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Effect of Vitamin D3 Supplementation on Anthropometry Measurements in Exclusively Breast Fed Infants.

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Abstract

Background: Vitamin D deficiency is considered to be the most common nutritional deficiency and one of the most common undiagnosed medical conditions in the world. Over the last two decades, understanding of vitamin D synthesis and its function has changed remarkably.

Methods: A randomized control study was conducted at Department of Pediatrics, MGM hospital, Navi Mumbai after ethical clearance, during period of 7 months from 1st march 2014 to 30 September 2014 and followed up till 30 June 2015. A final sample of 200 exclusively breast fed newborns, were then randomized into two groups:

Group A: Placebo group and; **Group B**: Vitamin D3 supplementation group (400IUOD). Both the groups were followed up at regular intervals (1.5, 2.5, 3.5, 6 and 9 months) during which anthropometric measurement (weight and length) was monitored. Statistical analysis was done by SPSS17. Data were analyzed by unpaired t-test.

Results: Significantly better anthropometry parameters ($p<0.05$) were noted in vitamin D3 supplemented group of babies as compared to placebo group (i.e. more weight gain and increased length) from 2.5 months of age onwards.

Conclusion: Vitamin D supplementation after birth should be recommended as it improves growth of infants. Findings of this study also support importance of vitamin D supplementation during first year of life in full term infants who are exclusively breast fed, for its importance for skeletal system and immune functions.

Keywords: Vitamin D3 deficiency, Exclusively Breast fed, Anthropometric measures (weight and length**)**

Introduction: Vitamin D is a fat-soluble vitamin that is converted to a hormone within the body. By definition, hormones are considered to be chemical messengers that relay messages to cells. Hormones cause cells to express specific sequences of deoxyribonucleic acid (DNA), which is contained within the cell nucleus. When this specific sequence of DNA is expressed within a cell, the cell then responds through the process of transcription and translation and produces specific proteins, which then perform direct functions in the Body[1]. The active form of vitamin D, calcitriol, acts as a hormone by binding to vitamin D receptors (VDRs) both on the cell membrane as well as in the nucleus. This binding then leads to specific gene expression[2]. The two main sources of vitamin D are sunlight and diet. The skin synthesizes a steroid, 7-dehydrocholesterol, which is capable of absorbing specific wavelengths of light. When the skin is exposed to certain wavelengths of ultraviolet B (UVB) rays from the sun, the stored 7-dehydrocholesterol is converted to previtamin D3 or precalciferol[3,4]. In two to three days, the previtamin D3 is thermally isomerized to produce vitaminD3, cholecalciferol. Vitamin D3 then diffuses into the blood stream via a vitamin D binding protein (DBP), which then transports the vitamin to the liver. Once in the liver, it is hydroxylated and becomes 25-hydroxyvitamin D3 after which it is transported to the kidney for a second hydroxylation in which it is converted to 1,25-(OH)2 D3, which is the active form of vitamin D. The major biological functions of vitaminD is to maintain calcium homeostasis. It affects intestinal calcium absorption by increasing the expression of the epithelial calcium channel protein, which in turn enhances the transport of calcium through the cytosol and across the basolateral membrane of the enterocyte. Vitamin D also facilitates the absorption of intestinal phosphate. $1,25(OH)_2D$ indirectly affects bone mineralization by maintaining plasma calcium and phosphorus concentrations, and subsequently extracellular calcium and phosphorus concentrations at the supersaturating range necessary for mineralization. Many authors have reported a positive correlation between vitamin D3 supplementation and anthropometric measurements in full term infants.[4,5] The present study was conducted with the aim of studying the effect of vitamin d3 supplementation on anthropometric measurements in exclusively breastfed full term new borns.

Materials and methods: A randomized control study was conducted at Department of Pediatrics, MGM hospital, Navi Mumbai after ethical clearance , during period of 7 months from 1st march 2014 to 30 September 2014 and followed up till 30 June 2015. A final sample of 200 exclusively breast fed newborns, were then randomized into two groups: **Group A**: Placebo group and; **Group B**: Vitamin D3 supplementation group (400IUOD). Both the groups were followed up at regular intervals (1.5, 2.5, 3.5, 6 and 9 months) during which anthropometric measurement (weight and length) was monitored.

Justification For Sample Size

Sample size was calculated by using software PS (i.e. power and sample) version 3.1.6 and by assuming effect size 0.35, standard deviation 0.875 ,type 1 error 0.05 and type 2 error(β)= 0.2 .The sample size was worked out to be 99 in each group.

Statistical Analysis

All the collected data was entered in Microsoft Excel sheet and then transferred to SPSS software ver. 17 for analysis. The unpaired t-test was used to test the significance of difference between the two groups. The P-value < 0.05 was taken as significant. All p-values were two tails.

Results

Table 1. Comparison of Anthropometry parameters at Birth

Anthropometry (Birth)	GROUP	N	Mean	SD	SE	p- Value
Length	A	101	49.33	1.69	0.17	0.82
	B	99	49.14	1.73	0.17	
Weight	A	101	2.86	0.39	0.04	0.77
	B	99	2.89	0.37	0.04	

The mean birth weight and height of subjects in Vitamin D (Group B) and Placebo group (Group A) was comparable (p> 0.05). This ensured that any difference (if noted) in anthropometry parameters during subsequent visit could not be attributed to differences in baseline parameters.

Table 2. Comparison of Anthropometry parameters at 1.5 month

Anthropometry (1.5 month)	GROUP	N	Mean	SD	SE	p- Value
Length	A	101	50.66	9.85	0.98	0.27
	B	99	51.99	7.05	0.71	
Weight	A	101	4.47	9.40	0.94	0.56
	B	99	4.78	6.93	0.70	

No difference in anthropometry parameters was noted between 2 groups at 1.5 months.

Table 3. Comparison of Anthropometry parameters at 2.5 month

Anthropometry (2.5 month)	GROUP	N	Mean	SD	SE	p- Value
Length	A	101	55.10	1.61	0.16	< 0.01
	B	99	55.96	1.67	0.17	
Weight	A	101	4.32	0.54	0.05	< 0.01
	B	99	4.82	0.53	0.05	

Difference in anthropometric parameters was noted between two groups at 2.5 months with increased mean length and weight in the group supplemented with vitamin D3.Thus there was a significant difference ($p<0.05$) in the anthropometry of the group supplemented with vitamin D3.

Table 4. Comparison of Anthropometry parameters at 3.5 month

Anthropometry (3.5 month)	GROUP	N	Mean	SD	SE	p- Value
Length	A	100	57.54	1.96	0.20	< 0.01
	B	99	58.68	1.73	0.17	
Weight	A	100	5.09	0.55	0.06	< 0.01
	B	99	5.67	0.52	0.05	

There was a significant difference in the anthropometric parameters ($p<0.05$) between both the groups at 3.5 months.

Table 5. Comparison of Anthropometry parameters at 6 month

Anthropometry (6 month)	GROUP	N	Mean	SD	SE	p- Value
Length	A	101	62.80	2.28	0.23	< 0.01
	B	99	64.52	2.26	0.23	
Weight	A	101	6.11	0.69	0.07	< 0.01
	B	99	8.34	8.68	0.87	

Difference in anthropometric parameters was noted between two groups at 6 months with increased mean length and weight in the group supplemented with vitamin D3.

Table 6. Comparison of Anthropometry parameters at 9 month

Anthropometry (9 month)	GROUP	N	Mean	SD	SE	p- Value
Length	A	101	67.03	2.77	0.28	< 0.01
	B	99	69.51	2.56	0.26	
Weight	A	101	6.94	0.75	0.07	< 0.01
	B	99	8.17	0.72	0.07	

Difference in anthropometric parameters was noted between two groups at 9 months with increased mean length and weight in the group supplemented with vitamin D.

Thus there was a significant difference ($p<0.05$) in the anthropometry of the group supplemented with vitamin D3.

Discussion

Vitamin D is well known for its role in calcium metabolism and bone health[6] We observed significantly better growth in vitamin D3 supplemented group of babies as compared to placebo group (i.e. more weight gain and increased length) from 2.5 months of age onwards . The significant benefit of vitamin D supplementation for these infants on length and weight is an important finding. Present study is in comparison to the study of Mazary et al who observed a positive co-relation between Vit D3 supplementation and anthropometric measurements in full term infants[5] Similarly Brook et al[7] reported increased weight and length in children from 6 months of age onwards, whose mothers were supplemented with vitamin D3. In another study done by Kumar et al. to study effect of vitamin D3 supplementation on mortality and morbidity of low birth weight infants. They observed that vitamin D treatment significantly increased standard deviation (z) scores at six months for weight, length, and arm circumference and decreased the proportion of children with stunted growth (length for age z score ≤2) or with arm circumference z scores of 2 or less[4].

Conclusion

vitamin D supplementation after birth should be recommended till one year of age , as it not only improves growth of infants but is also important for the skeletal system and immune functions.

References

1. Holick MF. The vitamin D epidemic and its health consequences.J of Nutr.2005;135: 2739S-2748S
2. Gropper S, Smith J, Groff J. Advanced Nutrition and Human Metabolism. 4th ed.Belmont, C.A.: Wadesworth Publishing, 2004.
3. Reese RW. Vitamin D and bone health. J of Lancaster General Hospital.2006; 1:78-87.
4. Geeta TK et al. Effect of weekly vitamin D supplements on mortality, morbidity, and growth of low birthweight term infants in India up to age 6 months: randomised controlled trial. Br Med J 2011;342:2975.
5. El-Mazary, A. A. M., et al. "Vitamin D Supplementation and the Risk of Infections in Full term Infants. Correlations with the Maternal Serum Vitamin D."Archives of Disease in Childhood 97.Suppl 2 (2012): A257-A257.
6. Holick MF, Vitamin D deficiency. N Engl J Med. 2007;357:266-81.
7. Brooke, O. G., et al. "Vitamin D supplements in pregnant Asian women: effects on calcium status and fetal growth." BmJ 280.6216 (1980): 751-754.