Original Research Article

Comparative study to evaluate the effect of vitamin D supplementation on vitamin D levels and pregnancy outcome at a tertiary care centre

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Abstract

Background: Vitamin D supplementation during pregnancy has been supposed to defend against adverse gestational outcomes. **Objectives:** To study prevalence of vitamin D deficiency in pregnancy and its correlation with the maternal complications and evaluate perinatal outcome. **Material And Methods:** The study was carried out for 1 years on 100 pregnant, divided in two groups in which one group was given supplementation of vitamin D and 2nd group was of patients coming directly in labour **Results:** Significant association was found between vitamin defficiency status low birth weight, and cesarean mode of delivery. Significant improvement in cord vitamin D status after supplimentation **Conclusions:** We suggest vitamin supplimentation in ANC mothers with dietary guidance and adequate exposure to sun light.

Key Words: Vitamin D, Cord blood.

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INTRODUCTION

Vitamin D deficiency is a common global problem in pregnant women and neonates.[1-3]The estimated prevalence rates of vitamin D deficiency among pregnant women and infants are about 60% and 15-65%, respectively.[4,5] Vitamin D deficiency is prevalent in India, a finding that is unexpected in a tropical country with abundant sunshine. Vitamin D deficiency is recognized as the most untreated nutritional deficiency currently in the world.[6] Several clinical studies suggest the possible association between low Vitamin D levels and potential adverse outcome of pregnancy.[7,8] Sufficient vitamin D concentrations are needed during pregnancy to address the increasing demand for calcium, by the fetus, during its growth and development. [9,10]Pregnant women who did not receive vitamin D supplementation showed a reduction in circulating 25(OH)D levels during the third trimester compared with the first trimester.[10,11] Several observational studies have reported that low maternal circulating 25(OH)D concentrations in pregnant women may have negative health consequences for both mothers and newborns.[9,12] Complications associated with vitamin D deficiency during pregnancy are preeclampsia; gestational diabetes mellitus and cesarean section. Whereas those in newborns are low birth weight, neonatal rickets etc. Vitamin D is also associated with neurodevelopment and development of immune system during the pregnancy itself. Therefore, prevention of vitamin D deficiency during pregnancy is of utmost importance. According to some studies, the currently recommended vitamin D supplement schedule is not sufficient to maintain the desirable value of vitamin D during pregnancy.[13] This study was conducted to determine the prevalence of hypovitaminosis D in mothers and fetuses, to study complications due to

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hypovitaminosis D and to establish recommended daily doses of vitamin D in pregnant women.

MATERIAL AND METHODS

A hospital based cross-sectional, observational study was carried out in the Department of OBG in 100 pregnant women were enrolled in the study. Approval from nstitutional ethics committee was taken. The study period was from. The study was carried out among 100 (50 registered in the first trimester and 50 visiting for the first time in labor). The study was conducted for the period of 1 years. Patients fitting into the inclusion criteria were selected for the study. Written informed consent were taken from all patients. Detailed history taking and examination were done. Patients were divided into 2 groups:

Group A: Patients visiting OPD for the first visit in her first trimester (1 -12 weeks) were enrolled. The patient was supplemented with 400IU vitamin D with calcium 1000mgdaily after 1st trimester (from 14 weeks until delivery). In these patients, 3 sample was taken to measure vitamin D levels.

1. 1st sample was taken on patient‘s first antenatal visit
2. The 2nd sample was taken when the patient is in labor
3. The 3rd sample was of cord blood for determining neonatal vitamin D level.

Group B: Patients visiting Hospital for the first time in labor. In these patients 2 samples were taken to measure vitamin D levels 1st sample was taken when the patient is in labor and 2nd sample was of cord blood for determining neonatal vitamin D level. Venous blood was collected from study group under all aseptic condition and was analyzed for serum vitamin D on fully automated chemilumine scence analyzer. Pregnant women with metabolic or systemic illness, Patients already on vitamin D supplementation or defaulters I.e. patients who did not take regular supplementations or who did not come for delivery at our center or were with poor follow up were excluded from the study.

RESULTS

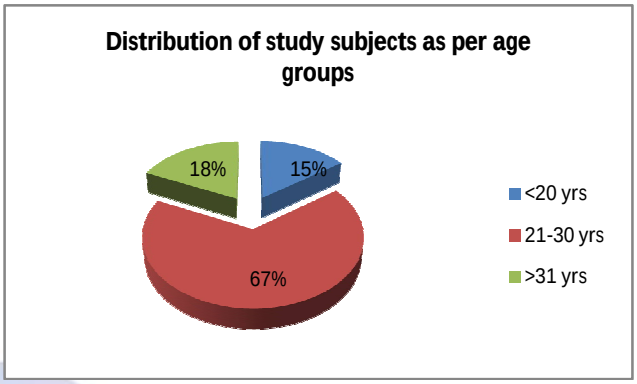

Figure 1: Comparison of age among study groups

Table 1: Comparison of vitamin D levels at 1st term and labour in Group A

Level	Group A		Chi square p value
	1st term	Labour	
Deficiency	40 (80.0%)	6 (12%)	
Insufficiency	6 (12%)	14 (28%)	χ2 14.94
Sufficiency	4 (8%)	30 (60%)	p< 0.05
Total	**50 (100%)**	**50 (100%)**	

Vitamin defficiency at first term and at labour is significant in group A patients.

Table 2: Showing comparison of vitamin D levels at labour among study groups

level at labour	Group		Total	Chi square p value
	A	B		
Deficiency	8 (16%)	38 (76%)	46 (46%)	
Insufficiency	13 (26%)	8 (16%)	21 (21%)	
Sufficiency	29 (58%)	4 (8%)	33 (33%)	χ2 13.24 p<0.05
Total	**50 (100%)**	**50 (100%)**	**100 (100%)**	

At labour stagegroup A showed significantly lower vitamin defficiency status.

Table 3: Showing comparison of cord vitamin D levels among study groups

level at labour	Group		Total	Chi square p value
	A	B		
Deficiency	10 (20%)	36 (72%)	46(46%)	
Insufficiency	12 (24%)	10(20%)	22(22%)	χ212.48
Sufficiency	28 (56%)	4 (8%)	32 (32%)	<0.05
Total	**50 (100%)**	**50 (100%)**	**100 (100%)**	

Cord blood analysis for vitamin D was significantly lower in group B.

Table 4: Showing association of birth weight with vitamin D levels

level at labour	Birth weight		Total	Chi square p value
	<2.5 Kg	> 2.5 Kg		
Deficiency	10 (56%)	35 (42%)	45 (45%)	
Insufficiency	5 (28%)	19 (23%)	24 (24%)	χ2 13.90
Sufficiency	3 (16%)	28 (35%)	31 (31%)	p < 0.05
Total	**18 (100%)**	**82 (100%)**	**100 (100%)**	

Low birth weight was significantly associated with lower vitamin D status.

Table 5: Showing association of mode of delivery with vitamin D levels

levels at labour	Mode of delivery (n=100)		Total	Chi square p value
	FTND	LSCS		
Deficiency	15 (34%)	29 (53%)	46 (46%)	χ2 6.68 p value p < 0.05
Insufficiency	12 (27%)	10 (18%)	22 (22%)	
Sufficiency	17 (39%)	15 (29%)	32 (32%)	
Total	**44 (100%)**	**54 (100%)**	**100 (100%)**	

Cesarean mode was significanlty associated with lower vitamin D levels in mothers.

DISCUSSION

A total of 100 ANC patients were evaluated in this study attending ANC clinic at Mamata Medical College, Khammam. Majority of the patients were < 30 years (82%), majority were secondary educated (49.55%), most common occupation was House wife (72%), most belonged to middle income group (61%). Similar findings were seen in study done by Prasad D *et al*[14] study. In our study 78% study subjects were found to be vitamin D defficient, 14% insufficinet and only 8% found to be sufficient in vitamin D levels. In Prasad D *et al*[14]study only (12%) pregnant women were vitamin D sufficient and vitamin D deficient and insufficient group formed (88%), this was in accordance with our study. Emadi *et al*[15] study vitamin D deficiency/ insufficiency was seen in 89.9% motherswhile Abbasian *et al*[16]observed vitamin D insufficiency in more than half of the mothers (60.2% of mothers). These results were similar with our study.

In Prasad D *et al*[14] study vitamin D deficiency in cord blood was present in 74% of Group B subjects as compared to 22% in group A, while in our study also 20% in group A and 72% in group B had vitamin defficiency status in their neonates cord blood. while sufficient levels were seen in only 10% in group B compared to 50% in group A subjects Prasad D *et al*[14] study. Similar significance was seen in our study also with $p < 0.05$ for cord blood in group supplied with vitamin D supplementation. We found significant association between birth weight of babies between mothers with vitamin D defficiency status compared to mothers with vitamin sufficiency status. Among total low birth weight babies 56% babies belonged to vitamin defficient mothers. Similar significance was seen in Patil S *et al*[17] study. In our study we found significant association of vitamin D levels at the time of labour, group A showed marked improvement 48% in Vitamin D level after treatment. Mahdy SM *et al*[18] and Siam AR *et al*[19] had similar finding as our study. Prasad D *et al*[14] concluded that vitamin D levels had no statistical correlation with birth weight (P=1.000), which in contrast with our study as we found siginificance between vitamin D levels and birth weight ($p < 0.05$). Mannion CA *et al*[20] also found similar conclusions regarding birth weight and vitamin D status. In Prasad D *et al*[14] study cesarean section rate (54%, P = 0.2) were more than FTND (34%, P = 0.213) in Vitamin D deficient group, but no significnace was seen while in our study we found significance($p < 0.05$) between Vitamin D defficinecy and casarean deliveries. While Patil S *et al*[17] did not find any significance in mode of delivery of their patients. But Dave *et al*[21] study showed an association of vitamin D deficiency and cesarean deliveries. Also Farrant HJ *et al*[22] reported similar conclusion. So we can conclude that though we have found significant improvement in group A serum vitamin D level campared to 1st trimester we recommond studies with larger sample size, further investigations regarding factors affecting vitamin D metabolism, along with evaluation of vitamin D levels in each ANC mother. So as per the findings of our study we suggest vitamin 400 IU and 1000 mg calcium daily supplimentation in ANC mothers after first trimester until delivery along with evalution of their dietary pattern and exposure to sun light.

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