

# Histomorphological Spectrum of Bone Lesions at Tertiary Care Centre

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**ABSTRACT- Background:** The spectrum of pathological bone lesions ranges from inflammatory to neoplastic conditions. Bone tumours are comparatively uncommon among the wide array of lesions. The roentgenogram helps in defining the exact location of the lesion but becomes difficult to differentiate them. They often pose diagnostic problems as they constitute a small portion of diagnostic experience among pathologist.

**Objective:** To study histopathological spectrum of bone lesions & correlate them with age, gender and site of occurrence.

**Results:** All bone biopsies from January 2011 to December 2015 received at Department of Pathology, S.Nijalingappa Medical College, India. Total 121 cases of bone biopsies were analysed. They were decalcified and processed routinely. Out of 121 bone biopsies, 35 (28.9%) cases were non- neoplastic, 77 (63.6%) were neoplastic and 9 (7.4%) were inadequate for evaluation. The incidence of benign lesions was more than malignant with 51(66.2%) and 26(33.7%) cases respectively. Chronic osteomyelitis is the most common non-neoplastic lesion. Giant cell tumor and osteosarcoma are common benign and malignant lesions respectively. The femur is the most common bone involved and metaphysis, the commonest site. The maximum numbers of cases were in the age group between 11-30 years with male preponderance.

**Conclusion:** Though bone lesions are less common, if viewed in perspective of clinico-radiology and histopathology, correct diagnosis can be reached.

**Key-words-** Bone lesions, Chronic osteomyelitis, Giant cell tumor, Histopathology, Osteosarcoma

## INTRODUCTION

A spectrum of pathological bone lesions can be presented in any form from inflammatory to neoplastic conditions <sup>[1]</sup>. They may affect children, adults or the elderly persons. They sometimes occur and develop quickly, often revealing themselves through pain, or the appearance of a palpable mass or by restricting the movement of the part involved <sup>[2]</sup>. Definitive clinical diagnosis of bone lesion is often difficult.<sup>[3]</sup> The roentgenogram helps in defining exact location of lesion <sup>[2]</sup> but is difficult to determine radiologically with plain film imaging whether a bone lesion is benign or malignant. Some benign processes such as osteomyelitis can mimic malignant tumors, and some malignant lesions such as metastases or myeloma, can mimic benign.<sup>[1]</sup>

The relevant demographic features like age, gender and skeletal sites are important factors while making a diagnosis <sup>[4,5]</sup> before deciding the line of treatment, be it simple curettement, excision surgery, amputation or irradiation <sup>[2]</sup>. For the correct diagnosis of bone lesions, charting out treatment plan and estimating prognosis, interpretation of biopsy material proves to be indispensable <sup>[3]</sup>. So, this study was carried out with an aim to access the patterns of various bone lesions and correlate them with age, gender and site of lesions.

## MATERIALS AND METHODS

The present retrospective study was undertaken in the Department of pathology (histopathological section) at S. Nijalingappa Medical College, Bagalkot, India covering a period of 5 years from January 2011 to December 2015. All the histopathological reports and slides of bone biopsies were reviewed for relevant information about age, gender, histopathological interpretation and the anatomical site of occurrence. The biopsy specimens received were fixed at 10% buffered formalin and decalcified in 5% nitric acid for 2-3 days.


Then the decalcified tissue was processed by increasing

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concentrations of alcohol and paraffin blocks were prepared. Sections were cut to 4–6 μ, stained with hematoxylin and eosin and examined under microscope for histopathological evaluation. The final diagnosis was made into inflammatory, benign and malignant lesions accordingly. Data tabulation and analysis done to know the relative frequencies of observed data.

Out of 121 cases, 33 (29.4%) cases each were presented between the age group of 11–20 and 21–30 years with male predominance in 70 (62.5%) cases (Table 1). The incidence of non-neoplastic lesions was 28.9% (35 cases), neoplastic was 63.6% (77 cases) and rest of 7.4% (9 cases) were inadequate for evaluation. Amongst neoplastic lesions, the incidence of benign tumors were more than malignant comprising of 66.2% (51 cases) and 33.7% (26 cases) respectively.

**RESULTS**

**Table 1:** Age and gender distribution of bone lesions

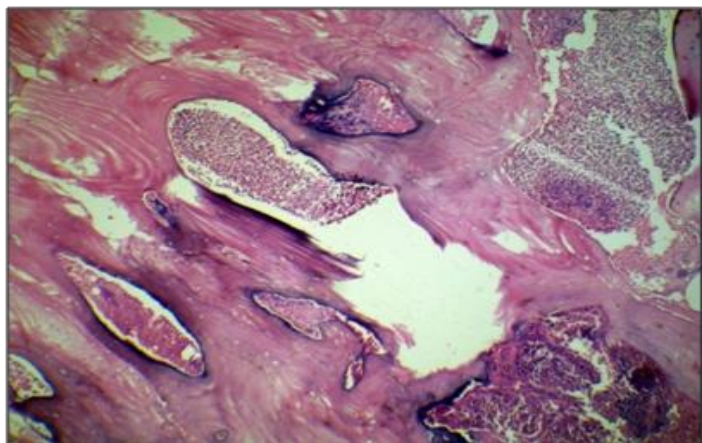
Histological types	Age in years							Gender		Total
	0-10	11-20	21-30	31-40	41-50	51-60	>60	M	F	
<b>Non-neoplastic</b>	4	10	11	3	4	1	2	22	13	35
<b>Benign</b>	3	16	16	8	5	2	1	31	20	51
<b>Malignant</b>	5	7	6	4	1	2	1	17	9	26
<b>Total (%)</b>	12(10.7)	33(29.4)	33(29.4)	15(13.4)	10(8.9)	5(4.46)	4(3.57)	70(62.5)	42(37.5)	112

Non-neoplastic lesions comprise of chronic osteomyelitis 16 (45.7%) cases, tuberculous bone lesions 10 (28.5%) cases, avascular necrosis 6 (17.1%) cases and 3 (8.6%) cases of brodies abscess (Fig. 1 & Fig. 2). These lesions were found more commonly in the age group between 21–30 years with maximum number of cases of chronic osteomyelitis followed by tuberculous lesions. Males were more

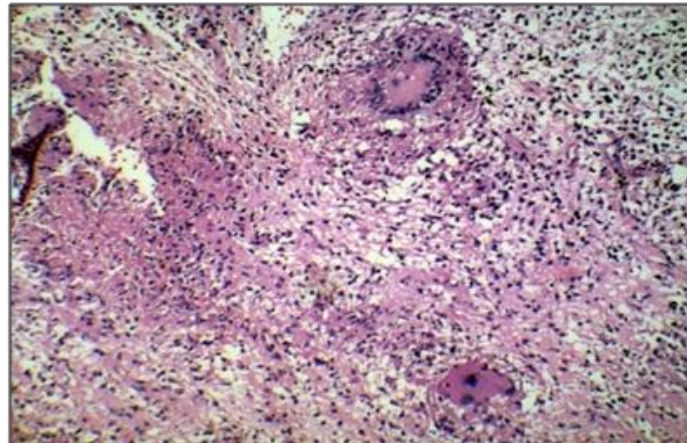
commonly affected than females with M: F- 1.7:1 but all the 3 cases of brodies abscess were found in female (Table 2). Chronic osteomyelitis has most commonly affected the metaphyseal region of femur with incidence of 62.5% (10 cases) sand tuberculous bone lesions has most commonly affected the vertebrae with incidence of 60% (6 cases).

**Table 2:** Age and gender distribution of non-neoplastic bone lesions

Histological subtypes	Age in years							Gender		Total
	0-10	11-20	21-30	31-40	41-50	51-60	>60	M	F	
<b>Non-neoplastic bone lesions</b>										
<b>Chronic Osteomyelitis</b>	3	5	5	3	–	–	–	11	5	16
<b>Tuberculous lesions</b>	1	3	5	–	1	–	–	6	4	10
<b>Avascular necrosis</b>	–	–	–	–	3	1	2	5	1	6
<b>Brodies abscess</b>	–	2	1	–	–	–	–	0	3	3
<b>Total (%)</b>	4(11.4)	10(28.5)	11(31.3)	3(8.5)	4(11.4)	1(2.8)	2(5.7)	22	13	35



**Fig. 1:** Chronic Osteomyelitis showing collection of chronic inflammatory cell infiltrate between bony trabeculae (10x)



**Fig. 2:** Tuberculous lesion of bone showing well formed granulomas (10x)

Out of 77 neoplastic bony lesions, 51 were benign and 26 were malignant. Benign lesions of bone found to comprise of giant cell tumor 21 (41.1%) cases, osteochondroma 16 (31.1%) cases, aneurysmal bone cyst 4 (7.8%) cases, fibrous dysplasia 4 (7.8%) cases, solitary bone cyst 4 (7.8%) cases and osteoid osteoma 2 (3.9%) cases (Fig. 3 & Fig. 4). The most common age group involved was 11–20 and 21–30 years with 16 cases each (31.3%) and maximum numbers of cases were of Osteochondroma. But Giant cell

tumor has affected the age group between 31–40 years. Males were more commonly affected than females with M:F-1.5:1 (Table 3). The femur is the common bone involved with maximum number of cases of giant cell tumor (13 cases) and osteo-chondroma (9 cases), and metaphysis being the common site (60.7%). But giant cell tumor most commonly affected the epiphysial region of bone (Table 4).

**Table 3:** Age and gender distribution of benign bone lesions

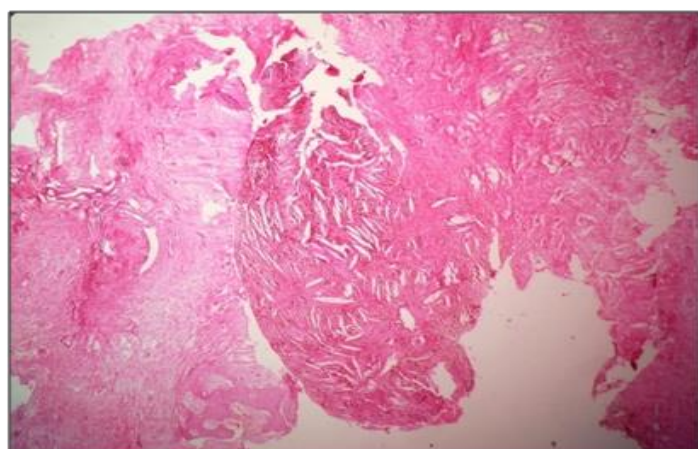
Histological subtypes	Age in years							Gender		Total
	0-10	11-20	21-30	31-40	41-50	51-60	>60	M	F	
<b>Benign bone lesions</b>										
Giant cell tumor	-	4	3	6	5	2	1	10	11	21
Osteochondroma	2	6	7	1	-	-	-	10	6	16
Aneurysmal bone cyst	-	2	2	-	-	-	-	3	1	4
Fibrous dysplasia	1	1	1	1	-	-	-	3	1	4
Solitary bone cyst	-	2	2	-	-	-	-	3	1	4
Osteoid osteoma	-	1	1	-	-	-	-	2	-	2
<b>Total</b>	3(5.8)	16(31.3)	16(31.3)	8(15.6)	5(9.8)	2(3.9)	1(1.9)	31	20	51

**Table 4:** Bone and site involvement of benign lesions

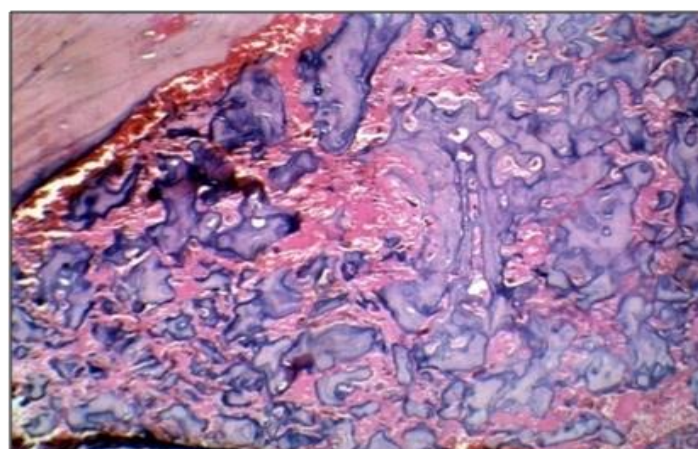
Benign lesions	Bone involved				Site		
	Femur	Tibia	Humerus	Small bones	Epiphysis	Metaphysis	Diaphysis
Giant cell tumor	13	8	-	-	15	6	-
Osteochondroma	9	5	2	-	-	15	1
Aneurysmal bone cyst	2	1	-	1	-	3	1
Fibrous dysplasia	3	-	-	1	-	1	3
Solitary bone cyst	2	-	2	-	-	4	-
Osteoid osteoma	1	1	-	-	-	2	-
<b>Total (%)</b>	30(58.5)	15(29.4)	4(7.84)	2(3.9)	15(29.4)	31(60.7)	5(9.8)

Malignant lesions of bone comprises of 11 (42.3%) cases of osteosarcoma, 9 (2.6%) cases of ewings sarcoma, 5(19.2%) cases of chondrosarcoma and 1 (3.8%) case of adamantinoma (Fig. 5). The age group between 11–20 years was more affected, but maximum number of Osteosarcoma cases was found between 21–30 years with

M: F ratio of 1.8:1, but ewings sarcoma has more commonly affected females (Table 5). The femur was the most common bone involved (69.12%) and metaphysis being the most common site. But ewings sarcoma most commonly affected diaphysis of bone (Table 6).



**Fig. 3:** Solitary bone cyst showing cyst wall with cholesterol clefts (4x)



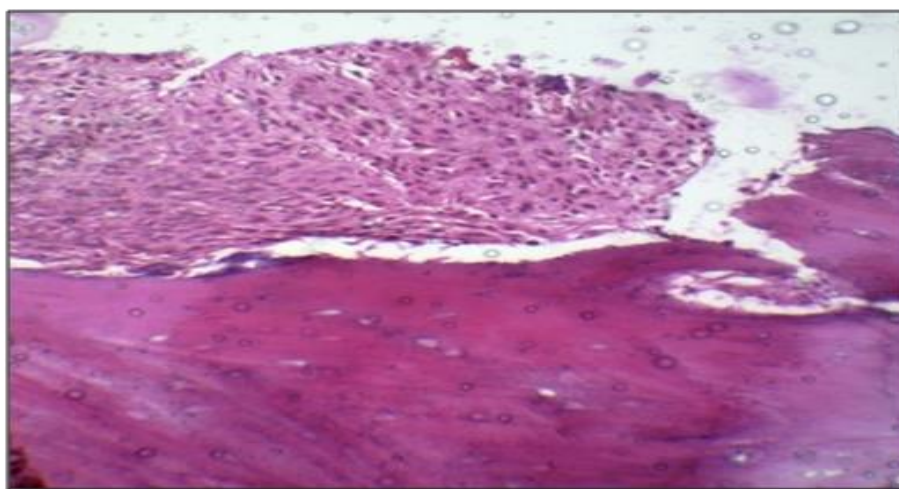
**Fig. 4:** Osteoid osteoma showing irregular trabeculae of woven bone with variable mineralization surrounded by thick sclerotic bone (10x)

**Table 5:** Age and gender distribution of malignant bone lesions

Histological subtypes	Age in years							Gender		Total
	0-10	11-20	21-30	31-40	41-50	51-60	>60	M	F	
<b>Malignant bone lesions</b>										
Osteosarcoma	-	4	5	2	-	-	-	9	2	11
Ewings sarcoma	5	3	1	-	-	-	-	3	6	9
Chondrosarcoma	-	-	-	1	1	2	1	4	1	5
Adamantinoma	-	-	-	1	-	-	-	1	-	1
<b>Total (%)</b>	5(19.2)	7(26.8)	6(23.04)	4(15.3)	1(3.8)	2(7.6)	1(3.8)	17	9	26

**Table 6:** Bone and site involvement of malignant lesions

Malignant lesions	Bone involved				Site		
	Femur	Tibia	Humerus	Others	Epiphysis	Metaphysis	Diaphysis
Osteosarcoma	8	2	1	–	–	11	–
Ewings sarcoma	7	1	1	–	–	3	6
Chondrosarcoma	3	1	–	1	1	4	–
Adamantinoma	–	1	–	–	–	–	1
<b>Total (%)</b>	18(69.1)	5(19.2)	2(7.6)	1(3.8)	1(3.8)	18(69.1)	7(26.8)

**Fig. 5:** Adamantinoma showing epithelial cell nests with hyper chromatic nucleus (10x)

## DISCUSSION

Bone lesions themselves constitute a small fraction of all the lesions prevailing in a population. It is absolutely essential to be equipped with information regarding the clinical details viz. age, gender, site and radiological findings before diagnosis of any bone lesion. Certain entities can be confused clinically like osteomyelitis and ewing's sarcoma, traumatic fracture or pathological fracture, osteoblastoma and osteosarcoma and tuberculosis or malignancy. Therefore, histological diagnosis is must in all bone lesions to differentiate above mentioned entities, to confirm the diagnosis of radiologist and clinician and to predict the prognosis of bone lesion on the basis of different cytomorphological criteria [6].

The present study was undertaken with a view to find out the incidence of bone lesions in the district area of Bagalkot and to find out common type of lesions and tumours. In the present study, bone lesions were common in the age group between 11–30 years. Males were more commonly affected than females. The femur was most common bone involved. Metaphysis was the commonest site of localization of most of bone lesion. It is similar to the study done by Patel *et al.* [2] but epiphysis was commonly involved with Giant cell tumour.

Primary bone tumors were more common than the secondaries [7-9]. Non-neoplastic and benign lesions were more common than malignant lesions. Chronic osteomyelitis was most common non-neoplastic condition affecting 16 patients (45.5%). Chronic osteomyelitis has mostly affected metaphysis of femur. Other non-neoplastic condition was tuberculous lesions in which spine was commonly affected. But the studies were done by Modi *et al.* [1] and Patel *et al.* [2] shows tuberculous lesion as common non-neoplastic bony lesions.

Benign cases were more common as compared to malignant cases similar to other studies done by Rao *et al.* [7]; Mohammad *et al.* [10] Giant cell tumor was most common benign condition in my study similar to the study done by Patel *et al.* [2] but Mohammad *et al.* [10] have got osteochondroma as the common benign lesion. The femur was commonly affected. Males were affected more than females. Others benign tumors were osteochondroma, fibrous dysplasia, aneurismal bone cyst and osteoid osteoma.

Osteosarcoma was the most common malignant tumour and affected femur in 72.7% cases. Others like Modi *et al.* [1] and Patel *et al.* [2] also reported similar findings. Other malignant bone lesions included Ewing sarcoma,

Chondrosarcoma and adamantinoma.

Ewings sarcoma was more common in age group between 0-10 years. Females were commonly affected and the femur was the most common site.

## CONCLUSIONS

Finally, we concluded that bone lesions are very common radiological finding for an orthopedic surgeon in many patients. Even an Orthopedic surgeon and radiologist together will not be able to reach to the precise conclusion and further treatment. Histopathology is the gold standard for the precise diagnosis of a very large number of conditions leading to bone lesions. All the lesions were quite consistent in their occurrence with relation to age, gender and site of distribution and show little deviation from the usual behavior in this respect. The demographic pattern and distribution of bone tumors seen at our centre are similar to those reported from other national and international studies. To achieve a high rate of accurate diagnosis of bone tumors requires joint clinical, radiological and pathological team work.

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