

# Abstract

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## **Craniotabes in normal newborns: the earliest sign of subclinical vitamin D deficiency.**

Yorifuji J, Yorifuji T, Tachibana K, Nagai S, Kawai M, Momoi T, Nagasaka H, Hatayama H, Nakahata T.

Department of Pediatrics, Kyoto University Hospital, 54 Shogoin Sakyo, Kyoto 606-8507, Japan.

**CONTEXT:** Craniotabes in otherwise normal neonates has been regarded as physiological and left untreated.

**OBJECTIVE:** Our objective was to investigate the role of vitamin D deficiency in the development of craniotabes in normal neonates.

**DESIGN AND SETTING:** Newborn screening of craniotabes was conducted at the single largest obstetrical facility in Kyoto, Japan. Follow-up study at 1 month was conducted at Kyoto University Hospital.

**SUBJECTS:** A total of 1120 consecutive normal Japanese neonates born in May, 2006, through April, 2007, were included in the study.

**MAIN OUTCOME MEASURES:** The incidence of craniotabes was scored each month. Neonates with craniotabes were followed up at 1 month with measurements of serum calcium, phosphorus, alkaline phosphatase (ALP), intact PTH, 25-OH vitamin D (25-OHD), urinary calcium, phosphorus, creatinine, and hand x-rays.

**RESULTS:** Craniotabes was present in 246 (22.0%) neonates, and the incidence had obvious seasonal variations, highest in April-May and lowest in November. At 1 month, infants with craniotabes had significantly higher serum ALP compared with normal neonates; 6.9% of them had elevated intact PTH over 60 pg/ml, and 37.3% had 25-OHD less than 10 ng/ml. When separately analyzed according to the method of feeding, 56.9% of breast-fed infants showed 25-OHD less than 10 ng/ml, whereas none of formula/mixed-fed infants did, and breast-fed infants had significantly higher serum PTH and ALP compared with formula/mixed-fed infants.

**SUMMARY:** These results suggest that craniotabes in normal neonates is associated with vitamin D deficiency in utero, and the deficiency persists at 1 month in many of them, especially when breast-fed.

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