

# Study of the Effects of the Age at Menopause and Duration of Menopause on Bone Mineral Density in Postmenopausal Women in Uzbekistan

Dilbar K. Najmutdinova, PhD, ScD; Lola S. Nurmukhamedova\*;  
Dilfuza A. Alieva PhD, ScD; Dilnoza S. Maksudova PhD; Zebiniso A. Nosirova

*Republican Specialized Scientific Practical Medical Center of Obstetrics and Gynecology  
Ministry of Health of the Republic of Uzbekistan  
Tashkent, Uzbekistan*

## Abstract

**The aim** of the present study was to determine whether an association exists between the duration of menopause and the age of menopause onset, and the differences in bone mineral density (BMD) in postmenopausal women.

**Materials and Methods:** We have reviewed medical records of 112 postmenopausal women who had not taken any anti-osteoporosis treatment and/or hormone replacement therapy at the time of BMD measurement. The mean age of the postmenopausal women was  $53.5 \pm 1.1$  years, and the mean menopausal period was 4.5 years. The women were evaluated according to the duration of menopause at the time of BMD measurement and age at menopause onset. BMD was measured anteroposteriorly at the L1–L4 level by the dual-energy X-ray absorptiometry method.

**Results:** According to WHO criteria, osteoporosis and osteopenia were identified in 18(16.2%) and 44(39.2%) cases, respectively; overall, 50(44.6%) women had normal BMD. At the time of BMD measurement, osteoporosis was determined in 10.3% and 29.1% of the women with menopause duration of 0–3 years and >7 years, respectively ( $P=0.047$ ). The percentages for osteopenia were similar among the three different menopause durations (36.2%, 43.3% and 41.6% for 0-3 years, 4-7 years and >7 years, respectively). No differences were determined in the prevalence of osteopenia and osteoporosis in women with menopause duration of >7 years. Thirty-three percent of women with the age of menopause onset of <40 years had osteoporosis; however, the percentages of women with osteoporosis among the other age groups were almost equal (18.7%, 14.29% and 15.0% for 40–46 years, 47–52 years and >52 years, respectively). The frequency of osteopenia did not differ between the groups according to the age of menopause onset.

**Conclusion:** According to our results, osteoporosis is related to the duration of menopause at the time of BMD measurement more than to the age of menopause onset among untreated postmenopausal women. (**Int J Biomed.** 2016;6(1):38-40.).

**Keywords:** *postmenopausal osteoporosis; age of menopause onset; risk factors; bone mineral density.*

## Introduction

Osteoporosis: a multidisciplinary problem faced by doctors of different specialties — gynecologists, endocrinologists, rheumatologists, and orthopedic traumatologists [1]. Postmenopausal osteoporosis (PMO): the most common form of the disease, with a progressive decrease in BMD associated with menopause (spontaneous or surgical) [2]. Numerous studies show that the primary determinant of osteoporosis in postmenopausal women is estrogen deficiency

caused by age-ovarian failure [3]. However, despite the decline in ovarian function, not all postmenopausal women develop impairments from mineralization of bone. Menopause is the most important risk factor for osteoporosis in adult women. Women lose about 2% of their cortical bone and 5% of their trabecular bone per year during the first 5-8 years [4].

For this study, it is important to take into account regional peculiarities of Uzbekistan: an early menopause, high birth rates at a low intergenetic range, a high prevalence of gynecological morbidity, and extragenital pathology.

As known, there are no typical clinical symptoms of osteoporosis, such as fractures, besides those already developed [5]. At the same time, carrying out a broad range of

\*Corresponding author: Lola S. Nurmukhamedova; E-mail: [lola-ss@yandex.ru](mailto:lola-ss@yandex.ru)

population BMD measurements is not possible due to limited access and economic expediency [6].

For these reasons, knowledge and evaluation of risk management in the diagnosis and prevention of osteoporosis are particularly important, as are a definition of risk factors and identification of women at risk for the development of this disease [6].

## Materials and Methods

We have reviewed medical records of 112 postmenopausal women (the residents of Tashkent city and other regions of Uzbekistan) attending the menopause outpatient clinic of Tashkent Republican Specialized Scientific Practical Medical Center of Obstetrics and Gynecology because of various manifestations of the climacteric syndrome. The mean age of the postmenopausal women was  $53.5 \pm 1.1$  years (from 40 to 67 years), and the mean menopausal period was 4.5 years.

The women were evaluated according to the duration of menopause at the time of BMD measurement, age at menopause onset, presence of hypertension and/or diabetes mellitus, smoking habit (cigarette/day).

Exclusion criteria were anti-osteoporosis treatment and/or hormone replacement therapy at the time of BMD measurement.

BMD was measured anteroposteriorly at the L1–L4 level by the dual-energy X-ray absorptiometry method using Hologic “Delphi N”. According to the WHO criteria, osteopenia is defined as a BMD T-score between -1 and -2.5 standard deviations (SDs) below the healthy young adult norm, while osteoporosis is defined as a BMD T-score of -2.5 SDs or lower [7,8].

The results were compared with the database densitometer designed for women of the Caucasus region, and compared with the results of BMD in women of the control group.

The prevalence of osteopenia and osteoporosis was investigated according to the duration of menopause at the time of BMD measurement in three different groups (0-3 years, 4-7 years, and >7 years) and the age of menopause onset in four different groups: <40 years, 40-46 years, 47-52 years, and >52 years.

Body mass index (BMI) was calculated as weight (kg)/height (m<sup>2</sup>). Main characteristics of the study population are presented in Table 1.

**Table 1.**

### Main characteristics of the study population

Variables	The study population
Age	53.5±1.1
Height, sm	164.6±1.4
Body weight, kg	86.4±2.8
BMI, kg/m <sup>2</sup>	31.5±1.0
Age at menarche onset, age	13.7±0.4
Age at menopause onset, age	47.8±1.5
The duration of menopause, age	14.7±2.1

Statistical analysis was performed using the SPSS for Windows. Baseline characteristics were summarized as frequencies and percentages for categorical variables. Group comparisons with respect to categorical variables are performed using  $\chi^2$  tests or, alternatively, Fisher's exact test when expected cell counts were less than 5. A probability value of  $P < 0.05$  was considered statistically significant.

The study was conducted in accordance with ethical principles of the Declaration of Helsinki. Written informed consent was obtained from all participants.

## Results and Discussion

According to the described criteria, osteoporosis and osteopenia were identified in 18 (16.2%) and 44 (39.2%) cases, respectively; overall, 50 (44.6%) women had normal BMD.

At the time of BMD measurement, osteoporosis was determined in 10.3% and 29.1% of the women with menopause duration of 0–3 years and >7 years, respectively ( $p = 0.047$ ) (Table 2). The percentages for osteopenia were similar among the three different menopause durations (36.2%, 43.3% and 41.6% for 0-3 years, 4-7 years and >7 years, respectively). No differences were determined in the prevalence of osteopenia and osteoporosis in women with menopause duration of >7 years.

**Table 2.**

### Low BMD and menopause duration

Results of BMD	Menopause duration at time of BMD measurement (years)			Statistics
	0-3 (n=58)	4-7 (n=30)	>7 (n=24)	
Normal (n=50)	31/53.4%	12/40.0%	7/29.0%	$\chi^2 = 4.407$ $P = 0.110$
Osteopenia (n=44)	21/36.2%	13/43.3%	10/41.6%	$\chi^2 = 0.494$ $P = 0.781$
Osteoporosis (n=18)	6*/10.3%	5/16.6%	7*/29.1%	Yates' $\chi^2 = 3.201$ $P = 0.202$ *Fisher's Exact Test $P = 0.047$

Thirty-three percent of women with the age of menopause onset of <40 years had osteoporosis; however, the percentages of women with osteoporosis among the other age groups were almost equal (Table 3). Differences among the four groups were not significant.

**Table 3.**

### Low BMD and the age of menopause onset

Results of BMD	The age of menopause onset (years)				Statistics
	< 40 (n=11)	40-46 (n=32)	47-52 (n=49)	>52 (n=20)	
Normal (n=50)	5/45.4%	13/40.6%	23/46.9%	9/45.0%	$\chi^2 = 0.318$ $P = 0.957$
Osteopenia (n=44)	4/36.4%	13/40.6%	19/38.8%	8/40.0%	$\chi^2 = 0.073$ $P = 0.995$
Osteoporosis (n=18)	2/18.2%	6/18.8%	7/14.3%	3/15.0%	Yates' $\chi^2 = 0.129$ $P = 0.988$

According to S.V. Yureneva (2004), the prevalence of osteoporosis is reported as ranging from 7% to 30% [9]. On average, 40% of postmenopausal women had osteopenia (Table 3). The frequency of osteopenia did not differ between the groups according to the age of menopause onset.

Thus, women with >7 postmenopausal years at the time of the BMD test and age at menopause of <40 years are the most at risk for osteoporosis. However, there was no difference of BMI among the groups.

Peak bone mass is attained in the third decade of life. Age-related decline in bone mass probably begins around the age of 40. In women, bone loss accelerates around the time of menopause as it is related to estrogen deficiency [10,11]. J.S. Finkelstein et al. [12] reported that BMD changes begin substantially during late perimenopause, and BMD continues to decline rapidly during the early postmenopausal years. However, their study did not evaluate BMD changes in the late postmenopausal years. Consistent with our findings, H. Ahlborg (2003) reported that BMD had decreased significantly by 6 years after menopause [13]. It is important to determine when bone mass reaches the critical level since such information is helpful for the clinician in deciding the appropriate time to screen postmenopausal women for osteoporosis. According to our results, delay in the BMD measurement time of more than 7 years postmenopause in untreated postmenopausal women predicted an increased risk for low BMD.

Furthermore, duration of menopause was determined to be more important than age at menopause for osteoporosis. Pregnancy and lactation result in hormonal and physiological changes, which increase the serum calcium levels. Maternal adaptations include increased bone resorption, decreased bone formation, increased intestinal calcium absorption, and decreased urinary excretion.

According to a comprehensive survey of women, duration of menopause at the time of BMD measurement is positively correlated with both osteoporosis and osteopenia. An inverse correlation with age at menopause was found only for osteoporosis. When comparing the four groups of women, divided according to the age of menopause, women with a duration of more than 7 years of menopause showed no differences in the prevalence of osteoporosis or osteopenia.

**In conclusion**, determination of the risk factors for osteoporosis and identification of the candidate postmenopausal women is important for the management of this population. According to our results, osteoporosis is related to the duration of menopause at the time of BMD measurement more than to the age of menopause onset among untreated postmenopausal women.

## Competing interests

The authors declare that they have no competing interests.

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