Original Article

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Study on Prevalence of Hypothyroidism in Pregnancy and its Maternal and Fetal Outcome

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Abstract

Background: Thyroid disorder is second most common cause of endocrine disorder in women of child bearing age. Pregnant women with hypothyroidism have a greater risk of early and late obstetric complications such as miscarriage, anaemia, gestational hypertension, placental abruption, premature delivery, post partum haemorrhage and admission of their baby to neonatal intensive care (particularly for RDS). *Aims and objectives:* To find out prevalance of hypothyroidism in pregnancy and to determine association of foetomaternal outcome with hypothyroidism. *Material and Methods:* A prospective study was conducted in 107 patients who came to routine antenatal clinic or admitted in labour room of Kamla Raja Hospital, Gwalior over a period of one year (from 1st May 2009 to 30th April 2010) and patients were divided in to two groups hypothyroid positive are study group and those negative were control group. Their fetomaternal outcomes were noted. *Conclusion:* Present study concludes that there is high prevelance of hypothyroidism 24.29% in this study. Incidence of hypothyroidism is higher in women >35 years of age and significant association of PIH, preterm, very low birth weight and ICU admission were seen.

Keywords: Hypothyroidism; Foetomaternal Outcome; Obstetric Complications.

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Introduction

Thyroid disorder is the second most common cause of endocrine dysfunction in women of child bearing age. Hypothyroidism is more common during pregnancy than hyperthyroidism [1].

Pregnancy is associated with significant but reversible changes in maternal thyroid physiology that can lead to confusion on the diagnosis or evaluation of thyroid abnormalities.

The overall prevalence of subclinical hypothyroidism in general population has been reported to be 4%-8.5% and overt hypothyroidism 0.2-0.3% [2].

Risk factors for development of hypothyroidism:

- Personal history of type I diabetes and other autoimmune disorder
- Family history of thyroid disease
- Older age (> 35 years)
- Smoking during pregnancy
- History of miscarriage
- South Asian ethnicity

Women with hypothyroidism can still conceive, although infertility rates are higher and failure of in vitro fertilization is more likely. Pregnant women with hypothyroidism have a greater risk of early and late obstetric complications such as miscarriage, anaemia, gestational hypertension, placental abruption, premature delivery, post partum haemorrhage and admission of their baby to neonatal intensive care (particularly for RDS) [3,10].

Recent studies indicate that undiagnosed

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(and hence untreated) hypothyroidism during the first half of pregnancy is associated with a risk of poorer neurodevelopment outcome in the progeny [13].

Considering the wide-spread clinical implications of gestational subclinical hypothyroidism and its sequelae this study is planned to know prevalence of hypothyroidism in pregnancy in women attending antenatal clinic in dept of Obstetrics and Gynaecology, Kamla Raja Hospital, G.R.M.C, Gwalior.

Aims and Objective

1. To find out incidence of hypothyroidism in pregnancy.
2. To determine association of foetomaternal outcome with hypothyroidism.

Material and Methods

A prospective study was conducted in 107 patients who came to routine antenatal clinic or admitted in labour room of Kamla Raja Hospital, Gwalior over a period of one year (from 1st May 2009 to 30th April 2010). Patients who attended antenatal clinic or were admitted in labour room were registered for the study. Patients were divided into two groups.

Study Group

This group included pregnant females who were diagnosed as cases of subclinical hypothyroidism on the basis of raised TSH and normal TF4 levels and overt hypothyroidism on basis of raised TSH and decreased TF4, 7 cases were diagnosed as hypothyroid but had pregnancy loss were dropped out from the study as they could not be followed for maternal and fetal outcome.

Control Group

This comprised of pregnant females in whom serum TSH and FT4 levels were found to be within normal range on estimation.

Exclusion Criteria

The patients who were already diagnosed hyperthyroidism were excluded from the study.

All patients were registered at their first antenatal visit. At the time of registration detailed history taking and general examination was done.

Blood was taken for estimation of S. TSH and FT4, Hb, ABO, Rh, RBS, HIV, HBsAg and urine R/M were done as a part of routine test.

Normal values taken in the present:TSH : 0.465-3.5 mIU/ml, FT4 : 10.0-28.2 pmol/L

After registering the patients were followed up with routine antenatal visits up to delivery and records were reviewed for any signs of development of PIH, preterm delivery, low birth weight, placental abruption, recurrent pregnancy losses, still birth, congenital anomalies, admission of baby to neonatal ICU, foetal distress in labour and hyperbilirubinaemia.

Statistical Analysis

There are different statistical methods for testing hypothesis. Based on these facts and with the help of biostatistician the statistical calculations for the present study involved the following tests.

Prevalence = Incidence × Duration

$$\text{Incidence} = \frac{\text{No. of pateint found to be clinical + subclinical hypothyroid}}{\text{Total number of patient screened}}$$

For statistical analysis following methodology applied

- Percentage
- Proportion
- Chi square test

Once the values of chi square-tests are calculated the corresponding values of 'p' will be obtained using the standard tales are per degree of freedom and the significance graded as

CL	p value	Results significance
95%	< 0.05	Statistical significant
99%	< 0.01	Highly significant
99.99%	< 0.001	Very highly significant

Results & Observations

Table 1 shows 31.57% patients in the study group were >35 years of age as compared to 8.6% patients in the control group. p-value (0.022) this shows with significant correlation of hypothyroidism with age>35 years.

Table 2 shows study group maximum number of patients 63.16% i.e. 12 patients, out of 19 were nullipara but multigravida while maximum patients in the control group were nullipara i.e. 59.3%, while in However, there is no direct association between parity and incidence of hypothyroidism but this trend may be attributed to the fact that the age of the patient increases with subsequent pregnancies and age >35 years is a risk factor for developing hypothyroidism.

In the study group patients 19 patients diagnosed with hypothyroidism out of which 9 developed PIH i.e. 47.36% on statistical analysis the result comes out to be statistically significant ($p<0.05$) in this P value 0.039.

Thus, this shows that hypothyroidism is associated with the development of PIH considering the common risk factor for occurrence of PIH.

It shows the relationship of screening for detection of hypothyroidism with high risk factor. Out of 100 patient underwent screening, 33 showed risk factor such as family history of thyroid disease in 10 patient, bad obstetrics history such as still birth or recurrent abortions in 20 patient, diabetes in 3 patient.

Out of 10 patients with family history 7 develop hypothyroidism, on statistical analysis the correlation was found to be significant ($p<0.001$)

Table 1: Distribution of cases according to age in different groups

Age group (yrs)	Case		Control	
	No.	(%)	No.	(%)
19-24	03	15.78	29	35.80
25-29	05	26.31	20	24.69
30-34	05	26.31	25	30.86
>35	06	31.57	07	8.6

Table 2: Distribution of cases according to parity

Parity	Case		Control	
	No.	(%)	No.	(%)
P_0	12	63.16	48	59.3
P_1	06	31.6	23	28.4
P_2	01	5.3	06	7.4
P_3	0	0	04	4.9

Table 3: Pregnancy outcome associated with hypothyroidism: maternal aspect

Patients	Study group		Control group		Chi-sqvalues	P value
	No.	%	No.	%		
PIH	09	47.36	17	20.9	4.28	0.039
Placental Abruption	04	21.10	07	8.68	1.32	0.251
Bad obstetric History	07	36.84	13	16.04	2.961	0.085
Family history	07	36.84	03	3.7	15.28	<0.001
Diabetes	02	10.50	01	1.23	2.105	0.147
Caesarean delivery	08	42.11	16	19.76	3.079	0.079

Table 4: Showsin study group 8 out of 19 (42.11%) delivered preterm while

Gestational Age at Delivery	Control Group (n=81)		Study Group (n=19)		Chi Square Value	P Value
	No.	%	No.	%		
<34 weeks	08	9.87	08	42.11	9.617	0.002
Very low birth weight	05	6.17	06	31.6	7.718	0.05
Fetal distress/meconium	25	30.86	09	47.36	1.205	0.272
Still birth	02	2.46	03	15.8	3.021	0.082
NICU admission	14	17.30	08	42.10	4.174	0.041
Hyperbilirubinemia	09	11.11	06	31.57	3.579	0.059

Table 3 shows that the occurrence of placental abruption in the two groups. 8.68% (7 patients, out of 81) showed placental abruption of some grade. In the study group, 4 out of 19 patients (21.1%) had abruption. When result were statistically analysed, it was found to be not significant (p>0.05) i.e. P value 0.251.

Table 3 shows the percentage of caesarean section in study and control group on statistical analysis no significant correlation seen p value 0.079.

Table 4 shows in study group 8 out of 19 (42.11%) delivered preterm while the 8 out of 81 patients delivered preterm at <34 weeks of gestation (9.87%)on statistical analysis the result was found to be highly significant P value comes out to be 0.002. The above table shows the incidence of low birth weight babies born in the control groups and study groups.6.17% babies weighed <2.0 kg at birth in control group as compared to 31.6% in study group giving a P value of <0.05 which is significantly. This table 4 shows comparison of neonatal outcomes in the study group and control grouponly ICU admission rates were found to be significant this could be due to very low birth weight and prematurity.

Discussion

Considering the widespread clinical implications of gestational hypothyroidism and its sequelae .

The present study was aimed to "Study on Prevalence of Hypothyroidism in Pregnancy and Its Maternal and Fetal Outcome".

The study was carried out on 107 patients, who presented to antenatal care in Kamla Raja Hospital Gwalior over a period of one year from 1st may 2009 to 30th april 2010. The women were followed up till delivery. The study population consisted of 81 normal patients and 19 hypothyroid patients diagnosed and followed up , 7 hypothyroid patients were dropped out from study. So prevalence of hypothyroidism came out to be 24.29%.

Sahu HT, Das V mittal et al (2010) this study aims to find prevalence of thyroid dysfunction in pregnancy and its impact on obstetrical outcome in Indian population. Prevalence of thyroid dysfunction was high in this study, with subclinical hypothyroi-dism in 6.47% and overt hypothyroidism in 4.58% women.

Distribution of Cases According to Age

The ages of study population ranged from 19-36 years 31.57% in the study group were >35 years of age as compared to 8.6% of patients in the control group, who were diagnosed as hypothyroids on the basis of TSH and FT_4 concentration estimation.

Study by Brian M. Casey et al in 2006 also showed similar results that women with subclinical hypothyroidism were significantly older than control group. 11% of women with elevated TSH value were aged 35 years or greater compared with only 7% of healthy control (p=0.09). There was no difference between the groups in relation to parity. The gestational age at screening was similar between the two groups.

Distribution of Cases According to Association with PIH

The present study shows 47.36% cases of PIH in patients diagnosed as hypothyroidism patients in study group compared to 20.9% incidence of PIH in patients in control group (P value 0.03- significant).

Sahu HT, Das V Mittal et al (2010) this study aims to find prevalence of thyroid dysfunction in pregnancy and its impact on obstetrical outcome in Indian population. Overt hypothyroids were prone to have pregnancy-induced hypertension (P=0.04), intrauterine growth restriction (P=0.01) and intrauterine demise (P=0.0004) as compared to control.

Similar results were shown by Aziz Nuzhat, ReddiPranathi et al in 2006 in their retrospective analysis of 161 cases of hypothyroidism complicating pregnancy. The incidence of hypertensive disorders was 17.4% in hypothyroid group which was higher than the incidence in general population of 8.6%.

Another study was conducted by Kumar Ashok, Ghosh B.K. et al in 2005 on 82 pregnant women. Pre-eclampsia has been observed in 16.7% of subclinical cases and 43.7% of overt cases of hypothyroidism during pregnancy.

Another study by Anna S. Leung, Lynnae K. et al in 1993 showed that gestational hypertension namely eclampsia, pre-eclampsia and PIH was significantly more common in the overt and subclinical hypothyroid patients than in general population with rates 22%, 15% and 7.6% respectively.

Study by K. Buckshee, A. Kriplani et al in 1992 on 26 pregnancies complicated by hypothyroidism showed 26.9% incidence of pregnancy induced hypertension in theses cases.

Relationship of Screening for Hypothyroidism with Individual High Risk Factors

The present study shows a significant correlation between risk factors such as family history of thyroid

disease, 70% patients with family history of thyroid which was veryhighlysignificant with P<0.001

De vivo, mancuso A et al (2010) evaluate whether the occurrence and timing of pregnancy loss could be related to thyroid autoimmunity or subclinical hypothyroidism (SH) per sec.

BijayViadya, Sony Anthony et al. in 2007 they showed that the prevalence of raised TSH was higher in the high risk group (6.8% Vs 1% in the low risk group, relative risk (RR) 6.5, confidence interval (CI) 3.3-12.6, p<0.001) increased the risk of raised TSH. However 12 of 40 women with raised TSH (30%) were in the low risk group.

They concluded that targeted thyroid function testing of only the high risk group would miss about one third of pregnant women with overt/subclinical hypothyroidism.

In the study group, 4 out of 19 patients (21.1%) had abruption. When result were statistically analysed, it was found to be not significant (p>0.05) i.e. P value 0.251.

Similar results were shown by Goel P, et al in their study on 30 patients with subclinical hypothyroidism in 2005. They found an incidence of 0.3% placental abruption in their study group which was not significant.

Study by Brain M. Casey, Jodi S. Dash et al in 2005 on 25756 pregnant women who underwent thyroid screening and delivered a singleton infant showed that pregnancy in women with subclinical hypothyroidism was three times more likely to be complicated by placental abruption when compared with healthy pregnant women (Relative Risk (RR) 3.0-95% CI 1.8-8.2%) p >0.05.

Comparison of Mode of Delivery in the Control and Study Groups

In the present study, we found that 8 out of 19 (42.11%) in the study group compared to 16 of 81 (19.76%) patients in the control group were delivered by caesarean section as on statistical analysis the difference was not significant

K. buskshee, A. Kripalni et al in their study on 26 pregnancies in 1992 at AIIMS New Delhi found a vaginal delivery rate of 61.5% and a caesarean section rate of 23.1% in hypothyroid group, which is comparable to 78.2% and 21.7% respectively in the present study.

Sahu HT, Das V Mittal et al (2010) this study find cesarean section rate for fetal distress was significantly higher among pregnant subclinical hypothyroid women (P=0.04).

Comparison of Preterm Birth in Control and Study Group

The present study showed preterm birth defined as delivery before 34 weeks 42.11% in the study group compared to 9.87% of controls, which was found to be statistically significant with p<0.05 (p value0.002).

Study by Brain M. Casey, Jodi S et al in 2005 showed that preterm birth was almost 2-fold higher in women with subclinical hypothyroidism (RR 1.8, 95% CI 1.1-29 specifically). This significant difference persisted after adjustment for maternal age, race and placental abruption.

Study by Aziz Nuzhat, ReddiPranathi et al in 2006 also showed 22% incidence of preterm delivery in hypothyroid group as compared to 19% in the diabetic group.

Leung et al in 1993 showed a 9% incidence of preterm birth in their study which is comparable to the present study.

Comparison of Cases according to Birth Weights

The present study showed significant proportion of babies having low birth weight 31.6% of infants weighed <2.0kg in the study group as compared to 6.17% of the control group (p value0.05).

Idris I., Srinivasan et al in 2005 in their retrospective study found prevalence of low birth weight infants (<2.5g) in groups H1 and H2 was 15% and 4.8% respectively (odds ratio (OR) – 3.55, 95 CI = 0.96 -10.31).

Another similar study by Goel P, Rathodia et al in 2005 showed 13.3% incidence of low birth weight and 20% had evidence of foetal distress.

Comparison of Cases according to Neonatal Outcome

The present study showed admissionto ICU is 42.1% in study group which is statistically significant (p value 0.04).47.36% of study group having foetal distress in labour, 3 babies out of 19 had still birth that is 15.8% and 1 out of 19 had congenital anomalies i.e.5.3%. The above were found to be not significant in relation to the control group .

Brain M Casey, Jodi S et al in 2005 showed that admission to the neonatal intensive care nursery and respiratory distress were twice as likely in infants delivered of women with sub clinical hypothyroidism (RR 1.8, 95) CI 1.1-2.9 and 1.0-3.3 respectively.

Another similar study by Goel P, Rathodia et al in 2005 showed 13.3% incidence of low birth weight and 20% had evidence of foetal distress.

The most cogent questions in whether identification and thyroid supplementation of women with subclinical hypothyroidism would prevent or modify any of the above adverse effects. . Because the mechanisms of disease whereby thyroid hormone deficiency leads to preterm labour, placental abruption and other complications is not known, the authors only speculates about any salutary effects of thyroxine replacement. One unifying hypothesis is that thyroid hormone is necessary for normal placental development specifically, there is evidence that preterm delivery and vascular diseases such as pre eclampsia and placental abruption may be causally linked to faulty early placentation.

Considering the above foetomaternal complications the most practical approach is to screen all pregnant women for hypothyroidism as early in pregnancy as possible (on before conception). in women with gestational hypothyroidism.

It is believed that if screening of all pregnant women in implemented, the mother, the infant and society will all benefit.

Summary & Conclusion

The present study therefore concludes that hypothyroidism continues to be an important medical condition in pregnancy with significant correlation withage>35 years and foetomaternal morbidity like PIH, preterm and very low birth weight which leads to ICU admissionj. This study therefore recommends that early identification and proper management of this condition is the only intervention to ameliorate and decrease its attendant morbidity and mortality. Further mmmorestudies are needed to know the fetomaternal effect of hypothyroidism during pregnancy.

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Conflict of Interest

None declared

Ethical Approval

The study was approved by the Institutional Ethics Committee

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