

## Research Article

# Sero-prevalence of vitamin D deficiency among pediatric subjects visiting central railway hospital, Byculla, Mumbai, India: a cross sectional study

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## ABSTRACT

**Background:** Vitamin D deficiency leads to improper bone mineralization and causes rickets in children. Recently role of vitamin D has been found in a wide range of physiological functions, including cell differentiation, immune function and insulin production.

**Methods:** This study was hospital-based cross-sectional study. Participants were recruited from population of young children aged 6 months to 15 years attending Dr. Babasaheb Ambedkar central railway hospital at Byculla, Mumbai, India. Sample size was 150 subjects. Study duration was May 2012 to May 2013. Vitamin D levels were measured by electrochemiluminescent immunoassay. Vitamin D deficiency was defined as levels <50 nmol/L.

**Results:** 127 children (84.6%) were vitamin D deficient. 91 subjects were males and 59 were females. 78 (85%) males and 49 (83%) females had vitamin D deficiency. The difference was not statistically significant ( $p=0.658$ ). The prevalence of vitamin D deficiency in age group 6 months to 5 years was 87.5%, 6 to 10 years was 84.9% and 11-15 years was 81.6%. The difference was not statistically significant ( $p=0.734$ ).

**Conclusions:** There was very high prevalence of vitamin D deficiency in study population. We found no age and gender variation in vitamin D deficiency.

**Keywords:** Hypovitaminosis D, Sun exposure, Paediatric population

## INTRODUCTION

Vitamin D has an established role in growth and maintenance of the skeletal system and the regulation of serum calcium levels. Vitamin D deficiency leads to improper bone mineralization and causes rickets in children. Recently there has been collection of scientific evidence which indicates role of vitamin D in a wide range of physiological functions, including cell differentiation, immune function and insulin production.<sup>1,2</sup> Earlier it was thought that India being a tropical country with abundant sun exposure, there will not be vitamin D deficiency in this part of the world.

However, it was found that vitamin D deficiency is highly prevalent in India.<sup>3</sup> Geeta Trilok Kumar et al reviewed related literature and reported that there are large gaps of information on vitamin D status of populations of different age groups. However, they mentioned that it is evident from the published literature that vitamin D deficiency is common in India and prevalent in all age groups and can be of public health concern.<sup>1</sup> John M Pettifor has also stressed that there is an urgent need for more epidemiological studies to determine circulating 25 (OH) D concentrations in children of all ages to determine the prevalence of vitamin D deficiency in the paediatric population of India.<sup>4</sup> Present study was carried out to find the sero-

prevalence of vitamin D deficiency among paediatric patients attending Dr. Babasaheb Ambedkar central railway hospital outpatient department at Byculla, Mumbai, India.

## METHODS

This study was a hospital-based cross-sectional study. Participants were recruited from the population of young children aged 6 months to 15 years during their visit to Dr. Babasaheb Ambedkar central railway hospital at Byculla, Mumbai. Sample size was 150 subjects. Study duration was from May 2012 to May 2013. Random selection was done by counselling every 10<sup>th</sup> patient visiting the outpatient department. Subjects who were taking calcium and vitamin D supplements, subjects with known endocrine disorders, chronic kidney disease, liver diseases, alimentary tract diseases like malabsorption, protein energy malnutrition and subjects with clinical/radiological evidence of rickets were excluded from the study. The parents of these young children were informed about this research and its objectives, and written informed consent was obtained from them. Prior approval was taken from institutional ethics committee.

### Sample collection and 25 (OH) D assays

5 ml of blood sample was collected by venipuncture and collected in plain bulbs and sent for measurement of

serum 25 (OH) D concentrations. Vitamin D levels of the participants were measured by electrochemiluminescent immunoassay (ECLIA) method (by COBAS machine by ROCHE diagnostics, with report range 3 to 150 mg/ml.) Vitamin D deficiency was defined as levels <50 nmol/L based on the previous definition of vitamin D deficiency as per the endocrine society clinical practice guideline.<sup>5</sup>

## RESULTS

Table 1 - 3 describes the study results. Out of 150 subjects, 127 children (84.6%) were vitamin D deficient. 91 subjects were males and 59 were females. 78 (85%) males and 49 (83%) females had vitamin D deficiency. The difference was not statistically significant ( $p=0.658$ ). The prevalence of vitamin D deficiency in age group 6 months to 5 years was 87.5%, 6 to 10 years was 84.9% and 11-15 years was 81.6%. The difference was not statistically significant ( $p=0.734$ ).

**Table 1: Distribution of study group as per vitamin D status.**

Vitamin D level	Frequency	Percentage
Deficient	127	84.6
Sufficient	23	15.4
Total	150	100

**Table 2: Comparison of male and female children and level of vitamin-D.**

SEX	Vitamin D			Chi-square value	p-value
	Deficiency	Sufficiency	Total		
Male	78 (85%)	13 (15%)	91 (100%)	0.196	0.658 (NS)
Female	49 (83%)	10 (17%)	59 (100%)		
Total	127	23	150		

NS: Statistically not significant

**Table 3: Association between age-group of children and level of Vitamin-D.**

Age-Group	Vitamin D			Chi-square Value	p-value
	Deficiency	Sufficiency	Total		
6 Months-5 years	42 (87.5%)	06 (12.5%)	48 (100%)	0.647	0.734 (NS)
6- 10 years	45 (84.9%)	08 (15.1%)	53 (100%)		
11-15 years	40 (81.6%)	09 (18.4%)	49 (100%)		
Total	127	23	150		

NS: Statistically not significant

## DISCUSSION

In our study which included age range from 6 months to 15 years, we found a very high prevalence (84.6%) of vitamin D deficiency in children of railway employees attending Dr. Babasaheb Ambedkar central railway hospital outpatient department at Byculla in Mumbai, India. Lokesh Tiwari et al had conducted study in

children between the ages of 9 months to 30 months in different areas of New Delhi.<sup>6</sup> They reported that in Rajiv Colony, 82.9% children were vitamin D deficient with levels below 35nmol/L (mean level 23.76 nmol/L, SD 27.03). In Gurgaon, 82% children were vitamin D deficient with mean level 19.2 nmol/L (SD 20.2). However, children from Sundernagari area had normal

levels of vitamin D. Only 2% children were vitamin D deficient. The mean vitamin D level was 96.3nmol/L and standard deviation was 25.7. Similarly, a study by Marwaha et al in school children from Delhi between 10 to 18 years of age found that over one third had 25(OH)D values <9 ng/mL.<sup>7</sup> Basu S et al reported 72.1% vitamin D deficient children in their study done in pediatric hospital in eastern part of India i.e. Kolkata.<sup>8</sup>

Limitations of our study include small sample size, cross-sectional design of study and it cannot be generalized over a diverse geographical area. Further studies with robust study design and over a large sample size and diverse geographical area will help in assessment of vitamin D deficiency status in India.

## CONCLUSION

In our study we found a very high prevalence of vitamin D deficiency in children of railway employees attending Dr. Babasaheb Ambedkar Central Railway Hospital outpatient department at Byculla, Mumbai. We found no age and gender variation in vitamin D deficiency.

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