

Incidence of Hypothyroidism in Antenatal Women with Maternal and Perinatal Outcome

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I. Introduction

Thyroid disorders are the most common endocrine disorders affecting the women of reproductive age group and hence constitutes the common endocrine disorder in pregnancy also. It has long been recognized that maternal thyroid hormone excess or deficiency can influence the outcome for mother and fetus at all stages of pregnancy as well as interferes with ovulation and infertility(1).

Maternal hypothyroidism is the most common disorder of thyroid function In pregnancy and has been associated with miscarriage, fetal loss, preeclampsia, preterm labour, placental abruption, low birth weight, fetal distress and reduced intellectual function of the offspring These adverse outcomes have been associated with both overt hypothyroidism (elevated TSH and reduced free T4) found in about 0.2% of pregnancies as well as subclinical hypothyroidism (elevated TSH and normal free T4 concentration) found in about 2-3%

Thyroid dysfunction is often overlooked in pregnant women because of the nonspecific symptoms and the hyper metabolic state of pregnancy. Hence thyroid function test becomes essential to know the thyroid status in pregnancy and also to detect the subclinical disease.(3-5)

In view of the potential for serious adverse effects associated with maternal thyroid disease and the apparent benefits of treatment many have recommended routine thyroid function screening in pregnancy.

As hypothyroidism would be a cause of a number of pregnancy and perinatal complications there is increasing need for screening of every antenatal women for thyroid disorder Hence this study is undertaken to find the significance of the relation between the adverse outcomes in pregnancy and hypothyroidism.(6)

II. Review Of Literature

The role of thyroid hormone for brain development and cognitive function:

Endo.dev 2014;26:26 Revet JE : Through its actions on regulatory genes that form, grow and sculpt the brain, thyroid hormone (TH) is essential for human brain development Children exposed to thyroid insufficiencies during critical stages of early development shows how and when brain needs thyroid hormone. This paper reviews some of the major studies form offspring of women with hypothyroidism during pregnancy and children with congenital hypothyroidism who were assessed using neuropsychological tests and with advanced neuroimaging techniques and compared, To know the time when the Thyroid effects on The brain.(7)

The effects of thyroid hormone function in early pregnancy

Bernardi L A current opinion Obstetrics and Gynecology 2013;25(4) : The multiple societies have published guidelines on thyroid disease in pregnancy but have not advocated universal screening however recent studies suggest close monitoring of women with hypothyroidism though there is lack of evidence that treatment of overt hypothyroidism improves the maternal and fetal complications.(8)

Prevalence of subclinical and undiagnosed overt hypothyroidism in a pregnancy loss clinic

IR Med journal 2013;106(4):107-110 : The prevalence of complications in these two groups of women were studied showing increased rates of miscarriages, late miscarriages intrauterine deaths and still births. 262 women included in the study with subclinical (8.39%) and overtly hypothyroid women (3.05%) Showing its association with unexplained pregnancy losses (10)

Maternal and fetal complications of hypothyroidism related to pregnancy

Maedica 2013;5(2):116-123 : Thyroid pathology worsens during pregnancy. This study was done to know the complications during pregnancy, labour and postpartum period. They found increased incidence of preeclampsia and preterm births. They have found that labour is dyskinetic with fetal distress and after birth with low APGAR and postpartum hemorrhage The indication for caesarean operation was mainly fetal distress.(11)

Hypothyroidism

Hypothyroidism is due to underactive thyroid gland means that the thyroid gland can't make enough thyroid hormone for normal body functions. Incidence of Hypothyroidism is 2.5% in the antenatal women In endemic areas like coastal regions of Andhra Pradesh incidence is 6-8/100 women. The incidence is very much high when compared to studies done in general population like Sharma Partha P et al.,(1999) which showed an incidence 1,15%. In a recent study conducted in 2011 by Nambiar et al., the incidence was found to be 5.2% in antenatal women. Another study by Cleary-Goldman et al., showed an incidence of <1% with overt hypothyroidism and 2.2% with subclinical hypothyroidism. (12)

Dignosis Of Neonatal Hypothyroidism

Ideally serum TSH and T3 are estimated from an elute of whole blood collected on filter paper by a heel prick between 4th and 6th days of life. If the screening blood TSH is more than 40mU/l_h then the child is called for retesting but treatment is not indicated unless rising levels are documented (13)

Specific reference range values of thyroid hormones

Test	Non pregnant	1 st trimester	2nd trimester	3rd trimester	Cord blood
SrT4 mcg/dl	5-12	1G+ 0.25	10-f 0.26	10.1+ 0.29	6-13
Free T4ngWI	1-2.3	0.86-1.77	0.63-1.39	0.16-1.12	15-3
SrT3 agM	110-230	174+ 6	182.6+ 6.3	208.2+ 7.18	40-60
Free T3 pg/dl		1.91-3.5	2.8-4.2	2.4 - 4.1	
SrTSHUM	1.94	0.03-2.3	0.03-3.7	0.13 - 3.4	0-20
Reverse T3 ng/dl	15-30				80-360
Rosin T3 % uptake	20-30				10-15
TBG g/dl	12-28	1548+1.96	14.92+ 2.05	1B.55* 28	10-16

III. Materials And Methods

A random prospective study was conducted in a total of 1000 pregnant women in the first trimester of any gravid status and parity attending the OPD unit at Government Victoria Hospital, Visakhapatnam, Andhra Pradesh between November 2013 to September 2014 were included in the study,

Inclusion criteria

Antenatal women with < 12 Weeks Gestation were taken up for study Only Singleton Pregnancy were included Either primigravida or multigravida were selected randomly Antenatal women who are residents of Visakhapatnam and who can come for regular antenatal checkups were chosen for my study

Exclusion Criteria

Antenatal women with Multifetal gestation
 Antenatal women with Known chronic disorders like" Diabetes and HTN
 Pregnant women with had previous bad obstetric history with known cause
 Those who underwent surgery for thyroid or a known case of thyroid

Method

After obtaining informed consent from the patient detailed history along with review of previous records will be taken in a prescribed proforma with emphasis on any previous medical complications, past history of thyroid disease physical examination was done to look for thyroid enlargement and to ascertain the pregnancy. 1000 patients in 1st trimester were randomly selected for the study. These patients fulfilled all the inclusion criteria, A detailed history was taken regarding the symptoms, and signs of thyroid disorders. Menstrual history, obstetric history, past history medical history, family history, personal history A thorough general physical examination with reference to pulse, BP, temperature, respiratory rate followed by examination of the CVS, CNS, respiratory system local and thyroid examination. Per abdomen examination and Per Vaginal examination done and pregnancy confirmed Patients are sent for T3, T4, TSH testing to a standard lab and following reference range was used (profile estimated by chemiluminiscent method)

Depending upon the fasting T3 and T4, TSH values they are grouped as Subclinical/Overt hypothyroidism If they are subclinical/overt hypothyroid, Thyroxin is started. Every 8 weeks TSH level will be estimated and the dose of the drug adjusted at the end, the pregnancy outcome noted.

The following outcome variables in relation to thyroid disorders studied Miscarriages Preterm deliveries IUGR, Preeclampsia, Anemia, Low birth weight, intra uterine fetal demise, Antepartum hemorrhage, Stillborn, Mode of deliveries- rate of normal, instrumental or caesarean, Postpartum hemorrhage, Birth asphyxia

IV. Discussion

Thyroid disorders are common in pregnant women. Diagnosis of thyroid dysfunction is complicated by nonspecific symptoms, hyper metabolic state of pregnancy and normal gravid thyroid physiology which results in alteration in maternal serum TSH and thyroxin concentration, if untreated, hypothyroidism may adversely affect the mother and the fetus. Earlier studies have reported an increased association with congenital anomalies (10-20%), perinatal mortality (20%) and impaired mental and somatic development (50- 60%) in newborns of untreated hypo thyroid women

The present study was conducted in Government Victoria Hospital in 1000 antenatal women attending antenatal op selected randomly and screened thyroid disorder It was a prospective study and the main aim of the study now the incidence of new cases of hypothyroidism in antenatal women their obstetric outcome.

Incidence

With the laboratory reference range used to detect hypothyroidism the number of cases found to have the disease were 66 which is highly significant The incidence is very much high when compared to studies done in general population like Sharma Partha P which showed an incidence of 1.15%. In a recent study conducted in 2011 by Nambiar et al., the incidence was found to be 5.2% nearly comparable to our study. Another study by Cleary-Goldman et al., showed an incidence of <1% with overt hypothyroidism and 2.2% with Subclinical hypothyroidism Casey et al., reported an overall incidence of hypothyroidism to be 2.5 %, This indicates that thyroid function screening is a necessary Investigation in patients who had a previous adverse pregnancy outcome.

Incidence of Complications in Sub-clinical Hypothyroidism

Study	PE	AP	PTD	AB	IUGR	LBW	SB
Our Study	17%		10.6%	4.2%			
Leung	15%		9%			9%	
SahuetaL.	9.9%		10.3%		2.4%		2.5%

In a study done by Leung et al the incidence of complications were PE (15%). PTD (9%), LBW (9%) in cases of subclinical hypothyroidism. which is slightly more than our study.

In a study done by Sahu MT et al⁶⁸, the complication like PE (9.9%), PTD (10.3%). IUGR (2.4%), SB(2.5%) were seen in cases of sub-clinical hypothyroidism. In these two studies there was no incidence of abruption placenta and abortion, but in our study it is 1.4% and 4.3% respectively which is significant.

In our study subclinical hypothyroidism was associated with complications preeclampsia (17%), preterm delivery (10.5%). which are comparable to studies. IUGR (4.2%) slightly higher in our cases., LBW (6.3%) and still 11 case mounting to 2.1%. In these two studies there is no incidence of but in our study, it is 42%, which is significant. In a study by Roli et al., even in LT4 treated pregnant hypothyroid increased rate of maternal complications such as anemia (31%). 44%) placenta! abruption (19%) postpartum hemorrhage seen in women not accurately monitored, and fetal fit as low birth weight (31%) and fetal death (12%) have been reported.

In our study the incidence of anemia was 8.5% which was less than that of Roti el al. which might be due to increase awareness on the use of iron supplement and healthy nutritious diet antenatal woman and good monitoring of thyroid status with treatment.

Incidence of complications in Overt Hypothyroidism

Study	PE	AP	PTD	AB	IUGR	LBW	SB
Out Study	31.5%	10.5%	10.5%	15.7%	15.7%	15.7%	5.2%
Leung	22%					22%	4%
SahuEtal.,	20.7%		4.7%		13.8%		2.9%
Ablovich		19%				6%	3%

In our study, overt hypothyroidism was associated with complications like PE (31.5%), AP (10.5%), PTD (10.5%). AB (15.7%), IUGR (15.7%), LBW (15.7%), SB (5.2%).

In a study done by Sahu_{MT}et al⁶⁸, the complications like PE (20.7%). PTD (4.7%), IUGR (13.8%), SB(2.9%) were seen in cases of overt hypothyroidism.

In a study done by Leung et al, the incidence of complications were PE(22%), LBW (22%), SB (4%) in cases of overt hypothyroidism.

In a study done by Abotovich et al⁷¹ the complications like AP (19%). LBW (8%), SB (3%) were seen in cases of overt hypothyroidism. The incidence of complications varied in different studies but some studies are comparable. In our study the incidence of abortion (15.7%) which is significant and is not seen in other studies..

A clinical study by DANIA Hirsch et al from 2009-2010 found that in cases with TSH>20mIU/l are associated with more severe form of gestational hypertension. This is comparable to our study as the maternal complications including hypertension are more in women with TSH>18m IU I.

A study by Rao VR et al..demonstrated the relationship between hypothyroidism and miscarriages This is also demonstrated in our study the relation of hypothyroidism with miscarriage.

Study by Jane dearyGoldmann (1999) showed that Hypothyroxemia is associated with preterm labour. Which is also found in our cases in might be due to placenta! insufficiency occurs in these cases.Davis L S elal..(1988) found that maternal complications are more common in hypothyroid women anemia (30%), preeclampsia (44%). APH (19%),preterm labour (19%). BW(31%).IUFD{ 12%), PPH (19%).(13-14)

A study by Vojvodic LJ et al., (1981-1990).in 183 women found significant higher incidence in preeclampsia in hypothyroid women (26.8%). This is comparable to our study and most of our cases were on cap depin and Tab Labetol till delivery. This is especially seen in overt cases

Table- Pregnancy Outcomes in Women with Untreated Subclinical Hypothyroidism and Isolated Maternal Hypothyroxemia Compared with Pregnant Women with Normal Thyroid Function Studies

	Norma TSH and Free T ₄ (n=16,011)	Subclinical Hypothyroid Ism (n = 598)	P value	Isolated Hypothyroxemia (n = 233)	P value
Hypertension (%)	6	9	.68	11	.53
Placenta! abruption (%)	0.3	10	.03	0.4	.75
Gestational age delivered (%)					
36 weeks	6.0	7.0	.09	6.0	.64
34 weeks	2.5	43	.005	2.0	M
32 weeks	1.0	2.2	.13	1.0	.47
RDS— ventilator (%)	1.5	25	.05	1.3	7&
Neonatal intensive care	2,2	40	.005	1.3	.32

RDS = Respiratory distress syndrome; T₄ = thyroxine; TSH = thyroid-stimulating hormone.
Data from Casey and colleagues (2007)

A separate study reported a markedly increased use of caesarean section because of fetal distress in women who were severely hypothyroid (56%) at their first antenatal visit compared with women who were mildly hypothyroid or euthyroid (3%). Even in our study there is increased rate of caesarean section and some instrumental deliveries in overt hypothyroid than subclinical hypothyroid mainly in view of fetal distress and some in view of prolonged labour.

Incidence of low birth weight neonates is markedly increased in cases of Overt hypothyroidism (22%) compared with subclinical disease (95) and the general population (7%), Research also shows the significant role of maternal thyroid hormone in fetal neurologic development

Table - Thyroid dysfunction in first trimester pregnant women by Dinesh et al. study

Parameters	N%	Anti TPOAb
Hypothyroidism total	143(14.3)	30(20.9)
Overt hypothyroidism	7(07)	5
Subdmical hypothyroidism	135(135)	25(18.%)

Our study shows high incidence of Hypothyroid especially subclinicalhypothyroidism with associated adverse pregnancy outcome which were more with overt hypothyroidism.

Based on the results of the present study we therefore suggest for a mandatory screening for antenatal women in the first trimester of pregnancy and detection of thyroid dysfunction among pregnant women attending to routine antenatal clinic and to be potentially aware of associated maternal and fetal complications.All the babies were screened for TSH on the 5 th post natal day but no baby had shown features of congenital hypothyroidism. The weakness of our study was that, follow up beyond newborn period was not possible and after discharge most infants did not come for follow up.

Summary

The present study was conducted in Government Victoria Hospital Andhra Medical College, Visakhapatnam. It is a prospective study. It included screening of 1000 pregnant women coming to routine antenatal check up their first trimester, TSH, T3, T4 level was estimated.

The incidence of thyroid disorders in our study was 6.6%,

The incidence of subclinical hypothyroidism in our study was 47%,

The incidence of overt hypothyroidism in our study was 1.9%.

In our study, subclinical hypothyroidism was associated with complications like PE (17%), PTD (10.6%), AB (4.2%), IUGR (4.2%), LBW(6-3%), SB (2.1%)

Overt hypothyroidism was associated with complications like PE (31.5%), AP (10.5%), PTD (10.5%), AB (15.7%), IUGR (15.7%), LBW (15.7%), SB (5.2%). IUD is seen in 1 case of subclinical and 2 cases of overt hypothyroidism. Most of the parameters are comparable to other studies with minimal variations with high incidence of preeclampsia in our study. Incidence of thyroid dysfunction was high in this study, with subclinical hypothyroidism in (4.7%) and overt hypothyroidism in (1.9%) women.

V. Conclusion

Incidence of Hypothyroidism {6,6%} is more in pregnant women. Though Subclinical hypothyroidism is more common than overt, maternal and perinatal complications are more with overt hypothyroid cases, emphasizing the need for routine screening for thyroid in early pregnancy. Thyroid function tests need to be included in the list of antenatal investigations done in antenatal women in view of high incidence of hypothyroidism seen in pregnant women.

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