



AN OBSERVATIONAL STUDY ON THE ASSOCIATION OF THYROID DYSFUNCTION WITH VITAMIN D DEFICIENCY IN THE FIRST TRIMESTER OF PREGNANT WOMEN SMS MEDICAL COLLEGE AND HOSPITAL JAIPUR RAJASTHAN

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ABSTRACT **Background**-The deficiency of vitamin D is known as a worldwide problem. Evidence has shown that vitamin D deficiency may increase the risk of a wide range of chronic diseases. Also, its deficiency can increase the likelihood of autoimmune diseases, upper respiratory tract infections, diabetes, cardiovascular disease, and cancer. Maternal thyroid function should be maintained normally, especially in the first trimester. In the first trimester, the fetus is fully dependent on maternal thyroid hormones for brain development **Methodology**-After obtaining the necessary permission study was conducted in the Department of Biochemistry (Immunoassay lab) and Obstetrics and Gynecology SMS Medical College and Hospital, Jaipur This study includes 30 cases (vitamin D deficiency in pregnant women in the first trimester with 18-40yrs age group) and control (vitamin D sufficient women in the first trimester with the age 18-40yrs age group) and difference in mean T3, T4 and TSH level **Result**-In this study, T4 levels (mean \pm SD) were significantly higher in the vitamin D deficiency group compared with the control group (9.89 vs. 53.0 ng/dl, P-value: <0.01), but there were no significant differences between the 2 studies groups regarding TSH and free T3 levels. In Linear regression analysis, assessing the effects of vitamin D deficiency plus maternal age, Body Mass Index, and number of pregnancies on thyroid function tests, it was shown that vitamin D deficiency had only a significant direct relation with free T4 levels (P-value: <0.01), but had no significant relations with the other thyroid function tests namely TSH, and free T3 **Conclusion**-: A significant direct relationships were observed between Vitamin D deficiency with the level of thyroxin (T4) during the first trimester of pregnancy. higher levels of T4 in vitamin D-deficient mothers. Due to the negative effects of Vitamin D deficiency and thyroid hormones on the mother, further studies should be conducted which may help in more accurate screening during pregnancy.

KEYWORDS :

INTRODUCTION

Vitamin D is a fat-soluble vitamin and a steroid hormone whose main role is calcium and bone metabolism. The deficiency of this vitamin is known as a worldwide problem. Evidence has shown that vitamin D deficiency may increase the risk of a wide range of chronic diseases. Also, its deficiency can increase the likelihood of autoimmune diseases, upper respiratory tract infections, diabetes, cardiovascular disease, and cancer. This Vitamin is active in the immune system and its role as a modulator of the immune system has recently been highlighted^[1]. Several clinical trials have shown that autoimmune diseases such as lupus erythematosus, Multiple sclerosis, Rheumatoid arthritis, Hashimoto's thyroiditis and hypothyroidism are associated with vitamin D deficiency. Vitamin D receptors are present in various tissues of the body such as the pancreas, thyroid gland, myocardium, etc important point here is that both vitamin D and thyroid hormones attach to similar receptors called steroid hormone receptors. On the other hand, a kind of gene in the Vitamin D receptor has been shown to predispose persons to autoimmune thyroid disease. Therefore, any change in vitamin D levels may increase the risk of thyroid abnormalities. For these reasons, patients with thyroid disease need to understand the effects of Vitamin D on health. The main mechanisms of the role of vitamin D in autoimmune diseases have not been fully understood but in a clinical trial with a review of vitamin D receptor (VDR) in patients with thyroiditis, increased thyroid disease risk was shown. Recent evidence demonstrates the relationship between vitamin D and Hashimoto thyroiditis and Graves disease. Vitamin D may have a role in thyroid diseases, including thyroiditis and thyroid carcinoma^[2]. It was also seen that Vitamin D deficiency, especially the amounts of less than 12.5 ng/ml, was considered a risk factor for autoimmune disease and thyroid disease^[3]. Besides, an increased level of TSH was observed after the administration of Vitamin D supplements^[4] Another study reported the effect of pregnancy suppressant on thyroid parameters thyroxin (T4) hormone triiodothyronine (T3) and thyroid stimulating hormone (TSH)^[5]. Even though many studies have evaluated the role of vitamin D in thyroid disease, few studies have investigated the effects of 25-hydroxy Vitamin D on Thyroid hormones in pregnancy and their effects on maternal and fetal health^[6-8]. Pregnancy may be associated with changes in iodine homeostasis and other physiological changes that eventually lead to altered thyroid function. Maternal thyroid function should be maintained normally, especially in the first trimester. In the first trimester, the fetus is fully dependent on maternal thyroid hormones for brain development Several studies have shown that

vitamin D deficiency and thyroid function can lead to a series of adverse complications during pregnancy including gestational hypertension, preeclampsia, Preterm delivery, intellectual and neurological growth disorder in children and so on^[8]. Therefore, to maintain a healthy pregnancy and normal fetal skeletal development and to prevent preeclampsia, an optimal Vitamin D level should be maintained to ensure fetal health. Also, hypothyroidism is common in pregnant women and if screening is performed only in high-risk groups, 25% of pregnant women with Subclinical and Hidden hypothyroidism are not explicitly diagnosed. Thyroid hormones are crucial for the maintenance of many fundamental functions in both adults and children. During pregnancy, adequate thyroid hormone levels are essential for normal pregnancy and optimal fetal growth and development. Maternal thyroid hormone is needed to support the development of placental and fetal hormones over the first half of pregnancy. Since the fetal thyroid gland matures only after 18–20 weeks of gestation, before that, all thyroid hormones depend on maternal thyroxin (T4) transferred through the placenta

METHODOLOGY

After obtaining Necessary permission from the institute's ethical committee, and Research Review Board, the study was conducted at Central Lab, Department of Biochemistry and Jaipur and obs & gyne (zanana/Mahila Chiktsalay) OPD, SMS Medical College and Hospital, Jaipur. This study was a hospital-based comparative Observational study and sampling for the study was done from period from January 2023 to June 2023. Informed written consent was obtained from the cases and controls. Study population 18-40yrs pregnant female with vitamin D deficiency reporting in gynae ward of SMS hospital.

Inclusion Criteria

Patient consent should be taken., The pregnant females in their first trimester (< 14 weeks) of pregnancy visited outdoors, The study was age 18-40yrs age pregnant women especially in the first trimester not having a chronic disease, malabsorption, single pregnancy, and not having any supplements except multivitamins.

Exclusion criteria

Mothers who had hypothyroidism before pregnancy and used levothyroxine tablets during pregnancy., Patient with endocrinological disorder (diabetes mellitus, pheochromocytoma, thyrotoxicosis) renal disease/hepatic disease/ connective tissue disease (lupus erythematosus)/urinary tract infection and any other chronic mental illness.

Blood samples of outdoor pregnant females with and without vitamin D deficiency as cases and controls will be taken in plain vials (5 ml) with a dry disposable syringe by venipuncture under all aseptic precautions. Samples will be left for clotting for one hour. After that, the serum will be separated at 3000 rpm centrifugation for 5 minutes. Samples will be analyzed on a fully automated analyzer Beckman Coulter AU-680 and a fully automated analyzer ADVIA CENTAUR XP using the Chemiluminescent immunoassay method.

RESULTS

The characteristics of the studied population, including age, the mean levels of Thyroid profile, and Vit D level are shown in Table 1

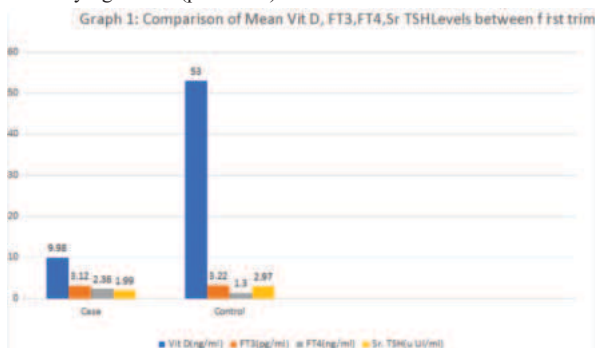
Parameter	Case(n=30)	Controls(n=30)	p-value
Vit D(ng/ml)	9.89	53.0	<.001
FT3(pg/ml)	3.12	3.22	0.509
FT4(ng/dl)	2.36	1.30	<.001
Serum TSH (uIU/ml)	1.99	2.97	<.001

In this study, 60 pregnant mothers were recruited in the study as two groups case (with vitamin D deficiency) and control (without vitamin D deficiency) (30 in each group).

In this study mean vitamin D level in the first trimester female in case is 9.98ng/ml and the control 53.0ng/ml respectively. This difference was statically significant($p < 0.001$)

Mean FT3 level first trimester female in case is 3.12pg/ml and control 3.22pg/ml, this difference was statically no significance ($p = 0.50$). Mean FT4 in case 2.36ng/ml and control 1.30ng/ml respectively, this difference was statically significance ($p < 0.001$)

The mean serum TSH level in the first trimester's female case is 1.99 u IU/ml and control 2.97 u IU/ml respectively. This difference was statically significant ($p < 0.001$)



DISCUSSION

This study aimed to investigate the relationship between vitamin D deficiency ($n = 30$) and thyroid function tests (free T3, free T4, and TSH) in the first trimester of pregnancy in a referral prenatal clinic. SMS Medical College and Hospital, Jaipur from January 2023 to June 2023 Normal pregnancy increases thyroxine stimulation and leads to the incidence of temporary hyperthyroidism becoming pregnant in the first trimester. The results showed that there was a significant relationship between serum levels of vitamin D and Thyroxin (T4) in early pregnancy, but there were no such findings about T3 and TSH. The mean level of T4 was higher in mothers with vitamin D deficiency, whereas the mean T3 and TSH levels in this group were lower (insignificantly) and it seems that vitamin D deficiency in the first trimester of pregnancy may increase T4 levels.

The findings of this study indicate that the higher prevalence of severe vitamin D deficiency (24%) in pregnant women is likely to be a result of nutritional deficiency and lifestyle.

In other studies, there was a significant correlation between vitamin D, Hypothyroidism, and its prevalence in women. Furthermore, one other study found there were no significant relationships between vitamin D, Hashimoto's Thyroiditis, and Hypothyroidism; this study showed that serum levels of 25-Hydroxy vitamin D were lower in the Hashimoto's Thyroiditis and Hypothyroid group compared to the healthy control group.

In the other study, it was observed that serum levels of vitamin D were lower in patients with Hashimoto's Thyroiditis compared to control. The prevalence of vitamin D and zinc deficiency was significantly

higher in patients with hypothyroidism compared to healthy controls. Serum vitamin D levels were significantly lower at the beginning of Graves' disease, Rostami et al.: The relationship between Vitamin D deficiency and thyroid function in the first trimester of pregnancy 134 Archives of Pharmacy Practice | Volume 11 | Issue S1 | January-March 20201 but there was no significant association between vitamin D and thyroid hormones. Studies have shown vitamin D deficiency as a risk factor for autoimmune thyroiditis and thyroid function Similar to our findings, Thorp et al. reported no relation between recurrent preterm birth and low vitamin D levels (< 20 ng/mL) in women at 16–22 weeks of gestation in a case-control study of women with prior preterm birth. Although we found no correlation between the first-trimester serum 25(OH)D levels and the neonatal gestational age or weight, a recent study demonstrated that first first-trimester 25(OH)D concentration of less than 12 ng/mL was associated with an increased risk of low birth weight and SGA infants. A study including 152 nulliparous women in Turkey showed that 44.6% of pregnant women have vitamin D deficiency and maternal vitamin D deficiency is associated with an increased risk of SGA. The variation in results between studies may also be explained by differences in cut-off points used, population characteristics, sample size, and methods to measure 25(OH)D

An interesting finding in our study was that women with higher levels of vitamin D in the first trimester had a higher rate of cesarean section than those with severe vitamin D deficiency. It might be explained by the fact that women who deliver vaginally were more likely to have risk factors for vitamin D deficiency such as wearing covered dress styles and less use of multivitamins than women who had a cesarean section. Furthermore, the current study was focused primarily on the first trimester of pregnancy and we cannot rule out the possibility that differences in 25(OH)D concentrations become apparent only in the third trimester. A recent study with large size of population revealed no association between the first-trimester vitamin D status and the mode of delivery Our findings are in contrast to those of two other studies, Merewood et al.⁹ found an almost four-fold increase in the rate of primary cesarean section in women with 25(OH)D levels below 15 ng/mL at the time of the delivery, and Scholl et al. reported increased risk for cesarean delivery for women with 25(OH)D levels below 12 ng/mL.

CONCLUSION

A significant direct relationships were observed between Vitamin D deficiency with the level of thyroxin (T4) during the first trimester of pregnancy. higher levels of T4 in vitamin D-deficient mothers. Due to the negative effects of Vitamin D deficiency and thyroid hormones on the mother, further studies should be conducted which may help in more accurate screening during pregnancy.

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