

Prevalence of Thyroid Dysfunction in Pregnancy and Its Outcome: The Indian Scenario

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ABSTRACT

Thyroid gland is the most important endocrinal gland in the human's body. It plays the important role in maintaining the metabolic rate and body's homeostasis mechanism.^[12] But however some physiological changes occur during the pregnancy. This leads to increased and decreased in level of thyroid hormone. All pregnant women shows the increased risk for subclinical hypothyroidism with maternal and fetal complication such as preeclampsia, abortion, abruption placenta, preterm labor, anemia, miscarriage, postpartum hemorrhage, prematurity, low birth weight, still birth, perinatal death and intrauterine growth retardation. This complication was highly due to delayed diagnosis and lack of knowledge among public. As this study conclude the early screening of thyroid function, prompt diagnosis and counseling to the patient will reduce the incidence of hypothyroidism.

Key Words: Thyroid dysfunction, Hyperthyroidism, Hypothyroidism.

INTRODUCTION

Thyroid gland is the most important endocrinal gland in the human's body. It maintains the metabolic rate and body's homeostasis mechanism.^[12] But however some physiological changes occur during the pregnancy. Pregnancy is the stress test for the thyroid hormone because the maternal thyroid function changes during the pregnancy and have the incredible effects in both mother and fetus.^[6] At 10-12th week of gestation there will be increased thyroid binding globulin and decreased thyroid stimulating hormone.^[14] This change in hormone level is mainly due to elevated estrogen and human chorionic gonadotropin concentration secreted by placental trophoblast.^[11]

The thyroid gland gets increased by 10% and the requirement of iodine gets increased by 50% during pregnancy. This is due to increased renal loss caused by

increased renal blood flow, GFR, and increased renal clearance.^[11]

Maternal thyroxin is important up to 12 weeks of gestation. It is important for normal fetal brain development, neural implication, and future intellectual development especially before the development of fetal thyroid gland.^[11]

The maternal outcomes that occur due to thyroid dysfunction include pre eclampsia, abortion, abruption placenta, preterm labor, anemia, miscarriage and postpartum hemorrhage. The fetal complications include prematurity, low birth weight, still birth, perinatal death and intrauterine growth retardation.^[2]

Thyroid disorder is broadly classified into two categories:

- Hypothyroidism
- Hyperthyroidism

The reference ranges of thyroid hormone are recommended according to American Thyroid Association for the

diagnosis and management of Thyroid disease during Pregnancy and Postpartum.

TSH value in 1st trimester 0.1 to 2.5 mIU/L, 2nd trimester 0.2 to 3.0m IU/L and 3rd trimester 0.3 to 3.0m IU/L and normal free T4 level is 0.7 to 0.8ng/ml, free T3 level is 1.7 to 4.2pg/ml and TSH 0.35-5.5mIU/L. [6]

Thyroid function during pregnancy may lead to either hypothyroidism or hyperthyroidism. But the pregnant women all over the India were highly reported with hypothyroidism mostly in first trimester than in second and third trimester. [2] The increase in risk of maternal outcome such as preeclampsia, miscarriage, abruption placenta and fetal complication such as intrauterine growth retardation were most commonly reported in all antenatal clinics India.

The prevalence of hypothyroidism in India is gradually increasing. This study is focused only on thyroid dysfunction in pregnancy and its outcome in Indian pregnant women. In this review, the original article, journals from 2009-2017 was collected from standard resources.

A study conducted in South Indian subjects at Madras Medical College includes 500 pregnant women in the year of 2007. Out of 495 patients, 50 were in 1st trimester, 291 in 2nd trimester, and 154 in 3rd trimester. Subclinical hypothyroidism was detected in 2.8%, with TPO antibodies positivity was seen in 57.1% when compared to euthyroid women. It also concluded that, there was no association between the hypothyroidism or TPO antibody positivity with gestational age or parity. [16]

The study conducted by Vimal Nambiar et.al., in Mumbai includes 483 patients. The cohort study was done in the year of 2007 was reported that miscarriage (24.24%) was more in the patient having hypothyroidism (4.8%) with TPOAb+ patient. Other hypothyroid abnormalities such as graves, thyrotoxicosis and thyroid autoimmunity was 0.6%, 6.4% and 12.4% was also reported. The rate of miscarriage was 3 times higher in patient with TSH >4

μIU/ml and abortion also reported in that patients. [4]

The study in central Indian population analyzed the antenatal thyroid function during the first three months was conducted in the years of 2009-2013 by the Chitnis et al., The study includes 1152 patients with the mean age of 26 ± 4.39 yrs was done prospectively and shows that prevalence of clinical hypothyroidism was 2.25%, and subclinical hypothyroidism was 10.85%. The study concluded that the prevalence of hypothyroidism was more in central India and hence the thyroid screening was needed. [13]

The prospective observational study done by Dhanwal et al., aimed to know the prevalence of subclinical hypothyroidism during the first trimester of pregnancy includes thousands of patients with 3.4 weeks in patient with age of 26. Total of 1000 patients 143 had hypothyroidism (14.3%) with TPOAb (20.9%) in 30 patients. Among that 135 had subclinical (13.5%) with TPO Ab (18%) in 25 patient and 7 had overt (0.7%) with 5 had TPO Ab. This report concludes that there is more prevalence of hypothyroidism (14.3%), mainly subclinical in pregnant women in first trimester and screening of hypothyroidism is recommended. [15]

The observational study conducted between the years of 2011-2012 by Upadhaya TL et al., includes 107 patients with age group of less than 40. The study showed increased prevalence of Subclinical hypothyroidism 31% then overt hypothyroidism 13%. The maternal and fetal complication reported are as follows: one miscarriage, one still birth, 5 preterm deliveries in case of overt hypothyroidism and 6 in case of Subclinical hypothyroidism. [10]

The cross sectional study conducted at 11 cities by Dhanwal et.al conducted from 2011-2012 in 2599 pregnant women. The study was designed for assessing the function of thyroid in pregnancy during each trimester. According to this study there was increased in prevalence of

hypothyroidism (13.13%) in patient with positive anti-TPO antibodies (40%).^[1]

The study done by Thanuja was aimed to know the prevalence of thyroid dysfunction in pregnancy and its maternal outcome in patient with thyroid dysfunction. This study was conducted between the years of 2011-2013 in India. 300 patients were selected randomly irrespective of gestation with singleton pregnancy. According to this study the prevalence of hyperthyroidism was more than hypothyroidism. The reported subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism and overt hyperthyroidism were found to be 0.7%, 1%, 1.3% and 2%. But the maternal and fetal complication was highly reported in overt hyper and hypothyroidism. The complication such as 2 abortion 66.7%, 1 abruption placenta 33.4% in overt hypothyroid patient whereas 1 abortion 50% and 1 low birth weight 50% of subclinical hypothyroidism. The occurrence of overt hyperthyroidism includes 3 abortion 50%, 2 preeclampsia 33.4%, and 1 case of preterm delivery 16.6% and subclinical hyperthyroidism includes 2 preeclampsia 50% and fetal complication of IUGR in 1 patient 25%.^[8]

The prospective and observational study showed that the patient second gravida are more prone to hypothyroidism. The study was conducted in patients with the age of 20-30yrs from 2011 -2014 in gynecology department; Bangalore was to know the effects of subclinical hypothyroidism in pregnancy and its outcome. In this study, 4864 pregnant women were included with the gestational age of 13.86 weeks, among that 101 women was screened with subclinical hypothyroidism 2.07%.^[20]

The hospital based cross sectional study was conducted in Thiruchirappalli in 2012 with one month interval. The study conducted by Senthilkumaran et al., includes the patients with age of 12 years, adolescent and pregnant women who attending the antenatal clinic. The main aim of this study was to know the prevalence

and distribution of Subclinical hypothyroidism over rural women. It was conducted in Chennai medical college and shows high prevalence of Subclinical hypothyroidism in patient with all age group. It also mentioned the intervention such as increase in age increases the risk of Subclinical hypothyroidism.^[19]

The prospective study conducted by Ajmani et.al., was aimed in detecting the current prevalence of thyroid dysfunction in normal pregnant women and its impact on outcome. According to this study, the prevalence of subclinical hypothyroidism was high with adverse fetomaternal outcome. 400 patients between the 13 -26 week was included in this study and was carried at Kasturba hospital Delhi, India between 2012-2013 and fetomaternal outcome was noted and compared with euthyroid patients. Adverse maternal complication such as preeclampsia 22.3%, abortion 16.6% in subclinical hypothyroid patient and preeclampsia 16.6%, abruption placenta 16.6% in overt hypothyroid patient. Adverse fetal outcome such as spontaneous abortion 5.5%, preterm delivery 11.2% , low birth weight 25%, IUGR 8.4% was also reported in subclinical hypothyroid alone as compared to euthyroid patients.^[3]

During the period of 2012-2015 the prospective study was performed in Mallareddy medical college in Hyderabad includes 2139 pregnant ladies. Among that 2028 was reported with normal thyroid function and 111 had subclinical hypothyroidism (59%). The maternal complication such gestational hypertension 9.8%, placental abruption 1.8%, preterm birth 7.2%, prelabour rupture 10.8%, gestational diabetes mellitus 2.7% and fetal complication such as fetal distress 3.6%, lowbirth weight 5.5%, IUGR 2.7% and fetal death 1.8% was also reported.^[22]

The study conducted by Singh and Reddy in Hyderabad was reported with hypothyroidism of (7.5%) and hyperthyroidism of (0.75%).^[5] 400 patients were included and was conducted prospectively at 1st trimester between 2013

to 2014 observed the adverse maternal outcome such as preeclampsia (33.3%), intrauterine growth retardation (16.6%) in patient with hypothyroidism was highly reported when compared with euthyroid patient. [5]

The study done by Sapana and Chaitanya include 27 cases, among that 59.3% had subclinical hypothyroidism and 40.7% had overt hypothyroidism with the fetal complication such as IUGR 7.4% and abortion 11.1%. The 9% of hypothyroid patients who were adequately treated and monitored for good maternal and fetal outcome. [9]

The prospective and comparative study by Saraladevi et al., conducted in the year of 2013 to 2015 at Warangal district. It includes 1000 pregnant women until delivery shows the more prevalence 11.6% with 95% CI. According to this study, the prevalence of subclinical hypothyroidism was 6.4%, overt hypothyroidism 2.8%, subclinical hyperthyroidism 1.8%, overt hyperthyroidism 0.6%. The patient with subclinical hypothyroidism and overt hypothyroidism were highly reported with maternal and fetal complication such as preeclampsia (9.37% & 14.28%), preterm delivery (7.81% & 0.7%), abortions (4.68% & 7.14%), abruption placenta (1.56% & 3.57%) and IUGR (6.25% & 10.71%), low birth weight (4.68% & 10.71%), still birth (1.56% & 3.57%). The maternal and fetal complication of subclinical hyperthyroid patient was preeclampsia 11%, preterm delivery 5.55%, and abortions 5.55% and IUGR 11.11%, still birth 5.55% and abortion 66.66% in overt hyperthyroid patients. [6]

A total of 100 patients at first trimester were included in the study conducted by Vidhya et al., with the study period from 2013 to 2015. The prospective study was conducted in Al Amen Medical College Hospital, Bijapur and reported with prevalence of thyroid dysfunction was 10% with the subclinical hypothyroidism 6%, overt hypothyroidism 2%, and subclinical hyperthyroidism 2%. [12]

The study conducted by Jayatinath was hospital based prospective study conducted in the gynaecology department, UP, India with the duration of 1 year (2013-14). Thousand pregnant women were included in this study irrespective of their gestational age. The result of this study showed that 6% of women were reported with abnormal TFT. 4.5% of patients had hypothyroidism, hyperthyroidism 1.5%. While 2.5% had overt hypothyroidism, 2% had subclinical hypothyroidism, 1.0% had overt hyperthyroidism and 0.5% had subclinical hyperthyroidism. The maternal and fetal complication such as abortion 4.5%, preeclampsia 7.8%, abruption 2.3%, preterm labour 2.2%, PPH 1.6%, puerperal sepsis 1.3%, preterm birth 2.0%, low birth weight 2.4%, IUGR 1.8%, stillbirth 0.9%, NICU 2.8%, neonatal 1.5%, neonatal death 10%. [21]

The study conducted over the rural/suburban areas of Hyderabad, Telangana showed the high prevalence of subclinical hypothyroidism. Out of 322 women, 89 pregnant women (26%) had TSH values more than 3.0mIU/L 76 had normal T4 value was considered as subclinical hypothyroidism, 3 had low T4 value was considered as overt hypothyroidism. This study also reported with overt hyperthyroidism and subclinical hyperthyroidism in two and one pregnant women. [18]

The prospective study was conducted randomly among 350 patients between the year of 2014 -2015 at ESI-PGIMSRMG hospital Parel, India by Gedam JK et al was to know the prevalence of thyroid disorder among antenatal women. This study shows that there is a high prevalence of hypothyroidism then hyperthyroidism. Among that subclinical was 7.7%, overt hypothyroidism was 4% and subclinical hyperthyroidism was 1.7%, overt hyperthyroidism was 0.8%. This increase the risk of abortion in patients with SCH and OH. [7]

The study conducted by Singh et al. in Manipur was aimed to know the

prevalence of hypothyroidism. 400 patients of first and second trimester were included and the patient with thyroid disorder and thyroid medication was excluded from this study. The patients were grouped into three categories based upon TSH values and was observed for thyroid dysfunction. The prevalence of hypothyroidism was high 23%. Out of these, subclinical hypothyroidism was 18% and overt hypothyroidism was 4.5%. [11]

The study conducted by Ankit Khatri in 2015 -2016 was aimed to know the prevalence of subclinical and overt hypothyroidism in antenatal women. This was cross sectional study includes 2492 pregnant women. In this study the patient with TSH 0.1-4.5mIU/L were considered as normal, TSH >4.5mIU/L to 10mIU/L were considered as subclinical TSH>10mIU/L were considered as overt. Out of 2492 women 78.25% were reported with hypothyroidism while 15.56% in subclinical, 3.4% in overt, 3% in hyperthyroidism. [14]

The study held at Anil Neerkonda hospital in Andhra Pradesh between 2016 - 2017march by Krishnamma B et al. A total of 380patientswith 8-36 week was included and shows high prevalence of (17.4%).The prevalence of subclinical was13.4% then overt was 3.9% and overt hyperthyroidism was 1.3%. The prevalence of hyperthyroidism was 2.1% whereas no patient was identified with subclinical hyperthyroidism. This was due to declined ft4 and increased TSH from first trimester to third trimester. [2]

The prospective study conducted by the Neelam Agarwal et al., includes 1791 patients and was conducted in Apex institute. Out of 1791 women, 1594 had a normal thyroid profile and the remaining 197(10.9%) had hypothyroidism. As this study showed high prevalence of subclinical hypothyroidism (10.9%) in pregnancy and 59% of these women had positive autoimmunity. The marked increase in subclinical hypothyroidism shows significant risk in pregnant women i.e. the

rate of caesarian section and neonates were born with low birth weight when compared to neonates of euthyroid patient. [17]

CONCLUSION

The prevalence of hypothyroidism was highly reported in India. Among hypothyroidism, all pregnant women shows the increased risk for subclinical hypothyroidism with maternal and fetal complication such as pre eclampsia, abortion, abruption placenta, preterm labour, anemia, miscarriage, postpartum hemorrhage, prematurity, low birth weight, still birth, perinatal death and intrauterine growth retardation. This complication was highly due to delayed diagnosis and lack of knowledge among public. As this study conclude the early screening of thyroid function, prompt diagnosis, and counseling to the patient will reduce the incidence of hypothyroidism related complication.

REFERENCES

1. Dhanwal DK, Bajaj S, Rajput R, et al., Prevalence of hypothyroidism in pregnancy: an epidemiological study from 11 cities from 9 states of India. *Indian Jendocrmetab.* 2016; 20:387-390.
2. Krishnamma B, Prabhavathi V, Prasad DKV. Prevalence of thyroid dysfunction in pregnant women and the need for universal screening: an observational study in northern Andhra Pradesh population. *Int J Reprod Contracept Obstet Gynecol.* 2017;6:2536-2540.
3. Ajmani SN, Aggarwal D, Bhatia P, et al., Prevalence of overt and subclinical thyroid dysfunction among pregnant women and its effect on maternal and fetal outcome. *J Obstet Gynecol India.* 2014; 64(2):105-110.
4. Vimal N, Varsha SJ, Sarathi V, et al., Prevalence and impact of thyroid disorders on maternal outcome in Asian-Indian Pregnant women. *JThyroid Res.*2011; 429097: 1-6.
5. Singh A, Reddy MJ. Prevalence of thyroid dysfunction in pregnancy and its implications. *Int J Med Sci Public Health.* 2015; 4:1247-1250.
6. Saraladevi R, Nirmalakumari T, Shreen B, et al., Prevalence of thyroid disorder in

- pregnancy and pregnancy outcome. IAIM.2016;3(3):1-11.
7. Gedam JK, Rajput DA. Prevalence of thyroid disorders among patients attending the antenatal clinic at tertiary care centre. Int J Reprod Contracept Obstet Gynecol.2017; 6(4):1235-1239.
 8. Thanuja PM, Rajgopal k, Sadiqunnisa. Thyroid dysfunction in pregnancy and its maternal outcome. IOSR-JDMS.2014; 13(1):11-15.
 9. Sapana CS, Chaitanya RS. Prevalence of hypothyroidism during pregnancy. JMS. 2014; 4(3):130-134.
 10. Upadhaya TI, A KC, Paudel S. Prevalence and complications of hypothyroidism during pregnancy in Western Nepal. NJMS. 2014; 3(1):48-50.
 11. Singh KP, Singh HA, Kamei H, et al., Prevalence of hypothyroidism among pregnant women in the sub mountain state of Manipur. Int J Sci Stud. 2015; 5(5):1443-146.
 12. Vidya AT, Majeed S. Prevalence of thyroid disorder in pregnancy. IJTRA. 2016; 4(2):12-16.
 13. Chitnis DS, Bose A, Soni N, et al., An enumeration of the prevalence of hypothyroidism during pregnancy in Central India. Clinical epidemiology and global health. 2015; 3:34-37.
 14. Khatri A, Kaushik A, Tyagi N, et al., Prevalence of Subclinical and Overt Hypothyroidism in antenatal Women: A Study from tertiary care center in North India. AWCH. 2016;2(2):11-14.
 15. Dhanwal DK, Prasad S, Agarwal AK, et al., High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. Ind J Endocr metab.2013; 17:281-284.
 16. Gayathri R, Lavanya S, Raghavan K. Subclinical Hypothyroidism and Autoimmune Thyroiditis in Pregnancy- A study in South Indian subjects. J Assoc Physicians India.2009; 57:691-693.
 17. Agarwal N, Suri V, Joshi B, et al., Prevalence and impact of subclinical hypothyroidism on pregnancy – Prospective study from Apex institute of North India. Indian J Appl Res. 2014; 4(10):404-406.
 18. Murty N, Bhashyakarla U. Prevalence of Thyroid dysfunction among pregnant women in a Rural Teaching Hospital. Sch J App Med Sci.2014; 2(6B):2022-2025.
 19. Senthilkumaran A, Sathyaprakash V, Sundhararajan A. A Study on Prevalence and Distribution of Subclinical Hypothyroidism in Rural Women. Sch J App Med Sci. 2015; 3(1D):287-290.
 20. Rao S, Patibandia A. A study to find out the Prevalence of Hypothyroidism among Pregnant women. Gynecol Obstet (Sunnyvale). 2016; 6(3):1-3.
 21. Jayatinath, Dutta. A Clinical Study on Thyroid Dysfunction in Pregnancy and its effect on the Fetomaternal Outcome. IJSR. 2015;4(9):2068-2070
 22. Lahoti SK, Toppo L. Subclinical Hypothyroidism and Pregnancy Outcomes. AIMDR 2015; 1(3):324-26.

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