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Prevalence of Vertebral Compression Fracture in Patients with Osteoporosis in Central Kashmir

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Abstract:
Introduction: Osteoporosis is a systemic disease characterized by micro-architectural deterioration of bone tissue, low bone mass and skeletal fragility. Bone fragility is affected by bone remodelling, bone turnover, bone mineral density (BMD), and bone quality. BMD is measured by dual energy X-ray absorptiometry (DEXA), which is a surrogate measure of bone strength. **Material & Methods**: Study was conducted district hospital Ganderbal Kashmir. Total 240 patients of age more than 50 years with backache problem were enrolled in study. These patients underwent radiological investigation (DEXA Scan) and shown features of osteoporosis. Among these 240 patients we performed X-Ray thoraco lumbo sacral spine to find out any vertebral compression fracture. **Results**: Total 240 patients were enrolled in our study. 112 were male and 128 were female. Among these patients, we found vertebral compression fracture in 39 cases. Of 39 cases 25 were female (64%) and rest 14 were male (36%). Mean age of fracture vertebrae was 69.20 years. Prevalence of vertebral compression fracture came out to be 16.25%. **Conclusion**: Vertebral fractures are also associated with back pain, physical deformity, and decline in social function, loss of self-esteem, impaired quality of life and increased morbidity and mortality.
Keywords: Osteoporosis, Fracture, DEXA, etc

Introduction:

Osteoporosis is a systemic disease characterized by micro-architectural deterioration of bone tissue, low bone mass and skeletal fragility. It is linked to one of the leading cause of socioeconomic burden, morbidity, and mortality in our country [1,2,3].

Examples of typical osteoporotic fractures are fractures of the hip, spine, and distal forearm. Presence of a single spine fracture increases the risk of subsequent vertebral compression fractures (VCFs) by five-fold and the risk of hip and other fractures two to three-fold [4]. Various aspects still exist regarding knowledge related to bone health and osteoporosis.

Bone remodelling is a tightly coupled cycle of bone resorption and bone formation happening inside multicellular units composed of osteoclasts, osteoblasts, and osteocytes. Bone fragility is affected by bone remodelling, bone turnover, bone mineral density (BMD), and bone quality. The maintenance of adult mass is affected by nutrition, lifestyle, physical activity, hormone status, systemic illnesses, genetic predisposition, advancing age, and medications. Trabecular and cortical microarchitecture, bone turnover, micro-fractures, mineralization, and micro-damage can affect bone quality [5,6].

Fragility fracture, by definition, occurs spontaneously or after trauma such as a fall from standing height or less[7,8]. Fractures of craniofacial region, hand, and foot are not considered osteoporotic. History of sudden onset backache or height loss might signal presence of occult vertebral fractures[9]. Fall risk assessment is done using standardized questionnaires, and gait and balance should be assessed. Screening for vertebral fractures can be done by documenting kyphosis, prospective height loss of >2 cm in a year, rib to pelvis distance ≤2 fingers' breadth, and an occiput-to-wall distance of >5 cm. The "Get-Up-and-Go Test" is used to assess proximal muscle weakness, gait, and risk of falls[10].
BMD is measured by dual energy X-ray absorptiometry (DEXA), which is a surrogate measure of bone strength [11], accounting for about 70% of bone strength[12,13]. Three major sites used are lumbar spine (L1 to L4), total hip, and femoral neck.A minimum of two vertebrae is necessary to generate an accurate report. Data generated by DEXA scan is analyzed to derive T and Z scores comparing BMD values to young healthy populations or age-matched controls, respectively. As per World Health Organization (WHO), osteoporosis is diagnosed in postmenopausal women and in men aged 50 and older if the T-score of the lumbar spine, total hip, or femoral neck is -2.5 or less. In men younger than 50 years, osteoporosis cannot be diagnosed solely on the basis of BMD.

The main limitation of BMD is that it explains bone strength only to a certain extent [14,15]. DEXA is two-dimensional and does not differentiate between cortical and trabecular bone microarchitecture.

Medical management of osteoporosis includes optimization of calcium, vitamin D, protein intake, fall prevention, ruling out secondary bone loss, lifestyle changes, and improved physical activity. Pharmacological management is mainly accomplished through anti-resorptive or anabolic agents. Bisphosphonates such as alendronate, risedronate, ibandronate, and zoledronic acid are recommended as initial treatment. Women who are at high risk of fractures should continue therapy, but those with low-to-moderate risk of fractures should be considered for a "bisphosphonate holiday".

Material & Methods:
This study was conducted in District hospital Ganderbal Kashmir between April 2022 to March 2024. During study period 530 patients of age > 50 years came with complaint of backache. After history taking and clinical examination those suspected of osteoporosis and fulfilling inclusion criteria's were suggested DEXA Scan. Total 240 patients of age more than 50 years with backache problem were enrolled in study. These patients underwent radiological investigation (DEXA Scan) and showed features of osteoporosis. Among these 240 patients we performed X-Ray thoraco lumbo sacral spine to find out any vertebral compression fracture.

Inclusion Criteria:

- Age more than 50 years.
- Persistent back pain, since more than a month.
- Giving consent for radiological examination for disease management.

- No history of glucorticoid medication intake.

Exclusion criteria:

- Age < 50 years.
- Known case of acute injury.
- History of spine fracture, injury or spinal surgery due to any reason.
- Known case of hyperparathyroidism, chronic kidney disease or osteomalacia.
- Known case of multiple myeloma or any other malignancy.
- Not giving consent.

After enrolment detailed clinical history was taken followed by clinical examination. Basic lab investigations were done and radiological investigation was advised. Patients underwent spine DEXA Scan for bone mineral density. Severely osteoporotic patients were suggested for X-Ray AP view and lateral view of thoraco lumbo sacral spine to find any fracture. To avoid observer bias, single radiologist reported all the cases. Radiological findings were compared with clinical findings. On the basis of X-ray findings prevalence of vertebral compression fracture was found.

Observation & Results:

Total 240 patients were enrolled in our study. 112 were male and 128 were female. Age of included cases varies from 51 years to 88 years. Mean age of cases in our study was 68.3 years.

Table 01: Sex wise distribution of cases:

S. No.		Number of patients with backache	Percentage
1	Male	112	46.6%
2	Female	128	53.4%
	Total	240	100%

Table 02: Age wise distribution of osteoporosis cases:

Age group	Number of patients	Percentage
50-60 years	66	27.6%
61-70 years	70	29.1%
71-80 years	55	22.9%
>80 years	49	20.4%
Total	240	100%

On radiological examination 240 patients were found to have osteoporosis. Among these patients, we found vertebral compression fracture in 39 cases. Of 39 cases 25 were female (64%) and rest 14 were male (36%). Mean age of fracture vertebrae was 69.20 years.

Table 03: Distribution of fracture cases:

	Fracture Absent	Fracture Present		Total
Male	98	14	(36%)	112
Female	103	25	(64%)	128
Total	201	39 (16.25%)	100%	240

Table 04: Distribution and prevalence of fracture cases with age:

Age group	Number of patients with VCF	Fracture Percentage	Fracture Prevalence
50-60 years	07 (66)	17.9%	10.60%
61-70 years	10 (70)	25.6%	14.28%
71-80 years	11 (55)	28.2%	20.00 %
>80 years	11 (49)	28.2%	22.44%
Total	39 (240)	100%	

Prevalence of fracture vertebrae among patients > 50 years having osteoporosis and presenting with backache.
Prevalence of disease % = (Number of patient with disease/ Population studied) X 100

Prevalence of vertebral compression fracture=(39/240)X100 =16.25%

Picture 01: L1 Compression Fracture.

Picture 02: L2 Compression Fracture

Discussion:

Prevalence of vertebral fracture among osteoporosis patients found around 16.5%. This suggest that every sixth person of age >50 years presenting with backache have vertebral compression fracture. Similar findings were observed by Svanhild et al [16], were they found overall prevalence of 12% in female and around 13% in male. This slight variation in prevalence is probably because they have included study population below 50 years of age. In a study by Gehlbach et al.[16] among 934 elderly women undergoing chest X-ray on hospital admission, 132 women retrospectively had vertebral collapse. Despite the critical importance of detecting vertebral fractures, these fractures remain under-diagnosed. Only one in four vertebral fractures is detected clinically because symptoms do not correlate well with underlying fractures. It has been estimated that about 20-25% Caucasian women and men above 50 years have a prevalent vertebral fracture and there is a steadily increasing upward trend in incidence of vertebral fractures with age [17]. The presence of one vertebral fracture confers a 5 to 12.6 times risk of subsequent vertebral fractures and a 2.3-3.4 times risk of hip fractures[18]. Any loss of height more than 20% of vertebra, presence of end-plate deformities and altered appearance of the vertebra should be considered as a fracture and further assessed. Osteoporosis is diagnosed in postmenopausal women and in men aged 50 and older if the T-score of the lumbar spine, total hip, or femoral neck is -2.5 or less. In men younger than 50 years, osteoporosis cannot be diagnosed solely on the basis of BMD.

Another fallacy in diagnosis is that insufficiency fractures are clinically associated with pain and limitation of movement which are also chronically present in many osteoporotic patients and these patients do not report to the hospital in an acute setting. In Genant's visual semiquantitative assessment, severity of vertebral fracture is assessed by visual determination of the extent of a vertebral height reduction and morphologic change[19]. Along with presence of vertebral fractures, the age of the fracture should also be assessed to determine whether the present fracture is responsible for current symptoms of the patient. Thus, the radiograph should also be assessed for presence of other features which would favour a pathologic fracture and necessitate further diagnostic workup with MRI or nuclear scan differentiate osteoporotic fractures from non-osteoporotic fractures having vertebral deformities such as H-shaped vertebra in sickle cell anemia, Gaucher's disease, congenital anomalies like block vertebra, osteochondritis and degenerative spondylosis. Screening for vertebral fractures can be done by documenting kyphosis, prospective height loss of >2 cm in a year, rib to pelvis distance ≤2 fingers' breadth, and an occiput-to-wall distance of >5 cm.

Conclusion:

Prevalence of vertebral fracture among osteoporosis patients is around 16-18% in our country. Vertebral fractures are also associated with back pain, physical deformity, decline in social function, loss of self-esteem, impaired quality of life and increased morbidity and mortality. Only one in four vertebral fractures is detected clinically because symptoms do not correlate well with underlying fractures. Routine BMD testing after age of 50 years is recommended. The main limitation of BMD is that it explains bone strength only to a certain extent. Besides osteoporosis, vertebral fractures are also seen in osteomalacia, osteoporosis secondary to glucocorticoid intake, hyperparathyroidism, chronic kidney disease, post-trauma, multiple myeloma and metastases. Thus clinical evaluation should me meticulously performed in old age patients suspected of osteoporosis.

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