

A Study on Vertebral Compression Fracture in Postmenopausal Women with Back Pain in Two Medical College Hospitals of Bangladesh

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Abstract

Background: To determine the prevalence and nature of the vertebral compression fracture in postmenopausal women suffering from back pain in the rural communities of Bangladesh.

Materials and methods: Cross sectional study was conducted for the period January to December 2018 which included all postmenopausal women aged 55 years and above presented with back pain in the Obstetrics and Gynaecology and Orthopedic outpatient Departments of Jahurul Islam Medical College and North Bengal Medical College Hospitals. Vertebral fractures were diagnosed by X-Ray scanning of the spine based on predefined criteria.

Results: Prevalence of vertebral compression fracture was 30.6%. Most of the subjects were highly active, of poor nutritional status and undergraduate. Majority (35.7%) of the patients belonged to 55-59 years group but prevalence was highest in 70-75 years of age. Maximum patients (48.1%) sustained fracture at only one vertebra. Highest number of fracture (61.1%) was found in the dorsolumbar region. Most of the fracture (44.8%) was of biconcave shape. Most of the wedge deformities were present from 12th thoracic and above and majority of the biconcave deformities were from 11th thoracic and below.

Conclusion: Although the prevalence was low in comparison to other studies, it showed a great burden on our social life. The most important step in treating vertebral compression fractures is prevention and treatment of osteoporosis.

Key words: Vertebral compression fracture; Postmenopausal women; Back pain.

INTRODUCTION

Vertebral fractures are common among people with osteoporosis and they are a serious health issue¹. Many publications indicate that vertebral fractures are the most common forms of osteoporotic fractures^{2,3}. In the year 2000, there were an estimated 1.4 million osteoporosis related vertebral fractures worldwide⁴. The combination of vertebral fractures and osteoporosis is associated with increased morbidity and mortality⁵.

Prevalence of osteoporotic vertebral fracture is 11.8% in women and 13.8% in men and the rate increases with age^{6,7}. Studies have suggested that having 1 vertebral compression fracture increases the risk of future vertebral compression fracture⁸. Among those with fractures, only one fracture is the commonest type; two and more fractures are present in approximately 30% of the cases. Due to a transitional region, thoracolumbar spine (From 12th thoracic to 2nd lumbar) is most vulnerable to fracture⁶.

The most important risk factor for vertebral compression fracture is osteoporosis, but there are a number of others, both modifiable and non-modifiable⁹. Postmenopausal women have the greatest risk because of hormonal changes which disrupts the bone microarchitecture and alters the contents of non-collagenous proteins in the bone matrix¹⁰. This structural deterioration of the tissue leads to fragile bones which are prone to fractures¹¹.

Fractures occur in these patients during trivial events. It has been hypothesized that fractures in vertebral bodies occur because of an increased load on the spine caused by contraction of paraspinal muscles¹². It has been suggested that approximately 30% of compression fractures in patients with severe osteoporosis occur while the patient is in the bed¹³. Patients with moderate osteoporosis can injure their spine by falling off a chair, tripping, or attempting to lift a heavy object. Vertebral compression fractures have an insidious onset and may produce only low grade back pain. Pain is the most common symptom after vertebral compression fracture. Over time, multiple fractures may lead to progressive loss of stature and continuous contraction of the paraspinal musculature to maintain posture. This combination results in muscle fatigue and pain that may continue even after the original compression fractures have healed¹⁴.

Vertebral compression fracture can be classified in three categories: wedge (50%), biconcave (17%) and crush (13%). Complex fractures account for the remaining 20% of vertebral compression fractures¹⁵.

Arm span is commonly used as a surrogate for maximum adult height for individuals with spinal deformity, and the difference between arm span and height serves as a measure of height loss¹⁶.

MATERIALS AND METHODS

All postmenopausal women presented with back pain in the outpatient Departments were enrolled for the study from January to December 2018. Informed consent was taken from the patients and those willing to participate were interviewed using a pretested semi structured interview schedule. It included age, socioeconomic status, obstetric history, past history of fracture, presence of other medical problem. Age ascertainment was done by directly asking age in completed years, correlating with important events like age at marriage, age at first child birth, present age of the child etc. Age at menarche was recorded as told by the women or/and correlated with personal life event like age at marriage, interval between menarche and marriage and also the period between menarche and first child birth. Age at menopause was recorded as told by the patient and/or correlated with personal life events like birth of youngest child. Mode of menopause was recorded as natural or surgical. Antero posterior and lateral X-Ray views of the dorsolumbar spinal region were taken to detect fracture.

The question on physical activity had four alternatives which were sedentary, moderate, high and very high. Having few answers both in the "sedentary" and "very high physical activity level" groups, we categorized sedentary and moderate physical activity level as low, and high/very high level as high. Five levels of self-perceived health (Very good, good, neither nor, bad, very bad) were categorized into two, good (Very good and good) and poor (Neither nor, bad, very bad). Educational information was combined from five to three levels: primary school only (i.e up to grade V level) up to SSC level and more than SSC level.

Inclusion criteria

- i) Postmenopausal women
- ii) Aged 55 years and above
- iii) Suffering from back pain.

Exclusion criteria

- i) Active smokers or with a history of moderate to severe asthma
- ii) COPD, pulmonary fibrosis, emphysema or other major lung disease
- iii) Study participants could not have taken inhaler delivered medications within the past 3 months or have any severe or chronically disabling conditions other than osteoporosis, such as congestive heart failure
- iv) Patients were not selected for this study based on their need for an inhaler.

Related definitions

Arm Span:

Arm span was measured to the nearest centimeter from the tips of the middle fingers of maximally outstretched hands, with the patient standing facing the wall.

Height:

According to a standardized protocol, patients were measured in bare feet, with their back against the wall mounted Harpenden Stadiometer, heels together, and head positioned in the Frankfort horizontal plane. The patient was asked to breathe in, and height was noted and recorded at peak inspiration¹⁶.

Arm span and height measurements were taken one time.

Type of Fracture:

Three types of fractures are identified: wedge, biconcave and crush. The wedge fractures are characterized by deformed structure of the anterior part of the vertebrae, the biconcave of the middle part, and crush fractures caused by compression of the total vertebrae¹⁵.

Severity of Fracture:

Using lateral radiographs of the thoracic and lumbar spines, each vertebra was scored quantitatively as 0, 1, 2, or 3. Grade 0 indicated an unfractured vertebra, grade 1 is mild compression (approximately 20%-25%), grade 2 is moderate compression (Approximately 25%-40%) and grade 3 is severe compression (>40%)¹⁷.

RESULTS

Total study population was 1000 among which 306 patients suffered from vertebral fractures yielding the prevalence rate 30.6%.

Table I : Patient Characteristics (n=1000)

Factor	No fracture (Mean±SD)	Fracture (Mean±SD)
Age	61±8.2	59±7.5
Height	150±6	154±7.1
Weight	45±6.3	47±7.1
BMI	21.2±2.1	22.1±2.5
Education		
1 (Primary)	231	117
2 (Up to HSC)	320	134
3 (More than HSC)	143	55
Activity		
Highly active	407	229
Low active	189	175
Health		
Good	247	197
Poor	325	231
Number of pregnancy	3±1	3±1.1
Age at menarche	12±1.5	12±2.7
Age at menopause	49±4	46±4.7
Reproductive years	44±5	43±4.7

Almost all the subjects were of same parameters with little variation but a few more subjects were in the highly active, poor nutritional status, undergraduate group.

Table II : Prevalence of vertebral fracture according to age (n=1000)

Age group (Years)	Women				Total	
	With fracture No.	Without fracture %	With fracture No.	Without fracture %	Total No.	Total %
55-59	56	5.6	301	30.1	357	35.7
60-69	148	14.8	95	9.5	243	24.3
70-74	176	17.6	37	3.7	213	21.3
≥75	165	16.5	22	2.2	187	18.7

Table III : Distribution of number of deformities (n=306)

Number of deformities	Number % (N)	Percentage
At least 1 deformity	147	48.1
2 deformities	94	30.7
3 or more deformities	65	21.2
Total	306	

Maximum patients (48.1%) sustained fracture at only one vertebra.

Table IV : Distribution of deformities in different regions of the spine (n=306)

Spinal region	Number	percentage
Dorsal (T5-T11)	64	20.9
Dorsolumbar (T12-L2)	187	61.1
Lumbar (L3-L5)	37	12.1
Skipped regions (i.e Upper Dorsal+ Lower Lumbar)	18	5.9

Highest number of fracture (61.1%) was found in the dorsolumbar region. 5.9% fracture was found in a skipped manner. A history of trauma in the past was found in most of the cases.

Table V : Type of deformity in patients (n=306)

Type of deformity	Number of patient	Percentage
Wedge	127	41.5
Biconcave	137	44.8
Crush	29	9.5
Mixed (Had more than one type of fracture)	13	4.2

We found most of the fractures (44.8%) in biconcave shape. Most of the wedge deformities were present from 12th thoracic and above, and most of the biconcave deformities were from 11th thoracic and below.

DISCUSSION

Age of the patient was a significant predictor of vertebral deformities in women with a prevalence increasing from approximately 5.6% in the age group below 60 years to approximately 34.1% in the age group 70+ in women. Same finding was observed by others⁶. However the prevalence rate may be an underestimate because we could not validate actual age of the patients in every case due to lacking of certifications. For women, it can even be regarded as rather low compared to other studies reported from Vietnam to be from 17.1% in the age group 50-59 to 39.2% in the age group 70+ (Overall prevalence 23%) and in Spain from 7.2% in the age group 55-59 and 46.3% in the age group 75+ (Overall 21.4%)^{6,18,19}. Women with vertebral fractures were older, shorter, weighted less, had lower educational level, and lower self-reported health compared to those without fractures. Prevalence of vertebral fracture showed an increasing trend with increasing age. This is because an accelerated bone loss which occurs after menopause makes the bone fragile⁶.

Interpretation of height loss would be more relevant if the previous heights of the patients were recorded. Dietary insufficiency leading to short stature and generalized disease in bone mineral density may make the bone soft. Decreased height may also be due to collapse of the vertebra leading to inevitable loss of height.

In women, half (44.8%) of the deformities were wedges, more than one third (41.5%) were biconcave, and 9.5% were crush. Most of the wedge fractures occurred in midthoracic and lower lumbar regions where anterior wedging affected in the midthoracic and posterior wedging in lower lumbar regions. Kyphotic shape of thoracic spine and lordotic shape of lower lumbar spine put an unequal stress over anterior and posterior part of the vertebra leading to wedging of osteoporotic fragile vertebra. Most of the biconcave fractures were located in upper lumbar (L1-L3) spine. Similar finding was observed by others as well⁶.

As reported by others, we also found the prevalence of vertebral deformities to be highest in the mid thoracic region (5th-9th thoracic) and thoracolumbar transition.²⁰ Wedge deformities were mostly found in the higher thoracic and the biconcave in the lower thoracic and lumbar region. As the age of the patient increased, so the number of fracture increased also. Majority of the patients had fracture at one vertebra level because 60% of our study population was below 70 years of age.

Difference in fracture mechanisms may possibly explain the discrepancy in prevalence, as non-vertebral fractures are connected to falls, whereas vertebral fractures are not^{9,21}. It has been reported that a large amount of vertebral fractures are asymptomatic²². Some studies report that only one in three vertebral fractures are diagnosed and as such argue that vertebral fractures are largely under diagnosed²²⁻²⁵.

CONCLUSION

Osteoporotic fracture is a public health problem in our country so in the developed countries. As life expectancy is on the rise, policy makers should deploy necessary planning to reduce the load of fragility fractures and thereby improving quality of life of the elderly.

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DISCLOSURE

All the authors declared no competing interest.

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