



## Original Research Article

## Study the prevalence of pre eclampsia in vitamin D supplemented non supplemented primigravida women

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## ABSTRACT

**Introduction:** Vitamin D is an essential factor in the regulation of calcium and phosphorus balance. It is synthesized in the skin but is also present in the diet.

**Objective:** To study the prevalence of pre eclampsia in vitamin D supplemented non supplemented primigravida women.

**Materials and Methods:** Group I included 100 pregnant women who received vitamin D supplementation in the form of oral cholecalciferol sachet 60,000IU weekly till 10 weeks along with routine iron, folic acid and calcium supplementation. Group II comprised of 100 pregnant women who received only routine iron, folic acid and calcium supplementation.

**Results:** Out of 200 patients, 22(11%) patients developed pre-eclampsia out of which 19 patients were not supplemented with vitamin D. The p-value was 0.0004 making this correlation statistically significant. Out of 200 patients, 19(9.50%) patients were managed with oral medication and 3(1.5%) required intravenous labetalol. The p-value was 0.001 making this correlation statistically significant.

**Conclusion:** there is significant role of vitamin D supplementation in pregnant women in prevention of pre eclampsia.

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### 1. Introduction

Vitamin D deficiency during pregnancy is associated with impaired maternal musculoskeletal preservation and fetal skeletal formation. Vitamin D deficiency is associated with multiple adverse health outcomes in mothers like gestational diabetes, pre eclampsia, bacterial vaginosis, miscarriage, osteomalacia, osteoporosis and higher incidence of caesarean section.<sup>1</sup> Hypovitaminosis D in pregnancy has important consequences for the newborn, including small for gestational age infants, neonatal rickets, tetany, infantile rickets. Rickets during infancy has been associated with higher prevalence of lower respiratory tract infection, the largest infectious cause of infant mortality.<sup>2</sup>

Pre eclampsia is a pregnancy specific disorder characterized by new onset hypertension and proteinuria

after 20 weeks of gestation.<sup>3</sup> Pre eclampsia as identified by new onset hypertension and proteinuria during pregnancy, is a serious disorder affecting pregnancies, and is alleviated only by delivery of placenta. Pre eclampsia is thought to originate in abnormal angiogenesis and immunologic adaptation occurring during implantation and trophoblast invasion at beginning of pregnancy. There is evidence that vitamin D affects transcription and function of genes responsible for trophoblast invasion, angiogenesis critical for implantation, and fetal allograft immunologic tolerance.<sup>4</sup> Vitamin D regulates angiogenic processes through direct effects on angiogenesis gene transcription, including vascular endothelial growth factor(VEGF).<sup>5</sup> It has been reported that the serum concentration of 25(OH)D in early pregnancy is reduced in women who subsequently develop pre eclampsia.<sup>6</sup> 1,25(OH)<sub>2</sub> vitamin D may play a key role in maintaining immunologic tolerance in pregnancy, and adequate vitamin D may help in the

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prevention and management of preeclampsia.<sup>7</sup>

At present there is not enough evidence to establish the effectiveness of vitamin D supplementation in pregnancy and therefore, vitamin D supplementation is not routinely offered to all pregnant women.<sup>8</sup>

This study is therefore designed to study the prevalence of pre eclampsia in vitamin D supplemented non supplemented primigravida women.

## 2. Materials and Methods

The study was conducted in department of obstetrics and gynaecology at Kasturba hospital from Jan 2016 to Dec 2016. Ethical clearance was obtained from IEC prior to the commencement of the study. A written informed consent was taken from all the recruited patients. Women with the following criteria were excluded from the study: Gestational age <16 weeks or >20 weeks, Subjects residing outside Delhi, Multigravidae, Multiple pregnancy, Subjects having hypertension, family history of hypertension, liver disease, renal disease, renal calculi, inflammatory bowel disease, secondary osteoporosis, rheumatoid arthritis, morbid obesity, treatment with ATT or anti-epileptic drugs in previous 6 months, taking vitamin D or calcium supplementation in previous 1 year, diabetes, family history of diabetes, Subjects with pre-existing calcium and parathyroid condition, requiring chronic diuretics or cardiac medication, having chronic HTN, active thyroid disease. 200 pregnant women of 16-20 weeks gestation were included in the study.

They were randomly assigned into two groups that is study group and control group. Study group comprised of 100 pregnant women of 16-20 weeks gestation who received vitamin D supplementation (irrespective of vitamin D level) in the form of oral cholecalciferol sachet 60,000IU weekly till 10 weeks along with routine iron, folic acid and calcium supplementation.

Control group comprised of 100 pregnant women of 16-20 weeks who received only routine iron, folic acid and calcium supplementation (irrespective of vitamin D level). At first antenatal visit a detailed history was obtained and thorough examination and routine antenatal investigations of all the subjects was done. At term role of vitamin D supplementation in prevention of pre eclampsia.

Role of vitamin D supplementation and Maternal outcome in terms of preeclampsia, GDM, preterm labour, Mode of delivery and fetal outcome in terms of LBW, NICU admission, tetany of the two groups was compared.

### 2.1. Statistical evaluation

All the data was entered in Microsoft excel sheet and various variables were compared by applying chi-square test as a test of significance for nominal and numerical variables with the help of computer using SPSS16.0 software. Statistical

significance was considered if p value was < 0.05.

## 3. Results

At term the prevalence of pre eclampsia among supplemented group and not supplemented group was compared. 177(88.50%) patients out of 200 were in the age group of 21-30 years out of which 91 were vitamin D supplemented and 86 were not vitamin D supplemented. 11(5.50%) were in the age group of <20 years out of which 6 patients were supplemented with vitamin D and 5 patients were not vitamin D supplemented. 12(6%) were in the age group >30 years out of which 3 patients were supplemented with vitamin D and 9 patients were not vitamin D supplemented. The p-value was 0.199 making this correlation statistically insignificant. In the present study out of 200 patients, 66(33%) patients were educated till 10<sup>th</sup> class out of which 29 patients were vitamin D supplemented and 37 patients were not vitamin D supplemented, 59(29.50%) patients were educated till primary level out of which 28 patients were vitamin D supplemented and 31 were not vitamin D supplemented, 35(17.50%) patients were educated till higher secondary level out of which 24 patients were vitamin D supplemented and 11 patients were not vitamin D supplemented, 34(17 %) were illiterate out of which 18 were supplemented with vitamin D and 16 were not supplemented vitamin D, and 6(3%) patients were graduate out of which 1 was supplemented with vitamin D and 5 patients were not supplemented with vitamin D. The p-value was 0.068 making this correlation statistically insignificant. Table 1

Out of 200 patients, 151(75.50%) were from lower socio-economic class out of which 74 patients were vitamin D supplemented and 77 patients were not supplemented with vitamin D, 47(23.5%) were from lower middle class out of which 24 were supplemented with vitamin D and 23 patients were not supplemented with vitamin D and 2(1%) patients were upper middle class both of them were vitamin D supplemented. The p-value was 0.353 making this correlation statistically insignificant. Table 2

Out of 200 patients, 22(11%) patients developed pre-eclampsia (out of which 3 patients had eclampsia) and out of 22 patients, 3 patients were vitamin D supplemented and 19 patients were not vitamin D supplemented. 178(89%) didn't develop pre eclampsia out of which 97 were supplemented with vitamin D and 81 were not supplemented with vitamin D. Majority of patients who developed pre eclampsia belonged to vitamin D non supplemented group. The p-value was 0.0004 making this correlation statistically significant. Table 3

Management of pre-eclampsia in study and control group is depicted in Out of 200 patients, 19(9.50%) patients were managed with oral medication out of which 3 patients were supplemented with vitamin D and 16 patients were not supplemented with vitamin D. 3 patients(1.50%)

**Table 1:** Literacy status in vitamin D supplemented and non supplemented group

		Status of supplementation with vitamin D		Total	p value
		Supplemented	Not Supplemented		
Literacy	ILLIT	18(18.00%)	16 (16.00%)	34(17.00%)	0.068
	I-V	28 (28.00%)	31 (31.00%)	59(29.50%)	
	V-X	29 (29.00%)	37 (37.00%)	66(33.00%)	
	X-XII	24 (24.00%)	11 (11.00%)	35(17.50%)	
	GRAD	1 (1.00%)	5 (5.00%)	6(3.00%)	
Total		100(100.00%)	100(100.00%)	100(100.00%)	

**Table 2:** Socio-economic status in vitamin D supplemented and non supplemented group

		Status of supplementation with vitamin D		Total	P value
		Supplemented	Not supplemented		
Socioeconomic Status	Lower class	74 (74.00%)	77(77.00%)	151(75.50%)	0.353
	Lower Middle	24(24.00%)	23(23.00%)	47(23.50%)	
	Upper Middle Class	2(2.00%)	0(0.00%)	2(1.00%)	
	Total	100(100.00%)	100(100.00%)	200(100.00%)	

**Table 3:** Cases of pre-eclampsia in vitamin D supplemented and non supplemented group

		Status of supplementation with vitamin D		Total	p value
		Supplemented	Not Supplemented		
Presence of pre eclampsia	No	97(97.00%)	81 (81.00%)	178 (89.00%)	0.0004
	Yes	3(3.00%)	19(19.00%)	22(11.00%)	
Total		100(100.00%)	100(100.00%)	200(100.00%)	

**Table 4:** Management of pre-eclampsia in vitamin d supplemented and non supplemented group:

		Status of supplementation with vitamin D		Total	p value
		Supplemented	Not Supplemented		
Management of Pre Eclampsia	Oral	3 (15.00%)	16 (80.00%)	19(86.36%)	0.001
	I/V	0 (0.00%)	3 (15.00%)	3(13.63%)	
Total		100 (100.00%)	100 (100.00%)	22(100.00%)	

X<sup>2</sup>=13.333

**Table 5:** Development of eclampsia in vitamin D supplemented and non supplemented group

		Status of supplementation with vitamin D		Total	p value
		Supplemented	Not Supplemented		
Eclampsia	No	100(100.00%)	97 (97.00%)	197(98.50%)	0.246
	Yes	0(0.00%)	3 (3.00%)	3(1.50%)	
Total		100(100.00%)	100 (100.00%)	200(100.00%)	

**Table 6:** Incidence of pre-eclampsia after vitamin d supplementaton in different studies

S. No.	Author	Year	p-value	RR/OR
1.	Haugen et al <sup>13</sup>	2009	-	0.73
2.	Parul et al <sup>17</sup>	2012	<0.001	0.375
3.	De-Regil L M et al <sup>16</sup>	2012	-	0.67
4.	Faustino R. P et al <sup>18</sup>	2015	0.88	
5.	Naghshineh et al <sup>19</sup>	2016	0.09	
6.	Present study	2016-2017	0.0004	

required intravenous labetalol all of them were not vitamin D supplemented. The p-value was 0.001 making this correlation statistically significant. Table 4

Development of eclampsia in study and control group is depicted in Table 5. Out of 200 patients, 3(1.50%) patients developed eclampsia and out of which all patients were not vitamin D supplemented. 197(98.5%) patients did not develop eclampsia out of which 100 were supplemented with vitamin D and 97 were not supplemented with vitamin D. The p-value was 0.246 making this correlation statistically insignificant. Table 5

#### 4. Discussion

All the patients were assumed to be vitamin D deficient as Vitamin D deficiency prevails in epidemic proportions all over the Indian subcontinent, with a prevalence of 70%–100% in the general population. In India, widely consumed food items such as dairy products are rarely fortified with vitamin D. Hospital located in walled city of Delhi caters to majority of Muslim population in whom burka practice is very prevalent. Hence deficiency of vitamin D is more prevalent in burka clad women who are devoid of exposure to sunshine.

The mean age in our study is 24.5 years among supplemented group and 24.9 years among non-supplemented group. The age distribution was comparable to that observed by Sachan et al (2002)<sup>9</sup> (mean age 24.0 years) and F Xiang et al (2013)<sup>10</sup> (mean age 26.4 + 3.1 years).

Our hospital caters to women mostly belonging to lower socioeconomic class where early marriage is prevalent and hence early age of conception, which is reflected in our study results.

Findings suggest low literacy level in our study group. Patients with low education level are ignorant about the importance of sun exposure and food sources which are rich in vitamin D.

Song et al 2010-2011<sup>11</sup> concluded in their study that vitamin D concentration was higher in better educated women.

Vandevijvere S et al 2012<sup>12</sup> also found that the risk of vitamin D deficiency was significantly higher for less educated women. The results of these studies are comparable with our study.

##### 4.1. Pre-eclampsia in study and control group

Out of 200 patients, 19(9.50%) patients were managed with oral medication out of which 16 were not supplemented with vitamin D and 3 were supplemented with vitamin D. 3 patients(1.50%) required intravenous labetalol all of them were not vitamin D supplemented. The p-value was 0.001 making this correlation statistically significant.

Out of 200 patients, 3(1.50%) patients who developed eclampsia all of them belonged to vitamin D non-supplemented group. The p-value was 0.246 making this

correlation statistically insignificant.

Similarly Haugen et al in 2009<sup>13</sup> conducted a study showed that nulliparous women who developed pre eclampsia had low concentrations of vitamin D in serum sample in mid pregnancy. Baker et al 2010<sup>14</sup> conducted a nested case-control study of pregnant women which included women with singleton pregnancies in the absence of any chronic medical illnesses. From an overall cohort of 3992 women, 51 cases of severe pre eclampsia were matched by race/ethnicity with 204 women delivering at term with uncomplicated pregnancies. Maternal midgestation vitamin D deficiency was associated with increased risk of severe preeclampsia. The result of this was comparable with our study.

Sablok et al<sup>15</sup> found prevalence of vitamin D deficiency in pregnant women and to evaluate the effect of supplementation with cholecalciferol in improving vitamin D levels in pregnant women and evaluate its correlation with fetomaternal outcome. The intervention group received supplementation of vitamin D in dosages depending upon 25(OH)-D levels. 40% patients in group A and 20.3% patients in group B developed pre-eclampsia. The result of this study was comparable with our study.

Hyponen et al 2013<sup>7</sup> This study suggests that low maternal serum 25 hydroxy vitamin D concentrations increases pre-eclampsia risk and that vitamin D supplementation lowers this risk. The result of this study was comparable with our study.

De-Regil LM et al<sup>16</sup> suggested that women who received vitamin D supplements may have a lower risk of pre-eclampsia than those receiving no intervention or placebo. The result of this study was comparable with our study.

#### 5. Conclusion

Vitamin D deficiency and insufficiency are common in pregnant women of Delhi. This study concludes that there is significant role of vitamin D supplementation in pregnant women in prevention of pre eclampsia. In the supplemented group the incidence of pre eclampsia was less.

#### 6. Source of funding

None.

#### 7. Conflict of interest

None.

#### References

- Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab.* 2011;96(7):1911–1930.
- Hollis BW, Wagner CL. Nutritional vitamin D status during pregnancy: reasons for concern. *CMAJ.* 2006;174(9):1287–1290.

3. Favus M. Laboratory values of importance for calcium metabolic bone disease. In: Favus M, ed. Primer on the metabolic bone diseases and disorders of mineral metabolism. 4th ed. New York: Lippincott, Williams & Wilkins ; 1999,. p. 467.
4. Lemire JM, Adams JS, Sakai R, Jordan SC. 1 alpha, 25-dihydroxyvitamin D3 suppresses proliferation and immunoglobulin production by normal human peripheral blood mononuclear cells. *J Clin Invest.* 1984;74:657–661.
5. Piccinni MP, Scaletti C, Maggie E, Romagnani S. Role of hormone controlled Th1 and Th2 type cytokines in successful pregnancy. *J Neuroimmunol.* 2000;109:30–33.
6. Bodnar LM, Catov JM, Simhan HN, Holick MF, Powers RW, et al. Maternal vitamin D deficiency increases the risk of preeclampsia. *J Clin Endocrinol Metab.* 2007;92:3517–3522.
7. Hypponen E. Vitamin D for the prevention of preeclampsia A hypothesis. *Nutr Rev.* 2005;63:225–232.
8. Heaney RP, Holick MF, Lips P, Meunier PJ, Vieth R. Estimates of optimal vitamin D status. *Osteoporos Int.* 2005;16:713–716.
9. Sachan A, Gupta R, Das V, Agarwal A, Awasthi PK, et al. High prevalence of vitamin D deficiency among pregnant women and their newborns in northern India. *Am J Clin Nutr.* 2005;81(5):1060–1064.
10. Xiang F, Jiang J, Li H, Yuan J, Yang R, et al. High prevalence of vitamin D insufficiency in pregnant women working indoors and residing in Guiyang China. *J Endocrinol Invest.* 2013;36(7):503–507.
11. Song SJ, Zhou L, Si S, Liu J. The high prevalence of vitamin D deficiency and its related maternal factors in pregnant women in Beijing. *J Bone Miner Res.* 2013;28(1):1–7.
12. Vandevijvere S, Amsalkhir S, Oyen HV, Moreno-Reyes R. High prevalence of vitamin D deficiency in pregnant women, a national cross-sectional survey. *PLoS One.* 2012;7(8):43868.
13. Haugen M, Brantsaeter AL, Trogstad L, J A, Roth C, et al. Vitamin D supplementation and reduced risk of preeclampsia in nulliparous women. *Epidemiol.* 2009;20(5):720–726.
14. Baker AM, Haeri S, Camargo CA, Espinola JA, Stuebe AM. A nested case-control study of midgestation vitamin D deficiency and risk of severe preeclampsia. *J Clin Endocrinol Metab.* 2010;95:5105–5109.
15. Sablok A, Batra A, Thariani K, Batra A, Bharti, et al. Supplementation of vitamin D in pregnancy and its correlation with foeto-maternal outcome. *Clin Endocrinol (Oxf).* 2015;83(4):536–541.
16. De-Regil LM, Palacios C, Ansary A, Kulier R, Peña-Rosas JP. Cochrane Database of Systematic Reviews. 2012;(2).

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