



## Original Research Article

# Study of prevalence of primary bone tumors at a tertiary care centre in Central India

Authors

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## Abstract

**Introduction:** Bone sarcomas account for 0.2% of all malignancies. Many relevant demographic, clinical and epidemiological characteristics have been reported.

**Objectives:** To analyze the spectrum of primary bone tumors and their relative frequency in Gandhi Medical College and Hamidia Hospital, Bhopal.

**Methods:** This is a three and a half year study conducted from July 2012 to December 2015. All primary bone tumors confirmed by histopathology have been included.

**Results:** A total of 124 cases of primary bone tumours were studied. Age range varied from 7 to 92 years with a mean age of 24.4 years. Among these, 55.65% were males and 44.35% were females. On histological examination, 51.6% were benign and 48.4% cases were malignant. Giant cell tumor was the commonest benign tumor (39.7%) and osteosarcoma was the commonest malignant tumor (56.7%). Maximum number of cases belonged to the 2<sup>nd</sup> decade followed by 3<sup>rd</sup> and 4<sup>th</sup> decade. Clinically, all patients presented with swelling, hence the most common symptom. 42% patients presented with both pain and swelling.

**Conclusion:** The pattern and distribution of bone tumors seen at our centre are similar to those reported from other studies. Males were more commonly affected than females with a peak in the second decade of life. Long bones of lower extremity were the most commonly affected sites. Giant cell tumour and osteosarcoma were the commonest benign and malignant varieties respectively.

**Keywords:** Bone tumors, sarcoma, prevalence.

## Introduction

Among the wide array of human neoplasms, primary tumors of bone are relatively uncommon<sup>[1]</sup>. This has led to the scarcity of data about their relative frequency. Overall, bone sarcomas account for just 0.2% of all malignancies and the five year overall survival rate is 67.9%<sup>[2]</sup>. Also, the clinical presentation of these patients is quite

non specific<sup>[1]</sup>. Majority of the patients report pain and swelling<sup>[3]</sup>. This non specific presentation poses a diagnostic problem. The challenge is greater in developing countries due to inadequate diagnostic and therapeutic amenities and unawareness. There are worldwide variations in patterns of cancer<sup>[4]</sup>. Age of the patient, site affected, radiographic and microscopic

appearances contribute in making the final diagnosis, hence a multidisciplinary approach is required. Early diagnosis and identification of benign lesions help in performing limb salvage surgeries<sup>[5]</sup>. This study has been conducted at a tertiary care centre in Central India in order to analyze the prevalence of bone tumors in this geographical area with respect to age, sex, site and clinical symptoms.

### Material and Methods

This is a three and a half year study conducted in Gandhi Medical College and Hamidia Hospital, Bhopal from July 2012 to December 2015. The study was retrospective for cases from July 2012 to July 2014, and prospective for cases from then onwards. All primary bone tumors confirmed by histopathology have been included in the study. All non neoplastic lesions and metastatic tumors have been excluded. All patients were registered according to the proforma. Patients were questioned for the symptoms of bone tumors like pain, swelling, weakness, range of motion of the involved joint, any sensory or motor deficit, rapid growth, erythema or pathological fractures.

A detailed clinical examination was done followed by investigations and comprehensive examination of other systems. Finally, patient's consent was taken, biopsy of tumor was done and sample sent for histopathological examination for confirmation.

### Results

A total of 124 cases of primary bone tumours were studied over a span of three and a half years. The cases were studied with respect to age of patient, sex and site affected and histopathologic diagnosis. Age range varied from 7 to 92 years with a mean age of 24.4 years. Among these, 69 patients (55.65%) were males and 55 patients (44.35%) were females. On histological examination, 64 cases (51.6%) were benign. The distribution of primary bone tumors is represented in Table 1 and Table 2. Giant cell tumor was found to be the commonest benign tumor accounting for

25 cases (39.7%) followed by osteochondroma (17 cases or 26.56%). The remaining 60 cases were malignant (48.4%). Among these, Osteosarcoma was the commonest malignant tumor accounting for 34 cases (56.7%) followed by Ewing's sarcoma (29 cases or 48.33%). Overall, the four common tumors (osteosarcoma, Ewing's sarcoma, osteochondroma and giant cell tumor) made up 95 cases. The rest of the 29 cases were of the less common tumors that is, Enchondroma (8 cases), Bone cysts (8 cases), Chondrosarcoma (5 cases), Osteoid osteoma (3 cases), Multiple myeloma (2 cases) and 1 case each of osteblastoma, chondroblastoma and fibrous dysplasia. On studying the age distribution, maximum number of cases belonged to the 2<sup>nd</sup> decade followed by 3<sup>rd</sup> and 4<sup>th</sup> decade. Among osteosarcomas, 14 cases each were seen in 2<sup>nd</sup> and 3<sup>rd</sup> decade making it the peak age group for the tumor. For Ewing's sarcoma, majority of the cases (11 cases) lied in the 2<sup>nd</sup> decade. No cases were seen in the age group >50 years. 12 cases of giant cell tumor were in 2<sup>nd</sup> decade followed by 6 cases in 3<sup>rd</sup> decade. None of the cases were seen in >60 years age group. Similar to all these three tumors, most cases of osteochondroma (7 cases) were found in the 2<sup>nd</sup> decade with no cases in the old age group. Coming to the uncommon tumors, enchondromas were also most common in 2<sup>nd</sup> decade, bone cysts in the 3<sup>rd</sup> decade and all cases of osteoid osteoma occurred within 20 years. Multiple myeloma occurred in older age group with a mean of 48.5 years. Chondrosarcomas occurred over a wide age range with a mean of 37.6 years. On studying the sex distribution, overall, a male preponderance was noted (69 male patients and 55 female patients). For Osteosarcoma, Ewing's sarcoma, Osteochondroma and bone cysts no definite gender predilection was noted. A definite male preponderance was noted for Giant cell tumors and Enchondromas. For the less common tumors, the number of cases was few to comment upon. Site wise distribution of common sites is illustrated in Table 3. Femur was the most

commonly affected bone. Other less common affected bones were foot, hand, fibula, ulna and scapula. 59% of osteosarcomas occurred in femur followed by tibia, humerus and radius. Among Ewing’s sarcoma, tibia was the commonest site (42%) followed by femur, pelvis and humerus. Giant cell tumors and osteochondromas were commonest in femur and tibia. For enchondromas, commonest site was hand (50%) followed by foot (37%). Clinically, all patients presented with swelling, hence the most common symptom. 42% patients presented with both pain and swelling. Occasional patients had limitation of movement and pathological fracture.

**Table 1-** Distribution of primary benign bone tumors

Primary benign bone tumor	Number of cases	Percentage of total number of cases (benign and malignant)
Giant Cell Tumor	25	20.16%
Enchondroma	08	6.45%
Osteochondroma	17	13.71%
Bone cysts	08	6.45%
Osteoid osteoma	03	2.42%
Osteblastoma	01	0.81%
Chondroblastoma	01	0.81%
Fibrous dysplasia	01	0.81%

**Table 2-** Distribution of primary malignant bone tumors

Primary malignant bone tumors	Number of cases	Percentage of total number of cases (benign and malignant)
Osteosarcoma	34	27.4%
Ewings’ Sarcoma	19	15.32%
Chondrosarcoma	05	4.03%
Multiple myeloma	02	1.61%

**Table 3-** Site distribution of primary bone tumors

Site affected	Number of cases	Percentage
Femur	53	42.7%
Tibia	26	21%
Humerus	14	11.3%
Pelvis	08	6.5%
Radius	08	6.5%

**Discussion**

This study was done to analyze the spectrum of primary bone tumors among patients in Gandhi

Medical College and Hamidia Hospital. The results of our study were obtained after statistical analysis of 124 cases of primary bone tumors (confirmed by histopathology) over a period of three and a half years. The data was recorded with respect to age, sex and site affected.

In our study, benign tumors (51.6%) were marginally more common than malignant tumors (48.4%). This is in concordance with other studies [6-8].

In our study, primary bone tumors were commonest in 2<sup>nd</sup> decade followed by 3<sup>rd</sup> decade. The findings were similar when compared to studies in other regions of India [8-9]. For osteosarcomas and Ewing sarcomas specifically, peak incidence was in 2<sup>nd</sup> decade as was seen in other studies [10-13]. For Giant cell tumors, incidence peaked in 2<sup>nd</sup> decade followed by 3<sup>rd</sup> decade in our study, slightly lower than in other studies, wherein the peak was in 3<sup>rd</sup> and 4<sup>th</sup> decade. There were 5 cases of chondrosarcomas with a wide age range and a mean of 37.6 years. Peak incidence for chondrosarcomas in study by Oyemade et al was 3<sup>rd</sup> and 4<sup>th</sup> decade. Multiple myeloma was found to be a tumor of older individuals with a mean of 48.5 years, concordant with other studies [7].

Coming to sex distribution, our study showed a male predominance with a ratio of 1.25, similar to findings in other studies [3,9]. However, for individual tumors no definite gender bias was noted in our study. There were 16 male and 18 female patients for osteosarcomas; 10 male and 9 female patients for Ewing sarcoma; 2 male and 3 female patients for chondrosarcomas. The findings have been variable in other studies in this aspect. One of the studies reported male predominance for osteosarcomas [12]. A study reported no sex difference for Ewing sarcoma, similar to our study [10]. For chondrosarcomas, one of the studies showed female predominance while another showed no sex difference [12,14]. The lack of gender bias in our study is probably due to small number of cases for each tumor type.

The most common sites of primary bone tumors in our study were femur (42.7%), followed by tibia (21%) and humerus (11.3%). These findings are concordant with other studies<sup>[3,8,15]</sup>. On analysis of individual types, 59% osteosarcomas, 40% giant cell tumors and 53% osteochondromas involved the femur bone in our study. Findings are similar to other studies<sup>[5,16,17]</sup>.

The most common tumor in our study was osteosarcoma (27.4%), the finding is concordant with a large study conducted in China with a sample size of 9200 patients<sup>[4]</sup>. However, some other studies found the most common tumor to be osteochondroma<sup>[5]</sup>. Giant cell tumor was second most common tumor in our study, a finding similar to other studies<sup>[4,5]</sup>. Also, in our study the 3<sup>rd</sup> most common tumor was Ewing's sarcoma accounting for 15.32% cases, this finding however did not show concordance with other studies. Petca et al also reported Ewing's sarcoma as the 2<sup>nd</sup> most common malignant primary bone tumor, most other studies found chondrosarcomas to be more common<sup>[15]</sup>. It can be considered as a geographical variation. Among the benign tumors, as mentioned earlier Giant cell tumors were the most common in our study (39.06% cases). The finding coincides with the study conducted in Ahmedabad<sup>[18]</sup>. Although studies conducted in Manipur, Jammu and Pune have reported osteochondromas as the most common benign tumor<sup>[5, 8, 9]</sup>. Overall, our study showed a higher prevalence of malignant primary bone tumors than benign tumors and a greater number of cases of Ewing's sarcoma when compared to other studies. The most common clinical presentation of these tumors was swelling. 55% patients presented with only swelling and 42% patients presented with both pain and swelling. Minority of patients presented with other symptoms like pathologic fracture and limitation of movement.

Our study describes the pattern and frequencies of primary bone tumors clinically evaluated at our institute over a three and a half year period. The pattern and distribution of bone tumors seen at our centre are similar to those reported from other

studies. Males were more commonly affected by bone tumours than females with a peak in the second decade of life. Long bones of lower extremity were the most commonly affected sites. Giant cell tumour and osteosarcoma were the commonest benign and malignant varieties respectively. A greater number of cases of Ewing's sarcoma were noted as compared to other studies. Since bone tumors present with non specific symptoms of pain and swelling, to achieve a high rate of accurate diagnosis of bone tumours, joint clinical, radiological and pathological team work is required. A high index of suspicion is recommended especially in patients in their first two decades of life.

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