BREASTFEEDING MEDICINE
Volume 9, Number 0, 2014
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DOI: 10.1089/bfm.2014.0118

Letter to the Editor

The Safety of Maternal Elimination Diets in Breastfeeding Mothers with Food-Allergic Infants

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Dear Editor:

Breastfeeding mothers are advised to avoid foods that cause allergic symptoms in their infant because even trace amounts of proteins in breastmilk may cause symptoms.[1] The most common foods responsible for allergic symptoms in infants are hen's eggs, cow's milk, peanuts, tree nuts, and grains, such as wheat. The avoidance of these foods of high nutritional content may put breastfeeding mothers at risk for nutritional deficits, but the influence of elimination diets has been inadequately documented in developed countries. We assessed the influence of lactation, with or without dietary restrictions, on anthropometric measures, serum parameters of nutritional status, bone metabolism, and nutrient intake.

Seventeen breastfeeding mothers of singletons were recruited. Eight mothers were advised by a physician to avoid cow's milk, as well as hen's eggs, peanuts, tree nuts, fish, and/or wheat in a stepwise manner because of suspicion of food allergy in their infant, and nine age-matched mothers of nonallergic infants were not subjected to such elimination diets. The mothers were counseled by a dietician on the strict avoidance diets and substitution of calcium (1 g/day). Protein sources included meats, legumes, and other grains such as rice and corn. Eight age-matched non-nursing women served as controls.

After a minimum of a 2-month elimination diet (range, 2–6 months), blood parameters of nutritional status including serum indices of protein, lipids, iron, trace elements, and bone metabolism were evaluated. Serum was frozen for subsequent determination of collagen type I C-terminal cross-linked telopeptide (ICTP), collagen type I C-terminal propeptide (PICP), and collagen type III N-terminal propeptide (PIIINP) by radioimmunoassay (Orion Diagnostica, Espoo, Finland). Mid-upper arm and thigh circumferences and skinfold thickness were evaluated at the triceps and subscapular area. Bone ultrasound attenuation was assessed with a bone ultrasound analyzer (model UBA575; Walker Sonics Ltd., Worcester, MA) in the right calcaneus bone. Two consecutive measurements, each consisting of nine scans, were performed. Three-day diet records were analyzed with FoodWorks version 16 software (The Nutrition Company, Long Valley, NJ).

Informed consent was obtained from the mothers. The study protocol was approved by the ethics committee at the Skin and Allergy Hospital of the Helsinki University Central Hospital.

Body mass index calculations were comparable in lactating mothers on the elimination diet (median, 20.6 kg/m^2; range, 19.5–25.4 kg/m^2), in lactating mothers with an unrestricted diet (median, 23.6 kg/m^2; range, 19.1–31.9 kg/m^2), and in the nonlactating controls (median, 23.1 kg/m^2; range, 19.5–25 kg/m^2). The anthropometric and bone density measurements, as well as the indices of iron, protein and lipid metabolism, and trace elements, were comparable and within the normal range in all groups. Levels of the markers of bone formation, PICP and PIIINP, and osteocalcin were significantly higher in the lactating mothers with dietary restrictions compared with those without dietary restrictions and the nonlactating controls (Fig. 1). The level of the bone resorption marker, ICTP, was significantly elevated in the two groups of lactating mothers compared with nonlactating mothers. However, bone- and liver-specific alkaline phosphatase levels were within the normal range, as was mean bone density assessed by ultrasound. Intakes of total calories, protein, and phosphorus were significantly decreased in nursing mothers on dietary restrictions compared with those not on a diet ($p = 0.009$, $p = 0.01$, and $p = 0.001$, respectively).

This study reports that lactation for approximately 6 months caused physiological bone mobilization, which was more pronounced in mothers consuming a restricted diet lacking cow's milk protein for at least 2 months, despite adequate calcium supplementation. Previous reports have shown a decrease in bone mineral density in lactating, well-fed mothers on a cow's milk–elimination diet[2] and transiently higher osteocalcin, bone-specific serum alkaline phosphatase, and serum N-telopeptide levels after breastfeeding for more than 6 months.[3] Another report has found maternal bone mineral density decreasing at the rate of 1–3% per month during lactation, reaching a total loss of 3–10% after 2–6 months.[4] Consistently, in our study, the longer duration of breastfeeding (≥ 7.5 months) was related to higher bone turnover, which may suggest that mothers with long periods of breastfeeding, when superimposed on elimination diets, may be especially susceptible to compromised bone health. In three mothers in our sample, postweaning collagen peptide

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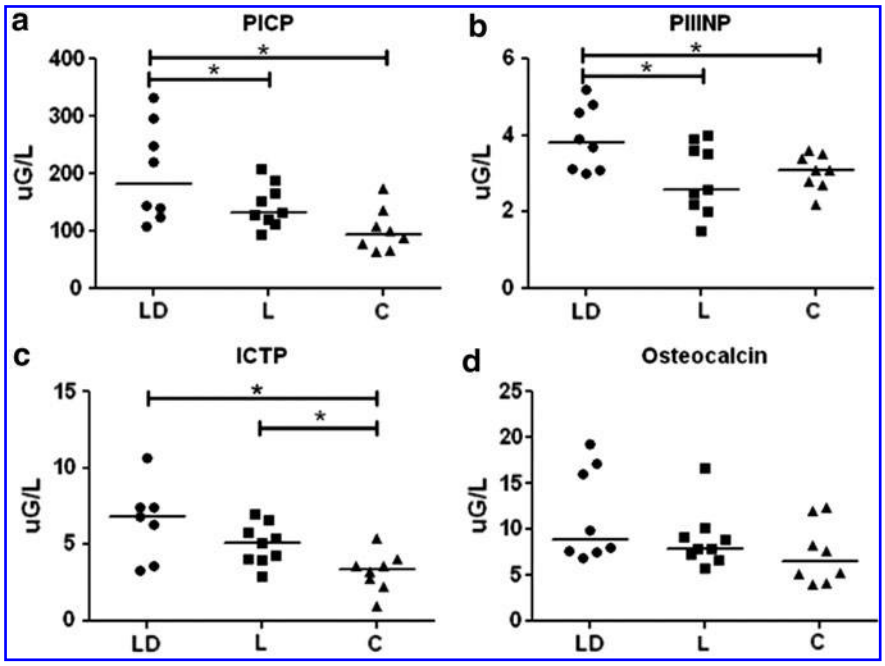

FIG. 1. Serum turnover markers in either lactating mothers with a diet restricted in cow's milk protein (LD) or in those with no dietary cow's milk restriction (L): **(a)** serum collagen type I C-terminal propeptide (S-PICP), **(b)** serum collagen type III N-terminal propeptide (S-PIIINP), **(c)** serum collagen type I C-terminal cross-linked telopeptide (S-ICTP), and **(d)** serum osteocalcin (S-Osteocalcin). Nonlactating mothers served as controls (C). $*p < 0.05$.

levels were available and showed normalized collagen peptide levels (data not shown), suggesting that changes may be reversible.

In conclusion, although bone turnover was increased in breastfeeding mothers with dietary restrictions, there was no negative effect of such diets on nutritional status and bone density, possibly because of the relatively short duration of such diets. The safety of maternal elimination diets during breastfeeding for long periods of time is unknown, and they should only be prescribed when clearly indicated.

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