DETECTION OF THYROID FUNCTIONS IN EARLY PREGNANCY AS A UNIVERSAL SCREENING

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ABSTRACT: Thyroid disease is particularly common in women of child bearing age. It is estimated that 2.5% of all pregnant women have some degree of hypothyroidism (1, 2). Thyroid disorders are the second are the second most common endocrine disorders found in pregnancy. Maternal complications of untreated hypothyroidism include microcytic anaemia, placental abruption, preeclampsia, postpartum haemorrhage, cardiac dysfunction and miscarriage (3). Fetal or neonatal complications include prematurity, low birth weight, congenital anomalies, stillbirth and poor neuropsychological development (1). In particular, as fetal thyroid cannot concentrate iodine until 10-12 weeks of gestation. Therefore before this time, the mother must provide for all the fetus' thyroxine (T4) requirements. This study focuses on thyroid screening in first trimester of pregnancy (1). **OBJECTIVE**: The aim of the study was to determine the incidence of hypothyroidism and hyperthyroidism in pregnancy during the first trimester. With the evidence provided by these results, we have studied if thyroid screening should be made as a routine screening in pregnancy.
Materials and methods: Total 400 pregnant women were screened for thyroid functions during the first trimester of pregnancy using FT3, FT4 and TSH as criteria. **RESULTS:** Increased prevalence of thyroid with increasing age. Abnormal thyroid profile seen in patients with recurrent abortions. **CONCLUSION:** Mandatory to screen to include the thyroid screening in the first trimester antenatal profile.
KEYWORDS: Maternal complications, neurological delay, FT3, FT4, TSH, universal screening.

INTRODUCTION: Overt hypothyroidism is estimated to occur in 0.3-.05% of pregnancies (2). Subclinical hypothyroidism appears to occur in 2-3% and hyperthyroidism is present in 0.1-0.4% (1, 2). Maternal thyroxine (T4) is important for fetal neural development throughout pregnancy particularly first trimester. Maternal thyroid dysfunction is associated with neonatal neurologic development delay because of the fact that transplacental transfer of thyroid hormone in early pregnancy is inadequate which is necessary for brain development. Maternal hypothyroidism has been associated with mental retardation in the living euthyroid offspring as well as increased fetal and neonatal losses. When the mother has hypothyroidism, fetal brain development could be impaired by lack of sufficient T4 before fetal thyroid function begins or even after the onset of fetal thyroid function. Hypothyroidism in pregnancy is associated with incidence of maternal complications but has a much higher perinatal mortality rate. Hence screening for hypothyroidism in pregnancy is recommended. it was also investigated that late outcome in children born to mothers who resided in areas with mild disease, IQ was 7 points lower than the mean IQ of children born to both controls and thyroxine treated mothers. Furthermore, three times as many children born to mothers with untreated hypothyroidism and IQ that were 2 standard deviations below the mean IQ of the controls. The conclusion that was undisclosed was associated with a risk of poorer outcome in

the progeny and a three fold increased predisposition for having learning disabilities later in life. The TSH value should be kept below 2 mIU/ml to get adequate control.

Before birth a baby is entirely dependent on the mother for thyroid hormone until the baby's thyroid gland becomes functional by 8-10 weeks gestation (1, 2, 3) and by 12 weeks gestation active fetal iodide trapping by fetal thyroid gland is detectable along with ability to produce T4. The process of normal fetal brain development, neuronal multiplication, migration, and structural organization (4, 5) mainly occurs in the second trimester when the fetus is primarily supplied with maternal thyroid hormones.brain development from the beginning of third trimester involves glial cell multiplication, migration and myelinisation, using primarily the fetal supply of thyroid hormone. A lack of adequate maternal thyroid hormones may result in irreversible effects such as disruption of normal brain growth and development of brain damage finally leading to poor cognitive development, mental retardation and cerebral palsy (2, 5).

Thus, hypothyroidism of the mother plays a role early, in pregnancy. In fact, the babies of mother who were hypothyroid in the first part of pregnancy, then adequately treated, exhibited slower motor development than babies of normal mothers. these children are more likely to have intellectual impairment.

Subclinical hypothyroidism is even more difficult to uncover, diagnosis, rarely if ever made is solely on clinical grounds. For early stage only high index suspicion is needed and therefore to initiate treatment before the condition becomes severe or complications occur (6).

MATERIALS AND METHODS: This is a prospective random cross sectional study done at the OPD of Basaveshwar Teaching and General Hospital and Sangameshwar Teaching and General Hospital, Gulbarga for a period of 2 years from November 2011 to October 2013 wherein a total of 400 pregnant women were screened for thyroid function during first trimester of pregnancy using FT3, FT4, and TSH. Random blood samples were collected from patients in their first trimester of pregnancy upto 14 weeks. Women included were all pregnant women irrespective of age group and parity walking into obstetrics OPD. Exclusion criteria were all pregnant women who were already diagnosed as hypothyroid on treatment, all women with diabetes, collagen diseases, heart diseases.

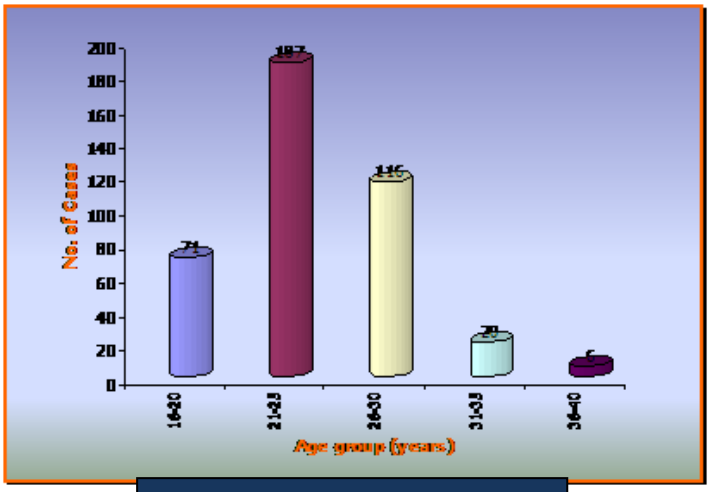
TSH range 0.4-4.2uIU/ml
FT3 range 2.0-3.8pg/ml
FT4 range 0.80-2.70ng/dl

RESULTS:

Study Design: A cross-sectional non-controlled hospital based clinical study with 400 pregnant women is undertaken to study to detect the incidence of thyroid disorders in early pregnancy, to evolve a routine screening method for timely and early detection of thyroid disorders in pregnancy and to detect the efficacy of serum TSH (FT3, FT4) as a screening method for thyroid disorders in early pregnancy.

Age (group)	No. of Cases	Percent
16-20	71	17.75
21-25	187	46.75
26-30	116	29.00
31-35	20	5.00
36-40	6	1.50
Total	400	100.00

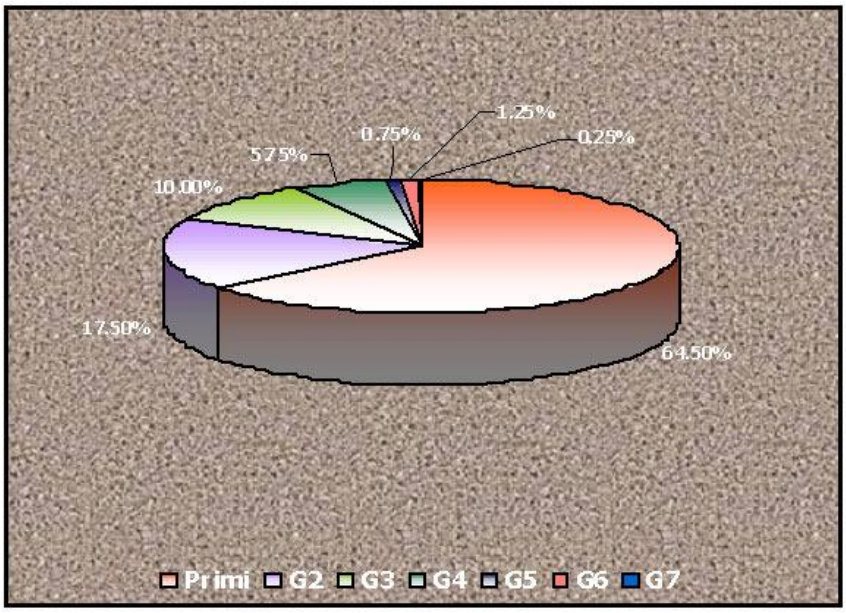
Table-1: Age wise distribution of cases



Age Wise Distribution of Cases

Obstetric History	No. of Cases	Percent
Primi	258	64.50
Multi	142	35.50
G2	70	17.50
G3	40	10.00
G4	23	5.75
G5	3	0.75
G6	5	1.25
G7	1	0.25
Total	400	100.00

Table-2: Obstetric History Wise Distribution of Cases

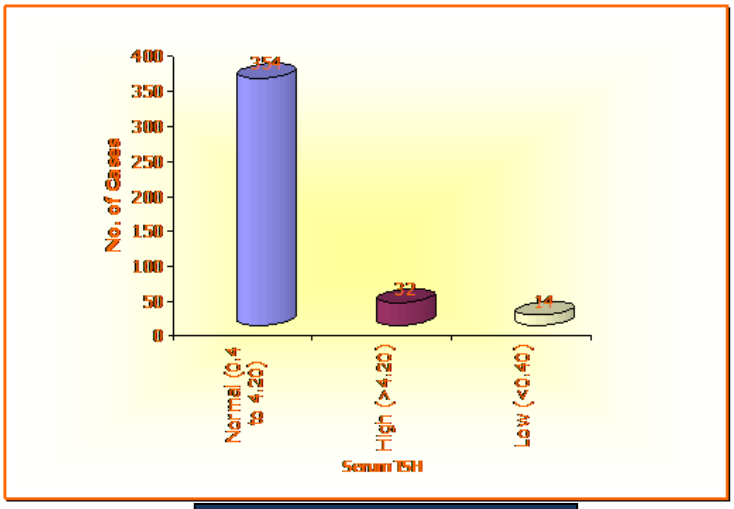


Obstetric History of Cases

Serum TSH	No. of Cases	Percent	Mean±SD
Normal (0.4 to 4.20)	354	88.50	1.736±0.85
High (>4.20)	32	8.00	11.4±16.18
Low (<0.40)	14	3.50	0.19±0.085
Total	400	100.00	

Table-3: Distribution of Serum TSH

In the study it is reveal that out of 400 subjects, TSH cases are 32 (9.0) and T.Hypercases 14 (3.5% (, total TSH cases are 46 (11.5%).

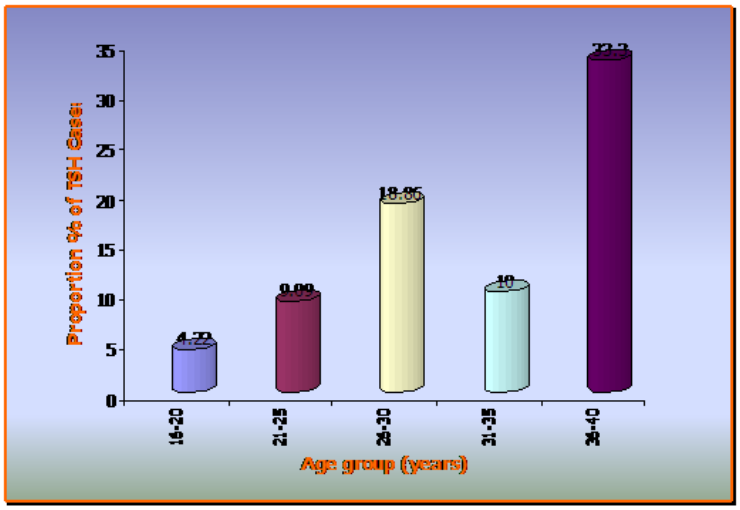


Distribution of Serum TSH

Age (group)	No. of subjects	Serum TSH cases		Total TSH Cases	Percent
		Hypo	Hyper		
16-20	71	2	1	3	4.22
21-25	187	7	10	17	9.09
26-30	116	20	2	22	18.86
31-35	20	1	1	2	10.00
36-40	6	2	0	2	33.3
Total	400	32	14	46	11.5

Table-4: Age wise distribution of TSH cases

Correlation between age and TSH (hypo and hyper) is r = 0.844 p<0.01 positive correlation is significant. Higher the age higher the TSH cases have been identified in the study, which is statistically significant.

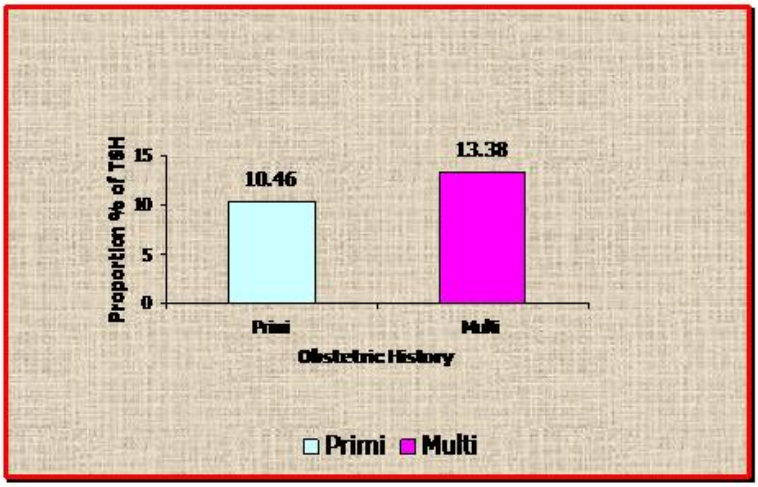


Age wise distribution of TSH cases

Obstetric History	No. of Cases	No. of TSH	Percent	p-value
Primi	258	27	10.46	x^2=0.62 p>0.05 NS
Multi	142	19	13.38	
Total	400	46	11.5	

Table-5: Obstetric history wise distribution of TSH cases

Out of 400 subjects 258 (64.5%) subjects were primi, among them TSH cases are 27 (10.46%) and 142 (35.5%) subjects were multipara. Out of them TSH cases are 19 (13.38%). It is revealed that TSH cases were multi subjects as compared to primi subjects but it is not statistically significant.



Obstetric history wise distribution of TSH cases

Obstetric History	No. of Cases	Serum TSH cases	Total	p-value
A1	32	3	35	χ^2=0.58 p>0.05 NS
A2	11	3	14	
A3	3	2	5	
A4	1	0	1	
Total	47	8	55	
Proportion percentage	13.27	17.39	13.75	

Table-6: History of abortion

In the study it is revealed that out of 354 normal cases, abortion are 47 (13.27%) and among 46 TSH cases 8 (17.39%) cases are abortion. This shows that more abortion cases in the TSH positive cases as compared to normal cases. But it is not statistically significant (p>0.05).

T3/T4	No. of Cases	Percent
Serum free T3	399	99.75
High (>4.2/ ml)	01	0.25
Low (<1.8 / ml)	00	0.00
Total	400	100.00
T4 Normal	398	99.50
High	0.00	0.00
Low	02	0.5
Total	400	100.00

Table-7: Free T3 and Free T4

Diagnosis	No. of Cases	Percent
	354	88.5
Overt hypothyroidism	--	--
Sub-clinical	32	8.00
Over hype	--	--
Sub-clinical hyperthyroidism	14	3.5
Total	400	100.00

Table-8: Diagnosis wise distribution of subjects

DISCUSSION: Pregnancy is a stress test to maternal thyroid gland due to increase in thyroxine binding globulin, increased demand for iodine, and thyroid stimulation by HCG. For normal euthyroid pregnant women this does not seem to be a burden, it is the borderline hypothyroid women, who conceive, and come out with subclinical or overt hypothyroidism. Fetus depends in the first 12 weeks on mother for thyroxine. A substantial amount of thyroxine is transferred across the placenta. Placental deiodinases can convert T4 to T3. Fetus needs thyroxine for brain development, growth and lung maturation.

Thus, if maternal levels of thyroxine are not well maintained in pregnancy, fetus is at risk. This demands as early or even prenatal FT4, TSH screening and more frequent fetal monitoring of thyroxine levels in pregnancy.

But in our study all 46 women who had high levels of TSH were subjected to FT3 and FT4 assay but all were within normal limits.

An analysis of age group distribution showed that majority of women were between 21-25 years, this can be easily explained by the fact that maximum number of pregnant women who report to the OPD are in this age group.

Out of 46 cases of abnormal thyroid function detected only 6 were elderly women (more than 35 years) with 2 being positive. Hence, this study suggests that universal screening to be done in all age groups, with specific attention and intervention being given to the increasing age group.

Most of the studies do not mention age prevalence of thyroid disorders but this study show increased prevalence of thyroid with increased age.

Out of 400 screened women, 258 (64.5%) were primigravidae and 142 (35.5%) were multigravidas.

In the current study out of 46 women (13.38%) with abnormal thyroid were multigravidas and 10.46% were primigravidas. It was also found that abnormal TSH values were found in 3-teenage pregnant, this may stress the need for considering adolescent pre-conceptional screening requirement.

In our study all the patients with abnormal TSH were followed with FT3 and FT4 which failed to diagnose even a single case of overt hypothyroidism and which reduced the adverse maternal and fetal outcome in overt hypothyroidism by an early diagnosis of sub-clinical hypothyroidism and sub-clinical hyperthyroidism. This further strengthens the need for universal screening.

In our study, 8 patients out of 46 with possible serum TSH levels were having history of spontaneous recurrent abortions, hence this suggests that prevalence of sub-clinical hypo and hyperthyroidism increases with increase in rate of recurrent abortions. Hence, in patients with

recurrent abortions, thyroid screening is must.

CONCLUSION:

- Out of 400 cases studies, 256 cases were euthyroid, 20 cases subclinical hypothyroid and 12 were subclinical hyperthyroid.
- It is very ideal to subject a pregnant woman for thyroid screening as early as possible in pregnancy.
- Follow-up of abnormal TSH values with FT3 and FT4 may yield valuable results which could enable us for therapeutic intervention and may go a long way in preventing adverse pregnancy outcomes.
- Therapeutic interventions should be initiated at the earliest for favourable pregnancy outcomes.
- It is ideal to screen all women preconceptionally whenever feasible.
- Preconceptional evaluation of the thyroid hormones is very important for the women who are trying for pregnancy, to achieve the euthyroid status, which will in the true sense prevent the effect of hypothyroidism and hyperthyroidism on the fetus rather than screening in the first trimester and starting the treatment after detection of the condition.
- In our country especially in rural areas, the sort of awareness is not there, at least it should be made mandatory to include the thyroid screening test in the first trimester antenatal profile.
- Considerations may be made even to include thyroid screening in school health programmes (for adolescent screening).
- Hence, to conclude, as per American association of Clinical Endocrinologists to recommended in 2002 that routine screening with TSH levels be performed pre-conceptionally or during first trimester in all pregnant women.

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