

the final version of the manuscript. All authors approved the final version of the manuscript.

Funding: None; *Competing interest:* None stated.

SHIKHA JAIN¹, GIRISH CHANDRA BHATT¹, ABHISHEK GOYA², VIKAS GUPTA³ AND BHAVNA DHINGRA¹

Departments of¹Pediatrics, ²Pulmonology & Sleep Medicine and ³ENT; AIIMS, Bhopal, Madhya Pradesh, India. ²drgcbhatt@gmail.com

REFERENCES

1. Van Herzelee C, Dhondt K, Roels SP, Raes A, Hoebeke P, Groen LA, *et al.* Desmopressin (melt) therapy in children with monosymptomatic nocturnal enuresis and nocturnal polyuria results in improved neuropsychological functioning and sleep. *Pediatr Nephrol.* 2016;31:1477-84.
2. Waleed FE, Samia AF, Samar MF. Impact of sleep-disordered breathing and its treatment on children with primary nocturnal enuresis. *Swiss Med Wkly.* 2011;141:w13216.
3. Kaditis AG, Alexopoulos EI, Hatzi F, Kostadima E, Kiaffas M, Zakynthinos E, *et al.* Overnight change in brain natriuretic peptide levels in children with sleep-disordered breathing. *Chest.* 2006;130:1377-84.
4. Jain S, Bhatt GC. Advances in the management of primary nocturnal enuresis in children. *Paediatr Int Child Health.* 2016;36:7-14.
5. Choudhary B, Patil R, Bhatt GC, Pakhare AP, Goyal A, Aswin P, *et al.* Association of sleep disordered breathing with mono-symptomatic nocturnal enuresis: A study among school children of central India. *PLoS One.* 2016;11:e0155808.

Subclinical Vitamin D Deficiency in Children from Thrissur, Kerala

This study was conducted to assess the 25-hydroxy vitamin D levels in children (age 1-5 yr) from Thrissur, Kerala, and to find its association with clinical manifestations of vitamin D-deficiency. Among the 79 children included, none had clinical features of rickets. The mean (range) vitamin D level was 18.1 (3.7 - 68.0) ng/mL. All the children had normal serum levels of Calcium, Phosphorous and Alkaline phosphatase. Serum parathyroid hormone levels were normal in 77 children. We conclude that most children with subclinical vitamin D deficiency diagnosed on basis of serum levels of 25 (OH) D do not have clinical symptoms/signs or biochemical evidence of secondary hyperparathyroidism.

Keywords: *Diagnosis, Hypovitaminosis D, Rickets.*

Hypovitaminosis D and its potential health implications are currently the subject of significant interest and controversy [1]. Though serum level of 25-hydroxyvitamin D (25OHD) is widely used as the marker of the vitamin D status, what level defines its deficiency is still under debate, particularly in children. This cross-sectional study was conducted in a tertiary care hospital in Central Kerala from June 2016 to December 2016 after approval by Institutional Ethics Committee. Children aged 1 to 5 years, attending the immunization clinic, outpatient clinic and well-baby clinic run by Department of Pediatrics were enrolled into the study after obtaining informed consent from parents/caretakers. Children with chronic illness, and those on Calcium or Vitamin D supplements were

excluded from the study. Baseline demographic details, detailed clinical history and complete physical examination were performed in all included children. Serum levels of 25-hydroxy Vitamin D (25 (OH) D) were measured in all children using Chemiluminescent Microparticle immunoassay (CMIA, Abbott). Serum parathyroid hormone (PTH) level was assessed by Electro Chemiluminescent Immunoassay (ECLIA, Roche). Serum calcium, phosphorous and Alkaline phosphatase (ALP) were also measured simultaneously. The laboratory reference range for PTH was 15-65 pg/dL, while that for 25 (OH) D was 30-70 ng/mL.

We categorized serum 25(OH)D levels as <12, 12-20, 20-60 and >60 ng/mL. Among the 79 children (42 boys mean age 3.4 y), none had clinical features of rickets. The 25 (OH) D level was normally distributed on visual inspection of curve. The mean (range) Vitamin D level was 18.1 (3.7- 68.0) ng/mL. Majority of children (37.9%) had levels between 12-20 ng/mL. Twenty-two children (27.8%) had a vitamin D level less than 12 ng/mL, suggestive of significant vitamin D deficiency. None of these children had hypocalcemia, and only two of them had high PTH levels (PTH >55 pg/dL). The mean (range) level of PTH was 31.3 (6.5-53.6 pg/mL). Calcium, phosphorus and ALP level had mean (range) values of 9.0 (8.3-10.9) mg/dL, 6.2 (2.8-7.8) mg/dL and 201.7 (100-317) IU, respectively.

Vitamin D deficiency was initially considered rare in India, as the studies were based on serum calcium and alkaline phosphatase in our population [2]. Assessment of serum 25 (OH) D is increasingly being used to assess vitamin D status, resulting in common diagnosis of

subclinical hypovitaminosis D. However, the optimal cut-off levels of 25 (OH) D for diagnosing vitamin D deficiency are not well described in children. In Kerala, there is a good antenatal care system assuming better maternal nutritional status [3]. The children in Central Kerala are adequately exposed to sunlight and have reasonably good health index. However, the mean value of 25 (OH) D in our study was 18.1 ng/dL, which is well below the accepted normal levels. Most of these children neither had clinical features of rickets nor had other laboratory evidence suggestive of Vitamin D deficiency. The present era is witnessing many diseases being etiologically attributed to vitamin D deficiency detected by low levels of 25 (OH) D. Hence, over prescribing Vitamin D, especially in pediatric age group, is quite common. Vitamin D is toxic in large doses and there are sporadic reports of vitamin D toxicity in literature [4]. Despite the concerns for over diagnosis and overtreatment of vitamin D deficiency, the practice, of testing for vitamin D deficiency using 25 (OH) D assay is on the rise. Few studies from Western countries have reported increased testing of 25 (OH) D levels leading to concerns related to quality of care, cost, and potential over-diagnosis [5].

Vitamin D measurement is often inaccurate and imprecise, and majority of tests performed currently fail to reveal vitamin D-deficiency [6]. IAP Guidelines on Vitamin D- and calcium-deficiency [7] do not recommend routine screening of healthy children; it should be performed only in those at risk of vitamin D deficiency. Moreover, there is a need for educating the practitioners as well as public about sun exposure for vitamin D synthesis [8], and dietary intake of vitamin D rich foods rather than promoting high market sales of calcium supplements, which could predispose to toxicity.

Contributors: AK, NT: conceptualized the study. AK collected the data and NT prepared the manuscript
Funding: Institutional Research Committee, Govt. Medical College, Thrissur; *Competing Interest:* None stated.

TMANANDA KESAVAN*, NITHYA THURUTHIYATH AND
ELIZABETH PREETHI THOMAS

*Department of Pediatrics,
 Government Medical College,
 Thrissur, Kerala, India. *dranandiap@gmail.com*

REFERENCES

1. Fraser DR. Vitamin D. *Lancet*. 1995;345:104-7.
2. Goswami R, Gupta N, Goswami D, Marwaha RK, Tandon N, Kochupillai N. Prevalence and significance of low 25hydroxyvitamin D concentrations in healthy subjects in Delhi. *Am J Clin Nutr*. 2000;72:472-5.
3. Jose JA, Sarkar S, Kumar SG, Kar SS. Utilization of maternal health-care services by tribal women in Kerala. *J Nat Sc Biol Med*. 2014;5:144-7.
4. Lee JY, So T-Y, Thackray J. A review on vitamin D deficiency treatment in pediatric patients. *J Pediatr Pharmacol Ther*. 2013;18:277-91.
5. Bilinski K. The rise and rise of Vitamin D testing. *BMJ*. 2012;345:e4743.
6. Bolland MJ, Grey A, Davidson JS, Cundy, Reid IR. Should measurement of vitamin D and treatment of vitamin D insufficiency be routine in New Zealand? *NZ Med J*. 2012;125:83-91.
7. Khadilkar A, Khadilkar V, Chinnappa J, Rathi N, Khadgawat R, Balasubramanian S, *et al*; Indian Academy of Pediatrics 'Guideline for Vitamin D and Calcium in Children' Committee. Prevention and Treatment of Vitamin D and Calcium Deficiency in Children and Adolescents: Indian Academy of Pediatrics (IAP) Guidelines. *Indian Pediatr*. 2017;54:567-73.
8. Meena P, Dabas A, Shah D, Malhotra RK, Madhu SV, Gupta P. Sunlight exposure and vitamin D status in breastfed infants. *Indian Pediatr*. 2017;54:105-11.