ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 07, pp.54997-55000, July, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

PREVALENCE OF THYROID DYSFUNCTION AMONG SAUDI WOMEN IN EARLY PREGNANCY AT KING ABDULAZIZ UNIVERSITY HOSPITAL

***Khulood Sami Hussein**

Department of Physiology, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

ARTICLE INFO

Article History:
Received 19th April, 2017
Received in revised form
11th May, 2017
Accepted 28th June, 2017
Published online 31st July, 2017

Key words:

Thyroid dysfunction,
First trimester, Hypothyroidism,
Pregnancy, Saudi women.

ABSTRACT

Introduction: thyroid disorders are common in pregnancy and have been linked to adverse maternal and fetal outcomes. Symptoms of thyroid disorders are sometimes mistaken for those of normal pregnancy, and so often go unnoticed. This study investigates the prevalence of thyroid dysfunction in pregnant women in a tertiary care hospital.

Subjects and Methods: This was a cross sectional study conducted at the largest tertiary care hospital in Jeddah, Saudi Arabia enrolling 154 first trimester pregnant Saudi women attending the Obstetrics and Gynecology clinic at King Abdulaziz University Hospital, from October to April 2015. Measurements of serum thyroid-stimulating hormone (TSH) were taken as part of the routine antenatal blood tests.

Results: The prevalence of hypothyroidism was 40.25% (n=62) and hyperthyroidism 0.6% (n=1) using the cutoff TSH level based on the guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy.

Conclusion: Prevalence of hypothyroidism was found to be high in our study and hence, antenatal thyroid screening should be judiciously offered. Routine testing with serum TSH is a sufficient and cost effective screening tool.

Citation: Khulood Sami Hussein. 2017. "Prevalence of thyroid dysfunction among Saudi women in early pregnancy at king Abdulaziz university hospital", *International Journal of Current Research*, 9, (07), 54997-55000.

INTRODUCTION

Maternal thyroid function undergoes physiological changes during pregnancy and some of the most prevalent endocrine disorders seen in pregnancy are those related to thyroid dysfunction (Abalovich, 2007). Major, yet reversible changes in thyroid physiology are observed in pregnant women (Lazarus, 2011). The increased glomerular filtration rate which occurs in pregnancy can lead to increased losses of urinary iodine, resulting in iodine deficiency and eventually maternal goiter (Lazarus, 2011 and Idris, 2005). Thyroxine-binding globulin rises because of higher estrogen levels, and thyroid-stimulating hormone (TSH) levels fall as human chorionic gonadotropin concentration rises (Abalovich, 2007; Lazarus, 2011; Galofre, 2009). In sum, pregnancy-induced stress on the thyroid can lead to hypothyroidism in women with inadequate thyroidal iodine reserve or iodine deficiency. It is not until the end of the first trimester that the developing fetus starts synthesizing thyroid hormones, so it is dependent on the maternal thyroid hormone supply for the development of its organs and the central nervous system as well as general growth (Fitzpatrick, 2010 and Stagnaro-Green, 2011). Adverse outcomes including attention deficit and hyperactivity disorder have been observed in children born to mothers with hypothyroidism (Ghassabian *et al*., 2012). Normal thyroid hormones levels are key to maintaining a normal pregnancy until delivery (Choksi, 2003). Research points to an association between maternal hypothyroidism and higher risks of miscarriages, stillbirths, premature births, and pregnancy-induced hypertension (Montoro, 1997; Davis, 1988; Smallridge, 2001; Wasserstrum, 1995 and Casey, 2005). Conversely, researchers have observed improved pregnancy outcomes in women who have been treated for hypothyroidism (Alexander, 2004). Elevated maternal thyroid hormone levels are also associated with adverse effects such as an increased risk of low birth weight, neonatal morbidity and mortality (Medici, 2013). Diagnosing women with thyroid dysfunction early in pregnancy allows early treatment and thus reduces the risk of adverse maternal and fetal outcomes (Ozdemir, 2013). While there is still some debate as to the most appropriate screening test for thyroid disorders in early pregnancy, most research suggests using TSH as the preliminary test, because this hormone is a more sensitive indicator of thyroid function than FT4 and takes into consideration the log-linear TSH-FT4

****Corresponding author: Khulood Sami Hussein,***
Department of Physiology, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

relationship (Ladenson, 2000; Dashe, 2005; Mandel, 2005). According to the Western literature, hypothyroidism in pregnancy is more prevalent than hyperthyroidism (2.5% vs. 0.2%, respectively) (LeBeau, 2006). There are only a few reports of the prevalence of pregnancy-related hypothyroidism in the Saudi context (Taha, 2011; Refaat, 2014). To provide more data on pregnancy-related thyroid disorders in Saudi Arabia, the current study aims to find the prevalence of hypothyroidism in Saudi women in their first trimester of pregnancy.

MATERIALS AND METHODS

This cross-sectional study was carried out at King Abdulaziz University Hospital (KAUH), the largest tertiary care center in Jeddah, Saudi Arabia. It included 154 first-trimester pregnant Saudi women attending the Obstetrics and Gynecology clinic between October and April 2015. Approval for the study was granted by the Biomedical Committee at the Faculty of Medicine, King Abdulaziz University. The sample size was based on the number of patients who met the inclusion criteria during the study period. Saudi women with singleton pregnancies, in the first trimester (6-13 weeks) and with a viable fetus were selected for inclusion. Women with a history of complicatedor multiple pregnancies, thyroid diseases, treatment with anti-thyroid drugs, family history of thyroid disorders, and medical conditions like hypertension, diabetes mellitus, renal and other autoimmune diseases were excluded from the study.

All the women were informed about the nature of the study and anyone who did not agree to participate was excluded. Socio demographic and medical information was obtained from each participant. Additionally, each subject underwent a complete physical examination including abdominal ultrasound to confirm gestational age and normality of pregnancy. At their first antenatal visit as part of routine laboratory workup, all participants were screened for thyroid function by measuring TSH levels. In the KAUH laboratory, TSH assay was performed using the electro-chemiluminescenceimmunoassay (ECLIA) on Cobas e411 (Roche Diagnostics International Ltd, Switzerland) according to the manufacture protocol. The normal range according to the manufacturer for TSH was 0.27-4.20 µIU/mL and the detection sensitivity was 0.005 µIU/mL. The intra and interassayco efficient of variation for TSH was 1.4% and 3.4%, respectively.

Thyroid dysfunction was classified according to the guidelines set out by the American Thyroid Association (ATA) for diagnosing and managing thyroid disease during pregnancy [6].

- Hypothyroidism: TSH <2.5 µIU/mL
- Hyperthyroidism: TSH ≤0.03 µIU/mL

All subjects with abnormal TSH were requested to come for follow-up for further testing at the endocrine clinic at KAUH. A written informed consent was obtained from all participants who agreed to participate. Statistical presentation and analysis of the present data was conducted, using SPSS version 20.0 SPSS Inc., Chicago, IL, USA).Continuous variables were analyzed as mean values ± standard deviation (SD). Percentages were calculated for categorical data.

RESULTS

Characteristics of the study population are given in Table 1. The mean maternal age of the study population ranged from 17-39 years with mean ± SD (24.4 ± 3.6). Sixty-three (40.9%) were nulliparous and 91 (59.09) were multiparous. The mean gestational age was 10.9 ± 2.0 weeks.

Table 1. Characteristics of the study population

Variable	Mean±SD
Age (years)	24.4 ± 3.6
BMI (kg/m^2)	25.48 ± 5.36
GA (weeks)	10.92 ± 2.02

BMI: body mass index; GA: gestational age

Following trimester specific cutoffs of <2.5 µIU/mL for the first trimester as suggested by the ATA (Stagnaro-Green *et al*., 2011), we found 40.3% (n=62) of pregnant women to have hypothyroidism in the first trimester (Table 2). Hyperthyroidism was detected in one (0.6%) of the participants.

Table 2. Thyroid dysfunction in the first trimester pregnant women (n=154)

Variable	N (%)
TSH <2.5 µIU/mL	62 (40.25)
TSH ≤ 0.03 µIU/mL	1 (0.6)

DISCUSSION

Thyroid disorders are common, and their prevalence rises in pregnancy (Karakosta, 2011 and Moleti, 2014). According to research by Casey *et al*., hypothyroidism during early pregnancy affects about 2.5% of pregnant women (Casey, 2005 and Casey, 2007). Similar figures were reported several studies (Männistö, 2009; Allan, 2000; Vaidya, 2007). These studies suggesting thyroid disorders are a common problem in pregnancy, in contrast with Gillett's position that routine screening for thyroid function is not necessary in pregnant women, unless they have increased risk factors for thyroid disease (Gillett, 2004). This study aimed to evaluate thyroid function during the first trimester of pregnancy in Saudi women living in the Jeddah area. The major finding is that 40.3% of pregnant women attending KAUH have hypothyroidism. The prevalence of hypothyroidism in various countries has been reported in recent years (Qian, 2013; Habimana, 2014; Moreno-Reyes, 2013). Results of the present study are fairly consistent with recently reported figures from Saudi Arabia. In their hospital-based study of 936 pregnant women (12-30 weeks of gestation) in the Madinah region, Taha *et al*. observed hypothyroidism in 24.2% of the women (Taha, 2011).

Refaat (2014) (Refaat, 2014) reported hypothyroidism in 32.4% of 162 pregnant women (4-12 weeks of gestation) in Makkah. While somewhat higher, our results are consistent with these Saudi studies, suggesting a high prevalence of hypothyroidism in pregnant Saudi women. A large study carried out in Delhi, India reported a 14.3% prevalence of hypothyroidism in women in their first trimester (Dhanwal, 2013). A smaller scale study conducted in Hyderabad, India on 163 nonpregnant women with repeated pregnancy loss

occurring up to 12 weeks of gestation found 4.12% prevalence of hypothyroidism in these women (Rao, 2008). Similarly, a large-scale study in the US found hypothyroidism to be present in 15.5% of the more than 500,000 pregnant women included in the study (Blatt 2012). The study demonstrates that hypothyroidism has a statistically significant relationship with recurrent pregnancy loss in the first trimester. However, another US-based study found hypothyroidism in only 2.2% of the pregnant women, in both their first and second trimesters, with no association with adverse outcomes (Cleary-Goldman, 2008). Hypothyroidism in early pregnancy has been linked to various outcomes during pregnancy including recurrent pregnancy loss, preeclampsia, premature birth, and increased fetal mortality and has also been associated with later problems in children such as impaired neuropsychological development (Stagnaro-Green, 2011; Männistö, 2009; Vaidya, 2007; Rao, 2008; Haddow, 1999; Li, 2010; Kourtis, 2010 and Pop, 2003). The thyroid gland and thyroid function come under increased stress during pregnancy, when physiological changes stimulate increased production of thyroid hormones to meet the needs of the mother and fetus. There is still some debate about the most appropriate method of initial screening for thyroid dysfunction in pregnancy. However, the consensus is that TSH is the best marker in initial tests (Vaidya, 2007; Cleary-Goldman, 2008; Kourtis, 2010 and Pop, 2003).

The adverse outcomes associated with hypothyroidism in pregnancy tend to be seen when using a threshold of TSH levels greater than 2.5 mIU/L in the first trimester instead of a TSH reference range based on cutoff values derived from apparently euthyroid pregnant women. The ATA gives >2.5 μIU/ml as the recommended cutoff point for diagnosis of hypothyroidism during the first trimester. The high prevalence of gestational hypothyroidism in Saudi Arabia could be considered a major public health burden. Debate on the need for universal screening for hypothyroidism in early pregnancy is ongoing (Vila, 2013). In its recent guidelines, the ATA has withheld recommendations for the universal screening of pregnant women for hypothyroidism, citing lack of evidence (Vila, 2013). Hyperthyroidism has a much lower prevalence than hypothyroidism, occurring in only 0.5-2/1000 pregnancies (Price, 2001). If left untreated, pregnant women with hyperthyroidism have a significantly higher risk of obstetric complications including preeclampsia, preterm labor, low birth weight, fetal and perinatal mortality (Price, 2001). In the current study, newly diagnosed hyperthyroidism was seen in one participant (0.6%). This high prevalence of hyperthyroidism in our study population could be explained by a possible population-specific elevated sensitivity of the thyroid gland to thyrotrophic molecules like HCG, resulting in gestational toxicosis. Price *et al*. reported similar differences between Asian and western Caucasian women in their study comparing thyroid function tests in both pregnant and non-pregnant women. The strong point of this study is that we have included only healthy pregnant women with no past or present history of thyroid diseases in this study and all samples were analyzed in one laboratory.

However, there are a few limitations of this study, which are the small sample size and being confined to only one hospital, which underestimate over all prevalence in the Saudi pregnant women population. This study suggests that hypothyroidism is more common in Saudi pregnant women in the Western Province of Saudi Arabia than it is in other countries. Given the negative maternal and fetal outcomes associated with maternal thyroid dysfunction, it is crucial that abnormal thyroid status be detected early and treatment started promptly. Therefore, screening pregnant women for maternal thyroid dysfunction as early as possible should be considered, particularly in a country like Saudi Arabia, which has a high prevalence of undiagnosed thyroid dysfunction. This study supports the use of TSH as a marker for pregnancy-induced hypothyroidism, but additional research on TSH during pregnancy without evidence of autoimmune thyroid disease is required to develop trimester-specific TSH reference ranges in the Saudi population. Further studies should be conducted to investigate the impact of gestational thyroid disorders in the Saudi population.

Acknowledgment

This research was supported by King Abdulaziz University Hospital, Jeddah, Saudi Arabia under the Research Reference No 235-16. Author is thankful to Dr. N. Al-Senani in Gynecology department at KAUH for sharing her pearls of wisdom during this research as well as for her comments that greatly improved the manuscript.

REFERENCES

Abalovich M, Amino N, Barbour LA, Cobin RH, De Groot LJ, Glinoer D, Mandel SJ, Stagnaro-Green A. 2007. Clinical practice guideline: management of thyroid dysfunction during pregnancy and postpartum: an endocrine society clinical practice guideline. *J ClinEndocrinolMetab*., 92(8 Suppl):S1-47.

Alexander EK, Marqusee E, Lawrence J, Jarolim P, Fischer GA, Larsen P. 2004. Timing and magnitude of increases in levothyroxine requirements during pregnancy in women with hypothyroidism. *N Engl J Med.*, 351(3):241-249.

Allan WC, Haddow JE, Palomaki GE, Williams JR, Mitchell ML, Hermos RJ, *et al*. 2000. Maternal thyroid deficiency and pregnancy complications: implications for population screening. *J Med Screen*., 7(3):127–130.

Blatt AJ, Nakamoto JM, Kaufman HW. 2012. National status of testing for hypothyroidism during pregnancy and postpartum. *J ClinEndocrinolMetab*., 97:777–84.

Casey BM, Dashe JS, Sponge CY, McIntire DD, Leveno KJ, Cunningham GF. 2007. Perinatal significance of isolated maternal hypothyroxinemia identified in the first half of pregnancy. *Obstet Gynecol*., 109(5):1129–1135

Casey BM, Dashe JS, Wells CE, McIntire DD, Byrd W, Leveno KJ, Cunningham FG. 2005. Subclinical hypothyroidism and pregnancy outcomes. *Obstet Gynecol*., 105(2): 239-245.

Choksi NY, Jahnke GD, St Hilaire C, Shelby M. 2003. Role of thyroid hormones in human and laboratory animal reporoductive health. Birth Defects Res B Dev *ReprodToxicol.*, 68(6):479-491.

Cleary-Goldman J, Malone FD, Lambert-Messerlian G, Sullivan L, Canick J, Porter TF, *et al*. 2008. Maternal thyroid hypo function and pregnancy outcome. *Obstet Gynecol.*, 112(1):85–92.

Dashe JS, Casey BM, Wells CE, McIntire DD, Byrd EW, Leveno KJ, Cunningham FG. 2005. Thyroid stimulating hormone in singleton and twin pregnancy: importance of gestational age specific reference ranges. *Obstet Gynecol*., 106(4):753-757.

Davis LE, Leveno KJ, Cunningham EG. 1988. Hypothyroidism complicating pregnancy. *Obstet Gynecol.*, 72(1):108-112.

Dhanwal DK, Prasad S, Agarwal AK, Dixit V, Banerjee AK. 2013. High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. *Indian J EndocrinolMetab.*, 17:281–4.

Fitzpatrick DL, Russell MA. 2010. Diagnosis and management of thyroid disease in pregnancy. *ObstetGynecolClin North Am*., 37(2):173-193.

Galofre JC, Davies TF. 2009. Autoimmune thyroid disease in pregnancy: A review. *J Women's Health,* 18(11):1847-1856.

Ghassabian A, Bongers-Schokking JJ, de Rijke YB, van Mil N, Jaddoe VW, de Muinck Keizer-Schrama SM, *et al*. 2012. Maternal thyroid autoimmunity during pregnancy and the risk of attention deficit/hyperactivity problems in children: The generation R study. *Thyroid.* 22:178–86

Gillett M. 2004. Subclinical hypothyroidism: Subclinical thyroid disease: Scientific review and guidelines for diagnosis and management. *ClinBiochem Rev.*, 25(3):191–194.

Habimana L, Twite KE, Daumerie C, Wallemacq P, Donnen P, Kalenga MK, *et al*. 2014. High prevalence of thyroid dysfunction among pregnant women in Lubumbashi, Democratic Republic of Congo. *Thyroid.* 24:568–75.

Haddow JE, Palomaki GE, Allan WC, Williams JR, Knight GJ, Gagnon J, O'Heir CE, Mitchell ML, Hermos RJ, Wasisbern SE, Faix JD, Klein RZ. 1999. Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. *N EnglJ Med.,* 341(8):549-555.

Idris I, Srinivasan R, Simm A. 2005. Maternal hypothyroidism in early and late gestation: effects on neonatal and obstetric outcome. *ClinEndocrinol.*, 63(5):560-565.

Karakosta P, Chatzi L, Bagkeris E, Daraki V, Alegakis D, Castanas E *et al*. 2011. First and second trimester reference intervals for thyroid hormones during pregnancy in "Rhea" mother child cohort, Crete, Greece. *J Thyroid Res.,* 2011:490783.

Kourtis A, Makedou K, Giomisi A, Mouzaki M, Slavakis A, Kalogiannidis L, *et al*. 2010. Prevalence of undiagnosed thyroid disease in pregnancy. *Endocrine Abstracts,* 22:794–794.

Ladenson PW, Singer PA, Ain KB, *et al*. 2000. American Thyroid Association guidelines for detection of thyroid dysfunction. *Arch Intern Med.*, 160(11):1573–1575.

Lazarus JH. 2011. Thyroid function in pregnancy. *Br Med Bull*., 97:137-148.

LeBeau SO, Mandel SJ. 2006. Thyroid disorders during pregnancy. *EndocrinolMetabClin North Am*., 35:117–36.

Li Y, Shan Z, Teng W, Y u X, Li Y, Fan C, *et al*. 2010. Abnormalities of maternal thyroid function during pregnancy affect neuropsychological development of their children at 25-30 months. *ClinEndocrinol (Oxf).,* 72(6):825–829.

Mandel SJ, Spencer CA, Hollowell JG. 2005. Are detection and treatment of thyroid insufficiency in pregnancy feasible? *Thyroid.* 15(1):44-53.

Männistö T, Vääräsmäki M, Pouta A, Hartikainen AL, Ruokonen A, Surcel HM, *et al*. 2009. Perinatal outcome of children born to mothers with thyroid dysfunction or antibodies: A prospective population-based cohort study. *J ClinEndocrinolMetab.*, 94:772–9.

Medici M, Timmermans S, Visser W, Timmermans H, Bongers-Schokking JJ, *et al*. 2013. Maternal thyroid hormone parameters during early pregnancy and birth weight: the Generation R study. *J ClinEndocrinolMetab.,* 98(1):59-66.

Moleti M, Trimarchi F, Vermiglio F. 2014. Thyroid physiology in pregnancy. *EndocrPract*., 1-26.

Montoro MN. 1997. Management of hypothyroidism during pregnancy. *ClinObstet Gynecol*., 40(1):65–80.

Moreno-Reyes R, Glinoer D, Van Oyen H, Vandevijvere S. 2013. High prevalence of thyroid disorders in pregnant women in a mildly iodine-deficient country: A population-based study. *J ClinEndocrinolMetab*., 98:3694–701.

Ozdemir H, Akman I, Coskun S, Demirel U, Turan S, Bereket A, Bilgen H, Ozek E. 2013. Maternal Thyroid Dysfunction and Neonatal Thyroid Problems. *Int J Endocrinol.*, vol. 2013, Article ID 987843, 6 pages.

Pop VJ, Brouwers EP, Vader HL, Vulsma T, van Baar AL, deVijlder JJ. 2003. Maternal hypothyroxinaemia during early pregnancy and subsequent child development: a 3-year follow-up study. *ClinEndocrinol (Oxf).*, 59(3): 282–288.

Price A, Obel O, Cresswell J, Catch I, Rutter S, Barik S, *et al*. 2001. Comparison of thyroid function in pregnant and non-pregnant Asian and western Caucasian women. *ClinChimActa*., 308:91-8

Qian W, Zhang L, Han M, Khor S, Tao J, Song M, *et al*. 2013. Screening for thyroid dysfunction during the second trimester of pregnancy. *GynecolEndocrinol.*, 29:1059–62.

Rao VR, Lakshmi A, Sadhnani MD. 2008. Prevalence of hypothyroidism in recurrent pregnancy loss in first trimester. *Indian J Med Sci.*, 62:357–61.

Refaat B. 2014. Prevalence of pregnancy induced thyroid dysfunction and the characteristics of the associated anaemia in primigravida Saudi women during the first trimester: A cross sectional study. *Gazz Med Ital- AechSci Med.*, 173:1-2.

Smallridge RC, Ladenson PW. 2001. Hypothyroidism in pregnancy: consequences to neonatal health. *J ClinEndocrinolMetab.*, 86(6):2349-2353.

Stagnaro-Green A, Abalovich M, Alexander E, Azizi F, Mestman J, Negro R, *et al*. 2011. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. *Thyroid.* 21:1081–125.

Taha I, Alhazmi J. 2011. Prevalence of overt and subclinical hypothyroidism among Saudi pregnant women attending tow referral hospitals in Saudi Arabia and associated maternal and fetal complications. *Endocrine Abstracts,* 25 P312.

Vaidya B, Anthony S, Bilous M, Shields B, Drury J, Hutchison S, *et al*. 2007. Detection of thyroid dysfunction in early pregnancy: Universal screening or targeted high risk case finding? *J ClinEndocrinolMetab.*, 92(1):203–207.

Vila L, Velasco I, González S, Morales F, Sánchez E, Torrejón S, *et al*. 2013. Controversies in endocrinology: On the need for universal thyroid screening in pregnant women. *Eur J Endocrinol.*, 170:R17–30.

Wasserstrum N, Anania CA. 1995. Perinatal consequences of maternal hypothyroidism in early pregnancy and inadequate replacement. *ClinEndocrinol.*, 42 (2):353-358.

****