

## SHORT REPORT

## Incidence of symptomatic vitamin D deficiency

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A survey of West Midlands paediatricians in 2001 identified 24 cases of symptomatic vitamin D deficiency in children less than 5 years of age. The overall incidence was 7.5 per 100 000 children per year with notable differences in incidence per ethnic group.

Nutritional rickets secondary to vitamin D deficiency has been recognised in the United Kingdom since the 17th century.<sup>1</sup> Although it has never completely disappeared there have been variations in its prevalence with time. In the final few years of the 20th century we became aware of an apparent resurgence of vitamin D deficiency rickets and decided to undertake a survey of West Midlands paediatricians in order to provide quantitative information on the incidence.

## METHODS

This was a prospective survey conducted from May 2000 to April 2001. One hundred and nineteen consultant paediatricians were sent a postcard on 10 occasions in one year on which they were asked to identify whether they had seen either *rickets*, as determined by x ray findings of fraying and splaying at the end of a long bone; or *hypocalcaemic convulsions* where the most likely cause was vitamin D deficiency in the mother or the child. They were requested only to report children between the age of birth and 5 years, and preterm babies with hypocalcaemia were excluded.

Paediatricians reporting cases were sent a questionnaire which requested information about ethnic origin, mode of feeding, biochemical results, and whether they were receiving any multivitamin supplements. Individual data was anonymised, but the age of the child and place of presentation were obtained to ensure no duplicate reporting. This study was approved as a non-invasive epidemiological study by the South Birmingham local research ethics committee. Data on the ethnic composition of the childhood population of the West Midlands was obtained from the 2001 census.

## RESULTS

A response rate of 76% was obtained. Over the one year period 24 children (13 male and 11 female) less than 5 years of age were identified with radiological and biochemical evidence consistent with vitamin D deficiency. Only one child was reported as having taken a multivitamin preparation. There were three main modes of presentation (fig 1). Eleven children presented with bowed legs at a mean age of 17.6 months (range 9 to 25 months), 10 of whom were breast fed, with a mean duration of 10.8 months. Six children presented with hypocalcaemic convulsions at a mean age of 6 weeks (range 6 days to 6 months), three of whom were receiving formula feeds. These children were all south Asian. Four children presented with gross motor delay at a mean age of 17.7 months (range 13 to 26 months). They were all black African or African-Caribbean and were all still breast fed. One of these children subsequently died within a week of starting treatment with vitamin D. A necropsy examination was declined so it is unclear whether vitamin D deficiency was related to the cause of death.

There was an overall incidence of 7.5 per 100 000 children, with those of south Asian ethnic origin having an incidence of 38 per 100 000, and children of black African or African-Caribbean ethnic origin having an incidence of 95 per 100 000. Only one child of white ethnic origin was reported, giving an incidence of 0.4 per 100 000.

## DISCUSSION

This study has provided useful quantitative evidence for the incidence of symptomatic vitamin D deficiency in young children in the United Kingdom in the early part of the 21st century. The only comparable study in a child health clinic in Manchester between May 2001 and July 2002<sup>2</sup> identified two of 124 ethnic minority children with rickets between the ages of 6 and 36 months, giving a prevalence of 1.6%. The results of our survey are likely to be applicable to other areas of the UK with large ethnic minority populations.

The figures we identified are probably an underestimate as nearly a quarter of the paediatricians did not respond, and a separate survey of children under the age of 16 years presenting to three Birmingham hospitals between June 2001 and June 2003 identified 65 individuals.<sup>3</sup> In addition we recognise the limitations of case ascertainment using a single method of reporting in determining the true incidence of a condition. This survey has highlighted three modes of presentation in this age group. Although the majority presented with bowed legs as toddlers, a quarter of the children presented with hypocalcaemic convulsions under the age of 6 months. In this latter group, who were all south Asian, maternal vitamin D deficiency was identified as an aetiological factor in many cases. This observation calls into question the recent NICE guideline on antenatal care which does not recommend routine vitamin D supplementation for pregnant women.<sup>4</sup> The third mode of presentation was with gross motor delay, particularly delay in walking. All these children were black African or African-Caribbean in whom prolonged and often exclusive breast feeding was present. Breast milk is a poor source of vitamin D, containing only 40 IU/litre. Such children often have a significant proximal myopathy and it is conceivable that the

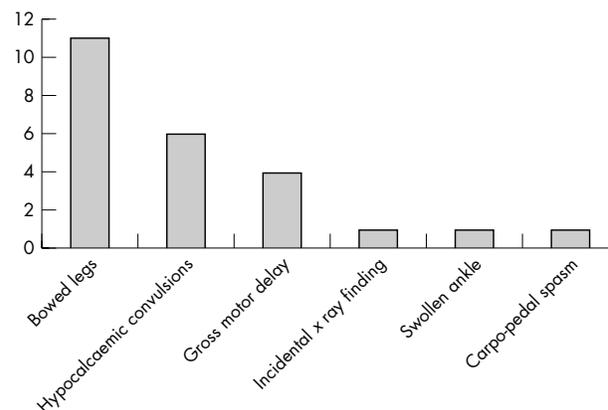


Figure 1 Mode of presentation of symptomatic vitamin D deficiency.

child who died may have had a cardiomyopathy, which is a potential consequence of severe vitamin D deficiency.<sup>5</sup>

This survey highlights that the recommendations of the Department of Health for vitamin D supplementation are being ignored.<sup>6</sup> Although the majority of the children were being breast fed it is pertinent to note that 50% of those who presented with hypocalcaemic convulsions were formula fed. This suggests that the vitamin D content of infant formulas is inadequate to compensate for the impact of maternal vitamin D deficiency during pregnancy.

It is our intention to repeat this survey in the West Midlands in a few years time following a renewed public health campaign to ensure appropriate vitamin D supplementation to vulnerable groups, including pregnant mothers, in order to reduce the incidence of this preventable condition.

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