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Original research article

Role Of Vitamin D In Preeclampsia

Dr. Sharadha Adarsh
Assistant Professor, Department of OBG, Kamineni Institute of Medical Sciences, Narketpally, Nalgonda, Telangana, India

Corresponding Author:
Dr. Sharadha Adarsh

Abstract

There is evidence that vitamin D promotes angiogenic characteristics in endothelial progenitor cells and that it modulates endothelial function and dysfunction in cell models. [Citation needed] [Abstract] This provides an explanation for the potential function of vitamin D in the development of preeclampsia. However, there is still debate on whether preeclampsia can be prevented by taking vitamin D supplements and at what dosage. The purpose of this study is to investigate whether or not vitamin D plays a function in preeclampsia.
Keywords: Vitamin D, preeclampsia, eclampsia, pregnancy

Introduction

Preeclampsia is a multisystem illness unique to pregnancy. It is estimated that between 5 and 15% of pregnancies are complicated by preeclampsia, which is characterised by high blood pressure and proteinuria. Preeclampsia is the leading cause of maternal and neonatal morbidity and mortality [1]. The etiopathogenesis of preeclampsia is not conclusively understood, and there is currently no preventative medicine that is proven to be beneficial. The pathogenesis of preeclampsia is influenced by a number of different factors, including genetic factors, angiogenic factors, abnormal placentation, inflammatory activation, oxidative stress, and immunological factors, all of which can lead to endothelial dysfunction [2]. Preeclampsia can also be caused by abnormal placentation. Even among pregnant women who have darkly pigmented skin, the prevalence of vitamin D deficiency in India and elsewhere in the world is extremely high [3]. Bone development and calcium homeostasis are two of the most important functions that vitamin D performs. It was discovered not long ago that vitamin D receptors are present in all of the other tissues. Several studies have revealed that vitamin D plays a function in immunomodulation as well as the formation of the placenta. In pregnancies that are worsened by a lack of vitamin D, there has been found to be an increased generation of inflammatory cytokines such as TNF-a. The 1, 25(OH) form of vitamin D is known to promote the activity of T regulatory cells, which play a critical role in assisting placental implantation by promoting a favourable immunological response [4]. There is evidence that vitamin D promotes the expression of angiogenic characteristics in endothelial progenitor cells and that it modulates endothelial function and dysfunction in cell models [5]. This provides an explanation for the potential function of vitamin D in the development of preeclampsia. However, the supplementation of vitamin D and the appropriate amount for doing so in order to

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prevent preeclampsia is a contentious topic [6].

Materials and Methods

Subjects: 50 pregnant women diagnosed as preeclampsia and 50 healthy normotensive pregnant women chosen as controls were included in the study.

Exclusion criteria: Multiple pregnancy, chronic hypertension, diabetes mellitus, renal disease.

Methods: After 20 weeks of pregnancy, preeclampsia was diagnosed in pregnant women if their blood pressure was higher than 140/90 mm Hg and they had proteinuria (defined as more than 300 mg/l of protein in 24 hours of urine) on two or more occasions that were at least six hours apart. For the purpose of this study, the control group consisted of healthy pregnant women with normal blood pressure who were admitted to the labour and delivery unit.

Following the receipt of informed consent, data were entered pertaining to the patient's name, age, symptoms, parity, height, and weight. The specifics of the prior pregnancy's result were carefully documented. After fasting for 12 hours over night, venous blood samples were taken for 25(OH) Vitamin D estimate. These samples were then shielded from light, centrifuged, and stored at -20 degrees Celsius until analysis. The chemiluminescence immunoassay was used to determine the 25(OH) vitamin D concentration (CLIA). The cutoff used to define vitamin D deficiency was a value of 25(OH) 0Vitamin D that was less than 20 ng/ml. The Pearson Chi-Square test was utilised in order to make comparisons between categorical variables. The quantitative information was presented as the mean standard deviation (standard deviation). The values of categorical variables were written out as numbers and percentages respectively. A p value of less than 0.05 was taken to indicate statistical significance. Both groups' outcomes during this pregnancy were analysed and compared.

Results

Table 1: Vitamin D level

Vitamin D (ng/ml)	Preeclampsia	Controls	p value
	No. of cases	No. of cases	
<20(deficient)	37(74 %)	32(64 %)	0.27
>20(normal)	13(26 %)	18(36 %)	
Mean vitamin D	16.97 ± 2.70	19.74 ± 3.82	0.004

Table 2: Vitamin D status & severity of preeclampsia

Vitamin D (ng/ml)	Mild preeclampsia	Severe preeclampsia	Eclampsia	P value
	No. of cases	No. of cases	No. of cases	0.32
<20(deficient)	20(40 %)	10(20 %)	7(14 %)	
>20(normal)	4(8 %)	6(12 %)	3(6 %)	

Table 3: Demographic pattern

Maternal characteristics	Preeclampsia (N=50)	Controls (N=50)	p value

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Age(years)	20-25	24(48%)	20(40%)	
	26-30	20(40%)	30(60%)	
	31-35	6(12%)	0(0%)	0.20
Pre pregnancy BMI (kg/m2)	<18.5	2(4%)	1(2%)	
	18.5-24.9	20(40%)	18(36%)	
	25-29.9	22(44%)	22(44%)	
	≥30	6(12%)	9(18%)	0.79
Gravida	Primi	28(56%)	38(76%)	
	Multi	12(24%)	8(16%)	
	BOH	10(20%)	4(8%)	0.08
Education standard	<12	19(38%)	23(46 %)	
	≥12	31(62%)	27(54%)	0.41
Socio economic status	Low	21(42%)	24(48%)	
	High	29(58%)	26(52%)	0.50

According to our research, 69 percent of people do not get enough vitamin D. A vitamin D level of less than 20 ng/ml was found in around 37% of preeclamptic women and 32% of normotensive women. There was found to be no statistically significant difference (p>0.05). Preeclamptic women had a mean vitamin D level of 16.97 2.70 while women who did not have the condition had a level of 19.74 3.82. It was statistically significant (p 0.05) that preeclamptic women had low levels of vitamin D in their blood (Table-1). Hypovitaminosis D was present in 20 of the 40 women (40%) who had moderate preeclampsia, 10 of the 40 women (20%) who had severe preeclampsia, and 7 of the 40 women (14%) who had eclampsia. There were three cases of eclampsia and six cases of severe preeclampsia among the women whose vitamin D levels were above 20 ng/ml. There was found to be no link between the levels of vitamin D and the severity of the condition (P>0.05) (Table-2). There was no significant difference in age between the women who developed preeclampsia and those who served as the control group (p>0.05). 76% of healthy women serving as controls were first-time mothers, compared to 56% of preeclamptic women (P>0.05). It was found that around 44% of women in both groups were overweight (p>0.05). Both groups had similar socioeconomic and educational backgrounds (p>0.05), and there was no significant difference between the two. Age at delivery was comparable between those who had mild preeclampsia and those who served as controls (p>0.05). When compared to women who did not have severe preeclampsia or eclampsia, the gestational age of women who did have these conditions was considerably younger (p 0.05). In both the control group and the group with moderate preeclampsia, the rates of vaginal births were comparable (p>0.05). In cases of severe preeclampsia and eclampsia, the rate of caesarean delivery was considerably higher (p 0.05). (Figure-2). There was no statistically significant difference in birth weight between the controls and the patients with mild preeclampsia (p>0.05). Both severe preeclampsia and eclampsia were associated with considerably lower birth weights (p 0.05).

Discussion

The prevalence of vitamin D deficiency was found to be 69% in this study, which is higher than the percentages found in the studies conducted by Bodnar *et al.* [7] (65%) and Ullah *et al.* [8] (78.19%). In the women in our study who had preeclampsia, the mean vitamin D level was considerably lower than normal. When corrected for other criteria, a reduction in serum concentration of vitamin D 30ng/ml quadrupled the risk of preeclampsia [7]. The mean amount of vitamin D was significantly lower in preeclampsia patients during the middle trimester. A lack of vitamin D was found to be

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connected with a risk of preeclampsia that was increased by 3-5 times [8]. Others have reported having the same or similar observations [9, 10, 11, 12]. On the other hand, many publications by other researchers have found that the levels of vitamin D in preeclamptic and control women are very similar [13, 14]. In contrast, we did not find any correlation between the severity of vitamin D insufficiency and the severity of preeclampsia in our research. Singla R *et al*. produced an observation that is comparable to this one [15]. On the other hand, several researchers [7, 8] have found a favourable link between hypovitaminosis D and the severity of preeclampsia. [Citation needed] According to the findings of M. Bakacak and colleagues, our research did not uncover any statistically significant associations between age, parity and BMI [9]. Women who had preeclampsia tended to be older and heavier [7]. Eclamptic women did not have children and had low body weights [8]. In our study, preeclamptic women had low gestational ages at birth and lower birth weights and their caesarean section rates were significantly higher. There was found to be no statistically significant difference between preeclampsia and eclampsia. This observation aligns with the findings of Murat Bakacak and colleagues [9]. There is limited evidence to support the use of vitamin D supplements for the prevention of preeclampsia. Patients who were given vitamin D in doses ranging from 400 to 600 international units per day had a 27% lower chance of developing preeclampsia, according to the findings of a major prospective trial carried out by Haugen *et al.* [16]. In contrast to this, Marya *et al.* [17] discovered that there was no significant difference in either group whether they received 1200 international units of vitamin D per day or not. J.M. Purswani and colleagues [18] conducted a comprehensive analysis of the published research on vitamin D and preeclampsia. They found that clinical studies did not demonstrate an independent impact of vitamin D supplementation in the prevention of preeclampsia.

Conclusion

According to the findings of our research, having a vitamin D deficit during pregnancy increases the risk of developing preeclampsia. This finding is supported by the vast majority of the data that has been published. However, the role that vitamin D supplementation plays in the prevention of preeclampsia is not yet demonstrated beyond a reasonable doubt. Additional research is required to determine the correct amount of vitamin D supplements that should be taken to reduce the risk of preeclampsia and ensure the health of both the mother and the baby.

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