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RESEARCH ARTICLE

The role of vitamin D in pre eclampsia and association of its deficiency with severity of pre eclampsia

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Abstract

Aim: To assess the association of vitamin D status in preeclamptic and normal healthy pregnant women.

Materials and Methods: Prospective case control study included 50 women with preeclampsia and 50 normotensive pregnant women. Serum vitamin D estimation was done. Correlation between vitamin D deficiency and preeclampsia was analysed statistically.

Results: Prevalence of vitamin D deficiency was comparable in both groups. Mean vitamin D level (19.7 ± 2.79 ng/ml) was statistically low in preeclampsia group while in that of control was 24.3 ± 1.89 ng/ml. Severity of vitamin D deficiency correlated with the severity of preeclampsia. Age, parity and BMI were similar in both the groups. No statistically significant difference seen regarding mode of delivery in both the groups.

Conclusion: Vitamin D deficiency is significantly associated with preeclampsia. Further studies are needed to document the role of vitamin D supplementation in prevention of preeclampsia.

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Introduction

Each day, 830 women die from preventable pregnancy related causes; low- and middle-income countries bear the greatest burden of disease [21]. Hypertensive disorders of pregnancy including gestational hypertension, preeclampsia (PE) and eclampsia are among the major complications that account for approximately 14% of maternal mortality [21,12]. Preeclampsia is a multisystem disorder unique to pregnancy. , Preeclampsia characterised by hypertension and proteinuria, complicates about 5-15% of pregnancies and is the major contributor of maternal and perinatal morbidity and mortality [14]. Multiple factors such as genetic factor, angiogenic factor, abnormal placentation, inflammatory activation, oxidative stress and immunological factors leading to endothelial dysfunction play a key role in the pathogenesis of preeclampsia [3]. Vitamin D is a potent immune modulatory agent [10]. Vitamin D is emerging as a promising agent for preeclampsia prevention [8]. Systematic reviews and meta-analyses have concluded that low serum vitamin D levels in pregnancy are associated with a higher risk of preeclampsia and suggest a preventive role of vitamin D supplementation [1,7,15,19]. But the role of vitamin D supplementation and dosage in prevention of preeclampsia is controversial [10].

Material and methods

This case-control prospective study was conducted at SMGS hospital Jammu for a period of 6 months from 16 March 2018 to 17 September 2018. 50 pregnant women diagnosed as preeclampsia and 50 healthy normotensive pregnant women chosen as controls were included in the study. Multiple pregnancy, pregnancy with chronic hypertension, diabetes mellitus and renal disease were excluded from this study. Pregnant women with blood pressure more than 140/90 mm Hg on 2 or more occasions at least 6 hrs apart with proteinuria (more than 300 mg/l in 24 hrs urine), after 20 weeks of gestation were diagnosed as preeclampsia [11]. Healthy normotensive pregnant women admitted in labour room were selected as control for this study. Both groups were matched for age, weight, height, parity, socioeconomic status and gestational age. After selection of cases and getting an informed consent, detailed history was taken, examination was done and data was recorded on a Performa which covered the personal and clinical information for each patient. Venous blood samples for 25(OH)Vitamin D estimation were collected after 12 hr overnight fasting, protected from light, centrifuged and stored at – 20°C until analysis. 25(OH) Vitamin D estimation was done using Chemiluminiscent Immunoassay (CLIA). As there is no universally acceptable definition of vitamin D deficiency, we used cutoff points suggested recently (11, 12). Value of 25(OH) Vitamin D \leq 20 ng/ml was the cut off to define Vitamin D deficiency. Various outcomes including mode of delivery were recorded and compared. Correlation between vitamin D deficiency and preeclampsia was analysed statistically using parameters like mean, standard deviation and chi square test and p value <0.05 was taken as statistically significant.

Results

In our study, mean of maternal age and gestational age at delivery in all studied subjects including preeclamptic and normotensive pregnant women were 26 ± 4.2 years and 37.4 ± 3 weeks, respectively. Comparison of maternal characteristics including age, parity, educational status, socio economic status, body mass index (BMI) reported in Table 1. As shown, maternal age and other characteristics in both the groups were similar and differences between groups were not statistically significant.

Table 1: Socio demographic characteristics of pregnant women in this study.

Maternal characteristic	Respondent's response	Preeclampsia	Control	P value
Age (in years)	20-25 26-30 31-35	13 30 7	11 30 9	0.812
Parity	All primigravidas with singleton pregnancy			

Educational status	Illiterate	9	6	0.712
	Primary school	5	8	
	Middle school	8	6	
	High school	21	20	
	Graduate	7	10	
Socio economic status	Low	28	26	0.387
	High	22	14	
BMI (kg/m ²)	< 18.5	3	2	0.912
	18.6-24.9	31	29	
	25-29.9	12	14	
	>30	4	5	

P-value by Chi-square test

56% preeclamptic women and 46% normotensive women in our study were Vitamin D deficient (Vitamin D <20 ng/ml). The mean vitamin D level in preeclamptic women in our study was 19.7±2.79 ng/ml while in that of control was 24.3±1.89 ng/ml, which was statistically significant difference (p value <0.001).

Table 2: Vitamin D level.

Vitamin D (ng/ml)	Preeclampsia		Control		P value
	n=50	%	n=50	%	
<20	28	56	23	46	<0.001*
20-30	18	36	25	50	
>30	4	8	7	14	
Mean±SD	19.7±2.79		24.3±1.89		

*Statistically Significant (P-value<0.05); P-value by Student's Independent t-test

In our study, out of 50 preeclamptic women, 36 had mild preeclampsia, 11 had severe preeclampsia and 3 had eclampsia respectively. Mean Vitamin D level in mild preeclamptic group was 21.2±1.34 ng/ml, while it was 19.5±0.982 ng/ml and 17.8±0.341 ng/ml in severe preeclampsia and eclampsia group respectively and the difference was statistically significant (p value <0.001).

Table 3: Vitamin D status & severity of preeclampsia.

Vitamin D (ng/ml)	Mild preeclampsia	Severe preeclampsia	Eclampsia	P value
	n	n	n	
<20	19	7	2	<0.001*
20-30	14	3	1	
>30	3	1	0	
Mean±SD	21.2±1.34	19.5±0.982	17.8±0.341	

*Statistically Significant (P-value<0.05); P-value by ANOVA

39 women (78%) in preeclamptic group and 41 women (82%) in control group had vaginal delivery in our study. 11 women (22%) underwent caesarean delivery in preeclamptic group including 1 with eclampsia, 6 with severe preeclampsia and 4 with mild preeclampsia respectively. The difference was not statistically significant (p value= 0.617).

Table 4: Mode of delivery.

Delivery mode	Preeclampsia	Control	P value
Vaginal	39	41	0.617

Caesarean	11*	9	
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P-value by Chi-square test

*eclampsia=1, severe preeclampsia=6, mild preeclampsia =4

Discussion

Prevalence of vitamin D deficiency (Vitamin D <20 ng/ml) in this study was 51% as compared to 65% in Bodnar et al [4] and 78.19% in Ullah et al [17] 56% preeclamptic women and 46% normotensive women in our study were Vitamin D deficient. Mean vitamin D level was 19.7±2.79 ng/ml in preeclampsia women in our study which was significantly low as compared to normotensive women (24.3±1.89 ng/ml) and the difference was statistically significant with p value <0.001. Similar observations were reported by other studies [2,15,16,18]. Contrary to this many reports by others observed similar vitamin D level in controls and preeclamptic women [20, 22].

The severity of vitamin D deficiency correlated with severity of preeclampsia in our study which was also seen in some studies [3,4,17] and was contrary in Singla R et al [15]. In our study no statistical difference was seen with age, parity and BMI as reported by M. Bakacak et al but contrary was seen in studies [4,17] where preeclamptic women were older and heavier and eclamptic women were nulliparous and underweight. Regarding the mode of delivery in both the groups, no statistically significant difference was seen in our study which was contrary to many studies [2,9].

Conclusion

Our study shows that vitamin D deficiency in pregnancy is associated with preeclampsia which was supported by majority of the published data. But role of vitamin D supplementation in prevention of preeclampsia is not proven beyond doubt.

Limitations

Issues with dose, timing, and duration of Vitamin D supplementation have not been addressed in our study. Also, neonatal outcomes were not studied and tertiary care hospital based figures are not strictly representative of the whole population.

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