EDITORIAL

Vitamin D in Critical Illness: Not a Panacea for All Ills!

BANANI PODDAR

Department of Critical Care Medicine, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, India.
bananip@sgpgi.ac.in

India has abundant sunshine, and we would have expected the population to be vitamin D replete. However, that is not the case, and the prevalence of vitamin D deficiency in children documented in several studies is as high as 75-90% [1]. Most of these studies have assessed the vitamin D status of infants, adolescents, pregnant and lactating women. Status of vitamin D levels in children between infancy and adolescence is not well studied, though we could expect the same degree of deficiency in them as well. Skin pigmentation and clothing habits along with poor nutrition and atmospheric pollution are thought to account for this deficiency. Recent attention has focused on the myriad actions of vitamin D on cardiovascular and respiratory health, inflammation, innate immunity and neuromuscular function; hence deficiency is expected to have multiple effects. The adverse effects of this deficiency are hypocalcemic seizures and increased risk of lower respiratory tract infections, apart from the well known effects on bone health.

When on one hand children who are otherwise healthy are found to be vitamin D-deficient, it is not surprising that critically ill children are deficient in vitamin D. Studies in sick Indian children are scarce [2,3]. However, there are some studies showing vitamin D deficiency in critically ill adult patients [4]. Critically ill patients with vitamin D deficiency have been found in some studies to have a worse outcome [5]. A higher requirement of vasoactive drugs, higher severity of illness scores, longer duration of intensive care unit stay, and higher mortality have all been attributed to vitamin D deficiency. However, the results are very varied, and no adverse effects can be firmly attributed to vitamin D deficiency. While vitamin D supplementation has not been found to be beneficial in most critically ill patients, children with congestive cardiac failure fared better with vitamin D supplementation in one study [6]. Results of ongoing studies on vitamin D supplementation in critically ill children are still awaited.

In the current issue of *Indian Pediatrics*, Shah, *et al.* [7] present the findings of their study of the calcium-parathyroid hormone-vitamin D axis in a cohort of critically ill children. They assessed the prevalence of vitamin D deficiency in this population and further studied whether the presence or absence of a parathyroid hormone (PTH) response in the setting of vitamin D deficiency influenced the outcome. The authors justified parathyroid hormone assessment as they speculated that critical illness may impair the calcium-PTH-vitamin D axis rather than affecting vitamin D alone. Vitamin D deficiency (defined as 25-hydroxy vitamin D level <20 ng/mL) was found in 83% of the children, which is similar to the prevalence in otherwise healthy children. The median level of vitamin D in the cohort was 11.7 ng/mL (a seriously low level), with 13.6% having levels <5 ng/mL. Vitamin D-deficient children were hypocalcemic more often than those who were vitamin D replete, as expected. Vitamin D deficiency was not associated with any increase in morbidity or mortality. Considering that the median level of 25-(OH)D was 11.7 ng/mL, it would have been interesting to note if children with levels ≤10 ng/mL fared worse than those with higher levels. Since children with congestive cardiac failure have been shown to have a worse outcome if vitamin D-deficient, this is a subgroup in which further study was warranted; however, the number of children in this subgroup was too small. The expected rise in PTH was seen in only around 20% of the children who were either vitamin D-deficient or hypocalcemic. It is rather contradictory that vitamin D-deficient children, who showed an appropriate PTH response, had higher severity of illness scores at admission! The explanation offered by the authors that lack of PTH response indicates better utilization of tissue vitamin D is not very convincing. A large proportion of children were malnourished, and hence this could affect the PTH response. Similar paradoxical results of sicker patients having a more appropriate PTH response to hypovitaminosis D have been found in earlier studies of adult critically ill patients [8].

To summarize, this study adds to the growing body of literature on vitamin D deficiency in critically ill children. Unfortunately, the clinician is left wondering whether

routine assessment and/or supplementation of vitamin D in this population of children is necessary. Intervention studies of supplementation of vitamin D would perhaps solve this question. Meanwhile, we should not forget our preventive role, and should continue to encourage a healthy diet and lifestyle to prevent vitamin D deficiency in the community.

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

REFERENCES

1. Joshi K, Bhatia V. Vitamin D deficiency in a tropical country – treatment and prevention in children. Indian J Pediatr. 2014;81:84-9.
2. Prasad S, Raj D, Warsi S, Chowdhary S. Vitamin D deficiency and critical illness. Indian J Pediatr. 2015;82:991-5.
3. Ebenezer K, Job V, Antonisamy B, Dawodu A, Manivachagan MN, Steinhoff M. Serum vitamin D status and outcome among critically ill children admitted to the pediatric intensive care unit in south India. Indian J Pediatr. 2016;83:120-5.
4. Azim A, Ahmed A, Yadav S, Baronia AK, Gurjar M, Godbole MM, *et al*. Prevalence of vitamin D deficiency in critically ill patients and its influence on outcome: Experience from a tertiary care centre in North India (an observational study). J Intensive Care. 2013;1:14.
5. Abou-Zahr R, Kandil SR. A pediatric critical care perspective on vitamin D. Pediatr Res. 2015;77:164-7.
6. Shedeed SA. Vitamin D supplementation in infants with chronic congestive heart failure. Pediatr Cardiol. 2012;33:713-9.
7. Shah SK, Kabra SK, Gupta N, Pai G, Lodha R. Vitamin D deficiency and parathyroid response in critically-ill children: Association with illness severity and clinical outcomes. Indian Pediatr. 2016;53:479-84.
8. Nair P, Lee P, Reynolds C, Nguyen ND, Myburgh J, Eisman JA, *et al*. Significant perturbation of vitamin D-parathyroid-calcium axis and adverse clinical outcomes in critically ill patients. Intensive Care Med. 2013;39:267-74.