The Journal of
Obstetrics and Gynecology
of India

Bone morbidity in pregnant women

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OBJECTIVE(S) : To determine the incidence of bone morbidity in pregnant women with specific correlation to parity.

METHOD(S) : Two hundred and thirty three pregnant women were assessed for bone mineral density and the results were analysed in terms of T-score for the incidences of normal bone mass, osteopenia, and osteoporosis in primigravidas and multigravidas.

RESULTS: Out of 233 pregnant women, 23.6% had normal bone reserve, 41.6% were osteopenic and 34.8% osteoporotic. Results analysed in terms of T-score showed that multigravidas (n=183) had statistically significant higher incidence of osteopenia (P=0.0486) and of osteoporosis (P=0.0077) as compared to primigravidas (n=50).

CONCULSION(S) : Significant number of pregnant women have low bone reserve even at first conception and the severity of bone loss increases with parity. Therefore good counseling regarding diet is a must for adolescent girls and early supplementation of calcium is mandatory during pregnancy.

Key words : bone mineral density, osteopenia, osteoporosis

Introduction

Osteoporosis is the most common metabolic disorder. The reduction in bone mass results from an imbalance in the processes that influence the acquisition and maintenance of skeletal mass. Osteoporosis is defined as bone mass which is 2.5 SD lower than that in young adult of same sex and nationality. Bone mineral density (BMD) between 1 SD and 2.5 SD lower indicates osteopenia. The assessment of BMD plays a vital role in identifying the individual at risk for developing osteoporosis. The effect of pregnancy upon maternal skeleton is not fully understood. The information that has been gathered by recent studies is conflicting with regard to overall loss or gain of bone during pregnancy. Pregnant women, however constitute high risk group for bone morbidity.

Methods

The present study was conducted on 233 pregnant women which included 50 primigravidas and 183 multigravidas. BMD assessment was done in all of them irrespective of gestational age. It was noted that these women were not suffering from any systemic disease and were not on any drugs, which could lead to low bone mass. The BMD was assessed using ultrasound densitometer in the os calcis of right foot. It is a convenient, safe and economical screening test as compared to other methods. BMD was assessed as stiffness using SOS (speed of sound) and BUA (Broad band Ultrasound Attenuation). The formula for stiffness is :

Stiffness=0.67 BUA + 0.28 SOS – 420

The results were analyzed and interpreted in terms of T - score -

$$T\text{ - score} = \frac{\text{Patient BMD} - \text{Reference BMD}}{\text{Reference SD}}$$

The green zone in Figure 1 represents stiffness value comparable to that of a young normal adult. The lower line of green zone represents BMD 1 SD lower as compared to normal. The yellow zone represents T score 1 SD to 2.5 SD lower indicating osteopenia and the red zone refers to severe

osteopororis with BMD more than 2.5 SD lower as compared to that in young normal adults. The results in primigravidas and multigravidas were analysed using Chi-square test.
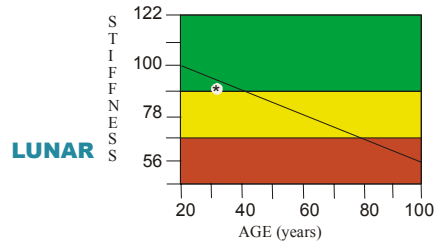
Stiffness [1]	89 ± 2
% Young adult [2]	89 ± 2
% Age matched [3]	95 ± 2

LEFT HEEL

Age (Years) 32	Weight (kg) 0	Ethnic .... A
Sex .... F	Weight (cm) 0	System 9540
STIFFNESS 89	SOS (m/s) 1542	BUA (dB/MHz) 116

	Stiffness [1]		
Young adult [2]	89 %	-.01	T-score
Age matched [3]	89 %	-.41	T-score

1-See appendix E on precision and accouracy-Statistically 68% of repeat scans will fall within 1 SD
2 - USE Reference population Age 20.   3 - Matched for Age - See appendices.

Figure 1. Bone mineral density patterns.

Results

The observations made in 233 pregnant women were studied in terms of age and parity for bone mass reserve. The study group was divided in to 50 primiparas and183 multiparas. Out of the total number of women studied, only 23.6% had normal BMD, 41.6% were osteopenic, and 34.8% osteoporotic.

Out of 80 young pregnant women (age 20-29 years) only 30% had normal BMD, 37.5% were osteopenic and 32.5% osteoporotic. Whereas in 153 elderly women (age 30-39 years), 20.2% were normal, 43.7% osteopenic and 35.9% osteoporotic. The statistical analysis reveals that with advancing age the probability of developing osteopenia (P=0.256) and osteoporosis (P 0.248) does not increase significantly.

Table 1. Percentage distribution of BMD in terms of age.

Age (years)	Number	Normal	Osteopenia	Osteoporosis
20-29	80	24 (30)	30 (37.5) [a]	26 (32.5)[b]
30-39	153	31 (20.2)	67 (43.7) [a]	55 (35.9)[b]
Total	233	55 (23.6)	102 (43.78)	72 (30.9)

Figures in brackets represent percentages.   [a] P=0.256   [b] P=0.248

Analysis done in terms of parity showed that out of the 50 primigravas, 36% were normal, 40% osteopenic and 24% osteoporotic. In 183 multiparas, only 20.2% were normal, 42.1% osteopenic and 37.7% osteoporotic. The statistical analysis

revealed that the incidences of developing osteopenia and osteoporosis were significantly higher in multigravidas than in primigravas (Osteoenia P=0.0486; osteoporosis; P=0.0077).

Table 2. Percentage distributing of BMD vis-a-vis parity.

Parity	Number	Normal	Osteopenia	Osteoporosis
Primipara	50	18 (36)	20 (40)[a]	12 (24)[b]
Multiparas	183	37 (22.2)	77 (42.1)[a]	69 (37.7)[b]
Total	233	55 (23.6)	97 (41.6)	81 (34.8)

Figure in brackets represent percentages   [a] P=0.486   [b] P=0.0077

Discussion

In 233 pregnant women taken up for the study, a significantly low bone reserve was observed in 81 (34.8)% of the women. The severity of bone loss increases significantly with increasing parity but not with increasing age of the women. The results of this study are comparable to those in the study conducted by Ulrich et al [2] and by Kotlthoff N et al [3] who clearly conclude that pregnancy is characterized by high bone turnover with resorption preceding formation and there is significant decrease in BMD at sites rich in the trabecular bone such as lumbar spine and greater trochanter. Another longitudinal study conducted by Kaur et al [4] on changes in bone mineral density during pregnancy showed that there is a fall in BMD at specific sites during pregnancy which further increases with parity. Thus the results of the present study show that bone morbidity is higher in pregnant women and this further aggravates with advancing parity. Our study conducted on pregnant women shows that Indian pregnant women have very low bone reserve, which further aggravates with parity. Thus it is mandatory that every adolescent girl should be properly counseled at an early age regarding the bone health and should be motivated for good dietary supplementation and exercises because it will maintain a good bone health later in life. Calcium supplementation should be given early in pregnancy instead of in mid-pregnancy because pregnancy is a physiological event that could affect peak bone mass and majority of the pregnant women in our country already have low bone reserve. Thus the risk of developing osteoporosis is much higher in these females.

References

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