Vitamin D for Childhood Pneumonia

SEMIRA MANASEKI-HOLLAND
School of Health and Population Sciences, College of Medical and Dental Sciences, University of Birmingham, Rm 112, 90 Vincent Drive, Edgbaston, Birmingham B15 2TT, United Kingdom.
s.manasekiholland@bham.ac.uk.

The immunoregulatory functions of Vitamin D have become prominent in the current medical literature. With respect to infectious diseases, there is growing evidence for vitamin D enhancing innate immunity [1,2]. In vitro studies have shown that 1,25-dihydroxyvitamine D_3, the active metabolite of vitamin D, is important for promoting and regulating immune responses [3,4], induces expression of the TLR co-receptor CD14 [5] and antimicrobial gene expression (CAMP and defensin B_2 expression). The increased expression of anti-microbial cathelicidin by macrophages and epithelial cells in response to exposure to microbes depends upon the presence of vitamin D [1,2]. However, there is no clinical trial evidence for the effectiveness of vitamin D supplementation for improving treatment outcomes during infectious disease episodes. Observational studies have demonstrated important links between rickets or vitamin D deficiency and higher rates of infectious diseases that have significant burden of disease, such as pneumonia and tuberculosis. In pediatrics, two hospital-based case-control studies from Ethiopia [6] and India [7] suggest that vitamin D deficiency may substantially increase the risk of severe pneumonia among children. Only one other published study, prior to Choudhary and Gupta [8] in this volume of *Indian Pediatrics*, investigated the effect of vitamin D supplementation upon the treatment of pneumonia in children. A randomized placebo controlled trial of Cholecalciferol (Vitamin D_3) (100,000 IU) supplementation along with antibiotic treatment to 1-3 year old children with clinically diagnosed pneumonia found no difference in the time to recovery between the vitamin D and placebo groups [9]. The study in this issue resembles the 2006 study [9]. However, due to the totally different dosage regime of vitamin D, comparison of results becomes difficult. The trial by Choudhary and Gupta has strengths such as effective randomisation and looking at the most vulnerable category of pneumonia patients with more reliable clinical diagnosis, namely severe pneumonia patients. However, as acknowledged by the authors, its major weakness is the low dosage which together with no blood levels of vitamin D, makes adequate supplementation questionable and the study difficult to interpret. It is not clear if the lack of positive effect of supplementation was due to inadequate dosage or actual no effect from adequate supplementation.

An optimal vitamin D supplementation regime, for skeletal or immunological functions of vitamin D remains controversial, as does the fully sufficient serum levels for immunological function [10]. Nevertheless, it is important that numerous researchers in a range of settings investigate the effect of vitamin D supplementation upon pneumonia. Other infectious diseases should be explored, too. For example, *in vitro* studies indicate that diarrhea infections could be affected by vitamin D deficiency through the role of vitamin D on cethelicidin and α-defensin in gastrointestinal defence and IgA in adaptive immunity. As yet, this area remains unexplored.

Importance of further research is due to the public health significance of the topic. Vitamin D supplementation is affordable and pragmatic from the programmatic point of view. There is widespread evidence for vitamin D deficiency in low, middle and high income countries, and diarrhea and pneumonia are responsible for the highest burden of childhood mortality and morbidity, globally. Therefore, if alleviating deficiency is possible with supplementation and has an effect upon pneumonia or diarrhea rates or prognosis, this could be linked with significant reductions in childhood mortality. More research is needed in a range of settings, using different dosing regimes in order to establish whether and how any benefit can be demonstrated from vitamin D supplementation.

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Ages and Stages Questionnaire – A Developmental Screening Test

SUDHA CHAUDHARI AND SANDEEP KADAM*
Division of Neonatology, Department of Pediatrics, KEM Hospital, Pune 411 011, Maharahstra, India. kemhrc@vsnl.net

Developmental delays occur in 15% children under five years of age [1]. Early recognition of developmental delay facilitates the implementation of prevention and intervention programs and results in improvement in cognitive, behavioral, academic and adaptive functioning [2]. Hence, it is important that early identification of delayed development be done using standardized developmental tests, especially during the follow up of premature and "high risk" infants.

The American Academy of Pediatrics (AAP) has recommended a regular developmental assessment using standardized tools at the ages of 9, 18, 30 months. But their surveys have shown that a minority of pediatricians perform routine screening using standardized tools. This may be due to several factors like inadequate time and remuneration, conflicting reports on accuracy of available screening tests. It has been estimated that only about half of the children with developmental problems are detected before they join school [3]. Parents are usually the first to pick up signs of possible developmental delay, and any concern that the parents have about their child's development should always be taken seriously. On the other hand, the absence of parental concern does not necessarily mean that all is well. Parents' reports of current attainment of developmental tasks have been shown to be accurate and reliable [4].

Developmental surveillance is defined as a flexible, longitudinal, continuous process through which potential risk factors for developmental and behavioral disorders can be identified [5-7]. In a busy practice, obtaining parents' reports of development is a good 'first line screen', and an efficient and effective way of selecting out children who require a more detailed assessment and/or referral.

There are a variety of screening tests to choose from, many of which are completed by parents and require only a short period of time to administer and score. These questionnaire-based screening forms are convenient, as there are no directly administered test items and scoring requires only minimal training. For example, the Parents' Evaluation of Developmental Status (PEDS) is a parent interview form that provides an algorithm to guide the need for referral, more screening, or continued surveillance [8]. The Ages and Stages Questionnaire (ASQ), is a parent completed questionnaire that may be used as a general developmental screening tool, evaluating five developmental domains: communication, gross motor, fine motor, problem-solving, and personal adaptive skills, for children from the ages of 4 to 60 months [9].