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Original Research Article

"PREVALENCE OF HYPOTHYROIDISM IN SINGLETON PREGNANT WOMEN AND PERINATAL OUTCOME USING TSH LEVELS AS A SCREENING TOOL"

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ABSTRACT:

Background: Thyroid dysfunction comes from poor adjustment to changes in the mother's thyroid function during pregnancy[1,2]. Higher thyroid hormone-binding globulin (TBG) concentration, increased iodine clearance in the kidneys, and the thyrotrophic impact of human chorionic gonadotropin are some of the causes of these changes in thyroid function (HCG)[3,4]

OBJECTIVES:

1. To study the prevalence of hypothyroidism in pregnant women using TSH levels as a screening tool.
2. To evaluate the Perinatal outcome in detected hypothyroid cases.

Material & Methods: Study Design: Prospective hospital based cross – sectional study. **Study area:** Study conducted in the Department of Obstetrics and Gynecology, Gayatri Vidya Parishad Institute of Healthcare & Medical Technology, Vishakhapatnam, Andhra Pradesh over a period of 1 year. **Study population:** Pregnant women attending to the Department of Obstetrics and Gynaecology for the routine check-ups. **Sample size**: Study consisted a total of 200 subjects. **Sampling Technique:** Simple Random sampling method. **Study tools and Data collection procedure:** This study involves screening 200 consenting eligible women. The normal patients served as controls. The patients were classified as euthyroid, hypothyroid and hyperthyroid based on their TSH levels. Those with deranged TSH levels will undergo free T4 testing and they will be further divided into subclinical and overt hypothyroid patients these patients will be formed into study groups.

Results: In this study, out of all hypothyroid women 37.5% had complications and 62.5% had no complications. 5.6% of the adequately treated hypothyroid women and 78.6% of the

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

inadequately treated hypothyroid women had complications. There was a statistically significant difference in the pregnancy outcome amongst hypothyroid women based on the adequacy of treatment. The occurrence of complications was high in inadequately treated women. (Chi square value= 17.35, p value = <0.0001)

CONCLUSION: In my study, the prevalence of hypothyroidism was found to be 16% and majority of complications were found to occur in patients who were treated inadequately. Thus, universal thyroid screening in pregnancy meets the majority of the criteria for a beneficial and cost-effective screening programme, and it holds promise for improving foetal and maternal outcomes.

Keywords: Thyroid dysfunction, subclinical hypothyroidism, neonatal thyrotoxicosis

INTRODUCTION:

Thyroid dysfunction comes from poor adjustment to changes in the mother's thyroid function during pregnancy[1,2]. Higher thyroid hormone-binding globulin (TBG) concentration, increased iodine clearance in the kidneys, and the thyrotrophic impact of human chorionic gonadotropin are some of the causes of these changes in thyroid function (HCG)[3,4]. Anemia, preeclampsia, preterm, low birth weight (LBW), foetal distress during labour, foetal death, congenital hypothyroidism, and neurocognitive abnormalities in children were the main prenatal consequences of hypothyroidism.

Preterm delivery and a low Apgar score may also be associated to subclinical hypothyroidism.[5] Overt hyperthyroidism and subclinical hyperthyroidism affects about 0.2% to 0.8% and 0.4% to 1% of pregnancies, respectively.[6] Maternal hyperthyroidisms may cause preterm delivery, intrauterine growth restriction (IUGR), and neonatal thyrotoxicosis.[7]

The administration of thyroxine throughout the first trimester (preferably, before birth) may help to lower the risk of complications. Because the fetus relies entirely on maternal thyroid hormone for optimal brain development in the first trimester, starting medication after the first trimester finishes will not eliminate any existing fetal neuro developmental delay.

During pregnancy, the thyroid physiology undergoes numerous modifications. In order to make a diagnosis of hypothyroidism, the cut-off levels are modified during pregnancy. Both of these illnesses have similar symptoms and indications. Pregnancy in severe hypothyroidism is uncommon because most of these women are infertile and have a higher likelihood of abortions.

Hence the present study was undertaken to study the prevalence of hypothyroidism in pregnant women using TSH levels as a screening tool and to evaluate the Perinatal outcome in detected hypothyroid cases.

OBJECTIVES:

1. To study the prevalence of hypothyroidism in pregnant women using TSH levels as a screening tool.
2. To evaluate the Perinatal outcome in detected hypothyroid cases.

Material & Methods:

Study Design: Prospective hospital based cross – sectional study.

Study area: Study conducted in the Department of Obstetrics and Gynecology, Gayatri Vidya Parishad Institute of Healthcare & Medical Technology, Vishakhapatnam, Andhra Pradesh, over a period of 1 year.

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

Study population: Pregnant women attending to the Department of Obstetrics and Gynaecology for the routine check-ups.

Sample size: Study consisted a total of 200 subjects.

Sampling Technique: Simple Random sampling method.

Inclusion Criteria:

• Singleton pregnancy.

• Primigravida or multigravida

Exclusion criteria:

• Multifetal gestation.

• Known chronic disorders like diabetes and hypertension, liver disorders, renal disorders.

• Those who plan to deliver in another hospital.

Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.

Study tools and Data collection procedure:

This study involves screening 200 consenting eligible women. The normal patients served as controls. The patients were classified as euthyroid, hypothyroid and hyperthyroid based on their TSH levels. Those with deranged TSH levels will undergo free T4 testing and they will be further divided into subclinical and overt hypothyroid patients these patients will be formed into study groups.

They were treated and followed up till the completion of their pregnancy. They underwent TSH testing at 16, 20 and 32 weeks their response to treatment and pregnancy outcome will be noted and results analyzed. Written informed consent was obtained from every study subject. Patients satisfying the inclusion criteria and who consent for the study are included. Clinical history and relevant investigations are collected as mentioned in the proforma enclosed. All eligible patients will be screened and their thyroid status defined. Patients who are hypothyroid and subclinical hypothyroid were followed till termination of pregnancy. The clinical progression with the treatment given will be noted.

Statistical analysis:

Data Entry was done using Microsoft excel 2013 and analysis done using SPSS V 16. Qualitative data was expressed in frequencies and percentages and Quantitative data in mean and standard deviation. Bar diagrams and pie chart were used to represent the data. p value of <0.05 was considered statistically significant.

Observations & Results:

Table 1: Age distribution

	Study		**Control**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
<20	2	6.25%	18	10.7%	20	10%
21 – 30	30	93.75%	136	81.0%	166	83%

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

31 – 40	0	0.0%	14	8.3%	14	7%
Total	32	100.0%	168	100.0%	200	100%

In the present study, 10% of the patients were aged < 20 years, 83% were aged 21- 30 years, 7% were aged 31-40 years.

Table 2: Obstetric code distribution.

	Study		**Control**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
Primi	17	53.1%	73	43.5%	90	45.0%
Multi with previous normal delivery	10	31.3%	60	35.7%	70	35.0%
Multi with previous LSCS	5	15.6%	35	20.8%	40	20.0%
Total	32	100%	168	100%	200	100%

In my study, 45% of the pregnant women were primi gravidae, 35% were multi gravidae with previous normal delivery and 20% were multi gravidae with previous LSCS.

Table 3: Classification of pregnant women using TSH levels:

	Study		**Control**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
Euthyroid	0	0%	168	100%	168	84%
Subclinical	20	62.5%	0	0%	20	10%
Overt hypothyroidism	12	37.5%	0	0%	12	6%
Hyperthyroidism	0	0%	0	0%	0	0%
Total	32	100%	168	100%	200	100%

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

In the present study, 84% were euthyroid, 10% had subclinical hypothyroidism, 6% had overt hypothyroidism. There were no hyperthyroid cases detected.

Table 4: Prevalence of hypothyroidism:

	Frequency	**Percentage**
Euthyroid	168	84%
Subclinical Hypothyroid	20	10%
Overt Hypothyroid	12	6%
Total	200	100%

In the present study, 84% of pregnant women were euthyroid, 10% subclinical hypothyroid, 6% overt hypothyroid.

Table 5: TSH levels at 16 weeks:

TSH (in mIU/L)	**Frequency**	**Percentage**
<3	16	50.0%
3 – 4.2	10	31.25%
4.2 – 10	6	18.75%
Total	32	100%

At 16 weeks, 50% hypothyroid women started on treatment had TSH <3 mIU/L, 31.25% had 3-4.2 mIU/Land 18.75% had TSH 4.2-10 mIU/L.

At 20 weeks, 6.25% had spontaneous abortion before 20 weeks, 50% of hypothyroid women using medication had <3 mIU/Land 43.75% had 3-4.2 mIU/L.

At 32 weeks, 6.25% had spontaneous abortion before 20 weeks, 87.5% of pregnant women diagnosed with hypothyroidism using treatment were having TSH <3 mIU/L, 6.25% were having 3-4.2 mIU/L.

Those diagnosed before 10 weeks and on treatment, if their repeat TSH levels becomes normal they were grouped as adequately treated.

Those who were diagnosed after 10 weeks and treated of those who fail to reach normal levels of TSH despite aggressive treatment were classified as inadequately treated.

In this study, 56.25% were treated adequately and 43.75% were treated inadequately.

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

Table 6: Pregnancy outcome in hypothyroid women:

	Adequately treated		Inadequately treated		Total	
	N	%	N	%	N	%
Spontaneous abortion	0	0.0%	2	14.3%	2	6.3%
PIH	0	0.0%	1	7.1%	1	3.1%
Oligohydramnios	0	0.0%	1	7.1%	1	3.1%
GDM	0	0.0%	2	14.3%	2	6.3%
Preterm	0	0.0%	2	14.3%	2	6.3%
IUGR	0	0.0%	1	7.1%	1	3.1%
LBW	1	5.6%	2	14.3%	3	9.3%
No complications	17	94.4%	3	21.5%	20	62.5%
Total	18	100%	14	100%	32	100%

Chi square value = 18.92, p value = 0.008, statistically significant.

In this research, 6.3% of the cases had spontaneous abortion, 3.1% had PIH, 3.1% had oligohydramnios, 6.3% had GDM, 6.3% had preterm, 3.1% had IUGR, 9.3% had LBW, and 62.5% had no complications.

The number of complications were significantly high in inadequately treated group when compared to adequately treated hypothyroid women.

Table 7: Pregnancy outcome based on treatment:

	Treated adequately		Inadequately treated		Total	
	N	%	N	%	N	%
With complications	1	5.6%	11	78.6%	12	37.5%
No complications	17	94.4%	3	21.4%	20	62.5%

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

Total	18	100%	14	100%	32	100%

Chi square value= 17.35, p value = <0.0001, statistically significant.

In this study, out of all hypothyroid women 37.5% had complications and 62.5% had no complications. 5.6% of the adequately treated hypothyroid women and 78.6% of the inadequately treated hypothyroid women had complications.

There was a statistically significant difference in the pregnancy outcome amongst hypothyroid women based on the adequacy of treatment. The occurrence of complications was high in inadequately treated women.

Table 8: Pregnancy outcome in inadequately treated and control group

	Inadequately treated		**Control**	
	N	**%**	**N**	**%**
Spontaneous abortion	2	14.3%	3	1.8%
PIH	1	7.1%	19	11.3%
Oligohydramnios	1	7.1%	15	8.9%
GDM	2	14.3%	12	7.1%
Preterm	2	14.3%	8	4.8%
IUGR	1	7.1%	4	2.4%
LBW	2	14.3%	13	7.7%
No complications	3	21.5%	94	56.0%
Total	14	100%	168	100%

Chi square value = 15.22, p value = 0.03, Statistically significant

In the present study, in cases who were inadequately treated 21.5% of the cases did not have any complications and 56% had no complications in control group.

In inadequately treated groups, 14.3% had spontaneous abortions and 1.8% had spontaneous abortion in control group.

In cases with inadequate treatment, 7.1% had oligohydramnios, 14.3% had GDM, 14.3% were pre term, 7.1% had IUGR, 14.3% were LBW.

The occurrence of complications was significantly high in inadequately treated group when compared with the control group.

DISCUSSION:

Thyroid hormones are required for pregnancy and foetal growth. Thyroid disease is linked to adverse foetal and child neurodevelopmental outcomes, including low birth weight.

Subclinical hypothyroidism (elevated TSH and normal FT4 concentration) and isolated hypothyroxinemia (normal TSH and low FT4) have recently been linked to foetal loss,

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prematurity, and impaired offspring cognitive function. Some research has linked maternal thyroid autoimmunity to foetal loss.[8]

Thyroid dysfunction occurs when the mother's thyroid function changes during pregnancy. Thyroid hormone binding globulin (TBG) concentrations rise, kidney iodine clearance rises, and human chorionic gonadotropin's thyrotrophic action rises (hCG).[9-11]

In prior studies, the overt hypothyroidism prevalence was 1% to 1.5%, and subclinical hypothyroidism prevalence was 5% to 8%.[9-11] Fetal distress in labour, foetal death and congenital hypothyroidism were the main pregnancy complications of hypothyroidism. Subclinical hypothyroidism is linked to preterm birth and low Apgar scores. Hyperthyroidism affects 0.2-0.8 percent of pregnancies and 0.4-1% of pregnancies with subclinical hyperthyroidism.[12,13]

We discovered recently that a TSH level of 2.5 mIU/L in the first trimester is now considered the upper limit of the normal range, owing to a better understanding of the thyroid's interaction with pregnancy. This information has a big impact on how prior research is interpreted and how clinical hypothyroidism is diagnosed.[9]

In my study, 10% of the pregnant women were aged < 20 years, 83% were aged 21- 30 years, 7% were aged 31-40 years. In this study, 45% of the pregnant women were primigravidae, 35% were multigravidae with previous normal delivery and 20% were multigravidae with previous LSCS. In my study, period of gestation at the time of screening, 49.5% of women were at <10 weeks, 50.5% were >10 weeks.

84% were euthyroid, 10% had subclinical hypothyroidism, 6% of pregnant women had overt hypothyroidism. There were no hyperthyroid cases detected in this study. In this research, 84% of pregnant women were euthyroid, 10% were subclinical hypothyroid, 6% overt hypothyroid. In my study, out of all pregnant women diagnosed with hypothyroidism, 56.25% were treated adequately and 43.75% were treated inadequately.

Thyroid abnormalities, whether clinical or subclinical, are frequently discovered during pre-conceptional counselling or during thyroid function tests in women who have recently given birth. If laboratory-dependent, trimester-specific TSH ranges are not available, the recommended reference ranges for TSH are 0.1 to 2.5 mIU/L in the first trimester, 0.2 to 3.0 mIU/L in the second trimester, and 0.3 to 3.0 mIU/L in the third trimester, according to recent American Thyroid Association (ATA) guidelines.[14]

A number of pioneering studies by Man et al.[15] Haddow et al.[16] and newer studies by Rovet et al.[17] and Pop et al.,[18] have decisively demonstrated that children born to hypothyroid mothers have a considerably increased risk of IQ, cognitive developmental indices, and learning capacities impairment.

In a study by Rovet *et al*.[17] such children were shown to have modest deficits in global intelligence, but not in visual-spatial ability, language, fine motor skills, or preschool abilities. This study underscores the importance of providing proper follow- up to women once they begin treatment.

In this study, out of all hypothyroid women 37.5% had complications and 62.5% had no complications. 5.6% of the adequately treated hypothyroid women and 78.6% of the inadequately treated hypothyroid women had complications.There was a statistically significant difference in the pregnancy outcome amongst hypothyroid women based on the

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

adequacy of treatment. The occurrence of complications was high in inadequately treated women. (Chi square value= 17.35, p value = <0.0001)

Out of all, 6.3% of the cases had spontaneous abortion, 3.1% had PIH, 3.1% had oligohydramnios, 6.3% had GDM, 6.3% had preterm, 3.1% had IUGR, 9.3% had LBW, and 62.5% had no complications. The number of complications were significantly high in inadequately treated group when compared to adequately treated hypothyroid women. (Chi square value = 18.92, p value = 0.008)

Our findings were consistent with previous findings from India and Iran, where TSH levels in the second trimester ranged from 0.43 to 5.78 mIU/L and 0.5 to 4.1 mIU/L, respectively.[19,20] These disparities could be explained by differences in laboratory procedures, kits, maternal iodine status, ethnic, genetic, and environmental factors in our and other similar research. Other research, on the other hand, suggest a lower TSH range.[21]

Allan et al[22] TSH levels more than 6 mIU/L were shown to be significantly linked to a higher rate of pregnancy loss; however, a recent study found no link between TSH levels and the risk of preterm delivery.[14]

Consistent with our results, Goel et al[23] showed a higher risk of fetal distress in mothers with subclinical or clinical hypothyroidism. It appears that hypothyroidism has irreversible effects on the placenta and foetus during pregnancy and reduces the foetal ability to tolerate stress, resulting in neonates with low Apgar scores at birth.

In this study, we discovered that hypothyroidism during pregnancy, even in a subclinical form, can result in IUGR and a low Apgar score. Although hyperthyroidism was uncommon in our pregnant women, it can result in IUGR.

CONCLUSION:

In my study, the prevalence of hypothyroidism was found to be 16% and majority of complications were found to occur in patients who were treated inadequately. Thus, universal thyroid screening in pregnancy meets the majority of the criteria for a beneficial and cost-effective screening programme, and it holds promise for improving foetal and maternal outcomes.

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