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Unexplained Fractures in Infants and Young Children: (Ir)relevance of Serum Vitamin D

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PURPOSE

To test the hypothesis that low serum total 25-hydroxyvitamin D (VitD) predisposes children aged ≤2years to fractures, even when there is no overt rickets.

METHOD AND MATERIALS

A retrospective single centre study. The hospital database was interrogated for children ≤2years who had VitD measured between 01/01/10 and 12/31/14 AND at least 1 skeletal radiograph within 2 weeks of this. Blinded to VitD, 2 observers independently scored the anonymised full skeletal surveys (SS) and individual radiographs (XR) for fracture (yes/no), bone density (reduced/normal) and rickets (Thacher score 0/≥1). Discrepancies were arbitrated by a third observer in a final consensus read. Analyses (SPSS V22.0 for Mac, $p \leq 0.05$) included descriptive statistics (prevalence of clinical and radiographic parameters), Cohen's kappa (interobserver reliability for radiographic parameters) and binomial logistic regression (likelihood of fracture based on VitD, bone density or Thacher score). Further analyses (calcium/phosphate/ethnicity/breast fed) are on-going. Research and Development approval was granted; Ethics Committee approval was waived.

RESULTS

388 children, mean age 9 months (0-24), 167 SS and 239 XR were included. Mean VitD was 67nmol/L (<6-778nmol/L); 77 children (20%) were VitD deficient (≤25nmol/L); 78 (20%) insufficient (25.1-50nmol/L); 69 (18%) had at least one fracture; 39 (10%) reduced bone density; 22 (6%) Thacher ≥1. Interobserver kappa was very high for fracture (0.915) and Thacher score (0.842) and good for bone density (0.706). Logistic regression (Table) showed that radiographic bone density was the only statistically significant variable predictive of presence of fracture, with an odds ratio of 4.61 (95%CI 2.05-10.38). The odds ratio for VitD level was 1.02 (0.99-1.06).

CONCLUSION

Observer reliability for diagnosing reduced bone density and rickets from radiographs ranges from good to very high. This study provides objective evidence to support mainstream thinking that in the absence of radiographic evidence of reduced bone density and/or rickets, a low vitD should not be interpreted as the cause of unexplained fractures in a child below 2 years of age.

CLINICAL RELEVANCE/APPLICATION

In children aged ≤2years with unexplained fractures, whose radiographs reveal normal bone density and/or a Thacher score of zero, serum VitD level is irrelevant to the etiology of the fractures.

FIGURE (OPTIONAL)

Uploaded Image

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Disclosures:

Nothing to disclose:	Elaine Pang
Nothing to disclose:	Sujatha Gopal
Nothing to disclose:	Alan Sprigg
1. Honoraria/Travel Support: Alexion Pharmaceuticals Inc, BioMarin Pharmaceutical Inc, Infomed Research and Training Ltd 2. Director, OCIN Ltd	Amaka Offiah

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