

Association between prolonged breastfeeding and bone mineral density and osteoporosis in postmenopausal women: KNHANES 2010–2011

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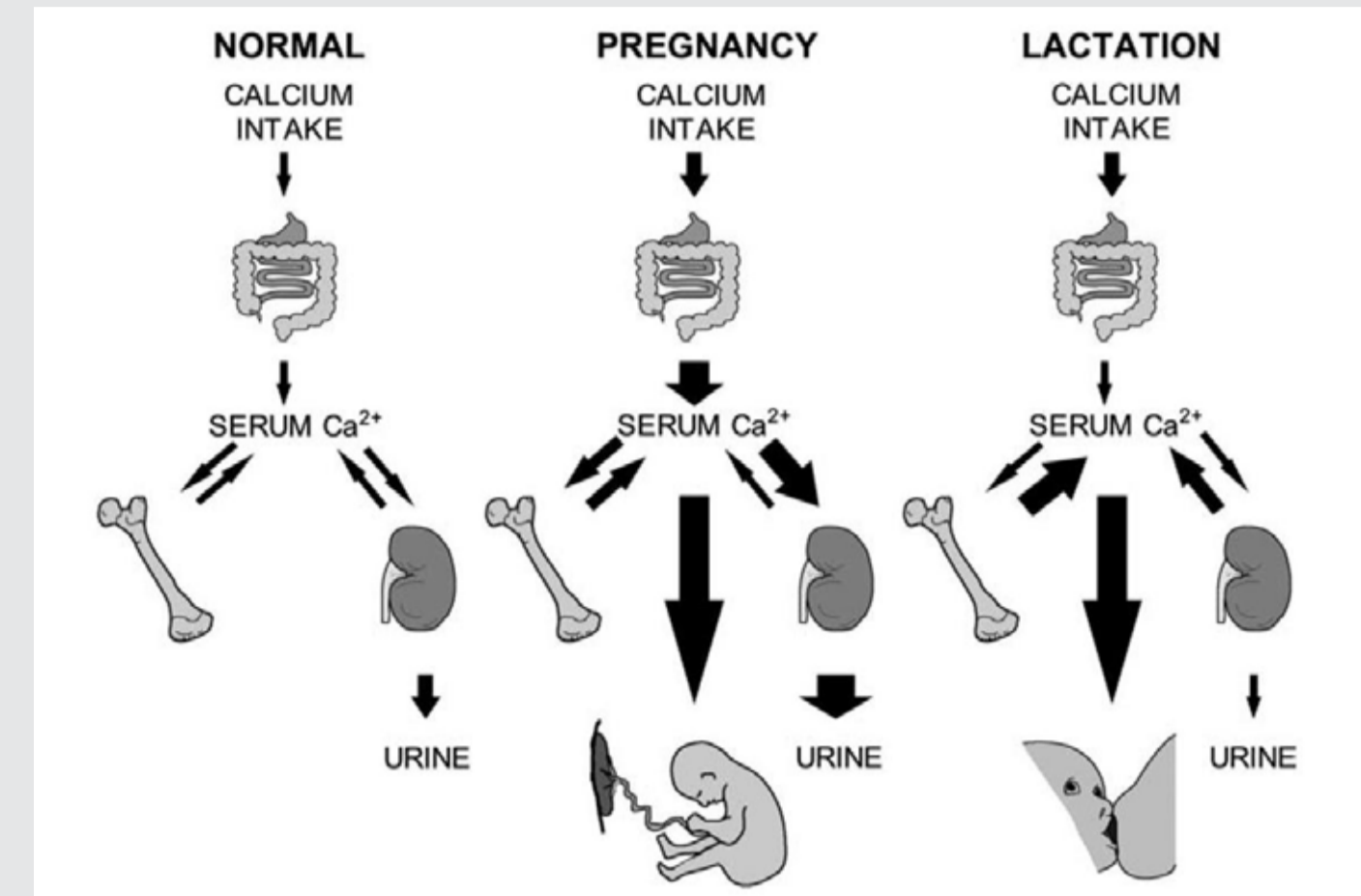
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Introduction

Bone mineral density (BMD) is affected by various factors related to calcium homeostasis. Pregnancy and breastfeeding are associated with increase of maternal calcium loss and have a deleterious effect on osteoporosis. During pregnancy, approximately 30 g of calcium is demanded to develop the fetal skeleton until birth, and 300–400 mg of maternal calcium is lost daily through breast milk during breastfeeding.



The bone loss associated with breastfeeding is substantially restored within 6 months after weaning. However, it is unclear whether bone loss is completely restored in extended breastfeeding women. Furthermore, number of deliveries and age at the time of delivery may also influence the risk of osteoporosis.

Endocrinol Metab Clin N Am. 2006. 35:21–51.

Objectives

- The aim of this study was to examine the effects of breastfeeding on BMD and the prevalence of osteoporosis in postmenopausal women

Method

- The present study was based on KNHANES 2010 and 2011 data.
- Inclusion criteria : postmenopausal women over the age of 45
- Exclusion criteria : chronic renal disease, abnormal menopause, hormone replacement, osteoporosis treatment, incomplete data.

Results

1. Baseline characteristics of participants

	Total (n=1222)	Non-osteoporotic (n=797)	Osteoporotic (n=425)	P value
Age, y	62.8 ± 8.8	60.0 ± 7.6	68.1 ± 8.5	<0.001
BMI, kg/m ²	24.2 ± 3.3	24.7 ± 3.4	23.3 ± 2.9	<0.001
Systolic BP, mmHg	127.8 ± 18.0	128.4 ± 17.9	131.0 ± 17.2	0.012
Diastolic BP, mmHg	76.2 ± 10.2	78.9 ± 10.0	76.4 ± 10.0	<0.001
PTH, pg/mL	69.2 ± 29.2	67.5 ± 29.0	72.4 ± 29.3	0.005
25(OH)D ₃ , ng/mL	17.5 ± 6.9	17.6 ± 6.9	17.4 ± 6.9	0.563
Lumbar spine BMD, g/cm ²	0.80 ± 0.14	0.87 ± 0.10	0.67 ± 0.08	<0.001
Total femur BMD, g/cm ²	0.77 ± 0.11	0.82 ± 0.09	0.68 ± 0.09	<0.001
Femoral neck BMD, g/cm ²	0.63 ± 0.11	0.67 ± 0.09	0.54 ± 0.08	<0.001
DM, n (%)	144 (11.8%)	102 (12.8%)	42 (9.9%)	0.132
HTN, n (%)	492 (40.3%)	302 (38.0%)	190 (44.7%)	0.021
Duration of menopause, y	14.8 ± 9.9	11.5 ± 8.1	21.0 ± 10.0	<0.001
Mean of breastfeeding duration, m	53.9 ± 47.6	44.1 ± 42.2	72.2 ± 51.5	<0.001
Breastfeeding duration				
0–6 mon, n (%)	146 (11.9%)	119 (14.9%)	27 (6.4%)	<0.001
7–18 mon, n (%)	135 (11.0%)	113 (14.2%)	22 (5.2%)	<0.001
19–36 mon, n (%)	337 (27.6%)	248 (31.1%)	89 (20.9%)	<0.001
≥ 37 mon, n (%)	604 (49.4%)	317 (39.8%)	287 (67.5%)	<0.001
Number of deliveries	3.3 ± 1.6	3.0 ± 1.4	3.9 ± 1.7	<0.001
Three or more deliveries, n (%)	778 (63.7%)	448 (56.2%)	330 (77.6%)	<0.001
Age at first delivery, y	23.7 ± 3.3	24.0 ± 3.3	23.2 ± 3.3	<0.001
First delivery age under 27, n (%)	986 (80.7%)	633 (79.4%)	353 (83.1%)	0.168
Age at last delivery, y	30.6 ± 4.6	29.8 ± 4.3	32.3 ± 4.8	<0.001
Last delivery age over 35, n (%)	234 (19.1%)	107 (13.4%)	127 (29.9%)	<0.001

All data are expressed as the mean ± standard deviation or as number (%).

All P values were calculated using Student's t-test or the Chi-square test.

Abbreviations: BMD, bone mineral density; BMI, body mass index; BP, blood pressure; GFR, glomerular filtration rate; PTH, parathyroid hormone; DM, diabetes mellitus; HTN, hypertension. *P<0.05.

2. General characteristics of groups according to breastfeeding duration

	Duration of breastfeeding				P value
	Group 1 (n=146)	Group 2 (n=135)	Group 3 (n=337)	Group 4 (n=604)	
Duration of breastfeeding (mean, m)	1.3 ± 2.1	13.3 ± 2.8	29.1 ± 5.8	89.5 ± 43.8	<0.001
Age, y	56.8 ± 6.7	56.6 ± 6.4	58.9 ± 6.8	67.8 ± 7.8	<0.001
BMI, kg/m ²	23.6 ± 3.2	24.2 ± 3.4	23.8 ± 3.0	24.6 ± 3.4	<0.001
Systolic BP, mmHg	126.1 ± 20.0	125.4 ± 18.7	126.6 ± 16.5	132.4 ± 17.0	<0.001
Diastolic BP, mmHg	79.6 ± 11.6	78.7 ± 10.2	78.2 ± 9.6	77.4 ± 9.9	0.088
PTH, pg/mL	68.4 ± 31.7	67.7 ± 24.0	65.1 ± 24.9	72.0 ± 31.4	0.007
25(OH)D ₃ , ng/mL	17.2 ± 6.1	16.8 ± 6.4	17.5 ± 6.7	17.8 ± 7.2	0.430
DM, n (%)	10 (6.8%)	14 (10.4%)	27 (8.0%)	93 (15.4%)	0.001
HTN, n (%)	40 (27.4%)	46 (34.1%)	106 (31.5%)	300 (49.7%)	<0.001
Osteoporosis, n (%)	27 (18.5%)	22 (16.3%)	89 (26.4%)	287 (47.5%)	<0.001
Lumbar spine fracture, n (%)	0 (0%)	1 (0.7%)	2 (0.6%)	12 (2.0%)	0.026
Duration of menopause, y	8.7 ± 7.7	7.8 ± 6.6	10.5 ± 7.3	20.1 ± 9.4	<0.001
Number of deliveries, n	1.9 ± 1.3	2.1 ± 1.0	2.6 ± 0.9	4.3 ± 1.4	<0.001
Age at first delivery, y	26.2 ± 3.4	25.4 ± 3.3	24.6 ± 2.9	22.3 ± 2.7	<0.001
Age at last delivery, y	29.6 ± 3.9	29.0 ± 4.5	28.7 ± 3.7	32.3 ± 4.6	<0.001
Duration from last delivery, y	27.0 ± 7.6	27.6 ± 7.5	30.2 ± 7.1	35.5 ± 7.2	<0.001

3. Association between breastfeeding duration and lumbar spine BMD and osteoporosis



Association between breastfeeding duration and lumbar spine bone mineral density according to unadjusted (A) and adjusted (B) models.

OR	0–6 mon (n=146)	7–18 mon (n=135)	19–36 mon (n=337)	≥37 mon (n=604)	P for trend
Unadjusted	1 (Ref)	0.858 (0.462–1.594)	1.582 (0.976–2.564)	3.990 ** (2.551–6.241)	<0.001
Model 1	1 (Ref)	1.227 (0.503–2.995)	2.238 * (1.105–4.532)	2.586 ** (1.280–5.223)	0.003
Model 2	1 (Ref)	1.242 (0.489–3.155)	2.820 ** (1.308–6.080)	3.292 ** (1.485–7.299)	0.001

Association between breastfeeding duration and odds ratios for osteoporosis

4. The association between childbirth parameters and lumbar spine fracture

	Unadjusted model	Model 1	Model 2
Duration of breastfeeding, m	1.016 (1.009–1.023) **	1.014 (1.003–1.025) *	1.015 (1.001–1.030) *
Number of deliveries, n	1.497 (1.172–1.913) **	1.310 (0.890–1.928)	0.999 (0.537–1.861)
Age at first delivery, y	0.964 (0.820–1.133)	1.074 (0.904–1.276)	1.145 (0.915–1.434)
Age at last delivery, y	1.177 (1.079–1.283) **	1.139 (1.017–1.275) *	1.078 (0.921–1.262)

Multivariable regression logistic model 1: adjusted for age, BMI, age at menarche, duration of menopause, systolic blood pressure, GFR, PTH, 25(OH)D₃, oral contraceptive use, HTN, DM, physical activity, and alcohol and smoking status.

Multivariable regression logistic model 2: adjusted for age, BMI, age at menarche, duration of menopause, systolic blood pressure, GFR, PTH, 25(OH)D₃, oral contraceptive use, HTN, DM, physical activity, alcohol and smoking status, number of deliveries, and age at first and last delivery. All data are expressed as odds ratios (95% confidence intervals).

*P<0.05, **P<0.01.

Conclusions

- We found a negative correlation between duration of breastfeeding and BMD in the lumbar spine. Moreover, the prevalence of osteoporosis was significantly higher in those that breastfed for more than 18 months. Neither the number of deliveries nor age at the time of delivery was associated with BMD at any site.
- Taken together, the results of the present study suggest that prolonged breastfeeding may be an important risk factor for osteoporosis.

