

# Vitamin D concentrations in Asian children aged 2 years living in England: population survey

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The Social Survey Division of the Office for National Statistics on behalf of the Department of Health carried out a survey between 1994 and 1996 of infant feeding practices of mothers of Bangladeshi, Indian, or Pakistani origin living in England.<sup>1</sup> A blood sample was taken during October–November 1996 from a subsample of children aged 2 years for analysis of iron and 25-hydroxycholecalciferol (vitamin D) concentrations. Details for iron concentration are published elsewhere.<sup>1 2</sup> We here report the vitamin D concentration.

## Subjects, methods, and results

Vitamin D concentration was measured in 618 of the children. No evidence was found of bias influencing the selection of this subgroup, which seems to be representative of Asian children in England. The table shows serum 25-hydroxycholecalciferol concentrations for the three groups in comparison with data from the national diet and nutrition survey of preschool children.<sup>3</sup> Between 20% and 34% of children in the three ethnic groups had values of vitamin D below 25 nmol/l, a value considered to indicate deficiency,<sup>4</sup> and 13–18% had values below 20 nmol/l; the percentages in the national survey were 1% and 0% respectively. Between 20% and 29% of children in the study had a haemoglobin concentration < 110 g/l.<sup>2</sup> All children in the study were apparently healthy, and none had been diagnosed as having rickets. At the age of 2 about 25% of children were given the Department of Health's recommended vitamin drops, which contain vitamins A, C, and D. In the national survey less than 5% were given such drops.<sup>3</sup>

Multiple regression analysis showed for all groups that the concentration of vitamin D was associated with whether children were given vitamin supplements. In bivariate analysis, failure to take a vitamin supplement,

a haemoglobin concentration of less than 110 g/l, and a ferritin value of less than 10 µg/l were associated with vitamin D concentrations lower than 25 nmol/l.

## Comment

Rickets has been recognised as a problem in children of Asian immigrants since the 1960s, but, although the Stop Rickets campaign (which encouraged vitamin supplementation) seemed to decrease the incidence of rickets in some regions, no national evaluation of its effectiveness has been carried out. Our data suggest that matters have improved slightly in Bangladeshi and Indian children but not in Pakistani children. Serum vitamin D concentrations show a seasonal variation, with lowest values early in the year.<sup>3</sup> Therefore the October values for these children are likely to drop further to those associated with rachitic bone changes in a higher proportion of children.

Some confusion exists among healthcare professionals about the necessity for vitamin supplementation after the age of 1 year, although the Department of Health recommends supplements for all children up to the age of 5. Those working with ethnic minority groups must deliver a clear message that a vitamin D supplement is essential for all Asian children under 5.

A high degree of association between iron deficiency anaemia and vitamin D deficiency has been reported previously.<sup>5</sup> A fifth of British Asian children surveyed showed signs of both deficiencies, and during the winter 50% of children with low vitamin D had low haemoglobin compared with none with normal vitamin D. In our study, iron deficiency was a significant risk factor for low vitamin D concentration in all three ethnic groups. This high association should alert clinicians to recommend a vitamin D supplement and screening for rickets in children with low haemoglobin concentrations.

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Contributors: ML coordinated the blood collection and laboratory analysis; MT coordinated the data collection and analysis. ML and MT wrote the manuscript. Ann Hardiman (Nutrition Unit, Institute of Child Health) managed the practical aspects of blood collection, and Vivienne Avery (Office for National Statistics) helped with data management. Plasma 25-hydroxycholecalciferol concentrations were measured by the Department of Chemical Pathology, Leicester Royal Infirmary, Leicester.

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Conflict of interest: None.

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Percentage distribution of serum 25-hydroxycholecalciferol concentrations with summary statistics

Vitamin D (nmol/l)	Ethnic group			National diet and nutrition survey <sup>3</sup> (data on children aged 1.5–2.5 years)	
	Bangladeshi (n=139)	Pakistani (n=200)	Indian (n=279)	All children (n=213)	Subgroup (n=76)*
<12.5	0	0	0	0	0
<20.0	13	18	13	0	0
<25.0	20	34	25	1	1
<50.0	69	81	70	17	13
<75.0	91	95	89	64	64
<100.0	99	99	96	93	94
<150.0	100	100	100	100	100
Mean	42.1	36.2	42.2	67.4	67.4
Median	37.5	30.0	37.5	67.5	65.0
Lower 2.5 centile	16.5	14.5	14.7	27.5	29.2
Upper 2.5 centile	91.2	92.5	102.5	155.0	121.1
SE	1.8	1.4	1.3	1.5	2.3
SD	21.3	19.6	22.5	21.8	19.8

\*Children aged 1.5–2.5 years who were sampled from October to December.