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Prolonged breast-feeding is an independent risk factor for postmenopausal osteoporosis

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ABSTRACT

Objectives: This study investigated the effects of parity and age at first pregnancy and breast-feeding, as well as duration of BF for total and per child on postmenopausal osteoporosis.
Study design: The study was conducted among 542 cases who were divided based on the presence or absence of osteoporosis. Patients were separated according to their first pregnancy and breast-feeding age as before or after 27 years. Osteoporosis was defined as a T score of −2.5 or lower.
Main outcome measures: Parity, age at first pregnancy and breast-feeding, breast-feeding period for total and average duration per child according to a questionnaire were assessed.
Results: Osteoporosis group had significantly lower parity compared to non-osteoporosis group. The age at first pregnancy and breast-feeding < 27 age were significantly more frequent in osteoporosis group. They also had prolonged breast-feeding period. Women who had a breast-feeding period per child > 1 year under age 27 was higher in osteoporosis group. In multivariate analysis, women who breast-fed > 1 year per child had the highest risk for osteoporosis (odds ratio: 12.92; 95% confidence interval, 3.1–52.6) and osteoporosis risk for women who breast-fed > 1 year per child under age 27 was 7.1. Increased parity was associated with a significant protective effect for osteoporosis.
Conclusions: Extended breast-feeding period per child > 1 year is the highest risk factor for osteoporosis independent of first breast-feeding age. However, high parity has a protective effect.

1. Introduction

Osteoporosis (OP) is a condition in which, due to the accelerated bone turnover and micro architectural deterioration, compromised bone strength leads to increased bone fragility and fracture risk [1]. Osteoporotic fractures result in substantial morbidity and mortality in postmenopausal period [2]. Therefore it is important that risk factors should be identified and prevention strategies should be set before osteoporotic fractures occur.

Women achieve their bone-mass peak at age 27 [3]. Pregnancy and lactation during this period may lead to impairment in bone metabolism [4,5]. There are limited and contradictory studies about the effects of pregnancy, age at first pregnancy and breast feeding (BF) on the development of postmenopausal osteoporosis [4,6]. If pregnancy is followed by a period of lactation, the mother loses approximately 300–400 mg of calcium a day, most of which is usually regained after weaning [7]. However, it is not clear if the recovery takes place after repeated pregnancies followed by prolonged periods of BF, especially at a younger age [4]. There is controversy in the literature about the effects of parity and BF on BMD [4,5,8–13].

The aim of this study is to investigate whether the numbers of pregnancies, age at first pregnancy and BF features, including age at first BF, duration of BF per child with a total duration of BF have any effect on postmenopausal osteoporosis.

2. Methods

The study was conducted in the Department of Obstetrics and Gynecology at Dokuz Eylul University Faculty of Medicine, Izmir, and the Department of Obstetrics and Gynecology in Aegean Maternity and Women's Health Hospital, Izmir, Turkey. The study protocol was approved by the Ethics committee of the hospital and informed consent and approval was obtained from all of the participants. The group studied was composed of a total of 1165 postmenopausal women who admitted to both centers for dual-energy x-ray absorptiometry (DXA) scan between November 2010

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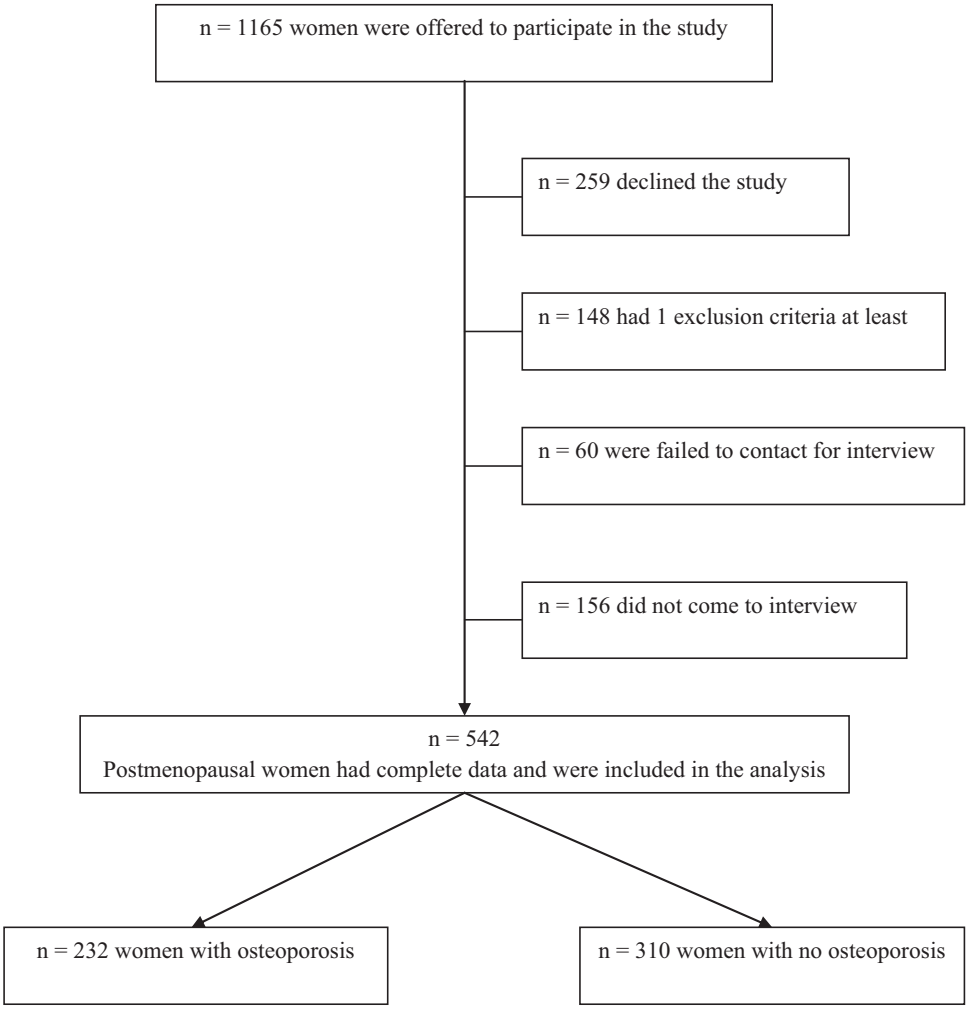

Fig. 1. Patients' flow charts.

and July 2011. Menopause was defined as amenorrhea lasting more than one year. Postmenopausal women between the age of 45 and 75 were included in the study. Women with a history of drug abuse or alcohol consumption (to drink at least ≥2 days per week), and a high intake of caffeinated coffee (>2 cups per day), laboratory tests or radiography of any bone metabolism disorder were excluded [11]. Any other disease or drugs that effect bone metabolism were excluded. The first and second authors contacted these patients by phone and gave verbal information about the survey and asked them to participate in this study. Women who agreed to answer the questions were interviewed on a face-to-face basis by using a detailed investigator-administered questionnaire. The questionnaire consisted of questions regarding prior pregnancy, BF and the medical history of the woman as well as demographic information. The pregnancy history contained the number of pregnancies, number of live births, delivery date for each live birth and the duration and the number of BF associated with each infant. BF was defined by previous reports [6]. BF duration was analyzed in two categories as total BF duration in a woman's life-time and the average duration of BF for each child of the woman. Pregnancy was defined as any gestation, which lasted for at least 28 weeks. The medical history included a family's history of fractures and OP, medical conditions, current smoking status, medication use, age at menarche and information about other established risk factors for OP. The results of each woman's DXA scan obtained from radiology department were recorded. OP was defined as a T score of −2.5 or lower in the results of DXA scan of cases obtained from one of three radiologic body regions [14,15]. Finally, 542 of 1165 women had completed data and were included in the analysis and they were classified into groups based on presence (OP) or absence (NOP) of the osteoporosis regarding to BF features and age at first pregnancy (Fig. 1). The age at first pregnancy was also divided into 2 groups: under age 27, and over age 27, based on a report of Schnatz et al. who used 27 as a cut-off age due to the achievement of peak bone mass (PBM) around this age [6].

A prior power analysis determined the need for approximately 477 participants to detect a 18 percentage-point difference in the prevalence of OP between the breast feeding and non breast feeding group (specifically, %33 vs. %50.6 respectively) with the hypothesis being that the breast feeding group has a higher prevalence of OP. This estimate would have afforded %95 power to detect an odds ratio of 2.08 [6]. Models included variables that showed statistically significant differences ($p < 0.05$) with univariate comparisons and those thought to have a clinical importance independent of their statistical contribution.

Data were analyzed using SPSS version 15.0 (SPSS, Chicago, IL, USA). Normal distributions of continuous variables were assessed by the Kolmogorov-Smirnov test. Statistical analysis was performed via *t* test, Chi-Squared test (or Fischer's exact test). The Mann–Whitney *U* test was used for abnormally distributed