Original research article

Role of Vit D supplementation in reducing the prevalence of pre-eclampsia in pregnant women: A comparative study.

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Abstract

Aim: To determine the effect of vitamin D supplementation during pregnancy in prevention of pre eclampsia in pregnant women.

Materials and methods: The present prospective comparative interventional study was conducted in the Department of Obstetrics & Gynaecology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India. from March 2019 to Dec 2019.Total 60 patients were divided into two groups. **Group I (n=30):** received only routine iron &folic acid and calcium supplementation (irrespective of vitamin D level). **Group II (n=30):**vitamin D supplementation (irrespective of vitamin D level)in the form of oral cholecalciferol sachet 60,000IU once in every two weeks, from 28 ± 1 weeks upt 36 ±1weeks of gestation, along with routine iron &folic acid and calcium supplementation. **Results:** Pre-eclampsia was observed in 16.7% of the patients who didn't receive vitamin D supplementation whereas the group II who received supplementation showed pre-eclampsia in 6.7% of the patients (p=0.041).**Conclusion:** This study concludes that there is significant role of vitamin D supplementation in pregnant women in prevention of pre-eclampsia.

Keywords: pre-eclampsia, vitamin D, singleton

Introduction

Vitamin D is especially important during pregnancy, as low maternal vitamin D stores may contribute to problems such as low birth weight and small for gestational age infants,as well as increased risk of maternal comorbidities.[1]

Vitamin D deficiency is worldwide epidemic, with a prevalence that ranges from 18% to 84% depending on the country of residence, ethnicity, and local clothing customs and dietary intake.[2,3] Clinical studies establishing an association between vitamin D levels and adverse pregnancy outcomes such as preeclampsia, gestational diabetes, and low birth weight, preterm labor, and caesarean delivery have conflicting results.[4]

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Pre-eclampsia is a pregnancy specific disorder characterized by new onset hypertension and proteinuria after 20 weeks of gestation.[5] 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.

A tendency towards a lower level of 1,25 dihydroxy vitamin D has been reported in pre-eclampsia. Pre-eclampsia is thought to originate in abnormal angiogenesis and immunological adaptation occurring during implantation and trophoblastic invasion at the beginning of pregnancy. There is evidence that vitamin D affects transcription and function of genes responsible for trophoblastic invasion and angiogenesis critical for implantation, and fetal allograft immunologic tolerance.[6] Vitamin D regulates the angiogenic processes through direct effects on angiogenesis by gene transcription, including vascular endothelial growth factor(VEGF).[7]

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. Hence the present study was conducted with the aim to assess the effect of vitamin D supplementation on the prevalence of pre-eclampsia.

Materials and method

The present prospective comparative interventional study was conducted in the Department of Obstetrics & Gynaecology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India, from March 2019 to December 2019. Sixty pregnant women , attending the antenatal OPD were selected for study after written and informed consent . The selected pregnant women were divided into two groups.

Inclusion criteria

- Age between 18 - 35 years
- Single pregnancy
- Normal BP
- Period of gestation 28±1 weeks
- Who gave informed consent

Exclusion criteria

- Women with chronic diseases before pregnancy, such as chronic hypertension, diabetes mellitus, kidney and liver diseases
- Gestational age less than 28±1 weeks
- History of intake of medications influencing bone, vitamin D or calcium metabolism e.g. antiepileptic, anti-tubercular drugs in the last 6 months.
- Not willing to participate

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Sample selection

The sample size was calculated using a prior type of power analysis by G* Power Software Version 3.0.1.0 (Franz Faul, Universitat Kiel, Germany). The minimum sample size was calculated, following these input conditions: power of 0.80 and $P \leq 0.05$ and sample size arrived were 24 participants in each group. The final sample achieved was 30 per group.

Grouping

The selected pregnant women were divided into two groups.

Group I: Received only routine iron &folic acid and calcium supplementation (irrespective of vitamin D level)

Group II: vitamin D supplementation (irrespective of vitamin D level)in the form of oral cholecalciferol sachet 60,000IU every two weeks , upto 36 weeks , along with routine iron &folic acid and calcium supplementation.

A comprehensive general physical examination, systemic and obstetric examination was conducted at first antenatal visit for all the subjects . During the follow up period (28^{th} to 36^{th} week), women were called for antenatal check up every two weeks and looked for any signs of pre eclampsia (rise in blood pressure, proteinuria, excessive weight gain, headache, epigastric pain oliguria).

All the women selected were normotensive at 28±1 week, At 36 weeks 5 women were found to have blood pressure >140/90mm in group I (control group)while only 2 women had blood pressure >140/90mm in group II (study group). At 28±1 weeks, proteinuria was nil/trace in both the groups. At 36 weeks proteinuria was 2+, in 5 women in control group. In study group , proteinuria was 2+, in 2 women who also had increased blood pressure .

Statistical analysis

The recorded data was compiled, entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages, means and standard deviations were calculated. Statistical test applied for the analysis were student t-test and chi-square test. Level of significance was set at $p \leq 0.05$.

Results

Table 1: Demographic and clinical profile

Variables	Groups	Mean	Std. Deviation	p-value
Age (Years)	I	25.20	3.48	0.632 (NS)
	II	25.57	3.52	
Gestational Age weeks	I	32.26	3.28	0.564 (NS)
	II	33.11	3.19	
BMI	I	20.79	1.74	0.713 (NS)

	II	20.66	1.51	

Test applied: student t-test

Table 2:Distribution of mode of delivery

Variables	Mode of Delivery		Total	p-value
Groups	NVD	LSCS		
I	13	17	30	0.813 (NS)
	21.7%	28.3%	50.0%	
II	12	18	30	
	20.0%	30.0%	50.0%	
Total	25	35	60	
	41.7%	58.3%	100.0%	

Test applied: chi-square test

Table 2: Distribution as per parity

Groups	Parity				Total	p-value
	0	1	2	3		
I	18	5	5	2	30	0.135 (NS)
	30.0%	8.3%	8.3%	3.3%	50.0%	
II	17	11	2	0	30	
	28.3%	18.3%	3.3%	.0%	50.0%	

Test applied: chi-square test

Table 4: Showing the distribution of occurrence of pre-eclampsia

Variables	Pre-eclampsia diagnosed		p-value
Groups	I (control group)	II (study group)	
Pre-eclampsia	5	2	0.041 (sig.)
	16.7%	6.7%	

Test applied: chi-square test

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.

The mean age in our study is 25.57 years among supplemented group and 25.20 years among non-supplemented group. The age distribution was comparable to that observed by Sachan et al.[8] mean age 24.0 years and F Xianget al.[9] mean age 26.4 + 3.1 years.

Sablok et al.[10] found prevalence of vitamin D deficiency in pregnant women and they evaluated the effect of supplementation with cholecalciferol in improving vitamin D levels in pregnant women and evaluated its correlation with feto-maternal 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 comorbidities preterm labour/pre-eclampsia/gestational diabetes. The result of this study was comparable with our study. Hypponen et al.[11] study suggests that pre-eclampsia is characterized by marked changes in vitamin D metabolism and 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.[12] suggested that women who received vitamin D supplements may have a lower risk of preeclampsia than those receiving no supplementation or placebo. The result of this study was comparable with our study.

Conclusion

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. The findings are consistent with other reports of protective effect of vitamin D on development of pre-eclampsia. However large studies are suggested for routine supplementation of vitamin D in pregnancy to lower the prevalence of pre-eclampsia.

References

1. Hollis BW, Johnson D, Hulsey TC, Ebeling M, Wagner CL. Vitamin D supplementation during pregnancy: double-blind, randomized clinical trial of safety and effectiveness. J Bone Miner Res. 2011;26(10):2341-57.
2. Ponsonby AL, Lucas RM, Lewis S, Halliday J. Vitamin D status during pregnancy and aspects of offspring health. Nutrients. 2010; 2(3):389-407.
3. Sharma S, Kumar A, Prasad S, Sharma S. Current Scenario of Vitamin D Status During Pregnancy in North Indian Population. J Obstet Gynaecol India. 2016;66(2):93-100.
4. Morley R, Carlin JB, Pasco JA, Wark JD. Maternal 25-hydroxyvitamin D and parathyroid hormone concentrations and offspring birth size. J Clin Endocrinol Metab. 2006;91(3):906-12.
5. Favus M. Laboratory values of importance for calcium metabolic bone disease. In: Favus M, ed. Primer on the metabolic bone diseases and disirders of mineral metabolism. 4th ed. New York: Lippincott, Williams & Wilkins; 1999, p. 467.
6. 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;74:657-61.
7. Piccinni MP, Scaletti C, Maggie E, Romangnani S. Role of hormone controlled Th1 and Th2 type cytokines in successful preganancy. JNeuroimmunol. 2000;109:30-33.
8. 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):1060-64.
9. 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):503-7.
10. Sablok A, Batra A, Thariani K, Batra A, Bharti, et al. Supplementation of vitamin D in pregnancy and its correlation with feto-maternal outcome. Clin Endocrinol (Oxf). 2015;83(4):536-41.
11. Hypponen E. Vitamin D for the prevention of preeclampsia A hypothesis. Nutr Rev. 2005;63:225-32.
12. De-Regil LM, Palacios C, Ansary A, Kulier R, Pe˜na-Rosas JP. Cochrane Database of Systematic Reviews. 2012;(2).
13.

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