International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 26-09-2018; Accepted: 30-10-2018
www.medicalsciencejournal.com
Volume 4; Issue 11; November 2018; Page No. 146-149

Assessment of the prevalence of subclinical and overt hypothyroid disorders in pregnancy with respect to maternal and fetal outcome

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Abstract
The prevalence of Subclinical Hypothyroidism in South Asia especially in India is more than in other parts of the world and mostly due to autoimmune thyroiditis and nutrition deficiency. The gravity of the complications like abortion, preterm birth, weight gain, postpartum thyroiditis and converting to overt hypothyroidism in future, outweighs the cost of screening. Hence based on above literature findings the present study was planned to assess the occurrence of overt and subclinical thyroid dysfunction in pregnant women and its effect on the maternal and fetal outcomes.
The 80 pregnant females referred for the treatment in the Department of the Gynaecology in ESI-PGIMSR, Basai Darapur were enrolled in the present study from Jan 2013 to Sept 2014. According to American Thyroid Association guidelines, normal TSH level is-0.1 to 2.5, 0.2 to 3, 0.3to3milli IU/L in first, second and 3rd trimesters respectively and these values were taken as reference for this study. In pregnancy, any value below these are hyperthyroidism and above are hypothyroidism. When T3, T4 values are normal and TSH is abnormal the disease is subclinical.
Hence based on the above findings it is recommended for pregnant females to perform thyroid function test at the start of pregnancy. Hypothyroidism is a common disorder in women in their reproductive age. Untreated hypothyroidism can affect the pregnancy and the neonate in an adverse fashion; though hypothyroidism when adequately treated and monitored had good maternal and fetal outcome.

Keywords: subclinical hypothyroidism, pregnancy, fetal outcome

Introduction
Hypothyroidism is a condition in which the body's thyroid gland is underactive. Meaning, the thyroid gland fails to produce enough of the thyroid hormones, Triiodothyronine (T3), and Thyroxine (T4).
The hormones produced by the thyroid gland affect the metabolism of the body. The hormones in general control how energy is used in your body and the resulting rate at which the different organs function in your body. The classic symptoms of hypothyroidism are fatigue, a hoarse voice, weight gain, constipation, pain in the joints, thinning hair, joint aches, muscle stiffness, dry skin, and increased sensitivity to cold. You need to consult your family physician or a general physician immediately for a diagnosis. If you are diagnosed of hypothyroidism, your physician should be able to treat and monitor your condition. You can also meet an endocrinologist for the management of hypothyroidism. However, if your symptoms are more aggressive, he may refer you to an endocrinologist for specialized treatment.
The thyroid gland is situated in front of the neck, below the voice box (larynx). It is a butterfly-shaped organ which has two lobes. The two lobes are on either side of the windpipe connected by a thin bridge (isthmus) of thyroid tissue. The thyroid gland is a part of the endocrine system of the body, which consists of a collection of glands in the body and the hormones produced by those glands.
The hypothalamus located in the brain directly controls the production of thyroid hormone through the pituitary gland. It produces the thyrotropin-releasing hormone (TRH), which signals the pituitary gland to release a hormone called thyroid-stimulating hormone (TSH). The TSH hormone released by the pituitary gland, in turn, signals the thyroid gland to produce the T3 or T4 hormones. If more T3 or T4 hormones are required, the pituitary gland produces more TSH and if the T3 and T4 levels are already high in the body, the pituitary gland releases less TSH. Hypothyroidism occurs when the production of T3 and T4 hormones by the thyroid gland is too less for the body. This can slow down your metabolism, and growth rate. Hypothyroidism may sometimes also lead to depression [1].
Women with thyroid dysfunction both overt and subclinical are at increased risk of pregnancy-related complications such as threatened abortion, preeclampsia, preterm labor, placental abruption, and postpartum haemorrhage. Fetal complications include low-birth-weight babies, first trimester spontaneous abortions, preterm delivery, fetal 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 [2].
Interest in thyroid disease in pregnancy, especially SCH, has escalated in part because of reports suggesting that variously

defined thyroid deficiency (including both overt and subclinical disease) during pregnancy results in impaired neurodevelopment in offspring [3]. Further, other reports have associated SCH with preterm delivery, pre-eclampsia and postpartum thyroiditis [4]. The prevalence of SCH could be anticipated to be between 2% and 5% of women screened, depending on the TSH and free T4 (FT4) level thresholds applied and this represents most women who would be identified with thyroid deficiency through routine screening. These complications have led some national societies as well as public interest groups to recommend routine thyroid screening during pregnancy [5]. Treatment of subclinical thyroid disorders is still controversial.

During pregnancy, there is a transient fall in TSH in the first trimester due to the structural homology between the TSH and human chorionic gonadotropin (hCG) molecules and their receptors, allowing hCG stimulation of the thyroid with an increase in thyroid hormone production. Thyroid hormone concentrations in blood are increased in pregnancy, partly due to the high levels of hyperestrogenic state of pregnancy and due to the weak thyroid stimulating effects of hCG that acts like TSH. Action of hCG is by cross reactivity of this hormone with TSH receptors. T4 levels rise from about 6-12 weeks, and peak by mid-gestation but at the same time the TSH level start decreasing [6]. During pregnancy, the thyroid gland may enlarge by 10% in countries where iodine sources are sufficient, and to a greater extent in iodine-poor countries. Production of thyroid hormones and iodine requirement each increases by approximately 50% during pregnancy. Gestation specific reference ranges for thyroid function tests are not widely in use although many centres are now preparing them. Fetal T4 is wholly obtained from maternal sources in early pregnancy since the fetal thyroid gland only becomes functional in the second trimester of gestation. As T4 is essential for fetal neurodevelopment it is critical that maternal delivery of T4 to the fetus is ensured early in gestation. In pregnancy, iodide losses through the urine and the fetoplacental unit contribute to a state of relative iodine deficiency [7]. Thus, pregnant women require additional iodine intake.

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.

The prevalence of Subclinical Hypothyroidism in South Asia especially in India is more than in other parts of the world and mostly due to autoimmune thyroiditis and nutrition deficiency. The gravity of the complications like abortion, preterm birth, weight gain, postpartum thyroiditis and converting to overt hypothyroidism in future, outweighs the cost of screening. Hence based on above literature findings the present study was planned to assess the occurrence of overt and subclinical thyroid dysfunction in pregnant women and its effect on the maternal and fetal outcomes.

Methodology

The 80 pregnant females referred for the treatment in the Department of the Gynaecology in ESI-PGIMSR, Basai Darapur were enrolled in the present study from Jan 2013 to Sept 2014. According to American Thyroid Association guidelines, normal TSH level is-0.1 to 2.5, 0.2 to 3, 0.3to3milli IU/L in first, second and 3rd trimesters respectively and these values were taken as reference for this study. In pregnancy, any value below these are hyperthyroidism and above are hypothyroidism. When T3, T4 values are normal and TSH is abnormal the disease is subclinical.

A detailed history and examination was performed with special regards to features suggestive of hypothyroidism, past and family history of known thyroid dysfunction was noted.

Following was the inclusion and exclusion criteria of the present study.

Inclusion criteria

Among pregnant women with singleton pregnancy irrespective of the period of gestation are selected by random sampling.

Exclusion criteria

Females having

1. Documented history of thyroid dysfunction
2. Multiple pregnancies
3. Gestational trophoblastic diseases
4. Women on treatment for thyroid dysfunction.
5. Any medical co-morbidities.
6. Bad Obstetric history with known cause

Results & Discussion

The data from the 80 pregnant women's were evaluated in the present study. The data was collected and presented as below.

As the gestational age increases, the percentage of women with subclinical hypothyroidism is doubled. Hence there is a need for screening subclinical hypothyroidism and thyroid autoimmunity in pregnancy, especially in the 1 st trimester when the fetal thyroid tissue is not functional. The role of routine screening becomes all the more relevant in these patients as they are asymptomatic and symptoms if any are ascribed to pregnancy itself.

Table 1: Obstetrical variable in the antenatal period.

Types	No. of Cases
Euthyroid	50
Subclinical hypothyroidism	18
Overt hypothyroidism	5
Subclinical hyperthyroidism	4
Overt hyperthyroidism	3
Total	80

Table 2: Maternal and fetal complications in different groups.

Maternal Complications	Euthyroid	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hyperthyroidism	Overt hyperthyroidism
No. of Cases	**50**	**18**	**5**	**4**	**3**
Anemia	9	7	1	2	
Preeclampsia	6	4	2	1	0
Abruption	3	0	1	0	0
GDM	2	0	1	0	
PPH	5	1	0	0	0
Fetal Outcomes71					
Preterm birth	5	5	1	0	0
IUGR	2	2	2	0	0
LBW	5	4	3	0	0
Abortions	1	1	1	1	
Still births	1	0	1	0	0
Neonatal Outcomes					
Respiratory distress syndrome	2	2	1	0	0
Sepsis	1	0	0	0	0
Hypoglycemia	1	0	0	0	0
Hypothermia	0	0	0	0	0
Intracranial bleed	0	0	0	0	0
Necrotizing enterocolitis	0	0	0	0	0
Early neonatal death	2	1	1	0	0

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 fetus. 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 fetal brain development.

It is more in Asian countries as compared to the West. There are few published Indian studies on this topic. Sahu *et al.* [8] have done thyroid function in second trimester and reported prevalence of thyroid disorders, especially overt and subclinical hypothyroidism to be 6.47% [9]. Dhanwal *et al.* from Delhi in 2013 reported a hypothyroidism prevalence of 14.3%, with a cut off of 4.5m IU/L as upper limit of normal in a cohort of 1000 pregnant women [10].

An inter-relation of this high prevalence of thyroid disorders with a high prevalence of the other major endocrinopathy diabetes mellitus has to be explored further. Prevalence of hyperthyroidism, both overt and subclinical in various studies has been reported to be around 1%. In the present study by Nangia *et al.* [11] in 2013 in two hospitals together in Delhi, a prevalence of 1-2% was found amongst 400 pregnant women. Further, significant adverse effects on maternal and fetal outcome were seen emphasizing the importance of routine antenatal thyroid screening. Although hyperthyroidism in pregnancy is uncommon, effects on both the mother and child are critical. However, in this study, no significant finding was seen as the sample size was small and the disease is comparatively infrequent.

There were several important findings from study. First, preeclampsia was the most common maternal complication in hypothyroid patients followed by abruption. Second, the occurrence of fetal loss (spontaneous abortion, fetal death) was significantly increased in the pregnant women with overt hypothyroidism. Third, the pregnant women with subclinical and overt hypothyroidism had a significant increase in the incidence of preterm delivery, fetal distress, and intrauterine growth retardation.

The drawback of the present study was it done on smaller population. Also, these women were not screened for thyroid antibodies. At present there is no available recommendations for detection or screening of thyroid dysfunction among Indian pregnant women. Recent consensus guidelines do not advocate universal thyroid function screening during pregnancy, but recommend testing for high risk women with personal history of thyroid or other autoimmune disorders or with a family history of thyroid disorders or symptoms of thyroid dysfunction

Conclusion

Hence based on the above findings it is recommended for pregnant females to perform thyroid function test at the start of pregnancy. Hypothyroidism is a common disorder in women in their reproductive age. Untreated hypothyroidism can affect the pregnancy and the neonate in an adverse fashion; though hypothyroidism when adequately treated and monitored had good maternal and fetal outcome.

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