Original Article

Effects of hypothyroidism on maternal and foetal outcome

Gauri Raghunath Shinde[1*], Dipa R Vaghasia[2], Manisha Laddad[3]

[1]Assistant Professor, [2]Jr.Resident, [3]Associate Professor, Department of Obstetrics and Gynaecology, KIMSDU, Karad, Maharashtra, INDIA.
Email: drgauri8@gmail.com

Abstract

Hypothyroidism in pregnancy is associated with significant Obstetrical and Neonatal complications, which leads to increased maternal morbidity, perinatal morbidity and mortality. **Material and Methods:** This retrospective study was conducted from June 2014 to June 2015 to determine the current prevalence of thyroid dysfunction among pregnant women and its impact on maternal and foetal outcome in Obstetrics and Gynaecology Department, Krishna Institute of Medical Sciences, Karad. Total cases studied were 4573. Out of 4573 cases 43 (0.94%) cases were diagnosed having hypothyroidism. Data collected from all these diagnosed cases of hypothyroidism regarding last thyroid profile values, dose of thyroxin, associated significant medical or surgical illness, frequency of ANC, antenatal, intrapartum maternal complications such as PIH, oligohydramnios, anaemia, preterm delivery, IUGR, mode of delivery and foetal complications in terms of period of gestation at delivery, birth weight of babies, need for NICU for these babies. All these hypothyroid patients further divided in subclinical hypothyroidism as Group A and overt hypothyroidism as Group B. **Results:** Among 43 hypothyroid cases, there were 30 (69.77%) patients in group A and 13 (30.23%) patients in group B. Group A has more incidences of patients who; conceived after treatment for infertility, IUGR, Polyhydramnios, oligohydramnios, anaemia in antenatal period compared to group B (8vs 5,2 vs 1, 2 vs 0, 1vs 0, 1 vs 0 respectively). There was 1 case of history of bad obstetric history and 1 case of IUD in group B. Some of these were having combined complications also. Out of total 43 cases of Hypothyroidism, 35% patients delivered by normal vaginal delivery and 35% patients underwent LSCS in group A. Where else 14% patients delivered by normal vaginal delivery and 16% patients underwent LSCS in group B. The various indications for lower segment caesarean section were infertility, uteroplacental insufficiency, IUGR, severe preeclampsia, non-reassuring NST and foetal distress.19% babies from group A and 9% babies from group B were having birth weight <2.5 kg. There were 51% babies from group A and 21%babies from group B having birth weight >2.5 kg. The two-sided P value is 0.7830, considered not significant. Chi-square = 0/0759 and Odds ratio =0.8182.56% babies from group A and 21% babies from group B were born with good outcome and stable after delivery. Whereas 16% babies from group A and 5% babies from group B required NICU admission for causes like birth asphyxia, low birth weight. There was 1 (2%) baby IUD in group B. **Conclusion:** As use of TSH for diagnosis of thyroid dysfunction is widely reproducible, reliable and not expensive, it is an important tool to diagnose hypothyroidism especially in this modern era, where each baby is precious due to small family norms, increasing age of motherhood. Present study concluded that incidence of antennal complications such as PIH, anaemia, preterm delivery, incidence of LSCS, low birth weight, need for NICU is more in subclinical hypothyroidism compared to overt hypothyroidism. We also concludes that in spite of great discrepancies in recommendations on universal screening of hypothyroid dysfunction in pregnancy, high prevalence of hypothyroidism in our country and its great impact on maternal and foetal health makes it necessary to screen all the pregnant women early gestation as per Indian Thyroid Society guidelines.

Keywords: Hypothyroidism, Thyroid disorders in pregnancy, Thyroid disorders.

[*]**Address for Correspondence:**
Dr. Gauri Raghunath Shinde, C/s no 1549, Opposite Swimming Tank, Ganesh Nagar, Sangli-416416, Maharashtra, INDIA.
Email: drgauri8@gmail.com
Received Date: 17/07/2016 Revised Date: 24/08/2016 Accepted Date: 08/09/2016

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 18 September 2016

INTRODUCTION

Pregnancy is the period of great physiological stress for both mother and foetus. However, if any endocrine disorder like thyroid disorder is associated with pregnancy, the potential for maternal and foetal adverse outcomes can be immense.[1] Thyroid disorders constitute one of the most common endocrine disorders in pregnancy.[2] Among thyroid disorders, hypothyroidism is

How to site this article: Gauri Raghunath Shinde, Dipa R Vaghasia, Manisha Laddad. Effects of hypothyroidism on maternal and foetal outcome. *International Journal of Recent Trends in Science and Technology*. September 2016; 20(2): 252-257 http://www.statperson.com (accessed 20 September 2016).

more common than hyperthyroidism.[3] Hormonal changes and metabolic needs during pregnancy result in profound alterations in thyroid gland function. Factors included like increase of Thyroxin Binding Globulin (TBG) due to elevated Oestrogen and Human Chorionic Gonadotropin (hCG), increased renal losses of iodine due to increased glomerular filtration rate, modifications in the peripheral metabolism of maternal thyroid hormones, and modification in iodine transfer to the placenta. Hypothyroidism in pregnancy is associated with significant Obstetrical and Neonatal complications, which leads to increased maternal morbidity, perinatal morbidity and mortality. An apparent increase in incidence of thyroid dysfunctions in pregnancy may be due to following reasons-Increasing maternal age at the time of conception, increasing a wareness, easy availability of tests and its low cost.[1] Thyroid diseases are prevalent in women of child-bearing age and for this reason commonly present in pregnancy and the puerperium.[4] Overt or symptomatic hypothyroidism has been reported to complicate between 2 and 10 pregnancies per 1000. It is characterised by insidious nonspecific clinical findings that include fatigue, constipation, cold intolerance, muscle cramps, and weight gain. Other findings include oedema, dry skin, hair loss and prolonged relaxation phase of deep tendon reflexes. Throughout pregnancy, maternal thyroxin is transferred to the foetus which is important for normal brain development, especially before development of foetal thyroid gland function.[5] Women with thyroid dysfunction both overt and subclinical are at increased risk of pregnancy-related complications such as threatened abortion, preeclampsia, preterm labour, placental abruption, and babies, first-trimester spontaneous abortions, preterm delivery, foetal or neonatal hyperthyroidism, intrauterine growth retardation, high rates of still birth and neonatal deaths, neonatal hyperbilirubinemia, higher incidence of neonatal hypothyroidism, and increased perinatal mortality.[6] The foetus is able to produce thyroid hormones by 8 to 10 weeks gestation, but prior to that time, it is totally dependent on maternal thyroid hormones. Thyroid hormone is critical for normal foetal brain development: neuronal multiplication, migration, and structural organisation. These processes occur mainly during the second trimester when the foetus is primarily supplied with maternal thyroid hormones.[7] A lack of adequate maternal thyroid hormone may have irreversible effect on foetus.[8] It can lead to the disruption of normal brain growth and the development of brain damage, manifesting itself in a variety of ways, such as poor cognitive development, mental retardation and cerebral palsy.[9,10] As now a days because of increase in number of nuclear family and current socio economic challenges there is reduction in number of children, pregnancy in advanced age, increase incidences of infertility, each baby is very precious. One of the important cause of infertility and bad obstetric history and other neonatal morbidity and mortality, is hypothyroidism. For this reason more aggressive measures to be taken to diagnose it earlier and should be treated adequately accordingly.

MATERIAL AND METHODS

This Retrospective study was conducted to determine the current prevalence of thyroid dysfunction among pregnant women and its impact on maternal and foetal outcome. This study was conducted in Department of Obstetrics and Gynaecology in Krishna Institute of Medical Sciences from June 2014 to June 2015. Total number of cases studied during that duration was 4573. Out of them there were 43 (0.94%) cases of diagnosed cases of Hypothyroidism. Among them, there were 30 cases of subclinical hypothyroidism which were labelled as Group A and 13 cases of overt hypothyroidism which were labelled as Group B. From all the cases of hypothyroidism significant data were collected regarding last thyroid profile values, hypothyroid drug taking for same with dose of that drug, associated significant medical or surgical illness, frequency of ANC check-up etc. All these patients were studied for antenatal, intrapartum maternal complications (PIH, oligohy dramnios, anaemia, preterm delivery, IUGR etc.) and neonatal complication, mode of delivery, gestational age at delivery, birth weight of babies, need for NICU for these babies. The statistical differences between variables were compared by Chi-square test (P value). Clinical or overt hypothyroidism is confirmed when an abnormally high serum TSH level is accompanied by an abnormally low thyroxin level. Subclinical hypothyroidism is defined by an elevated serum TSH level and normal serum thyroxin concentration.[5] Use of TSH for diagnosis of thyroid dysfunction is widely reproducible, reliable and not expensive, but evaluation of the results requires trimester specific reference ranges.[11]

Table 1: Normal values of thyroid hormones and its variation according to different trimesters of pregnancy.[12]

	Non pregnant adult	1st trimester	2nd trimester	3rd trimester
Thyroid stimulating hormone (TSH) (μIU/mL)	0.34 - 4.25	0.60 -3.40	0.37 -3.60	0.38 -4.04
Thyroxine,free (fT4) (ng/dL)	0.8 - 1.7	0.8 - 1.2	0.6 - 1.0	0.5 - 0.8
Thyroxine,total(T4) (μg/dL)	5.4 - 11.7	6.5 - 10.1	7.5 - 10.3	6.3 - 9.7
Triiodothyronine, free(fT3) (pg/mL)	2.4 - 4.2	4.1 - 4.4	4.0 - 4.2	Not reported
Triiodothyronine, Total(T3) (ng/dL)	77 – 135	97 – 149	117 – 169	1.0 – 162

Inclusion Criteria

1. Registered case
2. Singleton pregnancy
3. Primigravida and multigravida
4. TSH done in this pregnancy and newly diagnosed case of hypothyroidism
5. Known case of hypothyroidism with treatment taken for infertility

Exclusion Criteria

1. Unregistered cases
2. History of previous thyroid surgery
3. Multiple gestation
4. Associated medical illnesses such as Diabetes mellitus, chronic hypertension, Renal disorders etc.

RESULTS

This study was conducted in Department of Obstetrics and Gynaecology in Krishna Institute of Medical Sciences from June 2014 to June 2015. Total number of cases studied during that duration was 4573. Out of them there were 43 (0.94%) cases of diagnosed cases of Hypothyroidism. Among them, there were 30 cases of subclinical hypothyroidism which were labelled as Group A and 13 cases of overt hypothyroidism which were labelled as Group B.

Table 2: Gravidity wise distribution

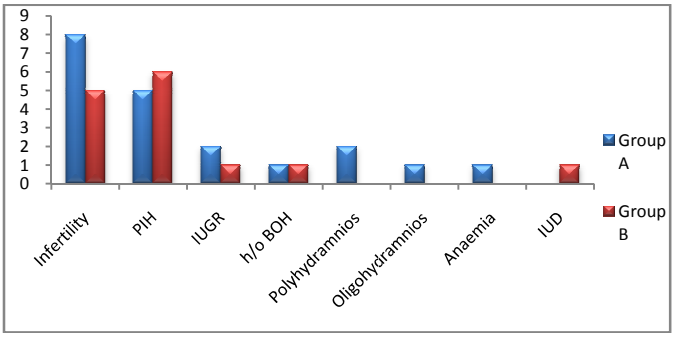
	Group A	Group B	Total
Primigravida	16(37.21%)	9(20.93%)	25(58%)
Multigravida	14(32.56%)	4(9.3%)	18(42%)
Total	**30(70%)**	**13(30%)**	**43(100%)**

Among 43 cases of Hypothyroidism, there were total 30(69.77%) cases of subclinical hypothyroidism and 13(30%) cases of overt hypothyroidism. In group A, 16(37.21%) patients were Primigravida and 14(32.56%) patients were multigravida. In group B, 9 (20.93%) patients were Primigravida and 4 (9.3%) cases were multigravida. (Ref. table 2)

P value is 0.5261, considered not significant. Chi-square = 0.4019 and Odds ratio = 0.5079.

Table 3: Hypothyroidism and associated risk factors in pregnancy

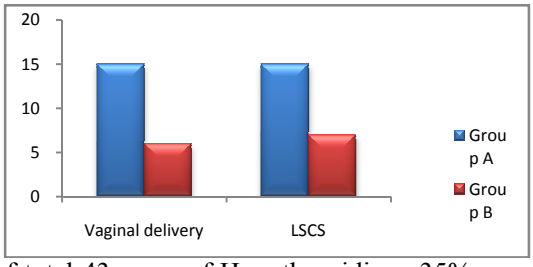
	Group A	Group B
Infertility	8	5
PIH	5	6
IUGR	2	1
h/o BOH	1	1
Polyhydramnios	2	0
Oligohydramnios	1	0
Anaemia	1	0
IUD	0	1



Among 43 cases of Hypothyroidism, there were 8 cases of Infertility in group A and 5 cases in group B. Out of total 13 cases of infertility, 7 cases were of Primary Infertility and 6 cases were of Secondary Infertility. All these cases of hypothyroidism were the cases in which the patient took treatment to conceive and conceived after treatment for hypothyroidism. There were 5 cases having associated PIH in group A and 6 cases in group B. There were 2 cases with associated IUGR in group A and 1 case in group B. There were 1, 2, 1, and 1 cases of history of Bad Obstetric history(h/o BOH), associated Polyhydramnios, Oligohydramnios and Anaemia respectively in group A. There were 1 case of history of bad obstetric history and 1 case of IUD in group B. Some of these were having multiple above mentioned complications. (Ref. table 3)

Table 4: Mode of Delivery

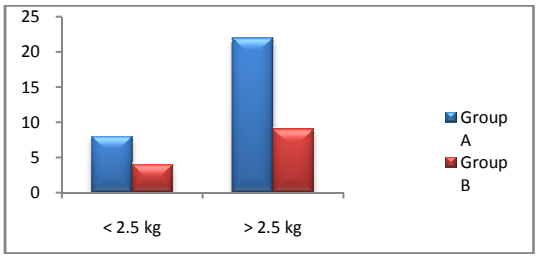
	Group A	Group B	Total
Vaginal Delivery	15(35%)	6(14%)	21(49%)
LSCS	15(35%)	7(16%)	22(51%)
Total	**30(70%)**	**13(30%)**	**43(100%)**



Out of total 43 cases of Hypothyroidism, 35%cases from group A underwent normal vaginal delivery and remaining 35% cases from group A underwent LSCS. Where else 14% cases from group B underwent normal vaginal delivery and remaining 16% cases from group B underwent LSCS. The various indications for lower segment caesarean section were infertility, uteroplacental insufficiency, IUGR, severe preeclampsia, non-reassuring NST and foetal distress.(Ref. Table 4) The two-sided P value is 0.8168, considered not significant. Chi-square = 0.0537 and Odds ratio = 1.167.

Table 5: Birth weight of baby

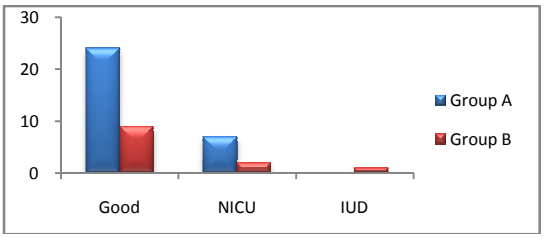
Title	Group A	Group B	Total
< 2.5 kg	8(19%)	4(9%)	12(28%)
> 2.5 kg	22(51%)	9(21%)	31(72%)
Total	**30(70%)**	**13(30%)**	**43(100%)**



Out of total 43 babies born to these hypothyroid mothers, 19% babies from group A and 9% babies from group B were having birth weight<2.5 kg. There were 51% babies from group A and 21%babies from group B having birth weight >2.5 kg. (Ref. Table5) The two-sided P value is 0.7830, considered not significant. Chi-square = 0/0759 and Odds ratio =0.8182.

Table 6: Foetal outcome

Title	Group A	Group B	Total
Good	24(56%)	9(21%)	33(77%)
NICU admission	7(16%)	2(5%)	9(18%)
IUD	0	1(2%)	1(2%)
Total	31(72%)	12(28%)	43(100%)



Out of 43 babies delivered, 56% babies from group A and 21%babies from group B, were born with good outcome and stable after delivery. Whereas 16% babies from group A and 5% babies from group B required NICU admission for causes like birth asphyxia, low birth weight. There was 1(2%) baby IUD in group B.(Ref. Table 6)

DISCUSSION

In India prevalence of hypothyroidism in pregnancy is much higher compared to western countries. Prevalence varies widely among various states in India, as we still face iodine deficiency in many part of the country.[1]our study showed low prevalence of hypothyroidism in Karad area of Maharashtra in India. In present study, Incidence of hypothyroidism is 9.4 per 1000 cases per year (0.94%). It is best to screen women early in the pregnancy for thyroid dysfunction because thyroid diseases satisfy most of the criteria for a disease to warrant population screening. They are common, treatable, and to some extent preventable conditions which produce morbidity and pose special risks for pregnancy and the developing foetus. Screening for thyroid dysfunction in a woman who is pregnant or wants to be pregnant is important because thyroid hormone status is directly related to foetal brain development.

Table 7: Comparison between Prevalence of hypothyroidism with different studies

Title	Subclinical hypothyroidism	Overt hypothyroidism	Total
Present study	0.66%	0.28%	0.94%
ChauhanRooplekha *et al*[1]	21.6%	2%	23.6%
Dhanwal *et al*[13]	13.5%	0.8%	14.3%
Ajmani *et al*[3].	9%	3%	12%
Singhai, Abhishek *et al.*[14]	9%	4%	13%

The prevalence of hypothyroidism in our study is less as compared to other study. The reason for that could be geographical variation, better iodine intake through salt, water or other factors.

Table 8: Incidence of Overt hypothyroidism in pregnancy

Study	Country	Overt hypothyroidism
Present study (2014-2015)	India	0.28%
Wang[5]	China	0.3%
Cleary-Goldman[5]	United Sates	0.3%
Vaidya[5]	United Kingdom	1.0%
Casey[5]	United States	0.2%

In present study, the incidence of overt hypothyroidism is almost correlating to the above mentioned studies.

Table 9: Complications related to subclinical hypothyroidism

Title	Our study	Chauhan Rooplekha *et al*[1]	Ajmani Sangeeta Nangia *et al*[3]
PIH	17%	26.8%	22.3%
Anaemia	3%	13.5%	5%
LSCS rate	50%	22.5%	16.6%
Low birth weight	27%	19.5%	12.11%
NICU admission	23%	27.5%	17.9%
IUD	0%	2.3%	1.7%

Incidence of LSCS was high in present study compared to above mentioned studies, reason might be incidence of antenatal complications such as infertility treated and conceived patients, BOH, IUGR; intrapartum complications like foetal distress, non-reassuring NST were high in present study.

Table 10: Complications related to overt hypothyroidism

Title	Our study	Chauhan Rooplekha *et al*[1]	Ajmani Sangeeta Nangia *et al*[3]
PIH	46%	60%	16.6%
Anaemia	0%	80%	8.3%
LSCS rate	54%	60%	41.6%
Low birth weight	31%	80%	50%
NICU admission	15%	80%	33.3%
IUD	8%	0%	16.6%

Maternal subclinical hypothyroidism increased the risk of foetal distress, which is in agreement with the study of Goel *et al*.[15] who reported a higher incidence of foetal distress in pregnancies complicated by maternal hypothyroidism (subclinical hypothyroidism, euthyroid on replacement therapy, and overt hypothyroidism); it has been suggested that hypothyroidism may exert irreversible effects on the foetus and placenta in early pregnancy, which impair their subsequent ability to tolerate stress, thereby increasing the incidence of foetal distress in labour. This might be the cause of increased incidence of LSCS in present study as one of the major indications for LSCS in present study was foetal distress. Foetal distress may impair infant developmental of the nervous system. Further, significant adverse effects on maternal and foetal outcome were seen emphasizing the importance of routine antenatal thyroid screening.

CONCLUSION

As use of TSH for diagnosis of thyroid dysfunction is widely reproducible, reliable and not expensive, it's an important tool to diagnose hypothyroidism. Especially in this modern era, where each baby is precious due to small family norms, increasing age of motherhood. We also concludes that in spite of great discrepancies in recommendations on universal screening of hypothyroid dysfunction in pregnancy, high prevalence of hypothyroidism in our country and its great impact in maternal and foetal health makes it necessary to screen all the pregnant women early gestation as per Indian Thyroid Society guidelines. Present study concluded that incidence of antennal complications such as PIH, anaemia, preterm delivery, incidence of LSCS, low birth weight, need for NICU is more in subclinical hypothyroidism compared to overt hypothyroidism. This simple study of thyroid profile (Serum TSH, serum T3, serum T4) will be boon in high risk pregnancies and in general population also as effect of hypothyroidism on both the mother and child are critical and if diagnosed in time these critical effects on mother and baby are treatable by simple remedy that is by administration of thyroxin in mother.

Limitations of Study

1. Due to small number of women with different thyroid classes, mainly in overt group we could not generalized the finding for population.
2. As this was a retrospective study there was lack of sufficient previous details regarding the ANC period.

REFERENCES

1. Chauhan Rooplekha, Sahu Bharti, Khan Shama: Research article on Prevalence of Hypothyroidism among pregnant women in mahakaushal area and its impact on Maternal and foetal outcome. Volume 4, suppl 1, 2015:140-147.
2. Abalovich M, Amino N, Barbour LA, *et al*. Management of thyroid dysfunction during pregnancy and postpartum: an endocrine society clinical practice guideline. J ClinEndocrinol Metab. 2007; 92(8):1–47. doi: 10.1210/jc.2007-0141.
3. Sangita Nangia Ajmani, Deepa Aggarwal, Pushpa Bhatia *et al*. Prevalence of Overt and Subclinical Thyroid Dysfunction Among Pregnant Women and Its Effect on Maternal and Fetal Outcome. J ObstetGynaecol India. 2014 Apr; 64(2): 105–110.
4. Krassas GE, Poppe K, Glinoer D. Thyroid Function and human reproductive health. Endocr Rev 2010;31:702-705
5. F.Gray Cunningham, Kenneth J. Laveno, Steven L.Bloom, Catherine Y. Spong, Jodins. Dashe, Barbara L. Hoffman, Barian M. Casey, Jeanne S. Sheffield. Williams obstetrics- 24th edition 2014; Section 12:chapter 58-Endocrine disorders- hypothyroidism: 1152-1153
6. So LB, Mandel SJ. Thyroid disorders during pregnancy. Endocrinol Metab Clin North Am. 2006; 35:117–136. doi: 10.1016/j.ecl.2005.09.009
7. Pop VJ, de Vries E, van Baar AL, Waelkens JJ, de Rooy HA, Horsten M, *et al*. Maternal thyroid peroxidase antibodies during pregnancy: A marker of impaired child development? J ClinEndocrinol 1995; 80:3561-6
8. De Escobar GM, Obregon MJ, Escobar Del Rey F. Is neuropsychological development related to maternal

hypothyroidism or to maternal hypothyroxinemia? ClinEndocinol 2000;85: 3975-87
9. Reuss ML, Paneth N, Pinto-Martin JA, Lorenz JM, Susser MB. The relation of transient hypothyroxinaemis in preterm infant to neurological development at two years of age. N Engl Med 1996;334: 821-7
10. Okosieme, OE; Marx, H; Lazarus, JH (Sep 2008). "Medical management of thyroid dysfunction in pregnancy and the postpartum." Expert opinion on pharmacotherapy 9 (13): 2281-93
11. Stricker R, Echenard M, Eberhart R, *et al*. Evaluation of maternal thyroid function during pregnancy: the importance of using gestational age-specific reference intervals. European Journal of Endocrinology. 2007;157:509-514
12. F.Gray Cunningham, Kenneth J. Laveno, Steven L.Bloom, Catherine Y. Spong, Jodins. Dashe, Barbara L. Hoffman, Barian M. Casey, Jeanne S. Sheffield. Williams obstetrics- 24th edition 2014;Appendix- Serum and blood constituents: metabolic and endocrine tests:1290
13. Dhanwal DK, Prasad S, Agrwal AK, Dixit V, Banerjee AK. High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. Indian J of EndocrinolMetab 2013; 17:281-4.
14. Singhai,Abhishek(2014) Study of Hypothyroidism Among Pregnant Women In Malwa Region of India,3rdedn.: International Journal of Medical And Applied Sciences.
15. Goel P, Radotra A, Devi K, etal. Maternal and perinatal outcome in pregnancy with hypothyroidism. Indian J Med Sci. 2005;59:116-117.doi:10.4103/0019-5359.15089.

Source of Support: None Declared
Conflict of Interest: None Declared