

## Brief Report

# Comparative study of rise of vitamin D in hypovitaminosis D babies after two different dosage recommendations

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### ABSTRACT

**Background:** There are currently two different guidelines for treatment of Vitamin D deficiency in infants, one is that of American Academy of Pediatrics and the other being Clinical Practice Guidelines of the Endocrine Society. This study was done to compare the two guidelines for treatment of Vitamin D deficiency in infants.

**Methods:** A hospital based, longitudinal interventional study was conducted for 2 years and 115 babies having vitamin d deficiency (Vitamin D less than or equal to 20ng/dl) were divided into group A and group B. Group A babies were treated as per American Academy of Pediatrics Guidelines whereas Group Cases were treated as per International Endocrine Society guidelines. All babies were followed up after 3-4 months when repeat Vitamin D levels were checked and then compared.

**Results:** In present study, Vitamin D level had increased by 0.6 times in Group A whereas it had increased by 1.3 times in group B and it was significant.

**Conclusions:** Study results were in favour of the guidelines recommended by the International Endocrine Society.

**Keywords:** Hypocalcemia, Rickets, Vitamin D deficiency

## INTRODUCTION

Vitamin D deficiency is increasingly being recognized world over and also in India.<sup>1</sup> Reports from various parts of India and in all age groups from neonates to adolescents as well as pregnant and lactating mothers have reported vitamin D deficiency to the tune of 30-90%.<sup>2</sup> Further, habitually low calcium intakes are reported in children and adolescents from several studies all over India, especially those from lower socio-economic classes.<sup>3</sup>

Given that vitamin D and calcium are both critical for musculoskeletal health in growing years, addressing the issues of their deficiency in them is critical. Deficiency of vitamin D (with or without calcium deficiency) may

result in rickets in an infant or adolescent or osteomalacia (abnormal mineralization of bone matrix) and muscle weakness in an older child/adolescent.<sup>4</sup>

While breast milk is the best source of nutrition for babies, it doesn't provide enough Vitamin D especially if mother is also deficient.<sup>5</sup> Since babies are not exposed to sunlight for at least the first six months of life, they are more prone for vitamin D deficiency.<sup>6</sup> Neonates need Vitamin D to absorb Calcium and Phosphorus.<sup>7</sup> Maternal vitamin D deficiency may result in neonatal hypocalcemic seizures and rarely cardiomyopathy. Rickets resulting from deficiency of vitamin D and/or calcium deficiency may be prevented and treated with adequate intake of Vitamin D and Calcium.<sup>8</sup> Vitamin D deficiency has been defined as a 25(OHD) level less than

20 mg/ml (50 nmol/l) while vitamin D insufficiency is defined as a 25(OH)D level between 21 and 29 ng/ml (52–72 nmol/l).<sup>9</sup>

As per American Academy of pediatrics (AAP) guidelines, 400IU/day of Vitamin D3 is needed in deficient babies.<sup>10</sup> As per The Endocrine Society Guidelines, for vitamin d deficiency in infants less than 1 year of age, 2000IU/D of Vitamin D2 or D3, or with 50,000IU of Vitamin D2 or D3 once weekly for 6 weeks to achieve a blood level of 25(OH) D above 30ng/ml, followed by maintenance therapy of 400-1000IU/D.<sup>11</sup>

This present study was done to compare the above two guidelines for treatment of vitamin D deficiency in neonates.

**METHODS**

This was a longitudinal intervention study was conducted in the Department of Pediatrics at Dr. L. H. Hiranandani Hospital, Mumbai for a period of two years from October 2012 to October 2014. The study was approved by the institutional ethics committee and protocol was followed as per ethical guidelines.

All babies born ≥37weeks of gestation in present hospital with Vitamin D deficiency were included in present study. Vitamin D deficiency defined as 25(OH)D below 20ng/ml.<sup>12</sup> Babies born to mothers on anticonvulsants, antiretroviral therapy, steroids >60-80mg/kg/day for more than 2 weeks were excluded from present study. Also, neonates with congenital anomalies, renal/bone or hepatic diseases, with inborn errors of metabolism or those requiring CPR or NICU admissions were also excluded.

Cord blood of all babies born ≥37 weeks of gestation was sent for estimation of Vitamin D levels. Those having Vitamin D<20ng/do were included in present study. They were then divided into two groups, A and B. Group A received 400IU/D while group B received 2000IU/D for 6 weeks followed by 1000IU/D for next 8 weeks. All babies were followed up till 4 months and vitamin D levels were re-estimated.

All the parameters were plotted in Microsoft Excel. The test used to study the data was Analysis of Variance (ANOVA) and Chi square test developed by R.A. Fisher. P value of <0.05 was considered as significant.

Parents were explained about the study and after getting informed written consent, and approval from the ethical committee, the study was conducted.

**RESULTS**

In present study, authors included 115 neonates with vitamin deficiency. Total number of babies in group A was 60 and in group B was 55. On admission, mean Vitamin D level was 12.55 among Group A which was

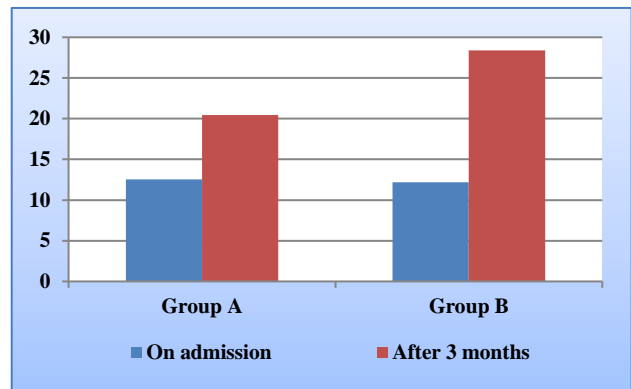
comparable to 12.18 among group B and difference was not significant (Table 1).

**Table 1: Comparison of mean vitamin d levels between the two groups.**

Period	Mean vitamin d level (±SD)		P value
	Group a (n=60)	Group b (n=55)	
On admission	12.55±06.09	12.18±06.11	0.746 (NS)
After 3months	20.43±05.83	28.39±06.71	
Mean diff (at admission-3)	07.88±05.56	16.21±06.93	
P value	*(0.001)	*(0.001)	*(0.001)

NS=Not significant, \*=significant (by ANOVA).

After 3 months, Vitamin D level showed significant rise of 62.8% among group A and 1.3 times more among group B which was significant from admission if compared change was significantly less among group A than group B (Figure 1).



**Figure 1: Comparison of mean vitamin D level between the two groups.**

There was a coincidental finding in the study which showed that after 3 months of treatment, in the babies who were given breast feeding along with formula feeds, there was a significant rise in the Vitamin D level, i.e. 1.1 times more than those who had breastfeeding alone after 3 months of treatment.

Other parameters which were taken in account were mothers who were on some drug treatment, mode of delivery, birth weight and sex of the baby. These parameters did not affect the Vitamin D levels at birth but at 3 to 4 months there was a significant rise after given dose.

**DISCUSSION**

The recommended level of deficient Vitamin D is taken as 20ng/dl or less.<sup>12</sup> Vitamin D deficiency in mothers and infants is a global health disorder despite recognition that it is preventable.<sup>13</sup> Adequate maternal vitamin D stores in pregnancy and lactation combined with modest sun exposure after birth is the natural means to prevent

deficiency in infants.<sup>14</sup> However, if a mother's vitamin D status is low and sunlight exposure is limited, vitamin D supplementation is essential to ensure vitamin D sufficiency in infants.<sup>15</sup>

Authors compared the two recommendations for Vitamin D deficiency treatment. American Academy of Pediatrics recommends 400IU/day for deficient babies. Whereas, the International Endocrine Society recommends 2000IU/day for 6 weeks followed by 1000IU/D for 4 weeks.

In present study authors found that the rise in Vitamin D level after 3 months of treatment was more after following the guidelines of International Endocrine Society and that it was statistically significant.

Other parameters which were taken in account were feeding patterns, mode of delivery, birth weight, sex of the baby and maternal drugs. These parameters did not affect the Vitamin D levels at birth but showed significant rise after 3 months of treatment.

All over the world, AAP Guidelines are followed for all babies, but present study shows higher doses increases it significantly without any side effects.

## CONCLUSION

Present study shows that for babies deficient in Vitamin D that is, less than or equal to 20ng/dl at birth should be supplemented with 2000IU/D for 6 weeks followed 1000IU/D for 4 weeks as per the International Endocrine Society Guidelines.

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