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Effect of Thyroid Disorder in Pregnant Women Admitted In Tertiary Care Hospital

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Abstract

Background: Thyroid dysfunction is the commonest endocrine disorder in pregnancy. Thyroid hormones are essential for fetal brain development in the embryonic phase. Maternal thyroid dysfunction during pregnancy may have significant adverse maternal and fetal outcomes such as preterm delivery, preeclampsia, miscarriage and low birth weight, IUGR, still birth.

Objectives: To determine the effect of thyroid disease and its spectrum in pregnancy in order to evaluate the necessity of routine thyroid screening during pregnancy.

Methods: This observational cross-sectional study was done at the Department of Obstetrics and Gynaecology, Mymensingh Medical College Hospital, Mymensingh. Total 73 pregnant women with thyroid disorder were studied from July 2016 to December 2016. Data were collected pre-designed data collection sheet. Data were analyzed using computer-based programme statistical package for social science (SPSS) for windows version 24.

Results: Idism, subclinical hypothyroidism, hyperthyroidism and subclinical hyperthyroidism was 54.8%, 34.2%, 6.8% and 4.1% respectively. In hypothyroid and subclinical hypothyroid pregnant women, the mean serum TSH was 6.72 ± .81 mlU/L and serum FT4 was 4.8 ± 2.34 pmol/L; hyperthyroid and subclinical hyperthyroid pregnant women the mean serum TSH was 0.04 ± 0.03 mlU/L and serum FT4 was 26.21 ± 10.85 pmol/L. The incidence of fetal complications in the cases of hypothyroidism was IUGR (27.4%) and low birth weight (13.7%).

Conclusion: Our results showed that hypothyroidism and subclinical hypothyroidism among pregnant women were associated with more adverse perinatal outcome. The timely diagnosis and adequate treatment of hypothyroidism during gestation minimizes the risks and generally, makes it possible for pregnancies to be carried to term without complications. Screening for thyroid hormones should be a part of routine evaluation for pregnancy.

Keywords: Thyroid dysfunction; Endocrine disorder; Preterm delivery; Preeclampsia; IUGR

Introduction

Thyroid disorder is the common endocrine disorder in pregnant women, there are four main types of thyroid disease: hyperthyroid or too much thyroid hormone; hypothyroid or too little thyroid hormone; benign (non-cancerous) thyroid disease; and thyroid cancer [1]. The significant maternal complication are miscarriage, placental abruption, preterm delivery and pre-eclampsia and the risk of pre-eclampsia is significantly higher in women with poorly controlled hyperthyroidisms [2]. The thyroid gland consists of two lobes and an asthmas and weights between 15 and 25 gm in adults the gland secrets two major hormones, thyroxin and triiodothyronine, commonly called T3 and T4, respectively and both of these hormones profoundly increase the metabolic rate of the body [3]. Human choriogonadotropin (hCG) a weak thyroid stimulating hormone agonist is raised at

this time, results in increase release of thyroxin(T4) and tri-iodothyronine(T3), which concurs a combination of events to modify the normal thyroid status. The hypermetabolic state of normal pregnancy makes clinical assessment of thyroid function often need biochemical evaluation [4]. Thyroid binding globulin concentrations increase primarily because of decrease clearance resulting from increase estrogen concentration and an increase in urinary excretion, particularly in the 1st trimester. Complete lack of thyroid secretion can increase the metabolic rate 60 to 100 percent above normal [2]. Although prevalence of hyperthyroidism can have a dramatic effect on the mother as well as the fetus. The clinical presentation of hyperthyroid may not be obvious because symptoms of tachycardia, sweating, dyspnea, and nervousness are seen in normal pregnancy [5]. 1 to 5 % neonates of mothers with Graves' disease have hyperthyroidism due to transplacental passage of maternal stimulating thyrotropin receptor antibodies (TRAbs) [5]. Having equal or even greater importance than the above is due to the detrimental effect of hypothyroidism during pregnancy on fetal brain development thus proper maternal thyroid function is important to the developing fetal neurons for their maturation and proper function. In particular, during the 1st first trimester the fetus is completely dependent on the mother for thyroid hormone and thus maternal hypothyroidism during pregnancy raises serious concern about long lasting psychoneurological consequences for the progeny [6]. Medical screening is the systemic application of a test or inquiry to identify individuals at sufficient risk of a specific disorder to benefit from further investigation and treatment or direct preventive action. In view of the potential adverse outcome associated with maternal thyroid disorder and the obvious benefit of treatment, some expert panels have suggested routine thyroid function screening in all pregnant women [7]. Women with thyroid disorder, both overt and subclinical are at increased risk of pregnancy related complications such as spontaneous abortion, preeclampsia, preterm labour, and abruption plancenta. Some investigators have found free T_4 concentration and TSH to fall below the lower limit of the normal range using newer assays. These discrepancies highlight the need for each laboratory to develop its own normal ranges in pregnancy. Suppression of TSH with an elevation of free T_4 is a common finding during the first trimester of pregnancy [8]. These findings are believed to be caused by stimulation of TSH receptor by hCG which results in an increase in FT_4 and subsequently suppresses TSH levels. These changes are particularly pronounced in patients with hyperemesis gravidarum where FT_4 levels may reach 37.6 and TSH may be suppressed to undetectable levels.

Methodology

This cross-sectional descriptive type of observational study was carried out in the Department of Obstetrics and Gynecology, Mymensingh Medical College Hospital, Mymensingh, during July 2016 to December 2016.Pregnant women attend at Antenatal Ward of Department of Obstetrics and Gynecology, Mymensingh Medical College Hospital, Mymensingh. Total 73 pregnant women with thyroid disorder were included in this study. Among them 40 pregnant women had hypothyroidism, 25 pregnant women had subclinical hypothyroidism, 5 pregnant women had hyperthyroidism, 3 pregnant women had subclinical hyperthyroidism. After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24).

Results

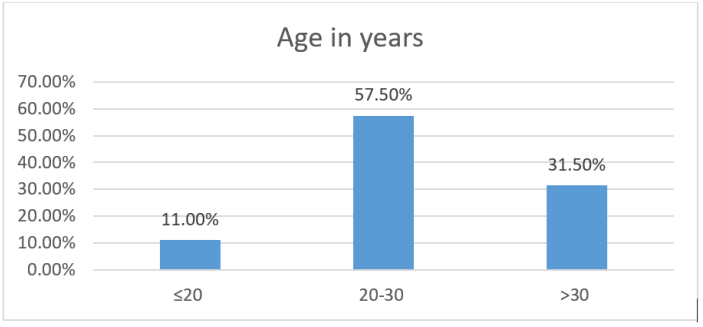

Figure 1: *Distribution of the patients according to age (n=73).*

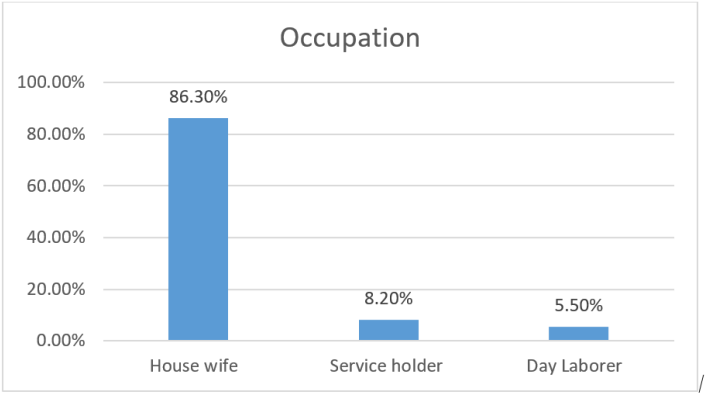

Figure 2: *Distribution of the patients according to occupation (n=73).*

Figure I shows majority (57.5%) of the patients between 20-30 years followed by 31.5% were 20-30 years and 11% were ≤20 years. The mean ages of the patients were 27.72 ± 6.03 years.

Figure II shows majorities (86.3%) were house wife. And (8.20%) were service holder and 5.50% were day laborer.

Figure III shows the mean duration of married life of study subjects were 8.45 years (Figures 1-3).

Table I shows 15.1% were nulipara, 21.9% had parity 1, 45.2% had parity 2 and 17.8% had more than 3 parity.

Table II shows 54.8% were hypothyroidism, 34.2% were subclinical hypothyroidism, 6.8% were hyperthyroidism, 4.1% were sub clinical hyperthyroidism.

Table III Shows mean serum TSH in Hypothyroid and subclinical hypothyroid pregnant women was 6.72 ± .81mlU/L.

Table IV Shows mean serum FT4 in Hypothyroid and subclinical hypothyroid pregnant women was 4.81 ± 2.34 pmol/L.

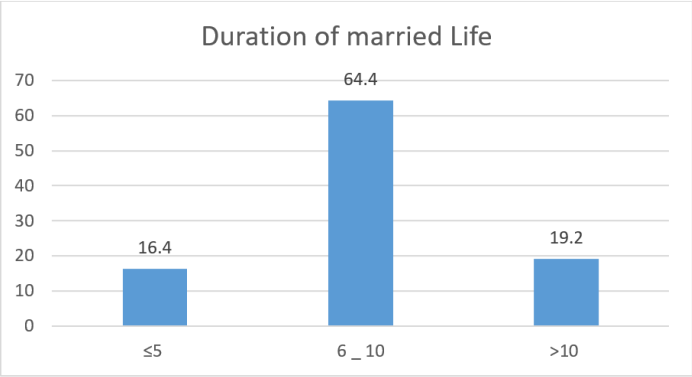

Figure 3: *Distribution of the patients according to duration of married life (n=73).*

Table V Shows mean serum TSH in Hyperthyroid and subclinical hyperthyroid pregnant women was 0.04 ± 0.03 mlU/L.

Table VI Shows mean serum FT4 in Hyperthyroid and subclinical hyperthyroid pregnant women was 26.21 ± 10.85 pmol/L.

Table VII shows adverse maternal outcomes were observed in 60 patients (72.6 %) and there were no complications in the rest 15 patients. The most common complications hypothyroidism was- pre-eclampsia (15.06%) and abortion (20.55%) and other common complication were preterm labour, abruptio placentae.

In the present study, the incidence of fetal complications in the cases of hypothyroidism was IUGR (27.4%) and low birth weight (13.7%). The incidence of fetal complications in the cases of subclinical hypothyroidism was IUGR (16.4%) and low birth weight (11%). Out of 5 cases of hyperthyroidism 4 cases had IUGR and 1 case had LBW. Out of 3 cases of subclinical hyperthyroidism, 2 cases had fetus with IUGR and 1 case had preterm birth (Tables 1-8).

Discussion

Thyroid disorders are one of the most common endocrine disorders in women during pregnancy and are associated with adverse maternal and foetal outcomes in pregnancy. However, an early detection of thyroid dysfunctions and treatment of mother during gestation improves the outcome [9]. The incidence of thyroid disorders in pregnancy and the maternal and fetal complications in the pregnant women with thyroid disorders varies greatly in different regions depending upon many factors and it is difficult to derive a single figure. The mean age of study subjects were 27.72 ± 6.03 years and majority (57.5%) of the patients were between 20-30 years. Average duration of married life of study subjects were 8.45 years and majority (45.2%) had parity 2. In hypothyroid and subclinical hypothyroid pregnant women, the mean serum TSH was 6.72±81 mlU/L and mean serum FT4 was 4.81±2.34 pmol/L. On the other hand, hyperthyroid and subclinical hyperthyroid pregnant women, the mean serum TSH was 0.04 ± 0.03 mlU/L and mean serum FT4 was 26.21 ± 10.85 pmol/L. According to the present study incidence of hypothyroidism in pregnancy was 54.8% which was inconsistent to the studies conducted by Taghavi, et al. (2.4%), PV Bandela, et al. (2.87%) and Ajmani, et al. (3%) [10-12]. Incidence of hypothyroidism in pregnancy according to the studies conducted by Weiwei Wang, et al. (0.3%) and Dinesh (0.7%) was less when compared to the present study [13,14]. Incidence of subclinical hyperthyroidism according to the present study was 4.1% which was comparable to the studies conducted by Taghavi, et al, Mannisto T, et al. and Rajput et al. showed incidence of subclinical hyperthyroidism was 4.2%, 3.5% and 3.3% respectively [10,15,16]. Incidence of hyperthyroidism according to the present study was 6.8% which was inconsistent to studies conducted by Taghavi, et al. (0.6%), Ajmani, et al. (0.5%) and Stagnaro green, et al. (0.4%) [10,12,17]. In this study maternal complication during hypothyroidism abortion (20.55%), preeclampsia (15.06%), preterm labour (10.9%). In case of hyperthyroidism maternal complication were abortion (2.74%), pre-eclampsia (1.37%). Fetal complications in hypothyroid pregnant wome were preterm birth (9.6%), low birth weight (13.7%), intrauterine growth retardation (27.4%) and still birth (4.1%). Abolovich et al. reported abortion (19%), LBW (6%), Still birth (3%) [7]. In a study by Leung et al. the incidence of complications was as follows- pre-eclampsia (22%), preterm labour (9%), low birth weight (9%) and still birth (4%) [16]. According to the study done by Ajmani et al., in pregnant women with subclinical hypothyroidism the incidence of complications like LBW (12.11%) and still birth (1.4%) was more when compared to the present study, incidence of complications like IUGR (1.4%) was less when compared to the present study [12]. Mannisto T et al. reported subclinical hyperthyroidism was associated with complications like low birth weight (2.3%) and Miller et al.[43] reported preterm births (13.2%) in subclinical hyperthyroidism. In this study found 3 perinatal deaths. Kriplani A et al. reported no perinatal deaths in their study on hypothyroidism in pregnancy [18]. The incidence of complications varied in different studies, but all these studies reinforced the fact that pregnancy with thyroid dysfunctions had adverse maternal and perinatal implications.

Table I: *Distribution of the patients according to parity (n=73).*

Table 1: *Distribution of the patients according to parity (n=73).*

Parity	n=73	(%)
0	11	15.1
1	16	21.9
2	33	45.2%
>3	13	17.8%

Table 2: *Distribution of the patients according to thyroid dysfunction (n=73).*

Thyroid dysfunction	n=73	(%)
Hypothyroidism	40	54.8
Subclinical hypothyroidism	25	34.2
Hyperthyroidism	5	6.8
Subclinical hyperthyroidism	3	4.1
Total	73	100

Table 3: *Level of serum TSH in Hypothyroid and subclinical Hypothyroid study subjects (n = 40 +25 = 65).*

TSH mlU/L	n=73	(%)	Mean ± SD
2.5-5.0	26	40.0	6.72 ± .81
5.1-10.0	30	46.1	
10.1-15.0	9	13.8	

Table 4: *Level of serum FT4 in Hypothyroid and subclinical Hypothyroid study subjects (n = 40 + 25 = 65).*

FT4 (pmol/L)	n=73	(%)	Mean ± SD
1.0-3.0	20	30.8	4.81 ± 2.34
4.0-6.0	28	43.1	
7.0-9.0	17	26.2	

Table 5: *Level of serum TSH in Hyperthyroid and subclinical Hyperthyroid study subjects (n = 5 + 3 = 8).*

TSH mlU/L	n=73	(%)	Mean ± SD
0.01-0.03	3	37.5	0.04 ± 0.03
0.04-0.06	2	25	
0.07-0.09	2	25	
≥ 0.10	1	12.5	

Limitations of the study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

Table 6: *Level of serum FT4 in Hyperthyroid and subclinical Hyperthyroid study subjects (n= 5 + 3 = 8).*

FT4 pmol/L	n=73	(%)	Mean ± SD
20-25	2	25	26.21 ± 10.85
20-30	3	37.5	
31-35	2	25	
36-40	1	12.5	

Table 7: *Maternal complications (n=73).*

Maternal Complication	Hypothyroidism	Sub Clinical Hypothyroidism	Hyperthyroidism	Sub Clinical Hyperthyroidism
Abortion	15 (20.55%)	8 (10.9%)	2 (2.74%)	1 (1.37%)
Abruptio Placentae	6 (8.2%)	2 (2.74%)	2 (2.74%)	0
Pre-eclampsia	11 (15.06%)	15 (20.55%)	1 (1.37%)	1 (1.37%)
Preterm Labor	8 (10.9%)	1(1.37%)	0	1 (1.37%)
None			15 (20.55%)	

Table 8: *Fetal Complications in thyroid dysfunction study subjects (n =73).*

Hypothyroidism (n=40)	Fetal complication	Sub clinical hypothyroidism (n=25)	Hyper-Thyroidism (n=5)	Subclinical Hyperthroidism (n=3)
7 (9.6%)	Preterm birth	5(6.8%)	0(00)	1(1.4%)
10(13.7%)	Low birth weight (LBW)	8(11%)	1(1.4%)	0(00)
20(27.4%)	Intrauterine growth retardation (IUGR)	12(16.4%)	4(5.4%)	2(2.7%)
3(4.1%)	Still birth	0(00)	0(00)	0(00)

Conclusion

This study showed a high incidence of thyroid disorder (10.9%) especially hypothyroidism in pregnant women, with the incidence of hypothyroidism being 54.8%, subclinical hypothyroidism being 34.2%, hyperthyroidism being 6.8% and subclinical hyperthyroidism being 4.1%. Due to the immense impact of the maternal thyroid disorder on maternal and fetal outcome, prompt identification of thyroid disorders and timely initiation of treatment is essential. The treatment of hypothyroidism is easy because thyroxin has no teratogenic effect. But the treatment of hyperthyroidism more difficult due to teratogenicity of anti-thyroid drug. Thus, universal screening of pregnant women for thyroid disorder should be considered especially in a country like Bangladesh where there is a high incidence of undiagnosed thyroid disorder.

Recommendation

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

Acknowledgements

The wide range of disciplines involved in the effect of thyroid disorder in pregnant women admitted in tertiary care hospital research means that editors need much assistance from references in the evaluation of papers submitted for publication. I would also like to be grateful to my colleagues and family who supported me and offered deep insight into the study.

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