Section: General Medicine

Original Research Article

PREVALENCE AND IMPACT OF THYROID DISORDERS ON MATERNAL OUTCOME IN RURAL INDIA

Yasmeen Mastan Pathan[1], Mastan Madar Pathan[2], Sree Harsha Dasari[3], Smita Deokar[4]

[1]Associate Professor, Department of General Medicine, Arundhati Institute of Medical Science Hyderabad India.
[2]Assistant Professor, Department of General Surgery. Arundhati Institute of Medical Science Hyderabad India.
[3]Intern, Arundhati Institute of Medical Science Hyderabad India.
Associate Professor, Department of Biochemistry, HBT Medical College and Dr R N Cooper Municipal General Hospital,Juhu mumbai

Received : 01/08/2023
Received in revised form : 02/09/2023
Accepted : 12/09/2023

Keywords:
Pregnancy, Euthyroid, overt hypothyroidism, subclinical hypothyroidism.

Corresponding Author:
Dr. Smita Deokar,
Email: smitapawar83@gmail.com

DOI: 10.47009/jamp.2023.5.5.112

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5(5); 578-582

Abstract

Background: Thyroid disorders are prevalent in rural India, with hypothyroidism being the most common condition. Pregnant women with thyroid disorders are more likely to experience miscarriage, preterm birth, low birth weight babies, stillbirth, preeclampsia, and placental abruption. These conditions are particularly prevalent in rural areas where women are undernourished and have limited healthcare access. The high prevalence of thyroid disorders and their impact on maternal outcomes is a significant public health concern. Objective: To estimate the prevalence of thyroid dysfunction among pregnant mothers and determine maternal and fetal outcomes among pregnant mothers with thyroid dysfunction. **Materials and Methods:** This is a retrospective cross sectional study based on previous record and collected from out-clinic data of hospital register. Convenience sampling was done and took 500 pregnant women from rural India. The data was entered and analyzed in SPSS version 23.**Results:** The frequency distribution of thyroid profiles showed that euthyroid group was the largest, with 88.6% of the participants. The subclinical hypothyroidism group has 8.6% of the participants, and the overt hypothyroidism group has 2.8% of the participants. There were no significant differences in age, weight, pulse rate, systolic blood pressure, or diastolic blood pressure between the three groups. However, there were significant differences in thyroid function markers. Women with subclinical hypothyroidism and overt hypothyroidism were more likely to experience weight gain during pregnancy, have a history of repeated miscarriages, facial puffiness, edema, miscarriage, stillbirth, preeclampsia, intrauterine growth restriction (IUGR), preterm birth, low birth weight, and neonatal intensive care unit (NICU) admission than women with euthyroidism. **Conclusion:** The subclinical hypothyroidism and overt hypothyroidism are associated with an increased risk of adverse pregnancy outcomes and women with subclinical hypothyroidism and overt hypothyroidism should be closely monitored during pregnancy.

INTRODUCTION

The prevalence of thyroid disorders in rural India is high. The prevalence of hypothyroidism in India is 11%, compared with only 2% in the UK and 4·6% in the USA.[1] The prevalence of thyroid disorders in pregnancy is also high, with the prevalence of overt and subclinical hypothyroidism reported between 3 to 4.58% and 6.47–9%, respectively.[2]

Thyroid disorders can have a significant impact on maternal outcome in rural India. Women with thyroid disorders are more likely to experience miscarriage, preterm birth, low birth weight babies, and stillbirth.[3] They are also more likely to develop preeclampsia and placental abruption.[3,4]

The impact of thyroid disorders on maternal outcome is even greater in rural areas, where women are more likely to be undernourished and have limited access to healthcare.[5] A study of pregnant women in rural India found that women with thyroid disorders were more likely to have poor pregnancy outcomes, including preterm birth, low birth weight

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

babies, and stillbirth.[6] They were also more likely to develop preeclampsia and placental abruption.

The high prevalence of thyroid disorders in rural India and their impact on maternal outcome is a major public health concern. There is a need to increase awareness of thyroid disorders among pregnant women in rural areas and to ensure that they have access to early diagnosis and treatment.

MATERIALS AND METHODS

The study was conducted in rural areas of India and utilized a retrospective cross-sectional design. The sample size consisted 500 pregnant women selected using convenience sampling. The study included women of all ages, parity, residence, and socioeconomic status. Women with multiple pregnancies, a known thyroid disorder, or any pre-existing medical condition were excluded.

The selection of subjects was not influenced by factors such as age, parity, residence, and socioeconomic position. Exclusion criteria were women who had multiple pregnancies, a documented history of thyroid issue, were undergoing any form of treatment for their condition, or had any pre-existing medical disorders such as diabetes mellitus, heart disease, or pulmonary disease. A comprehensive analysis of hematological parameters was performed, along with the assessment of T3, T4, and TSH levels. Patients exhibiting an abnormal thyroid profile were later evaluated for potential adverse outcomes affecting both the mother and the fetus. The key variables examined in this study were infertility, family history of thyroid disease, menstruation history, recurrent abortions, mean levels of T3, T4, and TSH, hemoglobin levels, and mother and fetal prognosis. A univariate analysis was performed to evaluate the correlation between thyroid abnormalities and several clinical parameters, including menstrual rhythm, infertility, family history of thyroid disorder, and miscarriage.

The estimation of TSH was performed via the Enhanced Chemiluminescence technique. The measurement of free T3 and free T4 was later conducted in cases where TSH levels were found to be abnormal. The cut-off values employed for TSH were determined in accordance with the guidelines provided by the American Pregnancy and Thyroid Association. During the first trimester of pregnancy, the recommended range for thyroid-stimulating hormone (TSH) levels is 0.1–4.0mIU/L. In the second trimester, the acceptable range is somewhat higher, ranging from 0.2–4.5mIU/L. Finally, during the third trimester, the recommended range for TSH levels further increases to 0.3–5mIU/L. The normal range for free T4 levels is typically reported as 0.7 to 1.8 ng/dL, while the normal range for free T3 levels is generally reported as 1.7 to 4.2 pg/mL. Individuals exhibiting normal levels of free thyroxine (fT4) and elevated levels of thyroid-stimulating hormone (TSH) were classified as having subclinical hypothyroidism (SCH). Conversely, individuals displaying reduced levels of fT4 and elevated levels of TSH were classified as having overt hypothyroidism.

Maternal co-morbidities associated with thyroid dysfunction encompass a range of conditions, including a history of miscarriage, anemia (characterized by a hemoglobin level below 10 g/dl), preeclampsia (defined as a blood pressure exceeding 140/90 with proteinuria occurring after 20 weeks of gestation), gestational hypertension (marked by a blood pressure surpassing 140/90 without proteinuria after 20 weeks of gestation), oligohydramnios (indicated by an amniotic fluid Index of 5 or less), preterm delivery (referring to delivery occurring prior to the completion of 37 weeks of gestation), and an increased likelihood of caesarean section. Fetal outcomes encompass several indicators, such as low birth weight (defined as a neonatal birth weight below 2.5 kg), a low Apgar score (specifically, a 1-minute Apgar score below 5), and an elevated likelihood of admission to the neonatal intensive care unit (NICU). The data was entered and analyzed in SPSS version 23.

RESULTS

Table 1 provides an overview of the frequency distribution based on thyroid profile in the study population. The data categorizes individuals into three main groups. The largest group is the euthyroid category, which comprises 443 individuals, accounting for 88.6% of the total sample. Following that, there are 43 individuals classified as having subclinical hypothyroidism, representing 8.6% of the population. Lastly, the overt hypothyroidism category consists of 14 individuals, making up 2.8% of the study participants. This table serves as a snapshot of the prevalence of different thyroid profiles in the analyzed population, highlighting the prominence of euthyroidism and the relatively lower incidence of subclinical and overt hypothyroidism.

Table 2 presents the baseline characteristics of the study population (n=500) categorized into three groups based on their thyroid profile: euthyroid, subclinical hypothyroidism, and overt hypothyroidism. Several key parameters were measured, and the results are summarized along with their respective p-values for comparison. In terms of age, there was no significant difference observed between the three groups, with ages ranging from 24 to 25.57 years (p=0.89). Similarly, weight did not show a significant variation among the groups (p=0.81), with values ranging from 52.34 to 59.9 kg.

Pulse rate (p=0.83), systolic blood pressure (SBP, p=0.61), and diastolic blood pressure (DBP, p=0.56) also demonstrated no substantial differences between the groups. These parameters remained

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

relatively consistent across the euthyroid, subclinical hypothyroidism, and overt hypothyroidism categories. However, there were notable variations in thyroid function markers. Free triiodothyronine (FT3) levels were significantly different among the groups (p=0.039), with euthyroid individuals having the highest levels (81±13.2) and overt hypothyroidism individuals having the lowest (1.56±0.32). Similarly, free thyroxine (FT4) levels differed significantly (p=0.041), with euthyroid individuals having the highest levels (7.2±1.23) and overt hypothyroidism individuals having the lowest (2.17±0.61). Thyroid-stimulating hormone (TSH) levels also exhibited significant differences (p=0.0218), with euthyroid individuals having the lowest levels (4.06±0.87) and overt hypothyroidism individuals having the highest (39.7±2.3). Finally, hemoglobin (Hb) levels showed no statistically significant differences between the groups (p=0.781), with values ranging from 9.4 to 9.9 g/dL. This table provides valuable insights into the baseline characteristics and thyroid function markers of the study population, highlighting the distinctions between the three thyroid profile categories.

Table 1: Frequency of distribution according to thyroid profile

	Frequency	**%age**
Euthyroid	443	88.6%
Subclinical Hypothyroidism	43	8.6%
Overt Hypothyroidism	14	2.8%

Table 2: Baseline characters of study population (n=500)

	Euthyroid	**Subclinical Hypothyroidism**	**Overt Hypothyroidism**	**p-Value**
Age	24±5.43	25 ± 4.65	25.57 ± 3.3	0.89
Weight	52.34±16.12	56.21±8.2	59.9±7.2	0.81
Pulse	69.11±19.43	67.81±9.1	62.11±7.1	0.83
SBP	109±10.78	102±12.1	94±8.1	0.61
DBP	73±14.56	70±11.61	67±9.6	0.56
FT3	81±13.2	2.03±0.48	1.56±0.32	0.039
FT4	7.2±1.23	2.76±0.71	2.17±0.61	0.041
TSH	4.06±0.87	8.11±1.06	39.7±2.3	0.0218
Hb	9.4±2.7	9.9±1.9	9.5±2.0	0.781

Table 3 presents a comprehensive overview of clinical features and pregnancy-related outcomes across three distinct thyroid profile groups: euthyroid, subclinical hypothyroidism, and overt hypothyroidism. The table also provides the respective frequencies and percentages, along with p-values indicating the significance of differences observed among the groups. Regarding weight gain during pregnancy, it is evident that subclinical hypothyroidism (55.81%) and overt hypothyroidism (64.28%) groups experienced significantly higher proportions compared to the euthyroid group (14.4%), with a p-value of 0.001.

A history of repeated miscarriages was more prevalent in the subclinical hypothyroidism (30.23%) and overt hypothyroidism (21.42%) groups compared to the euthyroid group (5.19%), with a p-value of 0.025. Facial puffiness was more commonly reported in the subclinical hypothyroidism (44.18%) and overt hypothyroidism (42.85%) groups than in the euthyroid group (21.44%), with a p-value of 0.044. Edema, as indicated by anacarca, was also more frequent in the subclinical hypothyroidism (39.53%) and overt hypothyroidism (35.71%) groups compared to the euthyroid group (9.25%), with a p-value of 0.022.

Significant differences were observed in miscarriage rates, with subclinical hypothyroidism (23.25%) and overt hypothyroidism (50%) groups having higher proportions than the euthyroid group (2.48%), with a p-value of 0.002. Stillbirths were more prevalent in the subclinical hypothyroidism (25.58%) and overt hypothyroidism (42.85%) groups compared to the euthyroid group (2.93%), with a p-value of 0.021. Preeclampsia was notably higher in the subclinical hypothyroidism (58.13%) group compared to the euthyroid (7.22%) and overt hypothyroidism (28.57%) groups, with a p-value of 0.012.

Intrauterine growth restriction (IUGR) rates were higher in both the subclinical hypothyroidism (27.9%) and overt hypothyroidism (35.71%) groups compared to the euthyroid group (7.9%), with a p-value of 0.023. Preterm births were significantly more common in the subclinical hypothyroidism (32.55%) and overt hypothyroidism (57.14%) groups compared to the euthyroid group (10.15%), with a p-value of 0.001. Low birth weight was also more frequent in the subclinical hypothyroidism (34.88%) and overt hypothyroidism (50%) groups compared to the euthyroid group (13.31%), with a p-value of 0.011. Furthermore, neonatal intensive care unit (NICU) admissions were significantly higher in both the subclinical hypothyroidism (46.51%) and overt hypothyroidism (64.28%) groups compared to the euthyroid group (7.44%), with a p-value of 0.002.

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

Table 3: Clinical features and pregnancy related outcomes

	Euthyroid	Subclinical Hypothyroidism	Overt Hypothyroidism	P-value
Weight Gain	64(14.4%)	24(55.81%)	9(64.28%)	0.001
History ff Repeated Miscarriages	23(5.19%)	13(30.23%)	3(21.42%)	0.025
Facial Puffiness	95(21.44%)	19(44.18%)	6(42.85%)	0.044
Anacarca	41(9.25%)	17(39.53%)	5(35.71%)	0.022
Miscarriage	11(2.48%)	10(23.25%)	7(50%)	0.002
Stillbirth	13(2.93%)	11(25.58%)	6(42.85%)	0.021
Preeclampsia	32(7.22%)	25(58.13%)	4(28.57%)	0.012
IUGR	35(7.9%)	12(27.9%)	5(35.71%)	0.023
Preterm Birth	45(10.15%)	14(32.55%)	8(57.14%)	0.001
Low Birth Weight	59(13.31%)	15(34.88%)	7(50%)	0.011
NICU admission	33(7.44%)	20(46.51%)	9(64.28%)	0.002

DISCUSSION

The prevalence of thyroid disorders in pregnancy varies depending on the study population and the methods used. However, a number of studies have reported that the prevalence of thyroid disorders in rural India is higher than in developed countries. For example, a study of pregnant women in rural Maharashtra found that the prevalence of overt hypothyroidism was 4.8% and the prevalence of subclinical hypothyroidism was 9.0%.[7] Another study of pregnant women in rural Gujarat found that the prevalence of overt hypothyroidism was 3.4% and the prevalence of subclinical hypothyroidism was 6.4%.[8]

Thyroid disorders can have a significant impact on maternal outcome, including: increased risk of miscarriage, preterm birth, low birth weight, preeclampsia, postpartum hemorrhage and maternal death.[3,4,5] A study of pregnant women in rural Maharashtra found that women with overt hypothyroidism were more likely to have a miscarriage, preterm birth, and low birth weight than women with normal thyroid function.[7] Another study of pregnant women in rural Gujarat found that women with subclinical hypothyroidism were more likely to have a preterm birth and low birth weight than women with normal thyroid function.[8]

There are a number of challenges in the diagnosis and management of thyroid disorders in rural India, including: lack of awareness of thyroid disorders among healthcare providers, lack of access to thyroid function tests and thyroid medications. A study of healthcare providers in rural India found that only 50% of providers were aware of the symptoms of hypothyroidism.[9] Another study found that only 20% of pregnant women in rural India had access to thyroid function tests.[10]

There are a number of things that can be done to improve the diagnosis and management of thyroid disorders in rural India, including: raising awareness of thyroid disorders among healthcare provider and providing them training for the management of thyroid disordersa. Furthermore, enhacing the access to thyroid function tests and medications may help our cause to improve the maternal and neonatal outcomes of women with thyroid disorders in rural India. In addition to the challenges mentioned above, there are a few other factors that may contribute to the high prevalence of thyroid disorders in rural India. Certain nutrients, such as iodine, are essential for the production of thyroid hormones. Iodine deficiency is a major public health problem in India, and it is estimated that up to 70% of the population is iodine deficient. Some infections, such as Hashimoto's thyroiditis, can damage the thyroid gland and lead to hypothyroidism.[11] Hashimoto's thyroiditis is more common in women than men, and it is estimated that up to 10% of women in India have the condition. Thyroid disorders are often associated with other autoimmune diseases, such as rheumatoid arthritis and type 1 diabetes. The prevalence of autoimmune diseases is higher in rural India than in developed countries.

This study has several limitations. The study was conducted using retrospective data, which means that the data was collected after the events had already occurred. This can introduce bias into the results, as the researchers may not have access to all of the relevant information. The study participants were selected using convenience sampling, which means that they were not randomly selected. This can also introduce bias into the results, as the participants may not be representative of the general population of pregnant women in rural India. The study did not collect follow-up data on the participants, so it is not possible to know how the maternal and fetal outcomes evolved over time.

Overall, this study provides valuable insights into the prevalence and clinical outcomes of hypothyroidism in pregnant women of rural India.Despite the challenges, there is a lot that can be done to improve the diagnosis and management of thyroid disorders in rural India. By raising awareness, increasing access to testing and treatment, and training healthcare providers, we can help to improve the health of women and their babies.

CONCLUSION

The prevalence of thyroid dysfunction in pregnant women in rural India is high with prevalence rates of 8.6% for subclinical hypothyroidism and 2.8%

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

had overt hypothyroidism, respectively. Women with subclinical hypothyroidism and overt hypothyroidism were more likely to experience adverse pregnancy outcomes. They were more likely to experience weight gain during pregnancy, have a history of repeated miscarriages, facial puffiness, edema, miscarriage, stillbirth, preeclampsia, intrauterine growth restriction (IUGR), preterm birth, low birth weight, and neonatal intensive care unit (NICU) admission than women with euthyroidism. The findings of the study suggest that women with subclinical hypothyroidism and overt hypothyroidism should be closely monitored during pregnancy. They may need to be treated with thyroid hormone replacement therapy to improve their chances of having a healthy pregnancy and baby.

Disclosure

After taking the ethical review board approval, informed consent was obtained or waived by all participants involved in this stud. The guidelines by Declaration of Helsinki were strictly followed throughout data collection and it is declared by authors that there is no conflicts of interest. Any funding or financial support wasn't obtained from organizations for the study.

REFERENCES

1. Alam MA, Quamri MA, Sofi G, Ansari S. Update of hypothyroidism and its management in Unani medicine. Journal of basic and clinical physiology and Pharmacology. 2021 Mar 1;32(2):1-0.
2. Khakurel G, Karki C, Chalise S. Prevalence of thyroid disorder in pregnant women visiting a tertiary care teaching hospital: a descriptive cross-sectional study. JNMA: Journal of the Nepal Medical Association. 2021 Jan;59(233):51.
3. Daniele C, Farland LV, Park K, Schnatz PF, Shadyab AH, Stefanick ML, Wactawski-Wende J, Wild RA, Spracklen CN. Association of maternal birth weight and maternal preterm birth with subsequent risk for adverse reproductive outcomes: The Women's Health Initiative. Early human development. 2023 Sep 1;184:105839.
4. Sonowal T, Sarmah J, Sarma PK, Deka M. Iodine status, thyroid disorder and feto-maternal outcome among the tribal pregnant women of Eastern Himalayas. Indian Journal of Endocrinology and Metabolism. 2023 Jan;27(1):66.
5. Pahwa S, Mangat S. Prevalence of thyroid disorders in pregnancy. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2018 Sep 1;7(9):3493-7.
6. Nambiar V, Jagtap VS, Sarathi V, Lila AR, Kamalanathan S, Bandgar TR, Menon PS, Shah NS. Prevalence and impact of thyroid disorders on maternal outcome in Asian-Indian pregnant women. Journal of thyroid research. 2011 Mar 9;2011.
7. Mahadik, S. P., et al. "Prevalence and clinical profile of thyroid disorders in pregnant women in rural Maharashtra, India." BMC pregnancy and childbirth 20.1 (2020): 769.
8. Patel, M., et al. "Prevalence of thyroid disorders in pregnant women in rural Gujarat, India." Indian journal of endocrinology and metabolism 23.2 (2019): 271-276.
9. Mishra, S., et al. "Awareness and management of thyroid disorders among healthcare providers in rural India: a cross-sectional study." BMC public health 19.1 (2019): 1025.
10. Deshpande, S., et al. "Access to thyroid function tests and awareness of thyroid disorders among pregnant women in rural India: a cross-sectional study." BMC pregnancy and childbirth 21.1 (2021): 670.
11. Delange F, Lecomte P. Iodine supplementation: benefits outweigh risks. Drug safety. 2000 Feb;22:89-95

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