DOI: https://doi.org/10.53350/pjmhs221631184

ORIGINAL ARTICLE

Prevalence of Hypothyroidism in Pregnancies and its Obstetric Outcomes

TABASSUM ALI[1], ABROO BAHADUR[2], BUSHRA BASHIR[3], TARIQ HASSAN[4], BENISH ISHAQ[5], MUHAMMAD QASIM[6]
[1]*District Gynaecologist, Gynae and Obs department, District Headquarter Teaching Hospital, Swabi*
[2]*Medical Officer, Gynae/Obs, Mian Rashid Hussain Shaheed Memorial Hospital (MRHSMH) Pabbi*
[3]*Assistant Professor (FMC), Gynae/Obs, King Abdullah Teaching hospital, Mansehra*
[4]*Physician General Practice, Diabetes Endocrine & Metabolic Disorder, DHQ Teaching Hospital, Timergara Dir Lower*
[5]*Post Graduate Resident, PIMS Islamabad*
[6]*Fellow Endocrinology, Diabetes and Endocrinology Ward, Hayatabad Medical Complex Peshawar*
Corresponding author: Abroo Bahadur, Email: abroo.bahadur85@gmail.com, Cell: 92333 9785058

ABSTRACT

Background and Aim: Hypertension, placental abruption, low birth weight, fetal death, and preterm birth are different pregnancy complications associated with clinical thyroid dysfunction. Thyroid dysfunction is common among pregnant women. The aim of the present study was to assess the prevalence of hypothyroidism in pregnancies and its obstetric outcomes.

Methodology: This cross sectional study was conducted 164 antenatal women with singleton pregnancy in third trimester at the department of Gynecology and Obstetrics, Hayatabad Medical Complex, Peshawar for the duration of six months from January 2021 to October 2021. All the pregnant women irrespective of parity, socio-economics, and age were enrolled after taking informed consent. All cases of thyroid disorders and having multiple pregnancy were left out. Routinely hematological factors and estimation of TSH, fT3, and fT4 was performed. Fetal and maternal complications were assessed subsequently in patients for thyroid deranged profile. Thyroid disease family and infertility history, level of hemoglobin, menstrual pattern, fetal outcome, and recurrent abortion were the main parameters. SPSS version 21 was used for data analysis.

Results: Out of 164 women screened, prevalence of thyroid dysfunction was 41 (25%). The incidence of subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism was 13 (7.8%), 6 (3.7%), and 9 (5.4%) respectively. Higher TSH and abnormal fT4 was found in one sample. About 28.5% patients had anemia among over and subclinical hypothyroidism. Hypothyroidism was significantly associated with NICU admission 39.2% (p=0.001), LBW 28.7% (p=0.001), and low APGAR score 23.6% (p=0.039). Comparing hypothyroidism women to euthyroid women, risk of NICU admission, low birth weight, lower APGAR score, and anemia was found 1.3, 5.8, 3.7, and 4.9 times higher.

Conclusion: Our study revealed that pregnant women are more susceptible to subclinical hypothyroidism. In the third trimester of pregnancy, the occurrence of subclinical hypothyroidism is 3.7%. Hypothyroidism is associated with pre-eclampsia, anemia, neonatal morbidities, and high caesarean rates.

Keywords: Pregnancy, Hypothyroidism, Thyroid dysfunction, obstetric outcomes

INTRODCTION

Hypertension, placental abruption, low birth weight, fetal death, and preterm birth are different pregnancy complications associated with clinical thyroid dysfunction. Thyroid dysfunction is common among pregnant women. Pregnancy changes regarding physiology and hormones increase thyroxin (T4) and tri-iodothyronine (T3) production to 50%, increasing an iodide obligation, while reduce the thyroid-stimulating hormone (TSH) levels, particularly in first trimester caused by high levels of Human Chorionic Gonadotrophin (HCG) [1]. Pregnancy stress manifests as overt disease with low thyroid reserves among women [2]. Thyroid adaptations are well tolerated in an iodide sufficient area because adequate amount of inner thyroid iodide is stored; however, in an iodide deficient area, significant changes in pregnancy caused by these physiological adaptations [3, 4]. Hypothyroidism is common in pregnant women. Hypothyroidism dysfunction early finding and treatment could reduce the pregnancy common adverse foetal and maternal outcomes. About 2-3% pregnant women affected by overt thyroid dysfunction, 10% by subclinical dysfunction, and 5–10% by autoimmunity [5-7].

Miscarriage, anaemia, preeclampsia, gestational hypertension, placental abruption, preterm delivery, increased caesarean section rate, and postpartum haemorrhage are all examples of maternal complications. The delivery mode may have an effect on the pituitary-thyroid axis. Preterm birth, low birth weight (LBW), neonatal respiratory distress syndrome, increased NICU admission, perinatal morbidity and mortality, and cognitive and neuropsychological impairment are all outcomes of thyroid dysfunction in fetuses [8]. Thyroid hormone is essential for the brain development in the developing foetus. Abnormalities associated with neurological and cognitive severity might developed in case of patents are not treated promptly. A previous study found that infants born to hypothyroid pregnant women had lower intelligence quotient (IQ) scores than children born to non-hypothyroid pregnant women [9, 10]. The purpose of present study was to determine the frequency of thyroid disorders in pregnancy and its outcomes.

METGODOLOGY

This cross sectional study was conducted 164 antenatal women with singleton pregnancy in third trimester at the department of Gynecology and Obstetrics, Hayatabad Medical Complex, Peshawar for the duration of six months from January 2021 to October 2021. All the pregnant women irrespective of parity, socio-economics, and age were enrolled after taking informed consent. All cases of thyroid disorders and having multiple pregnancy were excluded. Routinely hematological factors and estimation of TSH, T3, and T4 was performed. Fetal and maternal complications were assessed subsequently in patients for thyroid deranged profile. Thyroid disease family and infertility history, level of hemoglobin, menstrual pattern, fetal outcome, and recurrent abortion were the main parameters. Miscarriage history, anaemia, preeclampsia, gestational hypertension, preterm delivery, and an increased rate of case LBW is one of the fetal outcomes.

The Pearson chi-square test was used to evaluate categorical variables. Binary logistic regression was used to calculate the risk factor association. Only when the p value was less than 0.05 was the test considered significant. The Institution's Scientific and Ethical Committee approved the study protocol. SPSS version 21 was used for data analysis.

RESULTS

Out of 164 women screened, prevalence of thyroid dysfunction was 41 (25%). The incidence of subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism was 13 (7.8%), 6 (3.7%), and 9 (5.4%) respectively. Higher TSH and abnormal fT4 was found in one sample. About 28.5% patients had anemia among over and subclinical hypothyroidism. Hypothyroidism was significantly associated with NICU admission 39.2% (p=0.001), LBW 28.7% (p=0.001), and low APGAR score 23.6% (p=0.039). Comparing hypothyroidism women to euthyroid

women, risk of NICU admission, low birth weight, lower APGAR score, and anemia was found 1.3, 5.8, 3.7, and 4.9 times higher. Serum TSH, fT3, and fT4 mean levels were calculated among subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism women. The mean value of TSH levels among subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism women were 0.06±0.04 mIU/ml, 11.39±4.52 mIU/ml, and 7.9±1.34 mIU/ml, respectively. Mean levels of serum fT3 and fT4 among women with subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism are shown in Table-I. Prevalence of subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism are depicted in Figure-1. Risk factors associated with thyroid dysfunction are infertility history, thyroid dysfunction family history, irregular menstrual cycle, and miscarriage as shown in Table-II. Maternal and fetal associated risk factors in hypothyroidism effected women are preterm birth, low birth weight, preeclampsia, cesarean section, and anemia etc. as shown in Table-III.

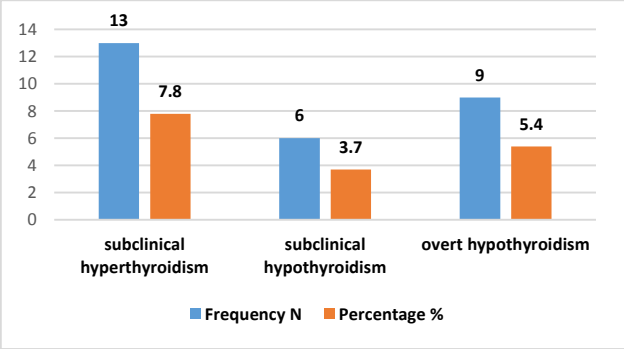

Figure 1: Incidence of subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism

Table 1: Mean levels of serum TSH, fT3 and fT4 among women with subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism.

Thyroid dysfunction	Prevalence N (%)	TSH (Mean) mIU/ml	fT3 (Mean) pg/dl	fT4 (Mean) ng/dl
Subclinical Hypothyroidism	6 (3.7)	11.39±4.52	2.89±0.531	1.09±0.30
Subclinical Hyperthyroidism	13 (7.8)	0.06±0.04	4.21±0.38	1.2±0.10
Overt Hypothyroidism	9 (5.4)	7.9±1.34	1.63±1.38	0.36±0.24

Table 2: Occurrence of hypothyroidism associated risk factors (n=41)

Risk factors	Frequency N	Percentage %	p-value
Infertility history	11	26.8	0.732
Thyroid dysfunction (family history)	2	4.8	0.23
Irregular menstrual cycle	2	4.8	0.18
Miscarriage	1	2.4	0.84

Table 3: Maternal and fetal associated risk factors in hypothyroidism effected women

Outcomes n (%)	Odd Ratio	95% CI	p-value
Preterm birth	2.41	0.243-21.91	0.451
Low birth weight	5.68	1.9-18.93	0.001
Preeclampsia	4.31	1.04-18.9	0.039
Cesarean section	4.5	1.4-14.42	0.021
Anemia	4.9	1.4-14.9	0.007
NICU Admission	0.21	0.05-0.492	0.000

DISCUSSION

Reproductive age women are more susceptible to thyroid disorder or hypothyroidism being the second most common disorders after diabetes at this age. The incidence of hypothyroidism in pregnant women varies with their fetal complications depending on various factors. Due to immense role of first trimester in preventing maternal complications in case of early diagnosed with SCH compared to 2nd and 3rd trimester [11, 12]. The prevalence of hypothyroidism in 3rd trimester pregnant women was 25% in the current study which is higher than E. K. Alexander et al. 10.2% [13] and D. Thenmozhi et al. 14% [14]. The incidence of hypothyroidism in Pakistan is higher than Western world [15]. In current study, incidence of subclinical hypothyroidism, subclinical hyperthyroidism, and overt hypothyroidism are 6 (3.7%), 13 (7.8%), and 9 (5.4%) respectively which resemble another study findings where subclinical hypothyroidism and overt hypothyroidism is 6.1 and 0.7% respectively [15]. A previous study reported 8% subclinical hypothyroidism in 2016 [16] whereas another review found overt hypothyroidism, isolated hypothyroxinaemia, and subclinical hypothyroidism 0.50, 2.05, and 3.47% respectively [16].

In our study, the mean value of TSH levels among subclinical hyperthyroidism, subclinical hypothyroidism, and overt hypothyroidism women were 0.06±0.04 mIU/ml, 11.39±4.52 mIU/ml, and 7.9±1.34 mIU/ml, respectively whereas fT3 mean serum levels were 4.21±0.38, 2.89±0.531, and 1.63±1.38 pg/dl respectively. The mean serum levels of fT4 were 1.2±0.10, 1.09±0.30, and 0.36±0.24 respectively. Reference value of fT3, TSH, and fT4 were reported 0.23– 3.59 (ng/100ml), 0.49–5.81 (uIU/ml), and 0.51–4.91 (ng/100ml) respectively in 3rd trimester [17]. High prolactin (PRL) levels, imbalance hormones, defect in luteal phase, and anovulatory cycles were different results of hypothyroidism which leads to irregular menstrual cycles and infertility [18, 19]. The prevalence of infertility was 4.8% in the present study which is higher than 4% and 3.8% in previous studies [20, 21]. Menstrual irregularities were found in 4.8% women with hypothyroidism.

Miscarriage is mostly caused by thyroglobulin presence in pregnant women which might causes other issues such as gestational diabetes, permanent hypothyroidism, and premature deliveries [22]. The prevalence of miscarriage was 2.4% in the current study which is lower than 5% and 5.6% reported by two previous studies [23, 24]. Abnormalities related to clinical obstetric has been significantly caused by hypothyroidism in pregnancy [25]. Though abnormalities associated with neurodevelopment might be developed in pregnant women with thyroid deficiency and too early to measures. However, higher and abnormal TSH levels in pregnant women with hypothyroidism had lower intelligence compared to euthyroid mother [26].

The prevalence of anemia in the present study was 24.6% whereas previous study reported lower prevalence of anemia 4.3% among women with hypothyroidism [27]. A previous study reported 60% prevalence of anemia due to iron deficiency in hypothyroidism women [28]. Thyroxine higher secretion might result proteinuria caused by thyroid dysfunction. Very few cases reported thyroid-binding globulins loss in severe case of proteinuria [29]. Women with hypothyroidism might outcome increased deliveries through cesarean section. A previous study reported 23% prevalence of cesarean section [30]. Hypertensive disorders, preterm birth, and gestational diabetes are all factors that increased chances of cesarean section [31]. Others studies found that abruption, pre-ecalmpsia, and preterm labor are substantially related to hypothyroidism [32].

Hypothyroidism also might cause low birth weight which is significantly related to pre-ecalmpsia. Offspring born with lower weight are caused by the development of cardiovascular homeostasis, fetal pituitary growth hormone secretion, and pituitary-thyroid axis [33]. Low Apgar score and NICU admission are the fetal outcomes of hypothyroidism in 3rd trimester pregnant women [34].

CONCLUSION

Our study revealed that pregnant women are more susceptible to subclinical hypothyroidism. In the third trimester of pregnancy, the

occurrence of subclinical hypothyroidism is 3.7%. Hypothyroidism is associated with pre-eclampsia, anemia, neonatal morbidities, and high caesarean rates.

REFERENCES

1. Dong AC, Stagnaro-Green A. Differences in diagnostic criteria mask the true prevalence of thyroid disease in pregnancy: a systematic review and metaanalysis. Thyroid. 2019;29(2):278–89.
2. Alexander EK, Pearce EN, Brent GA, Brown RS, Chen H, Dosiou C, et al. Guidelines of the American Thyroid Association for the diagnosis and Management of Thyroid Disease during Pregnancy and the postpartum. Thyroid. 2017;27(3):315–89.
3. Singh A, Pedduri S. Prevalence of hypothyroidism in pregnancy. Obs Gyne Review: J Obstet Gynecol. 2018;4(4):77–81. https://doi.org/10.17511/joog. 2018.i04.02.
4. Mankar J, Sahasrabuddhe A, Pitale S. Trimester specific ranges for thyroid hormones in normal pregnancy. Thyroid Res Pract. 2016;13:106–9.
5. Khadilkar S. Thyroid stimulating hormone values in pregnancy: cutoff controversy continues? J Obstetr Gynecol India. 2019;69(5):389–94.
6. Verma I, Sood R, Juneja S, Kaur S. Prevalence of hypothyroidism in infertile women and evaluation of response of treatment for hypothyroidism on infertility. Int J Appl Basic Med Res. 2012;2(1):17–9.
7. Manju VK, et al. Maternal outcome in thyroid dysfunction. Int J Reprod Contracept Obstet Gynecol. 2017;6(6):2361–5.
8. Bothra N, Shah N, Goroshi M, Jadhav S, Padalkar S, Thakkar H, et al. Hashimoto's thyroiditis: relative recurrence risk ratio and implications for screening of first-degree relatives. Clin Endocrinol (Oxf). 2017;87(2):201– 6. https://doi.org/10.1111/cen.13323 Epub 2017 May 31. PMID: 28273382.
9. Sreelatha S, Nadagoudar S, Asha Devi L. The study of maternal and fetal outcome in pregnant women with thyroid disorders. Int J Reprod Contracept Obstet Gynecol. 2017;6(8):3507–13.
10. Baghel M, et al. Association of thyroid status with hemoglobin levels in pregnancy. Int J Res Med Sci. 2017;5(11):4873–6.
11. Sreelatha S, et al. The study of maternal and fetal outcome in pregnant women with thyroid disorders. Int J Reprod Contracept Obstet Gynecol. 2017;6(8):3507–13.
12. Kiran Z, Sheikh A, Islam N. Association of thyroid antibodies status on the outcomes of pregnant women with hypothyroidism (maternal hypothyroidism on pregnancy outcomes, MHPO-4). BMC pregnancy and childbirth. 2021 Dec;21(1):1-2.
13. E. K. Alexander, E. N. Pearce, G. A. Brent et al., "2017 guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and the postpartum," Thyroid, vol. 27, no. 3, pp. 315–389, 2017.
14. D. Thenmozhi, "Prevalence of hypothyroidism in prgnancy and pregnancy outcome," IOSR Journal of Dental and Medical Sciences, vol. 16, no. 2, pp. 5–16, 2017.
15. S. K. Pandey, H. S. Pandey, and V. Kalra, "Study of prevalence of thyroid disorders in pregnant females of a tertiary care hospital of Garhwal region of Uttarakhand," Annals of International Medical and Dental Research, vol. 4, no. 4, pp. 25–27, 2018.
16. N. K. Moog, S. Entringer, C. Heim, P. D. Wadhwa, N. Kathmann, and C. Buss, "Influence of maternal thyroid hormones during gestation on fetal brain development," Neuroscience, vol. 342, pp. 68–100, 2017.
17. G. Schwarzer, H. Chemaitelly, L. J. Abu-Raddad, and G. Rücker, "Seriously misleading results using inverse of Freeman-Tukey double arcsine transformation in meta-analysis of single proportions," Research Synthesis Methods, vol. 10, no. 3, pp. 476–483, 2019.
18. P. Agrawal, S. Mehta, M. Gupta, and P. Khare, "Prevalence of hypothyroidism in the first trimester pregnancy in primigravida in North India," Indian Journal of Obstetrics and Gynecology Research, vol. 6, no. 1, pp. 68–70, 2019.
19. V. Diyora, T. Shah, and M. K. Mishra, "Thyroid dysfunction in women during first trimester of pregnancy: correlation with anti-thyroid peroxidase antibodies," Scholars International Journal of Biochemistry, vol. 2, no. 2, pp. 36–39, 2019.
20. B. Goel, A. Singh, P. Goel, J. Kaur, S. Singla, and M. Singla, "Evaluation of high risk screening protocol for detection of overt hypothyroidism in pregnancy," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 7, no. 11, pp. 4581–4586, 2018.
21. R. Gupta, S. Agarwal, K. Pandey et al., "A clinical study on thyroid dysfunctions in pregnancy and its effect on maternal and neonatal outcome," Journal of Evolution of Medical and Dental Sciences, vol. 7, no. 12, pp. 1520–1523, 2018.
22. K. Hymavathi, M. D. Gottipati, T. Jakka, and T. C. Bhavani, "Routine screening of antenatal population for thyroid disorders-mandatory," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 7, no. 7, pp. 2834–2839, 2018.
23. B. Kalra, M. Choudhary, M. Thakral, and S. Kalra, "Prevalence of hypothyroidism in term pregnancies in North India," Indian Journal of Endocrinology and Metabolism, vol. 22, no. 1, pp. 13–15, 2018.
24. V. R. Korde, S. P. Barse, and J. S. Barla, "Prevalence of thyroid dysfunctions in pregnant women: a prospective study in a tertiary care hospital in Maharashtra, India," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 7, no. 8, pp. 3211–3215, 2018.
25. A. Kumari, R. Srivastav, and S. Mitra, "Prevalence of thyroid dysfunction and its effects on fetomaternal outcome in pregnant women of eastern Uttar Pradesh, India," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 7, no. 11, pp. 4379–4383, 2018.
26. M. A. Kumari, K. Venkataramana, K. P. Leela, S. Aafreen, and A. Amrin, "Prevalence of thyroid dysfunction among antenatal women in a teaching hospital," Journal of Evolution of Medical and Dental Sciences, vol. 7, no. 4, pp. 441–444, 2018.View at: Google Scholar
27. S. Pahwa and S. Mangat, "Prevalence of thyroid disorders in pregnancy," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 7, no. 9, pp. 3493–3496, 2018.
28. J. Panda, A. Maji, J. Mishra, and M. Manjareeka, "Thyroid disorders in pregnancy: an exploratory study," Journal of Clinical and Diagnostic Research, vol. 12, no. 3, pp. 9–12, 2018.
29. N. S. Pillai and J. Bennet, "Prevalence of hypothyroidism amongst pregnant women: a study done in rural set up," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 7, no. 4, pp. 1586–1591, 2018.
30. N. S. Rohini, S. N. Ravishankar, H. S. Madhuvan, S. Patil, and N. R. Rakshith, "A retrospective study of effect of thyroid disorders on obstetric and perinatal outcomes: a hospital based study," Indian Journal of Obstetrics and Gynecology Research, vol. 5, no. 2, pp. 247–252, 2018.
31. P. U. Devi and G. Vanaja, "Maternal and perinatal outcome in antenatal women with hypothyroidism," International Archives of Integrated Medicine, vol. 4, no. 12, pp. 199–207, 2017.
32. S. Dubey and A. Pradhan, "Thyroid disorder in antenatal women in sub-himalayan region: a need for universal screening," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 6, no. 8, pp. 3445–3448, 2017.
33. J. K. Gedam and D. A. Rajput, "Prevalence of thyroid disorders among patients attending the antenatal clinic at tertiary care centre, Parel, Mumbai, India," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 6, no. 4, pp. 1235–1239, 2017.
34. M. Gupta, P. Pandotra, M. Jindal, G. Jamwal, S. Goraya, and V. Gupta, "Comparative study of feto-maternal outcome in clinical and subclinical hypothyroidism," International Journal of Reproduction, Contraception, Obstetrics and Gynecology, vol. 6, no. 5, pp. 1909–1914, 2017.