

breast feeding amongst post cesarean section mothers and possibly prevent successful establishment of breast feeding.

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Vitamin D Requirements of Children in Haryana

J. Singh
R.K. Marya
V.P. Sood
P. Khanna

Diet of Indian infants and children consists primarily of cereals and provides very little vitamin D. Therefore, we in India rely heavily on sunshine as natural source of vitamin D. A study designed to determine

From the Departments of Social and Preventive Medicine and Physiology, Medical College, Rohtak.

Reprint requests: Dr. Jagvir Singh, Assistant Director, Epidemiology, National Institute of Communicable Diseases, 22, Sham Nath Marg, Delhi 110 054.

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vitamin D requirements of Indian children has shown that under the existing dietary and environmental conditions supplementation of 200 IU of vitamin D promotes maximum calcium absorption(1). A level of 200 IU of vitamin D was therefore, suggested by the Indian Council of Medical Research (ICMR) as dietary allowances for Indian children(2). However, levels less than this could also prove adequate.

Vitamin D deficiency is known to cause rickets and retarded skeletal growth in children(3). It is therefore, reasonable to assume that the amount of vitamin D consumed by the children, who are free from rickets clinically and had adequate growth, will be the requirements of vitamin D of these children.

On the basis of this surmise, an attempt has been made in this study to find out the vitamin D requirements of children in Haryana where sunshine is available throughout the year.

Material and Methods

The present study was conducted in the Integrated Child Development Services (ICDS) covered area of the slums of Rohtak town during the period from September, 1987 to April, 1988. Three colonies were selected by simple random sampling. A "Hindu" infants and children in the age group of 6 months to <5 years available in the 'Anganwadis' of these selected colonies were weighed on a hanging beam balance to the nearest of 50 grams. Children having 80% of the reference weight for age (50th percentile of Harvard standard) were sorted out. All these children were examined clinically to rule out ricks.

These children were divided in three age groups, i.e., 6 months to <1 year, 1 year to <3 years, and 3 years to <5 years.

Quantity and quality of food taken by the children was assessed by the recall method of oral questionnaire diet survey(4) (by showing standard vessels) covering 15% of children in each age group selected at random. To minimize the error that would rise by recalling the previous week's intake, it was planned to be content with the previous day's intake. It was ensured that previous day was a typical day. Twenty four hour dietary recall is a standard dietary assessment; if the limitations of the 24-hour recall are borne in mind, rough calculations of nutrient intake are valid(4).

The amount of vitamin D consumed by the child was calculated with the help of tables published by ICMR(5).

Results

All the adequately nourished children who were examined clinically were found free from rickets. The chief dietary sources of vitamin D were found to be milk and milk products. Vanaspati Ghee and eggs were sources of vitamin D in some children. No child was getting vitamin D supplements.

Table I shows that the mean vitamin D intake in diet of all these children was very low and ranged between 14-30 IU in different age groups. Breast milk was not consid-

TABLE I—Daily Vitamin D Consumption
(Mean \pm SD)

Age group (yrs)	n	Vitamin D intake (IU)*	No. receiving breast milk
0.5-<1	14	13.86 \pm 11.74	12
1-<3	21	22.19 \pm 11.03	3
3-<5	15	29.67 \pm 12.42	nil

* Breast milk was not considered for calculation of daily vitamin D intake.

ered for calculations due to difficulty of its measurement.

Discussion

Little is known of the vitamin D requirements mainly because information is not available on the amount of vitamin D resulting from exposure to sunlight. It has been claimed that the entire requirement of vitamin D can be obtained through exposure to sunlight(6). The incidence of vitamin D responsive rickets in the tropics among children known to be adequately exposed to sunlight however, raises doubts about this claim, and therefore, some amount of dietary vitamin D may be necessary.

A joint FAO/WHO expert group(7) has recommended that the daily intake of vitamin D for the infants and children should be 400 IU. ICMR however, has recommended a lower daily intake (200 IU) for Indian children(2) on the basis of calcium balance studies(1) which indicated that under the existing dietary and environmental conditions, supplementation of 200 IU of vitamin D promotes maximum calcium absorption.

Deficiency of the vitamin D results in poor retention of calcium and phosphorus which in turn may cause rickets and retarded skeletal growth(3). When vitamin D is given to these children, not only rickets is healed, their growth may also improve. However, vitamin D supplementation does not affect the growth of adequately nourished children (having 80% of reference weight for age) who are free from rickets clinically(8). The amount of vitamin D consumed by such children who had adequate growth and are free from rickets clinically therefore, can be taken as requirement of this vitamin.

The mean vitamin D intake in diet of all these children ranged between 14-30 IU in different age groups. Breast milk was not considered for calculations due to difficulty of its measurement. Average intake of the breast milk is 400-660 ml in infants past six months of age and children up to 3 years of age(9). Human milk contains <40 IU of the vitamin D per litre(10). Therefore, even after considering the breast milk for calculation, the mean vitamin D intake of these children was much below 40 IU per day.

It is concluded that dietary requirements of vitamin D of under five children in Haryana are very small, i.e., much below 40 IU per day.

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Screening of Rickets in a Haryana Town

J. Singh
R.K. Marya
A. Sharma

Osteomalacia and rickets are highly prevalent amongst Asian immigrants in the U.K. In Rochdale(1), for example, a survey revealed that 30% of the Asian children and adults had overt rickets or osteomalacia, and 74% of the children and 53% of the adults showed changes in plasma calcium and alkaline phosphates typical of vitamin D deficiency.

Osteomalacia has been reported from Delhi(2), and rickets has been reported from Delhi(3-4), Bombay(5), Nagpur(6), Amritsar(7), Vellore, Poona, etc. However, during examination of children in 'Anganwadis' of Rohtak town (Haryana), it

From the Departments of Social and Preventive Medicine, Physiology and Pediatrics, Medical College, Rohtak.

Reprint requests: Dr. Jagvir Singh, Assistant Director, Epidemiology, National Institute of Communicable Diseases, 22, Shamnath Marg, Delhi 110 054.

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