

Evaluation of Vitamin D Levels In Pregnancy Induced Hypertension

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Abstract

Background: Pregnancy hypertension increases maternal and foetal morbidity and mortality. Vitamin D deficiency has been identified as a causative factor for hypertension, in addition to other risk factors. **Aim:** To evaluate the level of serum vitamin D in pregnancy induced hypertension and also to compare with normotensive pregnant women. **Material And Methods:** This prospective comparative study was conducted in the Department of biochemistry, govt. medical college Kathua India from August 2019 to December 2019. The levels of serum vitamin D were evaluated in fifty pregnant women with hypertension and were compared with equal number of normotensive pregnant women. Pearson's correlation was used to examine the relationship between vitamin D deficiency and hypertension. Comparisons between groups were performed using Student's t test for continuous variables and the chi-square test for categorical variables. Statistical significance was taken <0.05. **Results:** The prevalence of vitamin D deficiency in hypertensive pregnant women was 90% and in normotensive was 82%. Mean vitamin D levels in hypertensive pregnant females were significantly lower than those of normotensive pregnant females. A significant negative correlation was seen between systolic and diastolic blood pressure and vitamin D levels in hypertensive pregnant females. **Conclusion:** Vitamin D levels are low in Pregnancy induced hypertension patients, and vitamin D deficiency is more common in PIH patients, suggesting that vitamin D deficiency may be a risk factor for the pregnancy induced hypertension.

Keywords: hypertension, pregnancy, vitamin D deficiency

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Introduction

Hypertension that occurs as a direct result of becoming pregnant is known as pregnancy induced hypertension (PIH). Hypertension, one of the most common complications and leading causes of maternal mortality worldwide that affects one out of every ten pregnancies[1]. Vitamin D is thought to play a role in implantation and placental function during pregnancy because of its angiogenic and anti-inflammatory properties[2].

Vitamin D is a pro-hormone that regulates a number of human genes, which explains its connection to hypertension, diabetes, cancer, asthma, allergy, autoimmune disorders, and depression. It has a hormonal effect by binding to nuclear vitamin D receptors, which are located in the body and include the placenta and uterine placental bed. The active form of vitamin D, 1,25-dihydroxyvitamin D₃, has been used to fine-tune the transcription and function of genes involved in normal implantation, placental invasion, and angiogenesis. It also prevents endothelial cells from releasing adhesion molecules. Vitamin D deficiency in the mother can exacerbate the inflammatory response[3]. Vitamin D deficiency in pregnant women has been linked to a variety of severe short- and long-term health issues in their children, including stunted growth, skeletal problems, type 1 diabetes, asthma, and schizophrenia[4]. Vitamin D plays a part in PIH (high blood pressure with no proteinuria). However, few researchers have looked into the function of maternal vitamin D status in poor pregnancy

Outcomes[5]. So, the aim of the study is to evaluate the level of serum vitamin D in pregnancy induced hypertension and also to compare with normotensive pregnant women.

Materials and Methods

The present study included 50 patients of Pregnancy induced hypertension and 50 normotensive pregnancy patients presenting in Government Medical College, Kathua. After applying inclusion and exclusion criteria, 100 pregnant women who visited the outpatient department and labour room, 50 each from the normotensive and pre-eclamptic groups, were included in the sample. Maternal age of 20-40 years and gestational age of more than 20 weeks were the inclusion criteria. Whereas, women on vitamin D supplements, women having Diabetes Mellitus (DM), chronic hypertension, renal disease, liver disease, inflammatory or infective disorders, severe anaemia, preterm labor, history of smoking, history of tobacco chewing, bone diseases, current steroid therapy & NSAIDS, use of diuretics, beta blockers, multiple pregnancy, hypoparathyroidism were excluded.

Assay procedure: The measurement of 25-OH Vitamin D concentration in the serum or plasma was done by ELISA.

Statistical Analysis

All relevant data were analysed using the statistical package for social science version 21.0 (SPSS, Chicago, IL, USA). Continuous variables were expressed as mean \pm standard deviation (SD) and categorical variables as count and percentage. Comparisons between groups were performed using Student's t test for continuous variables and the chi-square test for categorical variables. The correlation between hypertension and thyroid function test was evaluated using Pearson's correlation. Statistical significance was taken <0.05.

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Results

Table 1: Reference range of vitamin D

Vitamin D	Levels (ng/ml)	Hypertensive		Normotensive	
		Number of patients	Percentage	Number of patients	Percentage
Deficiency	<20	39	78%	31	62%
Insufficiency	20–29	6	12%	10	20%
Sufficiency	30–100	5	10%	9	18%
Total		50	100%	50	100%

Table 2: Comparison of serum Vitamin D levels between both the groups

Parameter	Hypertensive	Normotensive	P value
Mean serum Vitamin D(ng/ml)	11.56±2.18	17.47±3.06	0.0001

Table 3: Correlation of vitamin D levels with SBP and DBP in hypertensive pregnant women

Parameter	Hypertensive	
	r coefficient value	p-value
SBP	-0.29	0.041
DBP	-0.34	0.015

Discussion

Vitamin D₃, a prohormone, is also known as calciferol. In addition to its neuromuscular functions, it is essential for calcium homeostasis and bone health[6]. Several studies have found a connection between maternal Vitamin D deficiency and foetal as well as maternal outcomes[5]. Vitamin D's non-classical role has been proposed in the last two decades; it controls a large number of human genes, resulting in a wide variety of autocrine effects in various tissues[7]. It is involved in cell proliferation, differentiation, and apoptosis control[5]. It regulates both innate and adaptive immunity and thus affects immune responses. This explains why vitamin D deficiency has been linked to an increased risk of hypertension, diabetes, cancer, multiple sclerosis, allergy, asthma, autoimmune and infectious diseases, and depression[8]. According to research Vitamin D enhances angiogenesis and prevents the release of adhesion molecules from endothelial cells[4,9]. In the present study the incidence of vitamin D deficiency in hypertensive pregnant women was 90% and in normotensive was 82%. In a study conducted by Gupta T et al[10], preeclamptic patients had a (90%) higher incidence of serious vitamin D deficiency than normotensive patients (62%). The difference in mean vitamin D levels between hypertensive and normotensive pregnant females was statistically significant, with hypertensive pregnant females having 11.56 ng/ml and normotensive pregnant females having 17.47 ng/ml. Bakacak M et al[11] compared Vitamin D levels in 40 pregnant women with normal blood pressure, 32 pregnant women with eclampsia, and 83 pregnant women with pre-eclampsia. In stable normotensive women, eclamptic women, and pre-eclamptic women, the levels were found to be 23.7±5.93, 18.5±5.47 and 19.3±4.31 ng/mL, respectively. Vitamin D levels in eclamptic and pre-eclamptic pregnant women were found to be significantly lower than in healthy pregnant women, which was statistically significant. In addition, Kaur G et al found that serum vitamin D levels were low in women with pregnancy-induced hypertension, with a mean vitamin D level of 13.006±6.24 ng/ml compared to 23.239±10.601 ng/ml in healthy pregnant women in their study. In this study, systolic and diastolic blood pressure, as well as vitamin D levels, were found to have a strong negative association in hypertensive pregnant women. Mehmood S et al[12] and Robinson CJ et al[13] published similar results. In their analysis, Singla M et al[2] found that although serum vitamin D deficiency was present in both groups, it was more serious in the pre-eclamptic community. In hypertensive pregnant women, there was a strong negative association between systolic and diastolic blood pressure and vitamin D levels. In the pre-eclampsia population, Singla M et al[2] found a significant negative association between Vitamin D and SBP/DBP.

Pre-eclampsia is found to be less common in the summer and more common in the winter, suggesting that Vitamin D and sunlight may play a role. It has been shown that circulating vitamin D levels have an inverse relationship with blood pressure, and that taking vitamin D supplements lowers blood pressure[14].

Conclusion

When comparing hypertensive and normotensive pregnant women, the current study found that hypertensive women had lower vitamin D levels. As a result, early detection of vitamin D deficiency during pregnancy can be useful in detecting and preventing hypertensive disorders and their related co-morbidities, reducing maternal morbidity and preterm birth. Furthermore, it has the potential to reduce the burden on healthcare systems, especially in developing countries. However, large-scale studies are needed, and a greater number of them must be analysed for a more thorough review.

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