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Clinical Profile and Etiological Pattern of Pathological Fractures in Patients Attending a Tertiary Care Hospital in Bangladesh

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ABSTRACT

Introduction: Pathological fractures, which are fractures that take place in bones that have been weakened by some kind of disease, constitute an important clinical problem that might lead to serious morbidity and loss of function. Such fractures can be caused by cancer, metabolic bone diseases, infections, or benign bone lesions, and usually happen after a very minor or no trauma at all. **Methods & Materials:** This cross-sectional observational study was carried out in the Department of Orthopaedics at 250-Bed Sadar Hospital, Cox's Bazar, Bangladesh, over the period from January 2025 to December 2025. 104 patients who came with pathological fractures were the subject of this study. Data were entered and analyzed using SPSS version 25. **Result:** The most common cause was metastatic malignancy (38, 36.5%), followed by osteoporosis/metabolic bone disease (28, 26.9%), primary bone tumors (16, 15.4%), infection (12, 11.5%), and benign lesions (10, 9.6%). Breast (10, 26.3%), lung (8, 21.1%), and prostate (7, 18.4%) were the top three cancers in the metastatic cases. The femur (42, 40.4%) was the bone most commonly involved, followed by the humerus (18, 17.3%), vertebrae (16, 15.4%), and tibia/fibula (14, 13.5%). Most patients (56, 53.8%) came after minor trauma. There were spontaneous fractures in 28 (26.9%), pain before fracture in 16 (15.4%), and incidental findings in 4 (3.9%). **Conclusion:** Pathological fractures in an advanced care hospital were mostly observed in middle-aged and elderly individuals with a predominant male ratio. The primary cause was metastatic malignancy, followed by osteoporosis and metabolic bone disease, and the femur was the most common site of involvement. Generally, most patients came after suffering from minor or no trauma.

Keywords: *Etiological Pattern, Pathological Fractures, Trivial Trauma.*

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INTRODUCTION

Pathological fractures are fractures that occur in bones weakened by some disease process and usually after little or no trauma. In contrast to traumatic fractures, which occur as a result of high-energy external forces, pathological fractures happen when bone strength is compromised by local or systemic pathology. These fractures constitute a major clinical issue as they are often a sign of serious underlying conditions like malignancy, metabolic bone disease, infection, or benign bone lesions, and they necessitate a different diagnostic and therapeutic approach than that used for traumatic fractures [1, 2]. The worldwide incidence of pathological fractures has been on the rise over the last few decades. The main reason for this increase has been population aging, better survival of patients with chronic diseases, and cancer treatments that not only extend life but also raise the risk of skeletal complications [2,3]. Among various causes, metastatic bone disease is the leading one for pathological fractures in adults. Breast, prostate, lung, thyroid, and kidney cancers are the most common primaries that metastasize to the bone. The resulting osteolytic or mixed lesions secondary to metastasis are responsible for weakening the skeletal framework and predisposing it to fractures even after minor stresses [3, 4]. Fractures due to pathological alterations in cancer patients contribute to the severity of the pain, a decrease in the patients' ability to move, a lower quality of life, and increased usage of healthcare services [4]. Besides, metabolic bone diseases make a significant contribution to the incidence of pathological fractures. Osteoporosis, the most common metabolic bone disorder, is clinically manifested by a decreased amount of bone as well as changes in the bone microstructure that result in higher bone fragility and predisposition to fractures [5]. Fragility fractures associated with osteoporosis have become a significant public health problem globally, especially for the elderly [5, 6]. The burden of osteoporosis and related fractures in the Asia-Pacific region, including South Asia, is still expected to increase significantly due to demographic changes and lack of preventive screening [6]. Besides cancer and metabolic disorders, the list of everyday conditions that can lead to pathological fractures is quite broad. Both benign and malignant primary bone tumors, tumor-like lesions such as bone cysts and fibrous dysplasia, chronic osteomyelitis, and systemic diseases that affect bone metabolism may weaken the bone structure enough to cause fractures [1, 7]. The younger population is mostly affected by benign lesions and primary bone tumors, whereas in the older population, metastatic disease and osteoporosis are the leading causes of fractures [2, 7]. It is, therefore, crucial to know the age and specific etiological patterns for early diagnosis and treatment. Accurately pinpointing the cause behind the pathological fracture is very important because the treatment of pathological fractures is very different from that of traumatic fractures. Management is frequently a complex decision that needs input from a team of orthopaedic surgeons, oncologists, radiologists, and pathologists. If a pathological fracture is not detected at the time of the first presentation, this may result in an inappropriate surgical procedure, the diagnosis of a malignancy being delayed, and altogether poor clinical results [1, 8]. Among the most important elements of the evaluation are a detailed clinical history, thorough physical examination, appropriate imaging, and histopathological examination if necessary [8]. Bangladesh, as a low- and middle-income country, may possibly have an epidemiological profile of pathological fractures that is different from that of high-income countries due to differences in disease prevalence, healthcare access, nutritional status, and diagnostic facilities. Although traumatic fractures have been

massively studied in the region, there is very little information about the clinical features and the etiological distribution of pathological fractures [9,10].

METHODS & MATERIALS

This cross-sectional observational study took place in the Department of Orthopaedics at 250-Bed Sadar Hospital, Cox's Bazar, Bangladesh, from January 2025 to December 2025. In total, 104 patients with pathological fractures were consecutively recruited after their informed consent had been obtained. Patients of any age and either sex were eligible for the study, while those with fractures resulting from high-energy trauma and no underlying bone pathology were not considered. Demographic data, clinical history, and the way the injury had occurred were documented. All patients were subjected to radiological evaluation, including X-rays of the fractured area, and additional imaging (CT/MRI) if necessary. Laboratory tests were done to detect any metabolic or systemic disorders that might be the cause, such as serum levels of calcium, phosphate, alkaline phosphatase, vitamin D, and appropriate tumor markers. Fractures were divided into metastatic malignancy, primary bone tumor, osteoporosis/metabolic bone disease, chronic osteomyelitis/infection, and benign bone lesions according to clinical, radiological, and histopathological findings. When the case was metastatic, the primary tumor site was determined if possible. Location of fracture was noted, i.e., femur, humerus, tibia/fibula, vertebrae, pelvis, or other bones. Presentation mode was documented as fracture after trivial trauma, spontaneous fracture, pain before fracture, or incidental diagnosis. Data were input and analyzed with the support of SPSS version 25. Sex, etiology, fracture site, and mode of presentation as categorical variables were presented as frequencies and percentages.

RESULTS

Of the total 104 patients, there were 14 (13.5%) patients aged 20 years, 28 (26.9%) patients in the 21-40 years age group, 36 (34.6%) patients aged 41-60 years, and 26 (25.0%) patients aged more than 60 years. The largest proportion of pathological fractures was in the 41-60 years age group (*Table I*).

Table I
Age Distribution of the Study Patients (*n* = 104).

Age group (years)	Number	Percentage (%)
≤20	14	13.5
21–40	28	26.9
41–60	36	34.6
>60	26	25.0

Among the 104 patients, 62 (59.6%) were male, and 42 (40.4%) were female. There was a male predominance, and the male, to, female ratio was nearly 1.5:1 (*Table II*).

Table II
Gender Distribution of the Study Patients (n = 104).

Gender	Number	Percentage (%)
Male	62	59.6
Female	42	40.4

Metastatic malignancy was the leading cause among the etiologies; it accounted for 38 (36.5%) patients. Osteoporosis or metabolic bone disease was the diagnosis in 28 (26.9%) cases. Primary bone tumors were found in 16 (15.4%) patients, and chronic osteomyelitis or infection was recorded in 12 (11.5%) cases. Benign bone lesions such as cysts, fibrous dysplasia, etc., were seen in 10 (9.6%) patients (*Table III*).

Table III
Etiological Pattern of Pathological Fractures (*n* = 104).

Etiology	Number	Percentage (%)
Metastatic malignancy	38	36.5
Primary bone tumor	16	15.4
Osteoporosis/Metabolic bone disease	28	26.9
Chronic osteomyelitis/infection	12	11.5
Benign bone lesions	10	9.6

Among the 38 patients presenting with metastatic fractures, 10 (26.3%) had breast cancer, 8 (21.1%) were diagnosed with lung cancer, and 7 (18.4%) had prostate cancer. Thyroid carcinoma was the cause in 5 (13.2%) patients, whereas 4 (10.5%) patients each were due to kidney cancer and other primary malignancies (*Table IV*).

Table IV
Primary Sources of Metastasis (*n* = 38).

Primary tumor site	Number	Percentage (%)
Breast	10	26.3
Lung	8	21.1
Prostate	7	18.4
Thyroid	5	13.2
Kidney	4	10.5
Others	4	10.5

The femur was the bone most affected in these patients (n=42, 40.4%). Next came the cases involving the humerus 18 (17.3%), vertebrae 16 (15.4%), and tibia/fibula 14 (13.5%) . Pelvic fractures were observed in 8 (7.7%) patients, while 6 (5.7%) cases involved other bones (*Table V*).

Table V
Anatomical Distribution of Pathological Fractures (*n* = 104).

Bone involved	Number	Percentage (%)
Femur	42	40.4
Humerus	18	17.3
Tibia/Fibula	14	13.5
Vertebrae	16	15.4
Pelvis	8	7.7
Others	6	5.7

In terms of clinical presentation, 56 (53.8%) patients fractured after suffering minor injuries, while 28 (26.9%) had spontaneous fractures without any trauma. A prior history of continuous pain before fracture was given by 16 (15.4%) patients, and 4 (3.9%) cases were incidentally detected during workup for other diseases (*Table VI*).

Table VI
Mode of Presentation (*n* = 104).

Clinical presentation	Number	Percentage (%)
Fracture after trivial trauma	56	53.8
Spontaneous fracture	28	26.9
Pain preceding fracture	16	15.4
Incidental diagnosis	4	3.9

DISCUSSION

In the current study, most pathological fractures belonged to the age group 4160 years (36 cases, 34.6%), then to >60 years (26 cases, 25.0%), 2140 years (28 cases, 26.9%), and 20 years (14 cases, 13.5%). The data revealed that pathological fractures are more frequent among middle-aged and elderly people. A study has shown that 58% of pathological fractures were in patients more than 40 years of age, and the most frequent period of occurrence was the fifth and sixth decades [11]. In the present study, a male preponderance was noted with 62 males (59.6%) and 42 females (40.4%), the male-to-female ratio being around 1.5:1. Kumar et al. reported the presence of 64% male patients in their series. A slightly greater percentage of males compared to females in these studies, as well as in the current study, could be due to males having more exposure to risk factors for malignancy and the practice of delayed male patients' healthcare seeking that is common in developing regions [12]. Considering etiology, metastatic malignancy was the main reason in 38(36.5%) patients, followed by osteoporosis/metabolic bone disease in 28(26.9%) patients, primary bone tumors in 16(15.4%), infection in 12(11.5%), and benign lesions in 10(9.6%) patients. Errani et al. showed that about 6070% of pathological fractures in adults result from metastatic disease, which is a markedly higher percentage than found in the present study. Similarly, Coleman stated that the majority of pathological fractures that occur in cancer patients are due to skeletal metastases. Meanwhile, the percentage of osteoporotic fractures in the present study (26.9%) is significantly greater than that in some oncological series, which may be a reflection of the increasing problem and lack of diagnosis of osteoporosis in South Asian populations [3,8]. Among 38 metastatic cases, the main primary tumor that this study found to be the source of metastases was breast cancer (10 cases, 26.3%), followed by lung (8 cases, 21.1%), prostate (7 cases, 18.4%), thyroid (5 cases, 13.2%), and kidney and others (4 cases each, 10.5%). Kakhki et al.'s study has shown that breast cancer was responsible for 31% of bone metastases, followed by prostate (25%) and lung (16%). Similarly, Coleman stated that breast and prostate cancers are the most common causes of skeletal metastasis. The pattern of distribution of primary malignancies in the present study is in agreement with the well, known bone, seeking tumors [3, 4]. The anatomical distribution of the lesions revealed that the femur was the bone most frequently affected (42 cases, 40.4%), followed by the humerus (18 cases, 17.3%), vertebrae (16 cases, 15.4%), tibia/fibula (14 cases, 13.5%), pelvis (8 cases, 7.7%), and other bones (6 cases, 5.7%). Bickels et al. reported that approximately 50% of pathological fractures occur in the femur, while the humerus accounts for 10–20% of cases. Similarly, van der Linden et al. observed that long bones, particularly the femur and humerus, were involved in the majority of patients with skeletal metastases. The site distribution in the present study closely follows this biomechanical and disease-related pattern [13,14]. Concerning clinical presentation, 56 patients (53.8%) sustained fractures after trivial trauma, 28 (26.9%) had spontaneous

fractures without trauma, 16 (15.4%) reported pain preceding the fracture, and 4 (3.9%) were diagnosed incidentally. Kanis et al. reported that more than 50% of fragility fractures occur after low-energy trauma, while Rizzo noted that pathological fractures frequently occur spontaneously or following minimal injury and are often preceded by persistent localized pain. The clinical pattern observed in the present study, therefore, reflects the classical presentation of pathological and fragility fractures [1,5].

LIMITATIONS

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

Pathological fractures were found mostly in middle-aged and elderly patients, with males more frequently affected in this tertiary care center. Metastatic malignancy was the major cause, followed by osteoporosis and metabolic bone disease, with the femur being the most commonly involved site. More than half of the patients came for care after minor or no trauma at all.

RECOMMENDATION

Any patient with fractures caused by minor or no trauma should be checked thoroughly for any underlying pathology. This should include proper clinical, radiological, and laboratory investigations. Special emphasis on early cancer and osteoporosis screening is a must for middle-aged and elderly patients to allow timely diagnosis and treatment.

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CONFLICT OF INTEREST

None declared.

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