

Effect of parity on bone mineral density among postmenopausal Saudi Arabian women

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ABSTRACT

Objective: Osteoporosis and osteopenia among postmenopausal Saudi Arabian women are common to the extent of over 60%. Pregnancy, multiparity and prolonged lactation are suggested as factors modifying negatively in the development of osteoporosis. Earlier reports from the institution indicated a beneficial role of multiparity in postmenopausal osteoporosis (PMO). We conducted this study to measure the effect of parity on bone mineral density (BMD) measurement of lumbar spine and the upper femur.

Methods: We conducted this prospective study at King Fahd Hospital of the University, College of Medicine, King Faisal University, Dammam, Saudi Arabia, between January 2002 and June 2003. This study analyzed 256 patients who attended orthopedic clinics. The data gathered was age, duration of menopause, number of children borne, height and weight for body mass index (BMI) calculation. We excluded women with secondary osteoporosis from the study. We entered the patients orthopedic complaints in the database. We carried out the BMD measurements using Hologic total body DEXA machine. We analyzed the data using SPSS package with significance at $p < 0.05$ and confidence interval of 95%. For final analysis, we took into consideration an average of results of the lumbar spine and hip region.

Results: We analyzed the available data of 256 patients. We divided the patients into 2 groups; group A with >6 children and group B with women of <5

children. In group A, there were 116 women and 140 in group B. The mean age of patients in group A was 56.81 (50-65) years $SD \pm 5.19$ and in group B the mean age was 58.86 years (48-76) $SD \pm 7.68$. The average BMI in group A was 31.95 kg/m^2 and in group B it was 29.14 kg/m^2 . The BMD of the lumbar spine of group A was 0.850 g/cm^2 ($SD \pm 0.112$) compared to group B of 0.699 g/cm^2 ($SD \pm 0.141$), $p < 0.005$. The BMD of the hip region of group A was 0.836 g/cm^2 and that of group B patients was 0.716 g/cm^2 ($p < 0.01$). In women with <5 children, 25.5 had normal BMD as compared to 47 in women with >6 children, 25.4% were osteoporotic in group A and in group B 48%. As per the World Health Organization classification 56% in group A had an increased risk of fracture as compared to 77.5% in group B women.

Conclusions: Our results indicate that women who had borne >6 children were less osteoporotic and of low fracture risk as compared to those women who had <5 children. The BMD of the women with >6 children was statistically higher than their counterparts, and they sustain this after prolonged lactation. We believe that increased parity protects women from osteoporosis and the severity of the disease, and it is our suggestion that women with <5 children and those nulliparous, who are at increased risk of developing osteoporosis should be investigated and treated accordingly.

Saudi Med J 2005; Vol. 26 (10): 1588-1590

Postmenopausal osteoporosis (PMO) is a major health problem, which affects millions of

women worldwide. Reduction of bone characterizes PMO, which results in the disruption of the bony

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Received 15th March 2005. Accepted for publication in final form 2nd July 2005.

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architecture. Osteoporosis affects more than 75 million in the USA, Europe and Japan alone,¹ and the morbidity and mortality of osteoporosis related fractures (ORF) is so enormous that it is causing major economic concerns. It is believed that PMO is not a problem in the middle-eastern countries despite many studies putting the figures of PMO between 50-70%.²⁻⁷ Among many factors which are implicated in the development of osteoporosis among the Saudi ethnic female population is hypovitaminosis D, multiparity and prolonged lactation. Woodhouse and Norton⁸ initially reported low vitamin D levels among the Saudi population, and the extensive work of Sedrani et al⁹⁻¹⁰ later confirmed this. Sadat-Ali et al³ suggested that multiparity protects women from developing osteoporosis and multiparity is common among Saudi Arabian women. We conducted this study to assess the effect of parity on bone mineral density (BMD), osteoporosis and risk of fractures.

Methods. This prospective study was conducted at King Fahd Hospital of the University, College of Medicine, King Faisal University, Dammam, Saudi Arabia, between January 2002 and June 2003. There are 4 adult orthopedic clinics seeing approximately 200 patients a week and the study was conducted on patients attending clinics with orthopedic related diseases. Postmenopausal women of a minimum of 2 years duration were consecutively screened for BMD of the lumbar spine and upper femur, using a DXA-Hologic scanner. Every effort was made to exclude women who were receiving steroids or having secondary osteoporosis. Weight and height were taken for the calculation of the BMI; number of children they have given birth to and a history of fractures was noted. The data

were analyzed by SPSS package and a *p* value of <0.05 with confidence interval of 95%.

Results. The data of 256 women were available for analysis. They could be divided into 2 groups; group A women with >6 children and group B with <5 children. **Table 1** shows the details of age, BMI, BMD of lumbar spine and proximal femur with the T and Z scores. The mean BMD of the lumbar spine and upper femur was higher in women with >6 children. The BMD was normal in women with <5 children, compared to women who had borne >6 children (**Table 2**). As per the World Health Organization (WHO) classification, 56% in group A were at increased risk for fracture as compared to 77.5% in group B.

Discussion. This prospective study shows that women who had >6 children were less osteoporotic compared with women with <5 children. Similar was the results for osteopenia and risk of fractures as per the definition of the WHO study group.¹¹ The overall prevalence of osteoporosis was 48.25% and increased fracture risk of 67%, in comparison with the Caucasian women in whom 21-30% are osteoporotic and approximately 54% with increased risk of fractures.¹² Earlier reports indicated a higher prevalence of osteoporosis when single-photon absorptiometry and radiography was used to diagnose osteoporosis, which was not as accurate as the present BMD measurement using dual-energy x-ray absorptiometry.¹³ Recently, El-Desouki,⁷ reported a prevalence of 57.5% of postmenopausal osteoporosis in the age between 50-79 years, with a similar mean age to this study. With the prevalence of osteoporosis higher than seen in the Western world, the incidence of ORF should be similar be at

Table 1 - Demographic data of patients with <5 and >6 children.

Description	>6 children	<5 children	<i>p</i> value
N of female	116	140	
Age (years)	56.8 ± 5.19	58.8 ± 7.68	
BMI kg/m ²	31.95 ± 4.74	29.24 ± 5.67	
BMD LS g/cm²	0.850 ± 0.112	0.699 ± 0.151	0.005
T score	-1.831 ± 2.148	-2.324 ± 2.984	
Z score	0.367 ± 0.985	-0.782 ± 1.632	
BMD hip g/cm²	0.836 ± 0.156	0.716 ± 0.141	0.01
T score	-1.596 ± 1.111	-2.173 ± 2.151	
Z score	-0.562 ± 1.158	-0.590 ± 1.297	
BMI - body mass index, BMD - bone mineral density, LS - lumbar spine			

Table 2 - Analysis of bone mineral density of lumbar spine and hip region.

Definition	Group A			Group B		
	LS	Hip	Average	LS	Hip	Average
Normal BMD	43	51	47	13	38	25.5
Osteopenic	36	43	39.5	44	51	47.5
Osteoporosis	37	22	29.5	83	51	67
Increased risk for structure	72	58	65	121	96	108.5
No increased risk	44	58	51	19	44	31.5
BMD - bone mineral density, LS - lumbar spine						

least similar to the Caucasian women. The reported hospital based prevalence was 5.9% in 24 months (Sadat-Ali et al [1992]) and 4/1000,¹⁴ in comparison with the incidence of ORF in Europe of 19/1000.¹⁵ There appear factors which favor the lower incidence of ORF, one of them could be because of multiparity and low percentage of the elderly population. Cure-Cure et al¹⁶ conclusively showed after a study of 1855 women, multiparous had a lower prevalence of osteoporosis when compared to nulliparous with significant incidence of ORF in nulliparous women. Recently, Cerroni et al¹⁷ reported the effect of parity in female rhesus macaques, and found that females with low parity had lower BMD when compared to higher parity. This study confirms our first observation that BMD in multiparous women was significantly higher than in women who had borne fewer children. Since BMD is a good predictor of fracture risk, Hillier et al,¹⁸ after analyzing prospectively 9704 post-menopausal women found that 44% of the women had increased risk of hip fractures and among parous women, with every birth there is a decreased incidence of fracture by 9%. In this series of 256 patients, in 18 months there were 23 fractures of which 16 (69.5%) were in women with <5 children. Many studies conducted on the relationship of pregnancy, lactation and bone health, has estimated that the daily loss of calcium in breast milk is not more than 400 mg¹⁹ and was found that within 12 months of weaning the BMD returns to normal.^{20,21} The affect of lactation on ORF was also assessed, and was found that women who breast-fed their newborn had no risk of ORF.^{22,23} After careful evaluation, Eisman²⁴ advocated that "women should be assured that with moderate intakes of calcium, there is no increased evidence for any long-term harm to their skeleton or long-term osteoporosis risk from pregnancy and lactation." With all the reports in the literature, we continue to speculate pregnancy and lactation, as a cause of osteoporosis.⁶

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