International Journal of Medical and Health Research
ISSN: 2454-9142, Impact Factor: (RJIF 5.54)
www.medicalsciencejournal.com
Volume 2; Issue 3; March 2016; Page No. 75-78

Original research article: Study of correlation of thyroid disorder with socioeconomic and environmental factors during pregnancy

[*1] Mr. Raghav Nepalia, [2] Dr. A K Verma

[1] Sr Demonstrator, Department of biochemistry, RNT medical college, Udaipur, Rajasthan, India.

[2] Sr Professor & Head, Department of biochemistry, RNT medical college, Udaipur, Rajasthan, India.

Abstract
Background: Thyroid disease is a disorder that affects the thyroid gland. Sometimes the body produces too much or too little thyroid hormone. Thyroid hormones regulate metabolism—the way the body uses energy—and affect nearly every organ in the body. Thyroid hormone plays a critical role during pregnancy both in the development of a healthy baby and in maintaining the health of the mother.
Aims & Objective: Study of Correlation of thyroid disorder with socioeconomic and environmental factor during pregnancy
Methodology: The present case control study was conducted on 100 patients (obstetric cases) attended and managed in the Department of Obstetrics and Gynaecology attached to Geetanjali Medical College and Hospital, Udaipur. The results of the patients were compared with 100 age matched control females having gynaecological problems (with normal thyroid). Fasting blood sample was investigated for the following parameters:- T_3 (Triiodothyronine). T_4 (Thyroxine). TSH (Thyrotropin Stimulating Hormone). P-value was calculated by using onloine student t-test calculator.
Result: All the cases of the control group had normal T_3 values. Values below normal were noted in one case each of I and III trimester and normal values were noted in 80.27 per cent in I trimester, 54.75 per cent in II and 55.28 per cent in the III trimester. Only 18.30 per cent cases of I trimester had raised values of T_3 while same was observed in 44.03 per cent in II and 43.51 per cent in III trimester. Variable values of T_4 were observed in various trimesters of pregnancy. Values of T_4 were below normal in 2.81 per cent in I, 1.20 per cent in II and 1.14 per cent in the III trimester. On the other hand in II and III trimester T_4 values were higher than normal in 6.02 per cent and 40.22 per cent respectively. TSH value below normal (0.27μIU/dl) were observed in 2 cases in I and II trimester each while normal values were noted in most of the cases i.e. 77.45 per cent in I, 71.41 per cent in II and 83.31per cent in III trimester. Fluctuating values of TSH above 4.2 μIU/dl were observed in 19.71per cent in I, 26.18per cent in II and 16.66 per cent in the III trimester.
Conclusion: T_3 values increased during pregnancy significantly more so in II trimester. T_4 values were less during I trimester particularly at par during II trimester and increased during III trimester. Raised TSH values were observed during pregnancy as compared to non-pregnant women. Significant increase was observed during II trimester.

Keywords: thyroid disorder, socioeconomic, environmental, pregnancy

Introduction

Too much thyroid hormone is called hyperthyroidism and can cause many of the body's functions to speed up. Too little thyroid hormone is called hypothyroidism and can cause many of the body's functions to slow down.[1]

Thyroid hormone plays a critical role during pregnancy both in the development of a healthy baby and in maintaining the health of the mother. Two pregnancy-related hormones—human chorionic gonadotropin (hCG) and estrogen—cause increased thyroid hormone levels in the blood. Made by the placenta, hCG is similar to TSH and mildly stimulates the thyroid to produce more thyroid hormone. Increased estrogen produces higher levels of thyroid-binding globulin, also known as thyroxine-binding globulin, a protein that transports thyroid hormone in the blood. [2]

These normal hormonal changes can sometimes make thyroid function tests during pregnancy difficult to interpret. Thyroid hormone is critical to normal development of the baby's brain and nervous system. During the first trimester, the fetus depends on the mother's supply of thyroid hormone, which comes through the placenta. At around 12 weeks, the baby's thyroid begins to function on its own. [3]

Material and method:

The present case control study was conducted on 100 patients (obstetric cases) attended and managed in the Department of Obstetrics and Gynaecology attached to Geetanjali Medical College and Hospital, Udaipur over a period of 10 months from 25th July 2011 to 10th May 2012.

The results of the patients were compared with 100 age matched control females having gynaecological problems (with normal thyroid).

The subjects for the study were grouped as follows:-

Group A (Study Group):- Study group will consist of obstetric cases of various trimesters. (n=100).

Group B (Control Group):- Females with gynaecological problems, having normal thyroid (control group). (n=100).

Inclusion criteria for study are as follows:-

1. Cases having no known thyroid problem were included in the study.
2. Age between 18-48 years.
3. Obstetric cases during I, II and III trimester irrespective of obstetric/medical complication were included.

Exclusion criteria included those with:-

The following are the conditions associated with euthyroid hyperthyroxinemia which were excluded from the present study:-

1. Familial dysalbuminemic hyperthyroxinemia.
2. Thyroid Binding Globulin (familial excess, acquired excess).
3. Transthyretin (excess, mutations).
4. Medications (Propranolol, Ipodate, Popanic acid, Aminodarone).
5. Sick Euthyroid Syndrome.
6. Resistance to thyroid hormone.

All patients were questioned and the information of the interview was recorded on the printed proforma.

Details about patient's name, age, husband's name and address, urban or rural, education status, S/E status were taken.

Details about obstetric history, menstrual history, associated medical problems and obstetric complication (if any) were noted.

The weight and hemoglobin was also recorded during the various trimesters of pregnancy. Special emphasis was given to correlate the awareness about thyroid disorder, family history of thyroid disorder, personal history of thyroid disease in the past (if yes, then medication with duration) with the thyroid profile values.

S/E status was calculated by criteria laid down by A K Agarwal (2008)[4]:-

Low (Poor+ Very Poor) Rs. 500-1499 per capita monthly income.

Middle (Lower+ Upper) Rs. 1500-4999 per capita monthly income.

High (High+ Upper High) Rs. 5000-10000 and above per capita monthly income.

The blood collection and sample study was done in clinical laboratory attached to the Department of Biochemistry, Geetanjali Medical College and Hospital, Udaipur.

Fasting blood sample was investigated for the following parameters:-

- T_3 (Triiodothyronine).
- T_4 (Thyroxine).
- TSH (Thyrotropin Stimulating Hormone).

The collected samples were incubated at 37^0C for 15 minutes in the incubator and then centrifuged for 10 minutes at approximately 3000 rpm and serum obtained was used in thyroid assay.

All the thyroid parameters were measured by ECLIA (Electro chemiluminescence immunoassay) and were done on Elecsys 2010 using commercial available kits of Cobas.

Obtained results of case group was compared with control group for detrmiantion of difference of significance.

P-value was calculated by using online student t-test calculator. p-value less than 0.05 was consider as significant.

Results:

Age and parity wise distribution of participants was done (Table 1, 2).

Obtained results of case group was compared with control group for determination of difference of significance.

p-value less than 0.05 was consider as significant.

Table 1: Age wise distribution of participants

Age (Yrs.)	Study Group		Control Group	
	No. of cases	%	No. of cases	%
Below 20	1	1	2	2
20-25	32	32	24	24
26-30	52	52	25	25
31-35	12	12	14	14
36-40	3	3	14	14
>40	NIL	NIL	21	21
TOTAL	**100**	**100**	**100**	**100**
MEAN	27.43	-	32	-
Minimum Age	19	-	18	-
Maximum Age	38	-	50	-

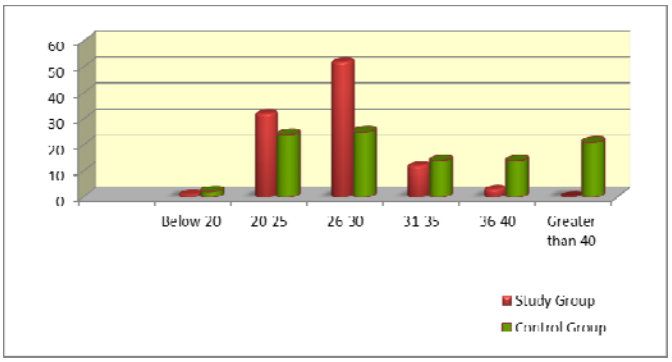

Fig 1: Graphical presentation of Age wise distribution of participants

Table 2: showing parity wise distribution

Parity	Study Group	
	No. of cases	%
Primi	48	48
II	28	28
III	16	16
More than III	8	8
TOTAL	**100**	**100**

Table 3: Socioeconomic status of the cases

S/E Status	Study Group		Control Group	
	No. of cases	%	No. of cases	%
Low	2	2	35	35
Middle	45	45	41	41
High	53	53	24	24
TOTAL	**100**	**100**	**100**	**100**

Only 2 per cent of the obstetric cases were of low S/E status while as much as 35 per cent of cases in the control group had low S/E status. Incidence of middle S/E status was 45 per cent in the study group and 41 per cent in the control group. 53 per cent 0f the cases in the study and 24per cent of the cases in the control group were from high S/E status.

Table 3A: Socioeconomic status of the cases

Thyroid disorder during pregnancy	S/E Status					
	High		Middle		Low	
No. of cases	No. of cases	%	No. of cases	%	No. of cases	%
37	21	56.76	15	40.54	1	2.70

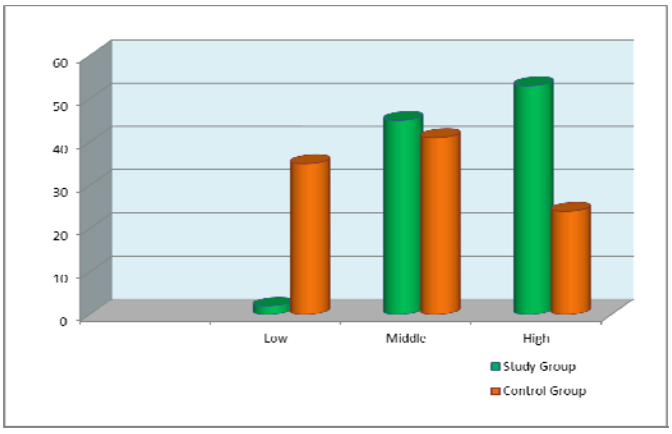

Fig 3: Socioeconomic status of cases

Out of 53 cases 21 had high S/E status with thyroid disorder while 15 out of 45 cases of middle group had the same. There were only 2 cases in the low S/E group. Out of which 1 had thyroid dysfunction.

The S/E status was determined as per criteria laid down by AK Agarwal (2008).

Table 4: Educational status of the cases

Educational Status	Study Group		Control Group	
	No. of cases	%	No. of cases	%
Illiterate	6	6	40	40
Primary	2	2	4	4
Middle	7	7	18	18
Intermediate and above	85	85	38	38
TOTAL	**100**	**100**	**100**	**100**

Only 6 per cent of the cases of the study group and as much as 40 per cent cases of the control group were illiterate. Most of the cases in the study group were well educated (85 per cent).

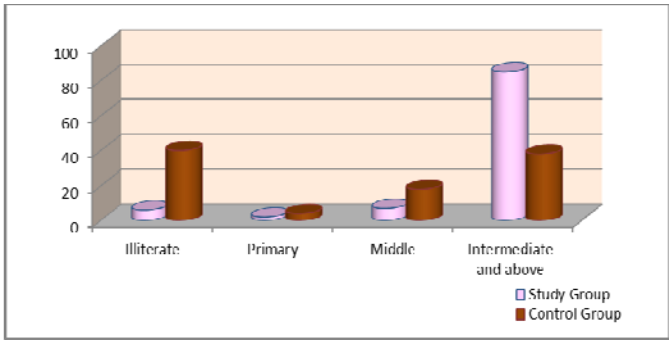

Fig. 4: Educational status of the cases

Table 4A: Educational status of the cases

Thyroid disorder during pregnancy	Education							
	Intermediate and above		Middle		Primary		Illiterate	
No. of cases	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%
37	28	75.67	4	10.81	1	2.70	4	10.81

The above table depicts that higher was the educational status more was the chance for thyroid disorder in the present study.

Table 5: Urban/Rural cases

Type of case	Study Group		Control Group	
	No. of cases	%	No. of cases	%
Urban	80	80	60	60
Rural	20	20	40	40
TOTAL	**100**	**100**	**100**	**100**

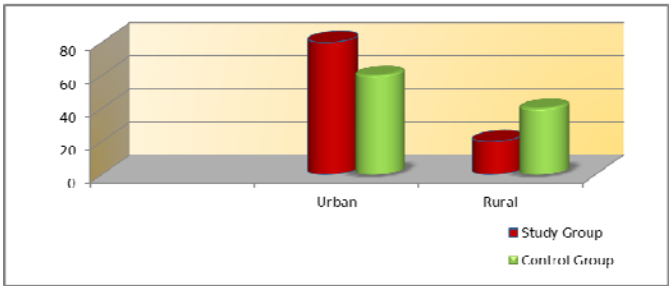

Fig. 5.4: Urban/Rural cases

Table 6: Education wise distribution

Thyroid disorder during pregnancy	R/U			
	Rural		Urban	
No. of cases	No. of cases	%	No. of cases	%
37	8	21.62	29	78.37

Most of the study group cases were from urban area (80 per cent). While in the control group ratio of urban versus rural cases was 60:40.

Ours is an urban biased medical college catering mostly to urban population. Hence, most of the cases were from urban area (80 per cent) compared to only 20 per cent from rural area.

Incidence of thyroid disorder in urban population was much higher (78.37 per cent) compared to rural counterparts (21.62 per cent). This may be a repercussion of higher education, better S/E status and more stressful lifestyle.

Table 7: Comparison of thyroid function tests in pregnant and non-pregnant women (mean values)

Subjects	T3(ng/ml) Mean±SD	T4(µg/dl) Mean±SD	TSH(µIU/dl) Mean±SD	FT3(Pg/ml) Mean±SD	FT4(ng/ml) Mean±SD
Non-Pregnant women	1.35±0.33	9.26±2.05	2.52±1.02	3.56±0.603	1.30±0.33
Pregnant women					
I Trimester	1.77±1.73[a]	6.65±1.55[b]	4.04±3.53[a]	3.54±0.43	1.38±0.27
II Trimester	9.09±24.25[a]	9.47±3.08	4.35±4.55[a]	3.36±0.30[b]	1.14±0.19[b]
III Trimester	4.43 ±6.55[a]	13.45±3.41[a]	3.84±5.07[a]	3.18±0.31[b]	0.97±0.18[b]

a= Significant increase compared to non-pregnant; P<0.05.
b= Significant decrease compared to non-pregnant; P<0.05.

Discussion:

T_3 values were raised during pregnancy. Maximum rise was seen during II trimester. Rising trend was noted in T_4 values in various trimesters of pregnancy except for I trimester.

Raised mean values of TSH were observed during II and III trimester of pregnancy. Peak value was recorded in II trimester. The III trimester fall may be a reflection of appropriate clinical management by the clinician. Low S/E status was observed in 2 per cent obstetric cases, out of which one had thyroid dysfunction. Middle and high S/E status was recorded in 45 and 53 cases respectively. Thyroid disorder was observed in 15 and 21 cases. (Table5)

In Our study Incidence of illiteracy was more in control group compared to study group (40 per cent). Most of the cases in the study group were well educated (85 per cent). Higher was the educational status more was the chance for thyroid disorder observed in the present study (75.67 per cent). (Table 4) Incidence of U/R cases was 80:20 in the study group and 60:40 in the control group. (Table 5)

Thyroid profile of pregnant versus non pregnant cases was compared by using two-sample *t*-test and it was observed that T_3 values increased during pregnancy significantly more so in II trimester. T_4 values were less during I trimester particularly at par during II trimester and increased during III trimester. Raised TSH values were observed during pregnancy as compared to non-pregnant women. Significant increase was observed during II trimester.

Ratcliffe WA, *et al.* (1976) [4] Stated that during pregnancy the well-known pattern of high serum T_4 and T_3 was observed. The levels were increasing during the I trimester and stayed nearly stable during the II and III trimester, being approximately 1.5 times the values found at the post-partum control. Serum rT_3 was relatively high already when, the first samples were obtained and remained elevated throughout pregnancy.

The observation regarding T_3 in the present study was at par with the observation of Kumar, *et al.* (2003) [5] that the mean T_3 increases during the II trimester and then declines in III trimester compared to the I trimester. Regarding mean T_4 value, in the present study the mean T_4 level rose in the II and then decreased in the III trimester. This was in contradiction to the study of Elduff A (1999) [6] where he observed the decreasing trend of T_4 values and Kumar, *et al* (2003) [7] where the author found that mean T_4 level rises in the II and decreases during the III trimester. According to Kumar, *et al.* (2003) mean TSH level rises progressively throughout all the trimester of pregnancy but in the present study peak rise in the mean TSH value was noted in the II trimester. Zarghami Nosratollah, *et al.* (2005) observed the declining mean FT_3 and FT_4 levels during the pregnancy which was same in the present study too.

Conclusion:

From the present study it may be concluded that Incidence of thyroid dysfunction was 37 per cent, being higher in primi parae and younger age group. Cases having high S/E status, urban population and higher educational status had higher incidence of thyroid dysfunction. The maximum number of cases studied were in the age group of 26-30 years in both the groups. Incidence of primi parae was 48 per cent while 24 per cent of the cases were para III or more. T_3 values increased during pregnancy significantly more so in II trimester. T_4 values were less during I trimester particularly at par during II trimester and increased during III trimester. Raised TSH values were observed during pregnancy as compared to non-pregnant women.

References:

1. Abraham Rebecca, Murugan V Srinivasa, Pukazhvanthen P, Sen Sk. Thyroid disorders in women of puducherry. Indian Journal of Clinical Biochemistry. 2009; 24(1):52-59.
2. Agarwal AK. Social Classification: The need to update in the Present Scenario. Indian Journal of Community Medicine. 2008; 33(1):50-51.
3. Allan WC, Haddow JE, Palomaki GE, Williams JR, Mitchell ML, Hermos RJ, *Et al.* Maternal thyroid deficiency and pregnancy complications: implications for population screening. J. Med. Screen. 2000; 7:127-130.
4. Ratcliffe WA. The radioimmunoassay of 3, 3', 5'-triiodothyronine in unextracted human sera. Clin. Endocrinol. (Oxf), 1976; 5:631-641.
5. Kumar Ashok, Ghosh BK, Murthy NS. Maternal thyroid hormonal status in preeclampsia. Indian J. Med. Sci. 2005; 59(2):57-63.
6. Ekins RP. Meaurement of free hormones in blood. Endocr. Rev. 1990; 11:5.
7. Kumar A. thyroid function tests in pregnancy. Indian J. Med. Sci. 2003; 57:252-258.