



**Original Article**

**Bone Mineral Density Measurement in Menopausal Women Presenting with Low Back Pain: A Prospective Study.**

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**Abstract**

Bone mineral densitometry was done in 107 women in their post-menopausal period using Dual energy X-ray absorptiometry method. All the patients were presented with low back pain. Quantification of bone mineral density was done in proximal femur and lumbar spines of all the patients. Sixty-eight patients showed normal bone mineral density in our study. Rest 39 patients showed declination of bone mineral density from mild osteopenia to severe osteoporosis. We conclude that Dual energy X-ray absorptiometry bone mineral measurement is an unique, non-invasive method of detecting bone mass disorder in post-menopausal women with low back pain and should be the first choice of investigation.

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**Introduction**

There are lots of clinical symptoms women are facing during their menopausal period<sup>1</sup>. Among these problems, low back pain is one of the most common and agonizing symptoms, sometimes that becomes a chronic one. Back pain is considered chronic when there is no relief after months of pain, which requires an accurate diagnosis to determine the treatment that is most likely to help<sup>2</sup>. Low bone mass due to osteopenia or osteoporosis is the common feature of menopausal period, which occurs due to decreased hormone secretion.

Osteoporosis is defined as 'a disease characterized by low bone mass and micro architectural deterioration of bone tissue leading to enhanced bone fragility and an increase in fracture risk<sup>3</sup>. It is one of the most significant health hazard

associated with climacteric because of the resulting fracture, disability and invalidism. The bone loss is the result of bone resorption exceeding bone formation with loss of calcium. The exact cause is not known, but it is suggested that it is due to decrease in secretion of estrogen<sup>4</sup>. Due to this consequence, menopausal women lose 35% of cortical bone and 50% trabecular bone compared to only 24% and 33% of respectively in man<sup>5</sup>. Inevitably, depending on peak bone mass and rate of bone loss, a point is reached where the skeleton becomes inadequate for weight bearing and back pain starts. If untreated, this situation may worsen and the morbidity and mortality related to this sequence can be considerable. It is well known that the development of one osteoporotic fracture markedly increases the risk of subsequent fractures as much as 20 folds<sup>6</sup>.

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Numerous indirect methods have been advocated for assessing aggressive bone loss, but none of this test is individually diagnostic<sup>7</sup>. The only way to determine osteoporotic changes in the skeleton is to measure bone density directly, for which Dual energy X-ray absorptiometry (DEXA) bone mineral densitometry is a very much useful method<sup>8</sup>. The aim of this study is to evaluate the frequency of osteoporotic changes in skeleton in the postmenopausal women presenting with low back pain.

### Materials and Methods

One hundred and seven patients were included in our study from July 2001 to June 2002. All the patients were above 50 years of age with the history of menopause >2 years. Mean age was 56.9±6.1 years. None of the patients had any pathological fracture of bone. But all the patients presented with low back pain. Careful drug history revealed that everyone took some kinds of analgesic and NSAID drugs, but without any permanent relief. Hormone replacement therapy was taken by 29 patients with little benefit. Plain X-ray of lumbar spines and hip were done in all the patients using DEXA Bone Densitometer (XR 36, Norland, USA), the spines and proximal femur were studied in all patients. The result was then compared with the reference population data for individuals of the same age, sex and ethnic background. The comparison was verified by age-matched (z-score) and Young reference (T-Score). Interpretation was done by the computer generated software program following WHO recommendation (Table, 1).

### Results

A total of 107 patients were evaluated in this study. All of the patients were above 50 years of age with mean age 56.9±6.1 years. Each patient presented with history of low back pain and all of them in their menopause of >2 year. Sixty-eight patients (63.5%) showed normal bone density both in lumbar vertebra and proximal femur. Rest 39 patients (36.5%) showed different grades of bone

mineral loss, which are summarized in Table 2. Nineteen of them were suffering from osteopenia (BMD: Lumbar vertebra- 0.82±0.03 gm/cm<sup>2</sup>, Femoral neck- 0.78±0.05 gm/cm<sup>2</sup>), 13 patients were suffering from osteoporosis (BMD: Lumbar vertebra- 0.68±0.06 gm/cm<sup>2</sup>, Femoral neck- 0.58±0.04 gm/cm<sup>2</sup>) and the rest 17 showed osteopenia and/or osteoporosis of either lumbar vertebra or proximal femur.

Radiological findings in all the patients were not convincing enough. Among the 107 patients, decreased intra-vertebral space was detected in only 7 patients (Sensitivity 54%, shown in Table. 3). Neither any fractures of vertebra nor any bone mass loss could be detected in radiological finding.

### Discussion

Osteoporosis is a major, potentially preventable health problem in which the gynaecologist can play a significant role<sup>9</sup>. Bone mass in body increases progressively until the age of about 35 years, maximal mass varying according to race and sex. Inevitably, depending on peak bone mass and rate of bone loss thereafter a point is reached where the skeleton becomes inadequate for weight bearing and may fracture after trivial stimuli. In the past decade, osteoporotic fractures have come to be recognized as one of the most serious problems in public health<sup>10</sup>. On the basis of many epidemiological, clinical and laboratory findings, Riggs and his colleagues<sup>3</sup> has proposed that involuntional osteoporosis is divided into two major types. These are—Type I: Post-menopausal osteoporosis and Type. II: Age related osteoporosis. An episode of acute pain in the middle to low thoracic, lumbar regions or in the hips while at rest or during routine daily activity may be the earliest symptoms of osteoporosis. The episode is often precipitated by routine activity that would not be stressful enough to cause a fracture in an individual with normal bone mass. This sudden onset of pain may restrict the spinal movement. Sometimes, chronic low back pain may be the presenting symptom of post-menopausal osteoporosis.

In our finding, about 36% patients in post-menopausal period are suffering from different grades of bone loss. Among these group, 13 patients are at great risk of fracturing their hip or vertebra.

Various physical and physiological disturbances occur in menopause, due to sudden hormonal changes in the body. Osteoporosis is one of them. As the result of osteoporosis is devastating, early diagnosis, commonly in osteopenic stage, is important and therapy must be initiated early enough to decrease the risk of pathological fracture.

Postmenopausal and age related osteoporosis are the most common forms of symptomatic bone loss seen in clinical practice over the age of 50 years. If presentation is atypical, other bone diseases like osteomalacia, multiple myeloma, Paget's disease, metastatic bone disease, hyperparathyroidism etc, should be excluded by serum calcium and phosphate levels, 24 hour urinary calcium level, parathyroid hormone level. Radiology is of limited value unless there is severe bone loss or compression fractures occur. Radiology is the least sensitive method for assessing bone density<sup>11</sup> and the error rate of radiological finding is 30-50%<sup>3</sup>. For confirming osteoporosis, bone mineral densitometry using DEXA method is now considered to be the most precise and accurate<sup>12</sup>. Our finding suggests that many of the woman over the age of 50 years are at great risk of fracturing their femur, vertebra or wrist and the risk factor increases when the patients presented with low back pain, which is a indication of bone loss. The increased recognition of the scale of morbidity and mortality attributable to osteoporosis has led to a major effort by the pharmaceuticals industry to develop new therapeutic strategies for the prevention of fractures<sup>13,14</sup>. Though in our community, this test is still now not a very popular test, which was supposed to be. When there is a

remedy in our hand for prevention of such crippling disease, it is important to learn more about the strength or weakness of bones before a fracture occur.

## Conclusion

When a woman seeks relief of symptoms of the climacteric, a discussion and assessment of the physiologic changes she is experiencing may be of great help to reach the therapeutic goal. Though much progress has been made in the Western world in last decade in growing awareness of this devastating menace to the health of aging population, we are still lacking behind in making any consciousness to our people about this silent epidemic, i.e. post-menopausal osteoporosis. Motivation of people as well as the physician community is strongly recommended to chalk out the population under risk factor with osteoporosis. In conclusion, as a non-invasive method with minimal radiation exposure, measurement of BMD in post menopausal women presenting with low back pain are to be recommended as the first choice of investigation for assessment of severity of bony loss, if any and also in the follow-up to monitor the therapy.

**Table.1:** World Health Organization Definitions of Osteoporosis based on Bone Density levels.

Normal	Bone density within 1 SD (+1SD or -1SD) the young adult mean
Low Bone Mass (Osteopenia)	Bone density within 1 to 2.5 SD (-1SD or -2.5 SD) below the young adult mean
Osteoporosis	Bone density 2.5 SD or more (>-2.5 SD) below the young adult mean
Severe Osteoporosis	Bone density more than 2.5 SD below the young adult mean and there have been one or more osteoporotic fractures.

**Table.2:** Bone mineral density (in gm/cm<sup>2</sup>) of Lumber vertebrae and Femoral Neck in different categories.

Site	Normal (n=68) in gm/cm <sup>2</sup>		Osteopenia (n=19) in gm/cm <sup>2</sup>		Osteoporosis (n=13) in gm/cm <sup>2</sup>		Combined (n=7) in gm/cm <sup>2</sup>			
	LV	FN	L.V	F.N	L.V	F.N	Osteopenia		Osteoporosis	
BMD (Standard Error)	1.10±0.04	0.91±0.06	0.82±0.03	0.78±0.05	0.68±0.06	0.58±0.04	0.79±0.03	0.69±0.04	0.67±0.04	0.61±0.04
T-Score (Standard Error)	0.49±0.31	0.68±0.29	1.21±0.13	1.26±0.19	2.33±0.18	2.16±0.27	1.25±0.17	1.21±0.17	2.38±0.18	2.58±0.17

\* LV= Lumber vertebra

\* FN= Femoral neck

\* Combined = Either osteoporosis of lumber vertebrae and osteopenia of femoral neck or osteoporosis of femoral neck and osteopenia of lumber vertebrae.

**Table. 3:** Sensitivity of radiological findings

X-Ray findings	Bone loss found in BMD		Total
	No bone loss found in BMD		
Positive Scan	07	01	8
Negative Scan	32	67	99
	39	68	107

## References

- Benson R C, Pernoll M L. The non-reproductive years. In 'Handbook of Obstetrics and Gynaecology'. McGraw Hill Inc. 9<sup>th</sup> ed. 1994; 639-648.
- Mellwain H W, Bruce D F, Silverfield J C et al. What kind of back pain do you have? In 'Winning with back pain'. John Wiley & Sons Inc. USA. 1994; 7-24.
- Drury P L, Shipley M. Rheumatology and bone disease. In 'Clinical Medicine'. Edited by: Kumar P, Clark M. W B Saunders. UK. 1998; 447-518.
- Sherman B M. Endocrinologic and menstrual alterations. In 'Menopause'. Edited by: Mishell D M. Year Book Pub. USA, 1987; 41-51.
- Riggs B L, Melton J L. Involution osteoporosis. New Eng Jour Med. 1986; 314:1676.
- Consensus Development Conference: Diagnosis, prophylaxis and treatment of Osteoporosis. Am J Med. 1993; 94: 646-650.
- Utian W H. the menopause and climacteric. In "Scientific foundation of obstetrics and gynecology": Edited by: Philipp E. Setchell M, Ginsberg J. Butterworth-Heinemann Ltd. UK. 1991; 207.
- Nelson D A, Molloy R, Kleerkooper M. Prevalence of osteoporosis in woman referred for bone density testing: Utility of multiple skeletal sites. J Clin Densitometry. 1998; 1: 5-13.
- Raisz L G. Local and systematic factors in the pathogenesis of osteoporosis. New Eng J Med. 1988; 156: 1284.
- Fogelman I, Blake G M. Different approaches to bone densitometry. J Nucl Med 2000; 41: 2015-2025.
- Frederick S. Kaplan. Osteoporosis: Pathophysiology and prevention. Clinical Symposia. 1987; 39: 2-33.
- Cooper C, Aihia A. Osteoporosis: recent advances in pathogenesis and treatment. Q J Med. 1994; 87: 203-209.
- Hosking D, Chilvers C E D, Christiansen C et al. Prevention of bone loss with alendronate in post-menopausal woman under 60 years of age. N Eng J Med. 1998; 338: 485-492.
- Black B M, Cummings S R, Karf D B, et al. Randomized trial of the effect of alendronate on fractures in women with pre-existing vertebral fracture: the FIT research group. Lancet. 1996; 348: 1525-41.

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