



# International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958  
P-ISSN: 2706-6630  
IJOS 2020; 6(4): 751-754  
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[www.orthopaper.com](http://www.orthopaper.com)  
Received: 05-09-2020  
Accepted: 17-10-2020

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## Epidemiological study of 470 bone tumours at a tertiary care centre along with review of literature

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DOI: <https://doi.org/10.22271/ortho.2020.v6.i4k.2415>

### Abstract

**Introduction:** We did this study to estimate the spectrum and number of bone tumours and tumour-like lesions presenting to our hospital which is the apex institute in the state of Haryana, India catering to a population of more than 25 million.

**Material and Methods:** The patient data was retrieved from the histopathological/cytological forms and registers maintained in Dept. of Pathology from the year 2014 to 2018.

**Results:** Histopathological data of a total of 470 patients from the period 2014-2018 with bone tumours and tumour-like lesion was analysed. Osteosarcoma was the most common primary malignant bone tumour (14.89%) followed by Ewing's sarcoma (9.57%). Giant cell tumour of the bone was the most common benign tumour as well as the most common neoplasm overall (30.42%).

**Conclusion:** Here, we have analysed the epidemiology of bone tumours and tumour-like lesions at the level of an apex tertiary care institute. There are many similarities and some differences from other large-scale epidemiological studies which can help guide resources at the state level and with some extrapolation to the national level.

**Keywords:** Bone tumours, osteosarcoma, giant cell tumour of bone, Ewing's sarcoma, epidemiological study

### Introduction

Primary bone sarcomas make up a very small number of mesenchymal neoplasms accounting for only 0.2% of all neoplasms in a large series<sup>[1]</sup>. On a comparison with soft tissue sarcomas, it was found that bone sarcomas occur at a rate approximately one-tenth of their soft tissue counterparts<sup>[2-4]</sup>. The age specific data shows a typical distribution for various bone neoplasms and hence provides a valuable aid in diagnosis<sup>[5]</sup>. Here, we did a thorough epidemiological study of all the patients who had a confirmed diagnosis of a bone neoplasm at our institute over a consecutive period of 5 years, from 2014-2018.

### Patients and Methods

All the cases with histopathologically confirmed diagnosis of bone tumour were included in this study. The data was retrieved from the histopathological/cytological forms and registers maintained in Dept. of Pathology from the year 2014 to 2018. The complete details available in the registers regarding these patients were noted. The data so collected was analyzed in view of the demographic profile including age, sex and location of tumour in the body.

### Results

Histopathological data of a total of 470 patients from the period 2014-2018 with bone tumours and tumour-like lesion was analysed. In this database, the most common histologic type of bone tumour was giant cell tumour of bone accounting for 30.42% (n=143) of all neoplasms, next was osteosarcoma accounting for 14.89% (n=70), Ewing's sarcoma/PNET (9.57%, n=45), osteochondroma (12.12%, n=57, Figure 1), plasma cell myeloma (3.61%, n=17), aneurysmal bone cyst (4.46%, n=21), enchondroma (2.76%, n=13), chondrosarcoma (2.34%, n=11), benign chondromatous tumour (2.34%, n=11) and adamantinoma in 1 case. (Tables 1, 2) Osteogenic sarcoma was the most common primary malignant neoplasm accounting for 14.89% of the total (70 out of 470).

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Highest incidence was among 11-20 years age group accounting for 74.28%. The most common bone involved was femur (44.2%) with the most common site being distal femur (32.8% of total cases), with the next being proximal humerus and proximal tibia (14.28% each). (Figure 2)

Ewing’s sarcoma was seen in 9.57% (n=45) of the total cases. Highest incidence was among the 11-20 years age group accounting for 40% of the cases. The most common bone involved was humerus with the most common site being proximal humerus (15.56%). Plasma cell myeloma constituted 2.11% (17 out of 802) of the total cases. The most common age group was 51-60 accounting for 47.05% of the cases. Metastatic tumours accounted for 31 cases, 6.59%. The most common age group was above 50 years accounting for 77.41% with most of the rest in the age group of 40-50 years. Giant cell tumour of bone (Figure 3) was the most common neoplasm (156 out of 470 cases) accounting for 30.42%.

Highest incidence was among 21-30 years age group accounting for 41.66% and next was 31-40 years accounting for 16.66%. The most common bone involved was tibia (19.23%, n=30), next was femur (14.10%, n=22).

Aneurysmal bone cyst was seen in 4.46% (21 out of 470) of the total. The most common age group was 11-20 years accounting for 47.61% (10 out of 21) with the most common bone involved being femur (28.57%).

There were 8 cases (1.70% of total) of simple bone cyst. Most of the cases were less than 10 years of age and only a few were in the age group of 11-20 years. Proximal humerus was the most common site accounting for 37.5% (n=3) of the cases. There were 7 cases of fibrous dysplasia. 4 were men and 3 were women. 2 cases involved tibia, 1 involved femur and 1 case had lesion in ulna. Most of the cases occurred in 2nd decade of life.

**Table 1:** Age distribution of the most common tumours (original)

Type of tumour	Age (in years)								
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	>80
<b>Benign</b>									
GCT	1	26	65	38	17	3	2	1	2
ABC	4	10	5	2	---	---	---	---	---
SBC	6	2	---	---	---	---	---	---	---
CB	---	4				1			
<b>Malignant</b>									
OS	6	52	4	2	2	2	1	1	
ES	3	18	13	8	---	1	2		
CS	---	---	2	---	2	3	2	2	---
MM	---	---	1	2	2	8	---	---	---

GCT- Giant cell tumour of bone, ABC- Aneurysmal bone cyst, OC- Osteochondroma, SBC- Simple bone cyst, CB- Chondroblastoma, OS- Osteosarcoma, ES- Ewing’s sarcoma, CS- Chondrosarcoma, MM- Multiple myeloma

**Table 2:** Sex distribution of the most common tumours (original)

Type of tumour	Sex distribution (in%)	
	Men	Women
<b>Benign</b>		
Giant cell tumour of bone	55.7	44.3
Aneurysmal bone cyst	67	33
Chondroblastoma	100	
Simple bone cyst	75	25
<b>Malignant</b>		
Osteosarcoma	61.42	38.58
Ewing’s sarcoma	64.44	35.56
Chondrosarcoma	72.72	27.28
Multiple myeloma	41	59

**Discussion**

Here, we have analysed the epidemiological profile of biopsy confirmed bone tumours who presented at our hospital, which is a tertiary care centre for management of musculoskeletal tumours in India.

The most common benign bone tumour was giant cell tumour of the bone (30.42%, n=156 out of 470) which was also the most com. In comparison, in the study by Gulia *et al.* [6] though GCT was the most common benign bone tumour (n=101 out of 2007), osteosarcoma was the most common neoplasm overall (n=243 out of 2007). Solooki *et al.* [7] found that the most common pathologic types of bone tumours were osteochondroma (n=136; 35.0%) and osteosarcoma (n=89; 22.9%) whereas GCT was seen in only 5.4% (n=21) of all bone tumours.

Osteosarcoma was seen in 8.7% (n=70). It was more common in males (61.42%). The most common age group was 11-20 years accounting for around 74.28%. Femur was the most

common bone involved in 44% (n=30, with the distal femur being the most common site in 76.66%), next was humerus and tibia in 14% each (n=10), pelvis in 3 cases, fibula and radius in 2 cases each, and clavicle, scapula in 1 case each. This data is similar to the study by Gulia *et al.* [6], in which osteosarcoma (n = 243) was also more commonly seen in males (67.48%), about 59% of the patients were in the second decade of life and femur was the most common site of involvement in 113 cases (46.5%) followed by tibia in 67 cases (27.5%), humerus in 24 cases (10%), and fibula in 13 cases (5%). Similarly, in Bergovec *et al.* [8], osteosarcoma accounted for 6.1% of total cases (n=214) with femur being the most common bone involved in 59% (distal femur being the most common site in 84%) and the most common age group being 10-19 years (44%).

Ewing’s sarcoma/PNET was the second most common malignant bone tumour with an incidence of 5.61% of the total (n=45). It was more common in males (64.44%). The most common age group was 11-20 years accounting for 40% followed by 21-30 years with 28.88% of the cases. 93.33% (n=42) of the patients were of the age below 40 years with 46.67% (n=21) below the age of 20 years. Humerus was the most commonly involved bone in 15.55%, next was the pelvic bone and femur with 13% each, tibia was involved in 11%, scapula in 9%, sacrum and fibula in 3 of the cases. In comparison, Solooki *et al.*, [7] 80% of the cases were of the age below 20 years with no patient above the age of 35 years, the most common bone involved was femur with 35.7% (n=10) of the cases. Gulia *et al* [6] found the incidence to be 7.32% (n=147) and also reported it as the second most common malignant bone tumour and that it largely affects

male (67%) and of the total 147 cases, pelvis was the most common site of affection in 32 cases (21.7%) followed by femur in 19.7% (n = 29), tibia in 15% (n = 22), humerus in 9% (n = 14), radius in 2%, and ulna in 1%. In contrast, Bergovec *et al.* [8] found incidence of Ewing sarcoma/PNET to be 2.8% (n=97) with femur involved in 48%, pelvis in 17%, tibia in 16% and humerus in 10% with the most common age group being 0–19 years (70%).

Chondrosarcoma was seen in 1.37% (n=11) with male preponderance (73%). The most common age group was 51-60 years (27.27%). The most common bone involved was femur (45.45%), pelvic bone and scapula accounted for 2 cases each. In study by Gulia *et al.*, [6] chondrosarcoma accounted for 3.03% (n=61) making it the third most common bone malignancy, it was most commonly seen in the sixth decade (26.23%) and predominantly affecting males (69%). Most common site of affection was pelvis (48%, n = 29) followed by femur (18%), humerus (6%), and tibia (6%). In this study we found a comparatively lower number of chondrosarcoma cases compared with the rates reported in literature. Bergovec *et al.* [8] reported that chondrosarcoma was seen in 2.9% (n=101) making it the second most common malignant bone tumour, femur was involved in 39% with the most common age group being 50+ years (40%). Dorfman *et*

*al.* [9] reported on primary bone sarcomas and placed chondrosarcoma second on the list, with it accounting for 25.8% of all sarcomas. Unni *et al.* [10] in a study of bone malignancies, reported chondrosarcoma to be the third most common of all bone tumours, at 10.7%. Aneurysmal bone cyst was seen in 2.61% (n=21). In study by Yuceturk *et al.* [11] aneurysmal bone cyst accounted for 2.01% (n=114). In Bergovec *et al.*, [8] aneurysmal bone cyst accounted for 2.75% (n=75). These studies show similar incidence rates.

The giant cell tumour of the bone was the most common surgically treated osseous lesion followed by osteosarcoma, osteochondroma and Ewing's sarcoma. Although osteochondroma is the commonest benign bone tumour but all the cases do not report to the surgeons and also all are not operated, therefore their number in this data is even less than osteosarcoma. Another important finding was that chondrosarcoma was relatively less commonly encountered.

Majority of the demographic profiles for these musculoskeletal tumours are consistent with reported literature with the exception of less occurrence of chondrosarcoma and GCT of bone being the most common surgically treated tumour. It seems that the incidence of GCT of bone is very high in our geographical area. (Table 3)

**Table 3:** Comparison of incidence of malignant bone tumours in various studies (as% of total number of bone tumours)

Centre/ Number of patients (n)	Osteosarcoma	Ewing's sarcoma	Chondrosarcoma	Metastasis	Plasmacytoma/ multiple myeloma
Gulia <i>et al.</i> [6] (n=1203)	20.19	12.21	5.07	20.03	-----
Bergovec <i>et al.</i> [8] (n=2721)	7.86	3.56	3.71	5.47	0.7
Solooki <i>et al.</i> [7] (n=389)	22.88	7.2	3.6	7.2	-----
Jain <i>et al.</i> [12] (n=117)	11.11	5.13	5.13	11.11	7.69
Malhas <i>et al.</i> [5] (n=4244)	24.15	8.12	10.36	12.55	----
PGIMS data (n=470)	8.7	5.61	1.37	6.59	2.11



**Fig 1:** Osteochondroma of ischium (original)



**Fig 2:** Osteosarcoma of femur in two different patients (original)



**Fig 3:** Giant cell tumour involving distal radius and ischium respectively (original)

### References

1. Greenlee RT, Murray T, Bolden S, Wingo PA. Cancer statistics. *CA Cancer J Clin* 2000;50:7-33.
2. Dorfman HD, Czerniak B. Bone cancers. *Cancer* 1995;75:203-10.
3. Higginson J, Muir CS, Munoz N. Bone. *Human cancer: epidemiology and environmental causes*. Cambridge: Cambridge University Press;1992.p.353-7.
4. Mack TM. Sarcomas and other malignancies of soft tissue, retroperitoneum, peritoneum, pleura, heart, mediastinum, and spleen. *Cancer* 1995;75:211-44.
5. Malhas AM, Grimer RJ, Abudu A, Carter SR, Tillman RM, Jeys L. The final diagnosis in patients with a suspected primary malignancy of bone. *J Bone Joint Surg Br* 2011;93:980-3.
6. Gulia A, Puri A, Chorge S, Panda PK. Epidemiological data and case load spectrum of patients presenting to bone and soft tissue disease management group at a tertiary cancer center. *Indian J Cancer* 2016;53:333.
7. Solooki S, Vosoughi AR, Masoomi V. Epidemiology of musculoskeletal tumors in Shiraz, South of Iran. *Indian J Med Paediatr Oncol* 2011;32:187-91.
8. Bergovec M, Kubat O, Smerdelj M, Seiwerth S, Bonevski A, Orlic D. Epidemiology of musculoskeletal tumors in a national referral orthopedic department. A study of 3482 cases. *Cancer Epidemiol* 2015;39:298-302.
9. Dorfman HD, Czerniak B. Bone cancers. *Cancer* 1995;75:203-10.
10. Unni KK, Inwards CY, Bridge JA, Kindblom LG, Wold LE. Tumors of the bones and joints. Series 4. Fascicle 2. Silver Spring: ARP Press, 2005.
11. Yuceturk G, Sabah D, Kececi B, Kara AD, Yalcinkaya S. Prevalence of bone and soft tissue tumors. *Acta Orthop Traumatol Turc* 2011;45:135-43.
12. Jain K, Sunila, Ravishankar R, Mruthyunjaya, Rupakumar CS, Gadiyar HB *et al*. Bone tumors in a tertiary care hospital of south India: A review 117 cases. *Indian J Med Paediatr Oncol* 2011;32:82-5.