<sup>th</sup> June 2014, after obtaining informed consent. A total of 1100 patients attending our OPD at first antenatal visit were included in our study.

Prevalence of thyroid disorders was 8.6%. Subclinical hypothyroidism was the most common thyroid disorder (n=79; 7.5%) followed by overt hypothyroidism (n=10; 1%) and hyperthyroidism (n=1; 0.1%) respectively. Mean age of women with thyroid disorder was significantly lower as compared to those with euthyroid status (p<0.001). Lower socioeconomic strata had highest prevalence of thyroid disorder (50%) while this prevalence was much lower in upper high socioeconomic strata (2.22%). Prevalence of pregnancy complications like preterm labor, Pregnancy induced hypertension, abruption, intra-uterine death, intra-uterine growth retardation and abortion was significantly higher in women with thyroid disorder as compared to euthyroid women.

The present study showed a high prevalence of thyroid disorders in pregnant women, some other recent studies have also shown similar findings, thus indicating a need to implement the universal screening for thyroid dysfunction. Keeping in view the high complication rates associated with thyroid disorders in pregnancy, a universal screening programme is recommended. In order to establish the utility of universal screening programme large multi-center case-control studies are recommended.

**Keywords:** subclinical hypothyroidism, hyperthyroidism, pregnancy, abruption.

### **INTRODUCTION**

Thyroid disorders are one of the most common endocrine disorders affecting women of reproductive age. Over the past several years it has been proved that maternal thyroid disorder influence outcome of mother and fetus, during and also after pregnancy. Disorders of thyroid hormone production can affect fertility, fetal growth

and development. Maternal thyroid deficiency during pregnancy is also found to be related to subsequent neuropsychological development of child. [1,2] 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 offspring. [3]

Pregnancy poses an important challenge to maternal thyroid gland as hormone requirements are increased during gestation. Thyroid function tests change during pregnancy is influenced by two main hormones: human chorionic gonadotropin (hCG), and estrogen. The hCG level is inversely related to TSH and high circulating hCG levels in first trimester may result in a slightly low TSH (called subclinical hyperthyroidism). When this occurs, TSH will be slightly decreased in first trimester and then returns to normal throughout the duration of pregnancy. [4]

Maternal plasma iodide levels decrease as a result of fetal iodide use and increased maternal renal clearance. In about 15 percent of pregnant women, these lower iodide levels are associated with a noticeable increase in thyroid gland size. [5] The physiological changes during pregnancy such as increase in cardiac output, oxygen consumption and heat production may mimic mild thyrotoxicosis, may exacerbate or improve underlying thyroid disorder. [6]

Hyperthyroidism should also be considered in pregnancy-specific conditions such as hyperemesis gravidarum and hydatidiform mole. The most common cause of hyperthyroidism in pregnancy is Graves' disease, which accounts for 85-90% of all cases. Unless hyperthyroidism is treated adequately, pregnant women are at increased risk for severe preeclampsia, preterm delivery, heart failure, and, possibly, miscarriage.

Thus both hypothyroidism as well as hyperthyroidism has a significant impact on pregnancy progression and its outcome. Hence, study of thyroid dysfunction is of interest from an obstetrician's point of view.

**Aims and Objectives:** The present study was carried out with an aim to study prevalence of thyroid dysfunctions during pregnancy and its association with pregnancy complications.

## MATERIALS AND METHODS

A cross - sectional study was conducted in the Department of Obstetrics and Gynaecology, in collaboration with the Biochemistry Department of Era's Lucknow Medical College, Lucknow. This study was conducted from 1<sup>st</sup> Jan 2013 to 30<sup>th</sup> June 2014, after obtaining informed consent. A total of 1100 patients attending our OPD at first antenatal visit were included in our study and venous blood sample for thyroid profile (including TSH, T4 and T3) was drawn from subjects and transported to laboratory within one hour of collection.

All pregnant women coming to Outdoor Patient Department at their first antenatal visit and all patients diagnosed with spontaneous abortions *i.e.* missed, complete, incomplete and threatened abortions were included in study while patients already diagnosed and on medication for thyroid dysfunction, patients suffering from chronic renal or liver disease and known hypertensive and diabetic patients were excluded from study.

Clinical or Overt Hypothyroidism was defined as abnormally high serum TSH level accompanied by abnormally low thyroxine levels. Subclinical Hypothyroidism was defined as an elevated serum TSH level and normal serum thyroxine levels. The trimester wise cut-off levels of TSH for diagnosis of hypothyroidism were taken according to table 1. Clinical or Overt Hyperthyroidism was defined as abnormally low serum TSH level accompanied by an abnormally high thyroxine levels.

## RESULTS

We enrolled 1100 pregnant patients in our study. Fifty pregnant patients were lost to follow-up, 79 pregnant patients had subclinical hypothyroidism, 10 pregnant patients had overt hypothyroidism, 1 pregnant patient had hyperthyroidism and 960 pregnant patients had normal thyroid

profile. Baseline socio-demographic characteristics of study population are depicted in table 2.

**Table 1: Pregnancy specific criteria for thyroid dysfunction** <sup>[6]</sup>

	TSH values (μU/L)
1 <sup>st</sup> trimester	0.03-2.3 μU/L
2 <sup>nd</sup> trimester	0.03-3.5 μU/L
3 <sup>rd</sup> trimester	0.13-3.5 μU/L

**Table 2: Socio-demographic variables of Study Population**

Age Group (years)	Total Subjects (n=1050)	
	No.	%
Personal habits		
Tobacco use	65	6.19
Alcohol use	65	6.19
Socio-economic status		
Upper High	99	9.42
High	177	16.85
Upper Middle	227	21.6
Lower Middle	199	18.9
Poor	348	33.14
Religion		
Hindu	344	32.7
Muslim	598	56.9
Christian	42	4
Sikh	36	3.42
Others	32	30.4
Region		
Rural	687	65.4
Urban	363	34.6

Prevalence of thyroid disorders was 8.6%. Subclinical hypothyroidism was the most common thyroid disorder (n=79; 7.5%) followed by overt hypothyroidism (n=10;

1%) and hyperthyroidism (n=1; 0.1%) respectively (Table 3).

**Table 3: Prevalence of thyroid disorders during pregnancy**

Type	No. of cases	Percentage
Euthyroid	960	91.4
Overt hypothyroidism	10	1.0
Subclinical hypothyroidism	79	7.5
Hyperthyroid	1	0.1
Total	1050	100.0

Age of women ranged from 23 to 37 years. Mean age of women with thyroid disorder was significantly lower as compared to those with euthyroid status ( $p < 0.001$ ). No association of personal habits with thyroid disorder was observed. Lower socioeconomic strata (poor) had highest prevalence of thyroid disorder (50%) while this prevalence was much lower in upper high socioeconomic strata (2.22%). Statistically, association between socioeconomic status and thyroid disorder was significant ( $p = 0.003$ ). No association of religion, region and parity was observed with thyroid disorder (Table 4). Clinical features like joint pain, muscle ache, heat/cold intolerance, dry skin and facial puffiness had a significant association with thyroid disorder (Table 5).

**Table 4: Association of Thyroid Disorder with different socio-demographic variables**

Age Group (years)	Pregnancy with thyroid disorders (n=90)		Euthyroid pregnancy (n=960)		Significance of difference	
	No.	%	No.	%	$\chi^2$	P
Mean Age±SD (Range)	27.91±4.44 (23-37)		29.84±4.86 (23-37)		$t^* = 3.625$ ; $p < 0.001$	
Personal habits						
Tobacco use	3	3.33	62	6.46	1.384	0.239
Alcohol use	3	3.33	62	6.46	1.384	0.239
Socio-economic status						
Upper High	2	2.22	97	10.10	15.677	0.003
High	14	15.56	163	16.98		
Upper Middle	15	16.67	212	22.08		
Lower Middle	14	15.56	185	19.27		
Poor	45	50.00	303	31.56		
Religion						
Hindu	22	24.44	320	33.33	3.531	0.473
Muslim	58	64.44	540	56.25		
Christian	4	4.44	38	3.96		
Sikh	4	4.44	32	3.33		
Others	2	2.22	30	3.13		
Region						
Rural	63	9.17	624	90.83	0.909	0.340
Urban	27	7.44	336	92.56		

**Table 5: Association between thyroid disorders during pregnancy and Clinical Presentation**

Variables	Pregnancy with thyroid disorders (n=90)		Euthyroid pregnancy(n=960)		Significance of difference	
	No.	%	No.	%	$\chi^2$	P
Fatigue	16	17.78	238	24.79	2.207	0.137
Joint Pain	13	14.44	64	6.67	7.325	0.007
Anxiety	6	6.67	64	6.67	0.000	1.000
Muscle ache	15	16.67	64	6.67	11.827	0.001
Sleeplessness	5	5.56	38	3.96	0.534	0.465
Heat/Cold Intolerance	11	12.22	64	6.67	3.829	0.050
Constipation	9	10.00	64	6.67	1.413	0.235
Diarrhea	5	5.56	38	3.96	0.534	0.465
Dry skin	12	13.33	64	6.67	5.447	0.020
Headache	10	11.11	64	6.67	2.481	0.115
Pedal edema	7	7.78	64	6.67	0.161	0.688
Palpitation	5	5.56	38	3.96	0.534	0.465
Tremor	4	4.44	38	3.96	0.051	0.822
Facial puffiness	11	12.22	64	6.67	3.829	0.050
Thyromegaly	5	5.56	43	4.48	0.219	0.640

Prevalence of pregnancy complications like preterm labor, PIH, abruption, IUD, IUGR and abortion was significantly higher in women with thyroid disorder as compared to euthyroid women (Table 6). Maximum number of cases with

hypothyroidism were diagnosed during second trimester (n=48; 53.9%) followed by those during first trimester (n=33; 37.1%) and those during third trimester of pregnancy (n=8; 9%).

**Table 6: Association between thyroid disorders during pregnancy and Complications in Current Pregnancy**

Variables	Pregnancy with thyroid disorders (n=90)		Euthyroid pregnancy(n=960)		Significance of difference	
	No.	%	No.	%	$\chi^2$	p
GDM	7	7.78	67	6.98	0.080	0.777
Preterm labor	30	33.33	130	13.54	24.955	<0.001
PIH	39	43.33	71	7.40	113.313	<0.001
Abruption	1	1.11	1	0.10	4.389	0.036
IUD	5	5.56	10	1.04	11.906	0.001
IUGR	3	3.33	8	0.83	4.961	0.026
Abortion	18	20.00	78	8.13	13.969	<0.001

## DISCUSSION

Prevalence of thyroid disorders during pregnancy in present study was 8.6%. In literature it has been reported variedly. In different studies it ranged from 1.43% to as high as 14.3%. [7,8] Studies from India have reported a high prevalence rate of above 10% thyroid disorders during pregnancy and two Indian studies have reported this prevalence to be 4.8 and 5.8% respectively. [9-13] In present study, prevalence of thyroid disorder was observed to be 8.6% which is in consonance with observation of other workers from India.

In this present study subclinical hypothyroidism was the most common component of thyroid disorders found in pregnant women. Subclinical

hypothyroidism is common problem in India with nearly 3-15% of adult population being affected by it, [14] thus in present study, prevalence of subclinical hypothyroidism (7.5%) is within defined range.

In the present study, prevalence of overt hypothyroidism was 1%. Dhanwal *et al.*, 2013 in their series reported the prevalence of overt hypothyroidism to be 0.7%. [8] Shah *et al.* (2013) in their study also reported the prevalence of overt hypothyroidism to be 0.9%. [12] Thus, prevalence of over hypothyroidism reported in present study is close to that reported in most of the studies in literature.

Hyperthyroidism during pregnancy is extremely rare and accounts for nearly 0.2% of pregnancies. [5] In the study of Shah

*et al.* (2013), its prevalence was reported as 0.6%.<sup>[12]</sup> Ajmani *et al.* (2014)<sup>[10]</sup> have reported a much higher prevalence of hyperthyroidism (1.25%) in their case series.<sup>[10]</sup> Similarly, Farogh *et al.* (2014) also reported a high prevalence of hyperthyroidism (1.5%) in their study population.<sup>[15]</sup> These findings suggest that hyperthyroidism during pregnancy is rare ranging from 0.2% - 1.5%. In the present study, we have found its prevalence to be only 0.1%, which is in accordance with the observation of other workers.

The high prevalence of thyroid disorders in the present study and that of other recent studies indicated a need to implement the universal screening for thyroid dysfunction. In present study, the patients with prediagnosed thyroid dysfunction were not included.

In the present study, we diagnosed maximum number of cases of hypothyroid patients within first and second trimester (n=81/89; 91.09%), however, in order to rule out the role of effect of hCG levels we used trimester specific reference range for identification of thyroid disorder.

In the present study we found that women with thyroid disorder were relatively younger in age (27.91±4.44 years) as compared to normal pregnant women (29.84±4.86 years). Contrary to this, Ajmani *et al.* (2014) reported the mean age of pregnant women with subclinical hypothyroidism to be close to that of Euthyroid women, and rather a relatively older age of patients with overt hypothyroidism and hyperthyroidism were observed.<sup>[10]</sup> One of the reasons for younger age of the pregnant women with thyroid disorder in present study could be the fact that we have already screened out women with known thyroid disorders and the pregnant women who are included are fertile.

In the present study looking out for etiological factors, we did not find a

significant association between personal habits such as tobacco/alcohol use and thyroid disorder. As a matter of fact, these personal habits were quite uncommon in the study population and hence their contributory role on the causation of thyroid dysfunction cannot be ascertained.

In the present study, significantly higher proportion of pregnant women with thyroid disorder complained of joint pain, muscle ache, heat/cold intolerance, dry skin and facial puffiness. One of the reasons for this was the fact that majority of the women of thyroid disorder in present study were that of subclinical hypothyroidism, which is associated with all these types of symptoms.

According to the present study, in the patients of thyroid disorders, proportion of poor patients was higher (50%) as compared to those without thyroid disorders (31.56%) and difference in socioeconomic status of pregnant women with thyroid disorders and Euthyroid women was found to be statistically significant (p=0.003). This higher prevalence in patients with poor socioeconomic status may be explained due to inadequate dietary intake of iodine.

According to the present study, a significant difference between the pregnant women with was observed with a significantly higher rate of preterm labor, pregnancy induced hypertension, placental abruption, intrauterine death, IUGR and abortion (p<0.05). In the study by Ajmani *et al.* (2014), pregnant women with thyroid disorders showed a higher prevalence of preeclampsia.<sup>[10]</sup> Shah *et al.* (2013) also found complications like abortion, hyperemesis gravidarum, preeclampsia, IUGR and preterm labor to be higher in pregnant women with thyroid disorder as compared to euthyroid pregnant women but did not find this association to be significant statistically.<sup>[12]</sup> In the study of Farogh *et al.* (2014) the rate of preeclampsia, IUGR and preterm delivery was found to be higher in pregnant women with thyroid disorder as



compared to the euthyroid pregnant women. [15] Thyroid disorders have a significant influence over metabolic and physiological activities and hence these eventually affect the maternal and fetal well being.

Männistö *et al.* (2013) also found that thyroid disorders were associated with higher rates of preeclampsia, GDM, preterm birth. In the present study, except for GDM, for all the other outcomes we found a similar relationship. [16] Hirsch *et al.* (2013) too, found an increased prevalence of abortions and premature deliveries. [17] In the present study, the most common thyroid disorder was hypothyroidism which was found to be associated with fetal loss, placental abruptions, pre-eclampsia, preterm delivery. The results were similar to the findings of previous studies. [3,13,18-20]

## CONCLUSION

The present study showed a high prevalence of thyroid disorders in pregnant women, some other recent studies have also shown similar findings, thus indicating a need to implement the universal screening for thyroid dysfunction. Keeping in view the high complication rates associated with thyroid disorders in pregnancy, a universal screening programme is recommended. In order to establish the utility of universal screening programme large multi-center case-control studies are recommended.

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