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Original Research Article

A prospective clinical trial to evaluate the prevalence of thyroid disorder among pregnant women and obstetrical and fetal outcome in a tertiary health centre located in central India

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ABSTRACT

Background: A prospective clinical trial to evaluate the prevalence of thyroid disorder among pregnant women and obstetrical and fetal outcome was done in a tertiary health centre (RKDF Medical College and Research Centre, Bhopal) located in central India.

Methods: This prospective study was carried out in antenatal women in their first trimester attending antenatal OPD in RKDF Medical College and Research Centre, Bhopal, Madhya Pradesh to know the prevalence of thyroid disorder and its association with pregnancy outcome.

Results: In this study prevalence of thyroid disorder was 12.4%, subclinical hypothyroidism 7.2%, overt hypothyroidism 3.4%, subclinical hyperthyroidism 1.4%, overt hyperthyroidism 0.4%. Thyroid disorder is responsible for several obstetrical and fetal complication like pre-eclampsia, preterm delivery, abortion, IUGR and low birth weight.

Conclusions: Thyroid disorder associated with poor obstetrical outcome and fetal complication. so timely diagnosis and treatment is required. Universal screening should be preferred over high-risk screening because of high prevalence of the disease in India.

Keywords: Hyperthyroidism, Overt hypothyroidism, Overt hyperthyroidism, Pregnant women, Subclinical hypothyroidism, Subclinical, Thyroid disorder

INTRODUCTION

Thyroid disorder is one of the commonest endocrine disorders in young women of reproductive age.¹ Thyroid disorder in pregnancy associated with adverse outcome in mother and foetus.²

Pregnancy is associated with change in the physiology of pituitary thyroid axis, iodine metabolism and immune function. The total serum t3 and t4 level increase during pregnancy due to increase in thyroxin binding globulin.³ Increase in TBG, occurs due to increase synthesis, under

the influence of oestrogen. Although, free hormone level remains unchanged. HCG shows structural similarity with TSH and cause transient increase in free thyroxin level, as a result TSH levels are suppressed.

Between 2.2%-2.5% of women have been found to have TSH level of 6 mIU/L or greater, at 15 to 18 weeks of gestation.⁴ In normal pregnant women, the thyroid gland maintains euthyroidism with minor fluctuation.

In women with limited thyroid reserve due to thyroid autoimmunity or iodine deficiency hypothyroidism can

develop.⁵ While the American thyroid association not recommends, universal screening but expert suggest number of pregnant women with thyroid disorder would be missed, if only high-risk patients were examined, so more extensive screening is required.

The objective of this study was to evaluate the prevalence of thyroid disorder among pregnant women, and its obstetrical and fetal outcome.

METHODS

This study was done at RKDF Medical College and Research Centre, Bhopal in department of obstetrics and gynecology from 1st December 2018 to 30th November 2019.

The study approved by research ethics committee at hospital.

It is prospective study includes 1000 pregnant women in their first trimester and informed consent was obtained from all women.

Inclusion criteria

- First trimester of pregnancy, singleton pregnancy, primi/multigravida.

Exclusion criteria

- Multifetal gestation, history of hypertension, diabetes, previous bad obstetrics history with known cause.

After taking informed consent from subjects, detail history was taken, general examination, systemic examination, per abdominal and per vaginal examination was done. Pregnancy confirmed by urine pregnancy test and ultrasonography. Routine antenatal profile testing was done.

Specific investigation

All patient tested for serum TSH level, if serum TSH values were deranged than free t3 and free t4 levels were tested.

(As per regulation of American thyroid association guidelines)

In this study, following normal reference ranges are recommended

- First trimester 0.1 to 2.5 mIU/L
- Second trimester 0.2-3 mIU/L
- Third trimester 0.3-3 mIU/L
- Normal free t4 level is 0.7-1.8 nanogram per ml
- Free t3 level is 1.7 to 4.2 pg/ml.

Based on the hormone values, patients were classified into-

- Subclinical hypothyroidism: high serum TSH and normal ft4 and ft3
- Overt hypothyroidism: high serum TSH and ft3 and ft4 less than normal
- Subclinical hyperthyroidism: low serum TSH and normal ft3 and ft4
- Overt hyperthyroidism: low serum TSH and ft3 and ft4 more than normal.

Following obstetrical and fetal outcome of pregnancy in relation to thyroid disorder were studied. Abortion, abruptio placenta, preeclampsia, preterm delivery, IUGR, low birth weight and stillborn.

RESULTS

Table 1: Prevalence of types of thyroid disorder among 1000 pregnant women.

Types of thyroid disorder	No. of cases in 1000 patients	Percentage
Subclinical hypothyroidism	72	7.2%
Overt hypothyroidism	34	3.4%
Subclinical hyperthyroidism	14	1.4%
Overt hyperthyroidism	04	0.4%

In the present study 124 out of 1000 pregnant woman screened found to have thyroid disorder. The prevalence of thyroid disorder was 12.4%. In the present study prevalence of subclinical hypothyroidism is 7.2%, overt hypothyroidism is 3.4%, Subclinical hyperthyroidism is 1.4% and overt hyperthyroidism is 0.4%.

Table 2: Thyroid stimulating hormone level in study cases.

Types of thyroid disorder	No. of cases in 1000 patients	Mean	Standard deviation
Subclinical hypothyroidism	72	4.2	1.24
Overt hypothyroidism	34	8.6	2.94
Subclinical hyperthyroidism	14	0.020	0.014
Overt hyperthyroidism	04	0.012	0.006

The mean TSH level in the cases of subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, overt hyperthyroidism was 4.2, 8.6, 0.02 and 0.012 respectively.

Table 3: Maternal and fetal complication among patient of subclinical hypothyroidism.

Complication	No. of cases in 1000 patients	Percentage
Preeclampsia	8	11.1%
Preterm delivery	6	8%
Abortion	4	5.5%
Abruptio placentae	2	2.7%
IUGR	5	6.9%
Low birth weight	4	5.5%
Still birth	1	1.3%

In present study, the incidence of maternal complications in the case of subclinical hypothyroidism was preeclampsia (11.1%), preterm delivery (8%), abortions (5.5%) and abruptio placentae (2.7%). In the present study, the incidence of fetal complication in the case of subclinical hypothyroidism was IUGR (6.9%), low birth weight (5.5%), stillbirth (1.3%).

Table 4: Maternal and fetal complication among patient of overt hypothyroidism.

Complication	No. of cases in 1000 patients	Percentage
Preeclampsia	6	17.6%
Preterm delivery	5	14.7%
Abortion	2	5.8%
Abruptio placentae	1	2.9%
IUGR	4	11.7%
Low birth weight	3	8.8%
Still birth	1	2.9%

In the present study, the incidence of maternal complication in case of overt hypothyroidism was preeclampsia (17.6%), percent preterm delivery (14.7%), abortion (5.8%), abruptio placenta (2.9%). The incidence of fetal complications in case of overt hypothyroidism was IUGR (11.7%), low-birth-weight (8.8%), stillbirth (2.9%).

Table 7: Comparison of incidence of complication in pregnant women having subclinical hypothyroidism.

	Preeclampsia	Preterm delivery	Abortion	Abruptio placenta	IUGR	Low birth weight	Still birth
Sahu MT et al ¹¹	9.8%	10.3%	-	-	2.4%	-	2.5%
Taghavi et al ⁷	2.7%	2.7%	-	-	-	-	-
Lang et al ¹²	15%	9%	-	-	-	9%	-
Ajmani et al ⁶	22.2%	5.8%	2.39%	-	4.9%	12.11%	1.7%
In present study	11.1%	8%	5.5%	2.7%	6.9%	5.5%	1.3%

Observation in this study

- Prevalence of thyroid disorder in pregnancy 12.4%

Table 5: Maternal and fetal complication among patient of subclinical hyperthyroidism.

Complication of subclinical hyperthyroidism	No. of cases in 1000 Patients	Percentage
Preeclampsia	3	21.4%
Preterm delivery	1	7.1%
Abortion	1	7.1%
IUGR	3	21.4%
Still birth	1	7.1%

In the present study, the incidence of maternal complication in case of subclinical hyperthyroidism was preeclampsia (21.4%), preterm delivery (7.1%), abortion (7.1%) and incidence of fetal complication was IUGR (21.4 %), stillbirth (7.1%).

Table 6: Maternal and fetal complication among patient of overt hyperthyroidism.

Complication of overt hyperthyroidism	No. of cases in 1000 patients	Percentage
Abortion	5	27.7%
IUGR	4	11.7%
Still birth	1	7.1%

The incidence of maternal complication in cases of overt hyperthyroidism was abortion (27.7 %) and incidence of fetal complication was IUGR (11.7%).

DISCUSSION

This study conducted in RKDF Medical College and Research Centre, Bhopal, Madhya Pradesh, India. The aim of study was to evaluate the prevalence of thyroid disorder in pregnancy and pregnancy outcome.

All pregnant women enrolled for study screened using serum TSH level and who had elevated TSH level, ft3 and ft4 was done.

- Prevalence of subclinical hypothyroidism 7.2%
- Prevalence of overt hypothyroidism 3.4%
- Prevalence of subclinical hyperthyroidism 1.4%
- Prevalence of overt hyperthyroidism 0.4%.

Prevalence of thyroid disorder in pregnancy, in this study is 12.4% which is comparable to study conducted by Ajmani et al, 13.25%, Taghavi et al, 14.6%, Wang et al, 10.2%.⁶⁻⁸

The study conducted by Tanuja et al, prevalence of thyroid disorder was less 5% and study conducted by Rajput et al, prevalence of thyroid disorder was higher 26.5% and not compatible with this study.^{9,10}

In pregnant women having subclinical hypothyroidism, Incidence of pre-eclampsia 11.1%, preterm delivery 8%, abortion 5.5%, abruptio placenta 2.1%, IUGR 6.9%, low birth weight 5.5%, and still birth 1.3% in this study (Table 7).

Study conducted by Sahu MT et al, incidence of preeclampsia 9.8%, preterm delivery 10.3%, IUGR 2.4%, stillbirth 2.5%.¹¹ In this study there was no incidence of

abortion and abruptio placenta but in the present study it is 5.5% and 2.7% respectively, which is significant.

Study by Taghavi et al, incidence of complication in pregnant women with subclinical hypothyroidism preeclampsia 2.7% and preterm delivery 2.7%.⁷ There was no in incidence of abortion in Taghavi et al study.⁷ Study conducted by Lang et al, incidence of preeclampsia 15%, preterm delivery 9% low birth weight 9%, which is slightly more than present study.¹²

Study conducted by Ajmani et al, incidence of preeclampsia 22.3%, preterm delivery 5.8%, abortion 2.3%, IUGR 4.9%, low birth weight 12.1% and still birth 1.7%.⁶ Incidence of complication preeclampsia (22%) and low birth weight (12.11%) was more than the present study and incidence of preterm delivery (5.8%) IUGR (4.9%), abortion (2.3%) was slightly less than present study.

Table 8: Comparison of incidence of complication in pregnant women having overt hypothyroidism.

	Preeclampsia	Preterm delivery	Abortion	Abruptio placenta	IUGR	Low birth weight	Still birth
Sahu MT et al ¹¹	20.7%	4.7%	-	-	13.8%	-	2.9%
Lang et al ¹²	22%	-	-	-	-	22%	4%
Ajmani et al ⁶	16.6%	33.3%	16.6%	16.6%	25%	50%	16%
In present study	17.6%	14%	5.8%	2.9%	11.7%	8.8%	29%

Table 9: Comparison of incidence of complication in pregnant women having subclinical hyperthyroidism.

	Preeclampsia	Preterm delivery	Abortion	Abruptio placenta	IUGR	Low birth weight	Still birth
Taghavi et al ⁷	4.7%	4.7%	-	-	-	-	-
In present study	21.4%	7.1%	7.1%	-	16.6%	8.8%	5.5%

In present study incidence of complication in pregnant women with overt hypothyroidism preeclampsia 17.6%, preterm delivery 14.7%, abortion 5.8%, abruptio 2.9%, IUGR 11.7%, low birth weight 8.8%, still birth 2.9%.

Study conducted by Ajmani et al, incidence of preeclampsia is 16.6%, preterm delivery 13.3%, abortion 16.6%, abruptio 16.6%, IUGR 25%, low-birth-weight 50%, still birth 16.6%.⁶ Study conducted by Sahu MT et al, Incidence of preeclampsia 27%, preterm delivery 4.7%, IUGR 13.8%, stillbirth 2.9%.¹¹

Study conducted by Lang et al, incidence of complication in pregnant women with overt hypothyroidism preeclampsia 22%, low birth weight 22%, still birth 4%.¹²

In present study Incidence of abortion was 5.8%, which is significant and not found in any other study except study

conducted by Ajmani et al, which showed incidence of abortion as 16.6%.⁶

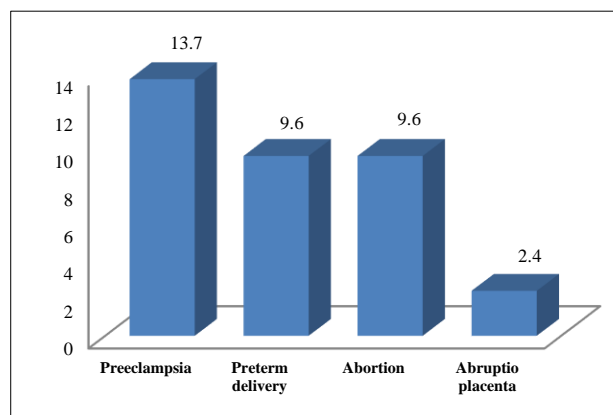


Figure 1: Incidence of maternal complication in thyroid disorder.

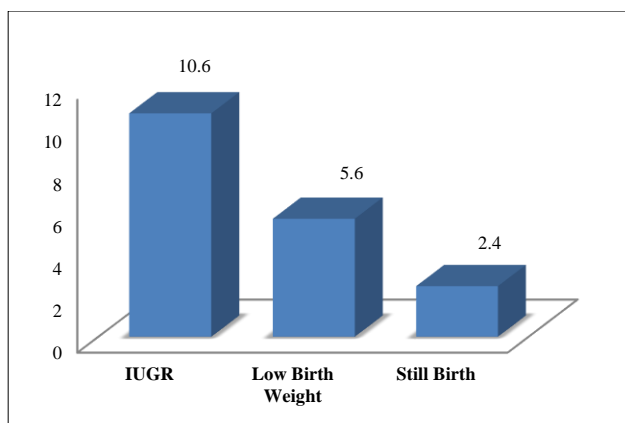


Figure 2: Incidence of foetal complication in thyroid disorder.

Incidence of complication in pregnant women in present study with subclinical hyperthyroidism, preeclampsia 21.4%, preterm delivery 7.1%, abruption 7.1%. IUGR 16.6% and Stillbirth 5.5% (Table 9). Study conducted by Taghavi et al, incidence of preeclampsia 4.7% preterm delivery 4.7%.⁷ Incidence of maternal complication in 124 pregnant women with thyroid disorder preeclampsia (13.7%), abortion (9.6%), preterm delivery (9.6%), abruptio placenta (2.4%) (Figure 1).

The incidence of fetal complication in 124 pregnant women with thyroid disorder was IUGR (10.6%) stillbirth (2.4%), low birth weight (5.6%) as per Figure 2.

CONCLUSION

This study showed a high prevalence of thyroid disorder in pregnant women. Thyroid disorders associated with several of obstetric and fetal complication and timely detection and optimal treatment of thyroid disorder, reduce the risk of the complication and because of high prevalence of thyroid disorder in pregnancy in India, Universal screening of pregnant woman is required.

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