Section: OBG

Research

A PROSPECTIVE STUDY TO DETERMINE THE PREVALENCE OFTHYROID DISORDERS IN ANTENATAL PERIOD

Kalpana G[1], Anisa Begum[2], Fareena Jabeen[3], Narguna Elsina[4], Sulochana K[5]

[1]Assistant Professor, Department of OBG, Malabar Medical College, Modakkallur, Kozhikode, Kerala
[2]Assistant Professor, Department of OBG, Kakatiya Medical College, Warangal, Telengana
[3]Specialist OBGYN, Armed Force Hospital, AL Khoud, Muskat, Oman
[4]Consultant, Jyothi Hospita l, BMY Charoda, Durg Dt, Chatthisgarh,
[5]Professor & HOD, IQRAA International Hospital and Research centre, Kozhikode, Kerala.

Received : *24/10/2022*
Received in revised form : *27/11/2022*
Accepted : *09/12/2022*

Keywords:
Thyroid screening, TSH, hypothyroidism, hyperthyroidism, overt and subclinical types, maternal complications, fetal complications.

Corresponding Author:
Dr. Kalpana G,
Email:drkalpanaji@gmail.com
ORCID: 0000-0001-6650-5464

DOI: 10.47009/jamp.2022.5.1.88

Source of Support: Nil,
Conflict of Interest: Nonedeclared

Int J Acad Med Pharm
2023; 5 (1); 425-429

Abstract

Background: Thyroid disorder is the second commonest cause of endocrine disorders in women of reproductive age. There is a close association between maternal and fetal thyroid function. The aims & objectives are to determine whether universal thyroid screening will help in picking up overt and subclinical thyroid dysfunction in antenatal mothers and to assess whether determining it will decrease the incidence of associated adverse maternal and fetal outcomes. **Materials and Methods:** A Prospective Observational clinical study was done in the department of obstetrics and gynaecology in one thousand antenatal women for a period of ten months, using Chi-square test and sample size formula(4pq/d2), eight hundred and ten patients as sample size. **Result:** One thousand pregnant women were recruited into this study and analyzed. Among the 1000 pregnant ladies screened , 146 were found to have different thyroid problems with the prevalence of 14.6%.Among the test population, 12.10% were found to be with hypothyroidism and 2.50% were found to be with hyperthyroidism. Among the study population, 85(8.5%) were found to be with subclinical hypothyroidism whereas 36(3.6%) were found with overt hypothyroidism. Subclinical hyperthyroidism was found in 17(1.7%) cases whereas 8 (0.8%) were with overt hyperthyroidism. **Conclusion:** Routine screening need to be emphasized to all antenatal mothers. In view of the adverse maternal and fetal effects in thyroid disorders complicating pregnancy, universal screening of antenatal population is thought to be helpful in interpreting the maternal and fetal outcomes.

INTRODUCTION

Thyroid disorder is the second commonest cause of endocrine disorders in women of reproductive age. A close association exists between the function of maternal and foetal thyroid gland.[1,2] This dysfunction is associated with complications such as anaemia , IUGR, mental retardation in the neonate. It can also affect fertility, wellbeing of mother, growth and development of the foetus.[1,2]

It is now believed that in addition to overt thyroid condition, subclinical level also has adverse effects on maternal and foetal health.[3] A study to know the clinical features, complications in mother and foetus due to thyroid problems in pregnancy would help to initiate appropriate therapy to prevent these complications and manage them accordingly.

Keeping all these in mind, screening of thyroid disorder in pregnancy has been proposed. But there are controversies in screening for thyroid dysfunction universally. Still studies recently have concluded that targeted high risk case finding may miss a significant number of those having the disease.Therefore universal thyroid screening is preferable.[4-6]

In South India, that too in Kerala, the prevalence of thyroid disorder is more, particularly in coastal areas,[7] and hence need is there for appropriate screening and diagnosis. This universal screening will aide to pick up many overt and subclinical cases.[8]Hence, this study was done on the results of thyroid screening of antenatal population attending outpatient clinic universally, in the obstetrics and gynaecology department for a period of 10 months.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

MATERIALS AND METHODS

The study was done in outpatient section among 1000 antenatal women for a period of ten months after obtaining the clearance from the ethical and scientific committees of the institution. This was an observational prospective study.

A sample of 1000 subjects were taken.

Sample size calculation

Sample Size: 810

N= 4pq (d^2)

P=Prevalence

Q=100 – P

d=Precision

n=Sample size

Inclusion criteria

Pregnancy with

Singleton pregnancy,

Exclusion criteria

Pregnancy with

1. Multiple pregnancy
2. Gestational trophoblastic disease
3. Other medical disorders complicating pregnancy (diabetes, hypertension, pre-existing thyroid problems)

About 1000 antenatal patients attending the obstetrics department were taken for this study. Complete clinical history and examination findings were noted.Along with routine antenatal investigations, we did specific investigations pertaining to this study like TSH, freeT3 and free T4.

Values of FT3,FT4,&TSH noted.

Recommended samples (serum and plasma) were collected with all precautions for venipuncture.

The test results were determined automatically by the four-parameter logistic curve (4PLC) math model. The biochemical test done specifically was TSH level estimation by ECLIA (Electro-Chemi-Luminescence-Immunoassay) method in laboratory.

Methodology

Normal value

TSH 0.27 – 4.2μIU/ml

- I trimester : 0.1 –2.5mlIU/L
- II&III trimester : 0.2 – 3.0mlIU/L

Data Collection

- A consent (written and informed) was taken from the study participants.
- Confidentiality was maintained.
- Detailed history taking, general physical and obstetrical examination was done.
- Routine investigations were done
  1. Hemoglobin %
  2. Routine urine examination
  3. Blood grouping and typing
  4. Random blood sugar.
  5. TSH was done and values were noted and categorized accordingly.

The above-mentioned outcomes were noted, and follow up was done. Calculation and analysis of frequency and percentage of each parameter was done.

After that, the subjects were categorized into three based on TSH values in 1st trimester as normal, increased or decreased TSH levels.Those having TSH values abnormal ,further biochemical tests (FT3, FT4, TPO antibodies, anti-microsomal antibodies) were done. With these results, the subjects were categorized as normal, overt/subclinical hypothyroidism, subclinical or overt hyperthyroidism. Then they were followed up during pregnancy and the outcome variables were compared.

Statistical Analysis

The findings and diagnosis were recorded in the MS-Excel sheet. Analysis of data done and statistics were presented.

- Categorical variables were summarized.
- On the basis of percentage of the total number,the analysis was done statistically .And the outcomes are expressed as percentages and proportions.

RESULTS

One thousand pregnant women were recruited into this study and analyzed. Among them, 146 were found to have different thyroid problems with 14.6% prevalence. Among them,12.10% had hypothyroidism and 2.50% had hyperthyroidism.

And 85(8.5%) were found to have subclinical hypothyroidism whereas 36(3.6%) were found with overt hypothyroidism. 17(1.7%) had Subclinical hyperthyroidism whereas 8 (0.8%) had overt hyperthyroidism. Both hypo and hyper levels were noticed mostly in 21-30yrs age groups.

Subclinical and overt hypothyroid were 44.3% and 32.35% respectively in primigravidas, whereas hyperthyroid (subclinical v/s overt) were 50% v/s 33.33%. Overt hypo and hyperthyroidism is seen in 67.64% and 66.67% respectively in multigravidas.

47% of the women diagnosed had positive family history.66% of pregnant women with hypothyroidism and 14.9% hyperthyroid women had positive family history. Pre-eclampsia (PE) was noted to be more about 9.1% among the maternal complications due to hypothyroidism. Next was preterm deliveries (5.8%) and then comes abortions (4.1%). PE was in 7.1% of subclinical cases and 13.9% were in overt hypothyroids .3.5%abortions in subclinical and 5.6% in overt types of hypothyroidism.

Maternal complications observed in hyperthyroid patients were abortions,(16.00%),preeclampsia (8%) & pre term deliveries (8%).

Intrauterine growth restriction (IUGR) was in 10.65% of subclinical hypothyroidism and 5.6% in overt hypothyroidism. Still-births noted in 0.8% in

ISSN (O): 2687-5365; ISSN (P): 2753-6556

subclinical type.IUGR (8.33%) and stillbirth (4.1%) were the fetal complications in pregnant hyperthyroidism patients.

DISCUSSION

Thyroid hormone derangements are the second most commonly found endocrine disorder in pregnant women.[3] It has serious effects on the pregnancy and the developing foetus.

The hormonal changes and metabolic demands during pregnancy results in significant alteration in foetal and maternal thyroid function. Glinoer et al described the mechanism regulating the maternal thyroid function and said that the changes in pregnancy were generally minor and consisted primarily of an increase in TBG2.

The proper screening and prompt treatment of thyroid disease during pregnancy is necessary in preventing adverse outcomes in both the mother and the foetus. We can note that, thyroid abnormalities are found to be subclinical without any symptoms. They are not easily recognized with targeted screening programs. It is also discovered that even mild maternal thyroid dysfunction can lead to neuro-developmental and cognitive problems in the developing foetus.

The diagnosis of thyroid disease is mainly by the measurement of serum TSH and free T3,T4 levels. We can see from various literature that, for thyroid disorders, TSH threshold that is gestation specific, is an important aid in its accurate diagnosis and treatment.

The Endocrine society clinical practice guidelines (2007) recommends screening of pregnant women,[9] who were found as high risk for developing thyroid disease. A study by Vaidya et al 2007 it was observed that by screening only high-risk women, 30% of hypothyroidism patients and 69% of hyperthyroid patients [10] may be missed.

As mentioned earlier, it is now well established that subclinical thyroid dysfunction can also lead to adverse outcomes in the mother as well as the foetus.[3]Hence, the main objective of this study is to detect the prevalence of thyroid dysfunction during pregnancy.

In the study by Sahu MT et al,[3]the prevalence of thyroid disorders in pregnant population was 11.05%. The prevalence observed in our study is 14.6%.Hence we can conclude that epidemiologically more percentage of thyroid disorders were prevalent in our area.

In studies by Weiwei Wang et al ,the prevalence observed was 10.2% and Ajmani et al was 13.25%.[19,20]The literature itself has reported that prevalence of hyperthyroid disorders are relatively low (2.4%) compared to hypothyroidism (10.3%) occurring in pregnancies. In our study too, the prevalence of hypothyroidism (12.1%) was more when compared to hyperthyroidism (2.5%).

Table 1: Types of Thyroid Disorders – Prevalence of hypo and hyper types

Study	Prevalence	
	Hypothyroidism	**Hyperthyroidism**
Sahu MT et al 2010,[3]	10.3%	2.4%
Present study	12.1%	2.5%

By the study by Sahu et al, the prevalence of subclinical hypothyroidism was 6.47% which is comparable with our study (8.5%). Prevalence of overt hypothyroidism in the same study was 4.58%, and our corresponding figure is 3.60%.

Overt hypothyroidism in our study was comparatively less to that of subclinical hypothyroidism. A study by Yadav et al,[21] found that hypothyroidism is seen in every 1 in 10 pregnant Indian women. The prevalence of hypothyroidism in the pregnant population is different among the states in India, but the data available is insufficient.[21]

Table 2: Hypothyroidism-Prevalence

Study	Prevalence	
	Subclinical	**Overt**
Casey BM et al 2005,[11]	2.3%	-
Sahu MT et al 2010,[3]	6.47%	4.58%
Present study	8.50%	3.60%

According to various studies, the prevalence rates of subclinical v/s overt hyperthyroidism ranges from 0.5-3.5% v/s 0.3-1.3%. In our study, findings of subclinical v/s overt are about the same(1.7% and0.8%.)

.

Table 3: Hyperthyroidism-Prevalence

Study	Prevalence	
	Subclinical	**Overt Hyperthyroidism**
Sahu MT et al 2010,[3]	0.9%	0.7%
TuijaMannistoetal2010,[12]	3.5%	1.3%
Stagnaro Green A et al2011,[13]	0.5%	0.3%
Present study	1.7%	0.8%

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Thyroid Disorders v/s Parity

The prevalence of hypothyroidism in the primigravida is 12.2.%, and13.3%,10.1%,14.0% as parity increases. (Primi-12.2%, multi-8.78%). The prevalence of hyperthyroidism is 3.2.%, and among 1.6%,3.6%,1.8% as parity increases. (Primi- 3.2%, multi-1.52%). With our results it is seen that thyroid disorders (Hyper and hypothyroid) were found to be more common in multigravidas compared to primigravida. This may be partly due to the reason that the thyroid dysfunction in the multigravidas would not have been diagnosed during their early pregnancies. In the study by Vaidya et al, it was determined that a family history was there in 22.8% including 413 pregnant women[10]. Our study, showed a higher association with positive family history of 47%. Thyroid disorders were noticed mostly in the age groups 21-30 years. Overt hyperthyroidism was not noticed in the age groups <20 years and >30 years.

In the study done by Muthukrishnan J et al (2013), it was observed that caesarean section (LSCS) were more seen in hypothyroidism (62.2%) which is likewise to ours (57.8.%). In our study, emergency LSCS rates were high both in hypo and hyperthyroidism

Also, in our study percentage of instrumental deliveries (15.7% & 16.0%) is considerably increased in hypo and hyperthyroidism the main indication being again uterine inertia in hypothyroidism patients and foetal distress in hyperthyroidism patients. Vaginal deliveries in study by Muthukrishnan J et al and our study are in the higher range. (38.0%).[14]

Table 4: Thyroid Disorders v/s Labor outcome.

Study	Hypothyroidism		Hyperthyroidism	
	NVD	LSCS	NVD	LSCS
Muthukrishnan Jet al 2013,[14]	27.5%	62.2%		
Present study	38.0%	57.8%	28.0%	56.0%

The major pregnancy complications like preeclampsia were seen in 17% cases in the study done by Leung et al and 12.2% in the study by Sahu et al respectively[3,15]. In our study, incidence of preeclampsia is 7.1% and 13.9% in subclinical and overt hypothyroid women. Hypothyroidism is a known cause of reversible hypertension, so an association between hypothyroidism and preeclampsia can be seen.

The other complication observed after is preterm labor (PTD) showing the incidence in the range 7.3%. In our study it was similar to the other studies around 8.3%. But in the literature, there are no data regarding the rate of miscarriage in pregnancy with hypothyroidism. The incidence of miscarriage is around (3.5% & 5.6%) in subclinical and overt hypothyroid women, respectively in our study.

Table 5: Hypothyroidism-Maternal and Fetal complications

Study	PE	AP	PTD	AB	IUGR
Leung et al 199315	17%	-		-	
Sahu MT et al 20103	12.2%	-	7.3%	-	5.4%
Present study Subclinical	7.1%	0.0%	4.7%	3.5%	10.6%
Overt	13.9%	2.8%	8.3%	5.6%	5.6%

In the study by Kriplani et al (1993), preeclampsia and preterm delivery was high (22% v/s 25%.)

The lesser incidence in our study can be due to early diagnosis and treatment of the complications. Some patients of preeclampsia were found to be late bookings, elderly and those with noncompliance.

In our study, miscarriage rate (16.0%) is significantly high compared to1.45% found in the study of Robert Negro et al. Still-births noted in were seen in women who were not compliant with the treatment and those who were not having regular antenatal visits.

Table 6: Maternal and Fetal Complications-Hyperthyroidism

Study	PE	AP	PTD	AB	IUGR	SB
Robert Negro et al2010,[16]			16.7%	14.3%		
Miller et al1994,[17]	4.7%					
Kriplaniet al	22%	-	25%			
TuijaMannisto et al2010,[12]	3.5%	1%				
PresentStudy	8.0%	0.0%	8.0%	16.0%	12.0%	8.0%

In the hypothyroid mothers, different neonatal complications were noted. By the study of Maria et al the percentage of jaundice and RDS were 8.9 % and 3.8%. In our study, the incidence is 6.6%and 3.3% respectively. Jaundice and RDS were seen mostly in subclinical hypothyroid mothers who had premature delivery. (7.1% and 2.4%)

Thyroid screening was done for all neonates. Screening test is performed after first 48hrs and within 5th day of delivery. If the levels after 48hrs is I3-30mU/l, a repeat test is done. Those infants with a repeat test > 8mu/l or initial value > 30mu/l, thyroxine with a dose of 10- 15mcg/kg/day was started. Treatment should be started immediately,for neonates with high levels to prevent neurocognitive damage.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 7:Neonatal complications in Hypothyroidism

Study	Jaundice	RDS	Delayed skeletalMaturity
Maria K et al 201218	8.9%	3.8%	15.2%
Present study	6.6%	3.3%	0.8%

Limitations of the Study

The results are not compared with the euthyroid population, but the maternal and fetal outcomes in the normal population can be compared with this study

CONCLUSION

This study concludes that universal thyroid screening in antenatal population will be helpful in preventing adverse maternal and foetal outcomes in view of the unfavourable outcomes on the mother and the foetus due to thyroid disorders.

Since hypothyroidism can be easily treated, early detection and treatment of the thyroid dysfunction could reduce the unfavourable outcomes in pregnancy which are often seen in these population. It is even better to screen the high-risk population in preconception period itself to confirm the euthyroid status before planning pregnancy which can help in good reproductive outcomes. Hence, further research is needed to decrease the gaps regarding thyroid disorders,its detection and treatment in pregnant population in a diverse country like India.

REFERENCES

1. Le Bean & Mandel-Thyroid disorders during pregnancy – Endocrinal MetabClin N Am 35(2006)117-136
2. Glinoer D,deNayer P, BouedoexP, LemoneM,RobynC,Van Steirteghem A, Kinthaert J, Lejeune B, Regulation of maternal thyroid during pregnancy. J.Cli.Endocrinal.Metab(1990) 71:276-287
3. Sahu.MT,Das.V et al:Overt and subclinicalthyroiddysfunctionamongIndian pregnant women and its effect on maternal and fetal outcome. Archives of obstetrics and gynaecology:2010:281(2):215-220
4. Nazarpour.S, Therani FR, Simbar M,Tohidi M,AlaviMajd H,Aziz F.Comparision of Universal screening with targeted high Risk case finding for diagnosis of thyroid disorders .EurJ Endocrinol.2016.
5. Journal of Clinical Endocrinology and Metabolism – detection of Thyroid Dysfunction in Early Pregnancy: Universal Screening or High Risk Case Finding, J Clin Endocrinol Metab (2007) 92(1):203-207.
6. International Journal of bioassays – Screening of Thyroid Dysfunction in pregnancy, Govt. Medical College Thrissur, Kerala, ISSN: 2278 -778X, Coden: IJBNHY.
7. Gayathri et al IMAKMJ, Incidence of Hypothyroidismincoastalareas,2009. 5-2004-2005.
8. Journal of Clinical Endocrinology and Metabolism – detection of Thyroid Dysfunction in Early Pregnancy: Universal Screening or High Risk Case Finding, J Clin Endocrinol Metab (2007) 92(1):203-207.
9. Endocrine society clinical practiceguidelines-2007.
10. Vaidya B, Antony S. Bilousm et al.Detection of Thyroid dysfunctioninearly pregnancy. Universal screening or high risk targeted case Finding J ClinEndocronol. Metab 2007; 92(1): 203-207.
11. Casey BM, Dashe JS, Well CE et al. Subclinical hypothyroidismand pregnancy outcomes. Obstet. Gynecol 2005;10(5):239-245.
12. TuijaMannisto,Maria Varasmaki et al,Thyroid dysfunction and mater morbidity. T.Clin Endocrinal Metab 2010 :95(3) : 1084-1094.
13. Stagnaro-Green A, Schwartz A, Gismondi R, Tinelli A, Mangieri T, Negro R. High rate of persistent hypothyroidism in a large-scale prospective study of postpartum thyroiditis in Southern Italy. J. Clin. Endocrinol.Metab.2011;96(3): 652–657.
14. MuthukrishnanJ, AbhyudayVerma, K.V.S HariKumar, Meena Ugala. Indian J Endocrinol Metab2013 : 17(2)294-297.
15. Leung AS, Millar L.K, Kooning PP, Montorom, Mestman J.Perinatal outcomes in hypothyroid pregnancies Obstet Gynecol1993;81(3):349-353.
16. Robert Negro ,Alan Schwartz et al. Detection and treatment of thyroid in pregnancy. J.Clin.Endocrinol.Metab.2010:95(4):1699-1707.
17. Millar.Lk.Wing DA .Low birth weight and preeclampsia in pregnancies complicated by hypothyroidism ,Obst and.Gynecol 1994:84(6) 946- 949.
18. Maria.K.Poulasouchidou,DimitriosG.Goulis,Paulos, Gesthiman Mintziori, Apostolos Athanasiadis, Grigorios G, Basil C.Tarlatzis : Prediction of maternal and neonatal adverse outcomes in pregnant women treated for hypothyroidism 2012:11(4) :468-476.
19. Wang W, Weiping Teng ZS, Wang S, Li J, Zhu L, Zhou J, et al. The prevalenceof thyroid disorders during early pregnancy in China: the benefits ofuniversal screening in the first trimester of pregnancy. Eur J Endocrinol.2011;164:263–8.
20. Ajmani SN, Aggarwal D, Bhatia P, Sharma M, Sarabhai V, Paul M. Prevalenceof overt and subclinical thyroid dysfunction among pregnant women andits effect on maternal and fetal outcome. J Obstet Gynecol India. 2014;64(2):105–10.
21. Vikas Yadav, Deepti Dabar, Akhil D. Goel, Mohan Bairwa, Akanksha Sood, Pankaj Prasad, Sanjay S. Agarwal, Sunil Nandeshwar, "Prevalence of Hypothyroidism in Pregnant Women in India: A Meta-Analysis of Observational Studies", Journal of Thyroid Research, vol. 2021, Article ID 5515831, 19 pages, 2021. https://doi.org/10.1155/2021/5515831

ISSN (O): 2687-5365; ISSN (P): 2753-6556