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Review Article

Thyroid Disease Screening for All Pregnant Women as a Universal Accepted Consensus Guideline: A Short Review

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ABSTRACT

Till date, the debate on whether to screen pregnant women presented on their first visit to the clinic for antenatal has not come to a decisive conclusion. This paper reviewed the recommendation by the American Thyroid Association (ATA) and Endocrine Society Guideline (ESG), which does not recommend screening for thyroid dysfunction for all pregnant women. According to ATA, there is insufficient evidence to recommend for or against universal screening for abnormal TSH concentrations preconception, except for women planning assisted reproduction or those known to have TPOAb positivity.

This review includes studies and publications from a Randomized trial, meta-analyses, retrospective studies, and peer reviews pointing out few physiological changes which predispose women to thyroid dysfunction and other risk factors which are acquired and play a significant role in thyroid malfunction, making thyroid disease common among pregnant women. Basing our decision to test for thyroid dysfunction among pregnant women on clinical judgment on their prenatal visit may not be the best approach as most pregnant women in need of the medical intervention of thyroid dysfunction will likely be unidentified. This could be due to clinical features of the disease being masked by the physiological changes that accompany pregnancy.

The effect of thyroid dysfunction on pregnancy outcome is no longer a thing of debate, but taking appropriate measures towards avoiding the occurrence of such devastating effect has been a bone of contention among physicians, obstetricians, gynaecologist and various medical bodies.

There is need for thyroid screening with evidence from various studies, having met the criteria for any disease to be considered for screening.

Keywords: Thyroid dysfunction; Hyperthyroidism; Hypothyroidism; Subclinical hypothyroidism; Screening; Pregnancy

INTRODUCTION

Anatomically, the thyroid gland is shaped like a butterfly, located at the lower part of the neck. This thyroid gland produces hormones called the thyroid hormone which has the responsibility to help the body use energy, stay warm and keep the brain, heart, muscles and other organs working as they should.

Hyperthyroidism and hypothyroidism represent pathologic conditions where an excessive or insufficient hormone synthesis occurs, respectively. Imbalance of this hormone has consequences on the individual. When this condition is present in pregnant women, it does not pose a threat to the mother alone, but also to the foetus, at prenatal, and to the baby, at postnatal. Pregnancy exposes healthy women to thyroid dysfunction and amplifies this condition when a woman is having an existing imbalance of this hormone.

Due to limited studies which are needed to provide evidence on the prevalence, adverse outcome, better management approach, diagnostic reference range that works for all irrespective of race

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and means of preventing the thyroid dysfunction among pregnant women, this disease is faced with a challenge of having a universally accepted guideline in the areas of identifying pregnant women who are at risk of complications associated with thyroid disease, through screening every pregnant woman on their first hospital visit.

The universal screening for thyroid disease either before or during pregnancy remains controversial. For universal screening to be recommended, any index condition must be prevalent, associated with adverse health outcomes, and treatable. Furthermore, effective therapy must not just exist but also be practical and effectively deliverable. Finally, the screening must be cost-effective. In this review, we study the criteria and evidence to evaluate if these criteria are met.

Iron deficiency in both developed and developing countries

Iodine deficiency has been a significant cause of hypothyroidism in developing countries. At the same time, chronic autoimmune thyroiditis is the primary cause of hypothyroidism in developed countries with thyroid auto-antibodies found in about 50% of women who are pregnant with SCH and more than 80% with overt hypothyroidism [1].

During pregnancy, there is an increase in the excretion of iodine by the glomerular filtration, renal clearance, and iodine transplacental transfer to the fetus, especially at the later gestation. Hence, the demand for production of the thyroid hormone to compensate for the increased loss and substances needed for the synthesis of the thyroid hormone will as well increase in demand [2]. For women who are suffering from chronic iodine deficiency during pregnancy, the depleted iodine store is not able to make up for the increased demand. When this deficiency is not corrected, it might lead to goitre formation and maternal hypothyroidism.

Is a study conducted in Europe as in 2011, 393 million Europeans (44.2%), including pregnant women and those of childbearing age, were estimated to be iodine-deficient. In most countries of Europe, America, Africa, and Asia, there has been significant progress made in the prevention of iodine deficiency by initiating policies that promote the use of salts fortified with iodine and administration of iodine supplement in areas of mild to moderate iodine deficiency [3].

Some studies have shown promising signs in the use of iodine supplement and iodise salt in correction and prevention of hypothyroidism, and a positive effect on the child cognitive and motor function. Iodine is an essential element for thyroid hormone production increases in demand by 50% and can be met by daily consumption of 250 μg of iodine for countries with unsuccessful iodisation program and 50 μg for countries with successful iodisation program for pregnant and lactating women, and should not exceed 500 μg, according to WHO.

Anti-seizure medicine

Epilepsy which is a form of seizure is a chronic medical condition that requires lifelong treatment with Antiepileptic Drugs (AED). Most patients with epilepsy have a common metabolic disorder which Sub Clinical Hypothyroidism (SCH) is one of them and is associated with the use of antiepileptic drugs.

Several studies have demonstrated the relationship between thyroid hormone production and this medication when used by children and adults. According to some published articles, there was a significant reduction in the level of thyroxine, Free Triiodothyronine (FT3), Free Thyroxine (FT4) and Thyroid Binding Globulin (TBG) concentrations with phenobarbital, phenytoin, carbamazepine, valproate and oxcarbazepine, but not with lamotrigine, levetiracetam, tiagabine and vigabatrin [4]. It is proposed that the mechanisms of interference of AEDs with thyroid function, which leads to SCH include enhanced metabolism and altered protein binding or interference of the function of the hypothalamic-pituitary-thyroid axis.

Physicians should be well informed of the possible danger of AEDs on the thyroid which can lead to an altered metabolic state, either as a short-term effect of a long-term effect, as well on fetal brain development for children whose mothers are on a long term AEDs.

Use of biotin supplement

Biotin is a readily available supplement that is part of the B-complex vitamins. These come in various forms, like vitamin B7, vitamin H and coenzyme R, and in some cases are not clearly stated to the end over, but are advertised as hair and nail enhancement solutions that are sold over the counter [5]. The Biotin is used by some physicians in the management of neuropathy, with current studies showing prospect in management of Multiple Scleroses (MS) with Biotin.

The excessive intake of Biotin has been linked to a false result of Grave's disease, an autoimmune disease of the thyroid that leads to hyperthyroidism. This interference with thyroid hormone test, which leads to false hyperthyroidism result stops when biotin usage by the patient is discontinued. FDA warns that Biotin in supplements can also affect tests for heart failure, pregnancy, cancer, and iron-deficiency anaemia. The effect of Biotin on bio-makers and hormone is still going through various studies [6].

High oestrogen level in women and oral contraception usage

The most common causes of increased serum TBG levels are the raise in estrogen production or administration, either as a component of an OC or as replacement therapy. The use of oral contraceptive can induce hyperthyroidism in women by decreasing TSH and increasing T4 production by the thyroid gland while transdermal and IUD has little or no effect on thyroid function.

In a study published by the European Journal of Endocrinology which analysed data from 94,009 participants, finding shows that prevalence of formerly diagnose hyperthyroidism is 2.5% in women and 0.6% in men, while hypothyroidism affected 4.8% of ladies and 0.9% of males. Based on these results, scientists

concluded that thyroid dysfunction was more common to women than in men [7]. These results could be due to the existence of abundant oestrogen level in women and the oestrogen-thyroid relationship. The oestrogen hormone indirectly contributes to thyroid concentration in circulation by raising the Thyroxine Binding Globulin (TBG), a unique form of protein that is synthesised by the liver.

Apart from the high level of oestrogen found in women, the outcome of this study might be due to increasing number of women using Oral Contraceptives (OCs) to regularise their menstrual cycle, birth control, treatment of a polycystic ovarian syndrome, infertility treatment, and hormonal imbalance [8]. With the knowledge of the interaction between OCs and the thyroid binding hormone, it is evident that this could put women at risk of thyroid dysfunction during pregnancy.

FACTORS THAT PREDISPOSES WOMEN TO THYROID DISEASE

Advanced maternal age

Pregnancy found among women with advance age, >35years has been linked to lots of complications ranging from Miscarriage, preterm birth, preeclampsia, gestational hypertension, placenta previa, and other congenital anomalies. In a research conducted by Hind A et al. with 888 patients shows that 699/888 (78.7%) were aged between 20 and 34 years and 189 (21.3%) were aged 35 years and above. Advanced maternal age was significantly associated with a higher incidence of type II diabetes mellitus (p=0001), hypothyroidism (p=0.02), history of miscarriages (p=0.0001), GDM (p=0.0001), placenta previa p=0.04, induction of labour (p=0.04), and Cesarean section (p=0.009).

A 3 years retrospective study conducted by Heves et al., with a sample of 234 patients diagnosed with thyroid dysfunction, the parental ages at birth were recorded in 215 patients. In our study group, 118 mothers (54%) were older than 27 years, and maternal age ranged between 18 and 45 years, with a mean maternal age of 28.9 ± 0.4, for infants diagnosed with TD. The study shows that advance maternal age is more common in cases of thyroid dysfunction. See Table 1 below.

Table 1: This table shows maternal age distribution in the study group.

Maternal age groups	Mothers of patients with TD	Control mothers
18 years and below	2 (0.9%)	31 (6.1%)
19-24 years	54 (25.1%)	201 (40%)
25-29 years	69 (32%)	161 (32%)
30-34 years	47 (21.8%)	81 (16.1%)
35 years and above	43 (20%)	28 (5.5%)
Total number (%)	215 (100%)	502 (100%)

EFFECT OF THYROID DYSFUNCTION ON PREGNANCY OUTCOME AND INFANTS

Hypothyroidism and subclinical hypothyroidism

Hypothyroidism in pregnancy is defined as Thyroid Stimulating Hormone (TSH) above the normal pregnancy reference range and the T4 below the reference range. Subclinical hypothyroidism in pregnancy is defined as a TSH level that is above the pregnancy reference range and a normal T4 value. This reference range varies by trimesters, race, and as well, from one healthcare institution to another. Most cases of hypothyroidism and subclinical hypothyroidism are caused by autoimmune thyroiditis, but can also be as a result of iodine deficiency. The effect of hypothyroidism on pregnancy outcome and infant morbidity is no longer a thing of debate because lots of evidence have been published stating its relation with preterm birth, miscarriages, preeclampsia, and Intrauterine Growth Restriction (IUGR) [9]. On the other hand, lots of work has been done trying to establish a relationship between subclinical hypothyroidism and pregnancy outcome. One of that is the study by Brian C., in which 17,000 women were screened for thyroid dysfunction. Subclinical hypothyroidism was identified in 2.3% of the total population screened, which corresponds with other studies. Also in his studies, it was identified that women with subclinical hypothyroidism had a significant, almost 2-times higher incidence of preterm delivery at or before 34 weeks of gestation, and 3-times increase in the incidence of placental abruption when compared with the healthy group.

A systematic literature search of PubMed, Web Science, and Embase meta-analysis by Fan et al., was conducted with six studies and showed that thyroid abnormalities during pregnancy might have an impact in the neuropsychological development of children. Of recent, much evidence has been presented which linked subclinical hypothyroidism with Attention Deficit Hyperactive Disorder (ADHD) and autistic symptoms in children [10].

Hyperthyroidism

Hyperthyroidism is defined as a high level of T4 above the reference range and decreased TSH. Hyperthyroidism during pregnancy is not as common as subclinical hypothyroidism and hypothyroidism, with a prevalence rate that is between 0.1% and 1% based on collective classification as subclinical hyperthyroidism or as hyperthyroidism alone.

Although this might appear to be seldom, it has the potential to cause an adverse outcome during or after pregnancy, either to the fetus or the mother or on both. In practical, subclinical hyperthyroidism has not been linked with a severe pregnancy complication. Hyperthyroidism has been liked to several complications encountered among pregnant women at one gestational point or the other. These complications include gestational hypertension, pregnancy complicated with congestive heart failure, spontaneous abortion, preterm delivery, Intrauterine Growth Restriction (IUGR), stillbirth, small for

gestational age, and has recently been linked with offspring neurological deficit.

Many clinical symptoms of hyperthyroidism such as palpitations, sleeplessness, anxiety, fatigue, are nonspecific and may be overlooked or interpreted as typical pregnancy symptoms. Hence, this can lead to misdiagnosis of hyperthyroidism if the physician is to really of clinical signs and symptoms. Clinical diagnosis of hyperthyroidism may be confirmed only by findings of elevated serum thyroid hormone concentrations and suppressed serum TSH levels.

DISCUSSION AND CONCLUSION

The knowledge and full understanding of the morbidity and potential life loss due to deficiency or malfunction of the thyroid gland or the pituitary gland has made it a thing of special interest toward finding a means of prevention and management of thyroid diseases.

In the past, the role and effect of the thyroid hormone during pregnancy and early phase of childhood were not adequately understood. Today, more works have been done in these areas and a clear picture of the role of thyroid hormone before, during, and after pregnancy like, implantation, intrauterine growth, fetal neuron and metabolic function, organ maturity, maternal health and safety during the gestation period are understood better with lots of evidence.

Some studies have shown that there are higher chances of missing a diagnosis of thyroid dysfunction among pregnant women. Recent studies from Europe, China, and the United States compared the case-finding approach of the high-risk pregnant women to universal screening for pregnant women at their first prenatal visit. They reported that one-third of women with hypothyroidism in the United Kingdom, 55% in the Czech Republic, 81.6% in China, and 80.4% in the United States, would have been missed by the case-finding approach. Also, a study that was carried out on pregnant Egyptian women which compared screening for thyroid function and not screening show that targeted screening for only high-risk pregnant women resulted in missing 34.5% of women with thyroid dysfunction. These missed women with thyroid dysfunction could be as a result of similarity in the clinical presentation of thyroid dysfunction and pregnancy physiology, such as constipation, weight gain and fatigue.

Today, a vast number of physicians are in favor of universal screening for thyroid dysfunction in pregnancy, and the majority is convinced that when left untreated it can reduce the Intelligence Quotient (IQ) in offspring. In a previous study by the European Thyroid Association (ETA) members revealed that 42% of respondents screened all pregnant women, and 43% adopted a case-finding approach. Also in another survey, 75% of Iranian endocrinologists opted for targeted screening, whilst Universal screening was supported by 57% in Israel and 43% by Latin America.

The international endocrine societies were neither for nor against screening. Majority of the physicians, healthcare institutions, and health organizations has acknowledged the potential adverse health implications of thyroid dysfunction, as well agreed with the benefits associated with early identification and treatment of this condition. Hence, a vast majority of endocrinologists are in support of thyroid screening among pregnant women.

Since the introduction of early diagnosis and prompt institution of replacement therapy has been achieved through the implementation of screening of every newborn baby using blood spotted on filter paper, almost all cases of congenital hypothyroidism are now identified and are appropriately managed. Below should be the ideal manner and a better approach towards management and possible prevention of devastative effect of thyroid dysfunction among pregnant women. Knowing very well that various medical institutions have their various reference ranges, using this algorithm with an institutional reference range is ideal.

Just like some disease, the need to prevent the catastrophic effect of thyroid diseases like hyperthyroidism, subclinical hypothyroidism, overt hypothyroidism, thyrotoxicosis, Thyroid Peroxidase (TPO) antibody, and other thyroid dysfunction, cannot be overemphasized. Depending on the clinical judgment through history taking and physical examination will not do justice towards preventing the devastating effect of this disease condition by identifying patients who are suffering from any of these thyroid diseases, especially during pregnancy? Hence, screening every intending pregnant woman, prenatal and postnatal women for thyroid disease will go a long way towards identifying women who are faced with such disease without clinical manifestation.

REFERENCES

1. Dayan CM. Interpretation of thyroid function tests. The Lancet. 2001; 357(9256):619-24.
2. Lifshitz F. Pediatric endocrinology: growth, adrenal, sexual, thyroid, calcium, and fluid balance disorders. CRC Press; 2006.
3. Liu Z, Long W, Fryburg DA, Barrett EJ. The regulation of body and skeletal muscle protein metabolism by hormones and amino acids. J Nutr. 2006; 136(1):212-217.
4. Standring S. Gray's anatomy e-book: the anatomical basis of clinical practice. Elsevier Health Sciences. 2021.
5. Nazarpour S, Tehrani FR, Simbar M, Azizi F. Thyroid dysfunction and pregnancy outcomes. Iran J Reprod Med. 2015; 13(7):387.
6. Stagnaro-Green A, Abalovich M, Alexander E, Azizi F, Mestman J, Negro R, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. Thyroid. 2011; 21(10):1081-1125.
7. Yoshimura M, Hershman JM. Thyrotropic action of human chorionic gonadotropin. Thyroid. 1995;5(5):425-434.
8. Lazarus J, Brown RS, Daumerie C, Hubalewska-Dydejczyk A, Negro R, Vaidya B. 2014 European thyroid association guidelines for the management of subclinical hypothyroidism in pregnancy and in children. Eur Thyroid J. 2014; 3(2):76-94.
9. Book series. Thyroid Disease in Pregnancy and Postpartum. Springer. 2005.
10. Polak M. Human fetal thyroid function. Paediatric Thyroidology. 2014; 26:17-25.