



## Original Article

# Histopathological evaluation of bone lesions in tertiary care centre

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### Abstract

**Objectives:** To study the histopathological features of bone lesion and correlate them with age, site and type of lesions.

**Material and Methods:** This study was undertaken in department of pathology, Dr SCGMC, Nanded for period of 3 years from November 2016-November 2019 to determine the histopathological findings in bone lesions.

**Results:** Total 60 cases were studied out of which nonneoplastic lesions comprised 32 cases (53.33%), 21 cases (35%) had benign tumors and malignant tumors accounted for 7 cases (11.66%). Bone lesions were more common in < 20 years age group (31.66%). Male to female ratio in bone lesions is 1.5:1. The most common site of bone lesion is femur (20/60), followed by tibia (15/60), humerus (11/60), radius (7/60), ulna (4/60), small bones (3/60).

**Conclusion:** The most common lesions are non neoplastic followed by benign neoplastic tumors then malignant neoplastic tumors. All are more common in younger age group with male predominance. The most common site involved is femur.

**Keywords:** Non neoplastic, neoplastic, bone lesions.

### Introduction

Bone is made of cartilage, osteoid, fibrous tissue, and bone marrow elements, with each tissue having a potential to develop a lesion either benign or malignant<sup>1</sup>. The gamut of bone lesions ranges from inflammation, degenerative changes, and metabolic diseases to neoplasm<sup>2,3</sup>. A spectrum of pathological bone lesions can be presented in any form from inflammatory to neoplastic conditions. It is important to remember, that some benign processes such as osteomyelitis can mimic malignant tumours, and some malignant lesions like metastases or myeloma, can mimic benign. It

is difficult to determine radiologically with plain film imaging whether a bone lesion is benign or malignant<sup>4</sup>. Bone tumours and tumour-like lesions occur mainly between the first and fourth decades of life. It is therefore clear that these tumours have a potentially devastating effect on the most productive segment of the population<sup>5</sup>. Neoplasms and tumour like conditions of bone are rare. Thus, orthopaedic surgeons, radiologists, and pathologists generally have little experience with these lesions. Bone lesions often pose diagnostic challenges to surgical pathologists. Therefore, an integrated approach involving radiographic,

histologic, and clinical data are necessary to form an accurate diagnosis and to determine the degree of activity and malignancy of each lesion<sup>6</sup>. Definitive clinical diagnosis of bone lesion is often difficult, so it is essential to identify the lesion correctly before deciding the line of treatment, be it simple curettement, excision surgery, amputation or irradiation<sup>7</sup>.

### Aims and Objective

To study the histopathological features of bone lesion and correlate them with age, site and type of lesions.

### Material and Methods

This study conducted in the Department of Pathology at SCGMC, Vishnupuri, Nanded over a period of 3 years from November 2016-November 2019. All the histopathological reports and slides of patients who had bone tissue biopsies were reviewed to provide relevant information on age, sex, histopathological interpretation, and the anatomical site of occurrence. All tumours of hematopoietic and odontogenic origin were excluded in this study. Bony along with soft tissue biopsy or in some cases amputated limb was received, and thorough gross examination of each lesion was done. Soft tissue of each biopsy was immediately fixed into 10% formalin and processed by paraffin embedding. Bone from each biopsy was kept for decalcification in 10% nitric acid. After that, fixation in 10% formalin, processing, section cutting and haematoxylin and eosin staining was performed.

### Results

A histopathological study of various bone lesions was carried out at a teaching hospital from November 2016-November 2019. During these 3 years, total 60 cases were studied. Nonneoplastic lesions comprised 32 cases (53.33%), 21 cases (35%) had benign tumors and malignant tumors accounted for 7 cases (11.66%).

**Table No 1:** Proportion of different bone lesions

Non Neoplastic	Neoplastic	
	Benign	Malignant
Osteomyelitis- 16	Osteochondroma-8	Mets -2
TB osteomyelitis -8	Osteoid osteoma- 4	Osteosarcoma -2
Aneurismal bone cyst- 5	Chondroblastoma- 2	Ewing sarcoma- 2
Nonossifying fibroma-1	Giant cell tumor- 7	Chordoma-1
Simple bone cyst- 2		
Total- 32	Total- 21	Total- 7

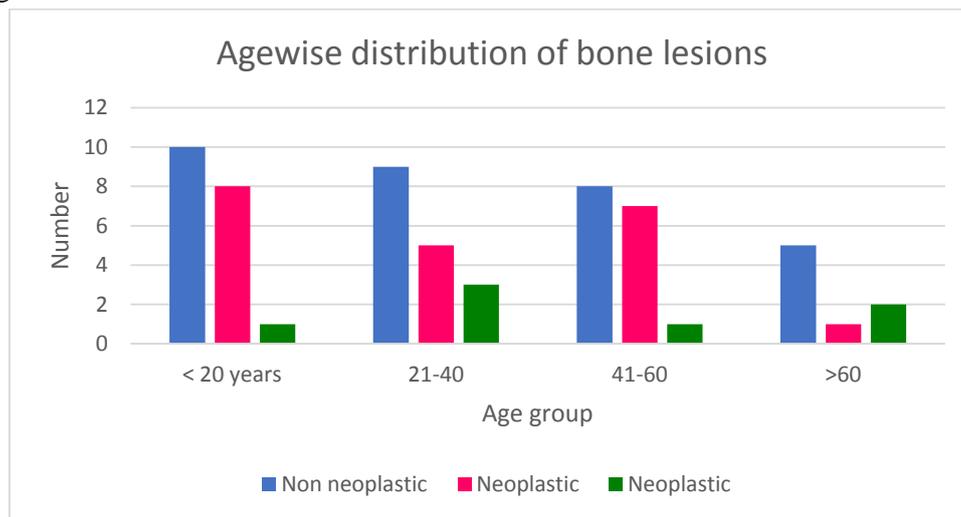
Amongst non-neoplastic lesions, chronic osteomyelitis (17 cases, 53.13%) were commonest followed by tuberculous Osteomyelitis (8 cases, 25%) and aneurysmal bone cyst (5 cases, 15.62%) while Osteochondromas (8 cases, 38.1%) was more common in the category of benign neoplastic lesions followed by giant cell tumour (7 cases, 33.33%). Osteoma (4 cases, 19%) and chondroblastoma (2 cases, 9.52%) were common neoplastic bone lesions. Among malignant tumours, sarcoma accounts for 4 cases (osteosarcoma 2, and Ewing's sarcoma 2) followed by metastatic carcinoma (2 cases), chordoma (1 cases).

**Table No 2:** Age wise distribution of bone lesions

Age (years)	Non neoplastic	Neoplastic		Total
		Benign	Malignant	
< 20 years	10	8	1	19
21-40	9	5	3	17
41-60	8	7	1	16
>60	5	1	2	8

Bone lesions were more common in < 20 years age group (31.66%).

**Graph No 1:** Age wise distribution of bone lesions

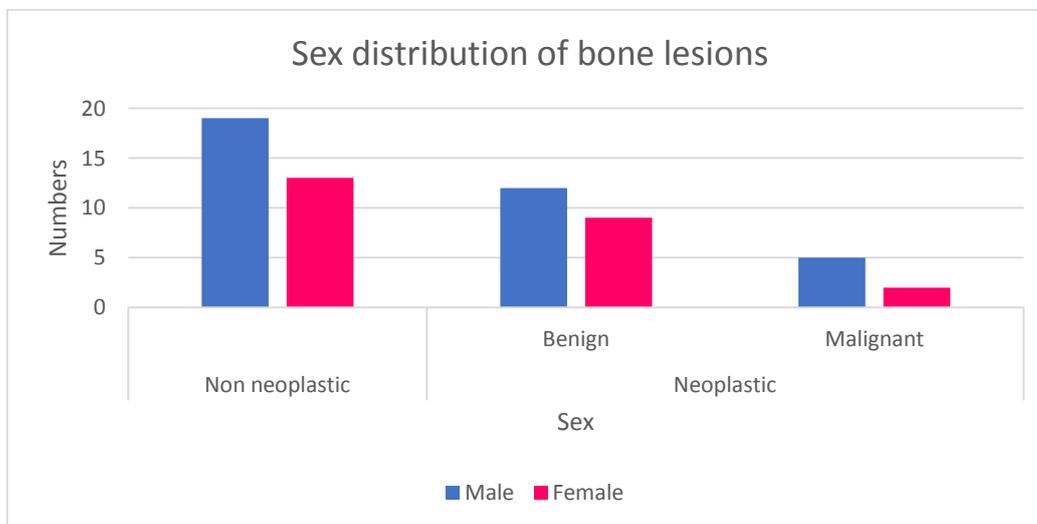


**Table No 3:** Sex distribution of bone lesion

Bone lesions	Non neoplastic	Neoplastic		Total
		Benign	Malignant	
Male	19	12	5	36
Female	13	9	2	24
Total	32	21	7	60

Males (36 out of 60 cases, 60%) were affected more commonly than females (24 out of 60 cases, 40%) with male to female ratio as 1.5:1.

**Graph No 2:** Sex distribution of bone lesion

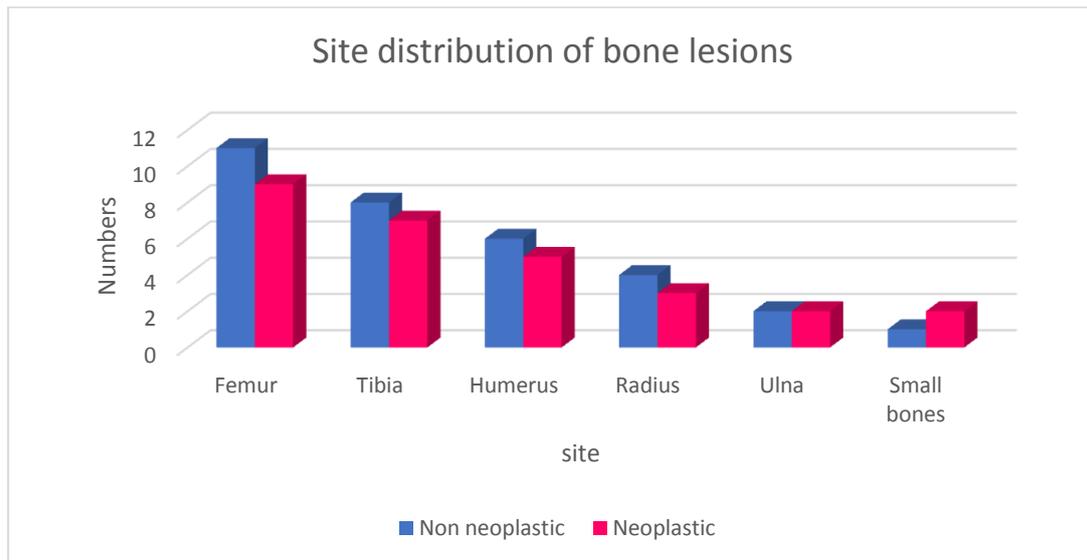


**Table No 4:** Site distribution of bone lesions

Location	Non neoplastic	Neoplastic	Total
Femur	11	9	20
Tibia	8	7	15
Humerus	6	5	11
Radius	4	3	7
Ulna	2	2	4
Small bones	1	2	3
Total	32	28	60

The most common site of bone lesion is femur (11/60), radius (7/60), ulna (4/60), small bones (20/60), followed by tibia (15/60), humerus (3/60).

**Graph No 3: Site distribution of bone lesions**



**Osteomyelitis:**

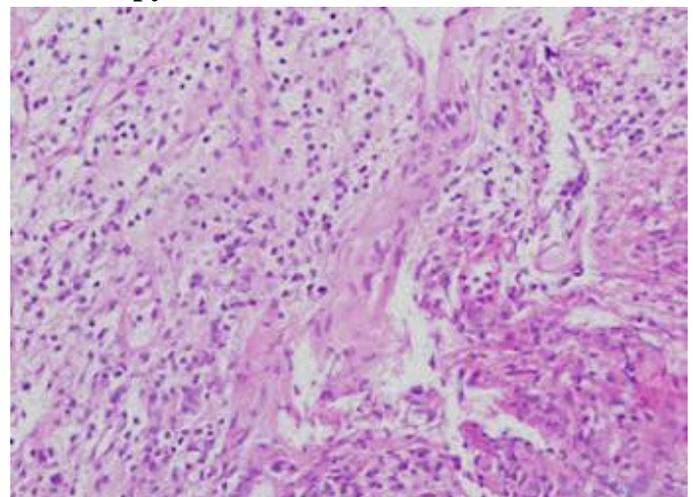


**Fig No 1(A)** (Osteomyelitis). Gross photograph of osteomyelitis of right foot.



**Fig No 1 (B)** (Osteomyelitis). X ray of osteomyelitis of right foot.

**Microscopy**



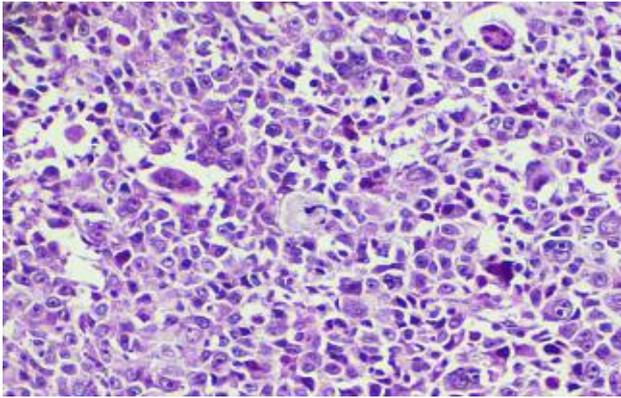
**Fig No 1 (C)** (Osteomyelitis) Section study shows inflammatory infiltrate comprised of lymphocytes, plasma cells along with fibrosis at places.

**Osteosarcoma**



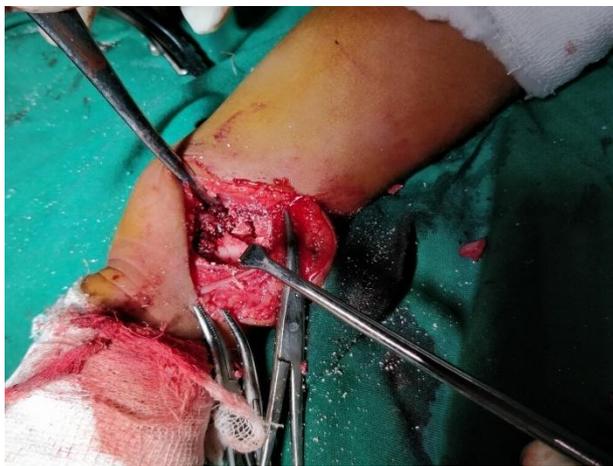
**Fig No 2 (A)** (Osteosarcoma). postoperative photograph high thigh amputation for osteosarcoma of proximal right femur.

**Microscopy**



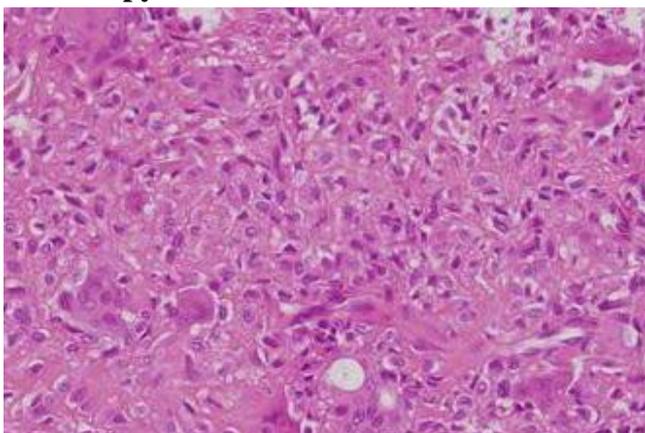
**Fig No 2 (B)** (Osteosarcoma). Section study shows atypical neoplastic hyperchromatic osteoblast along with giant cells and fibroblast.

**Chondroblastoma**



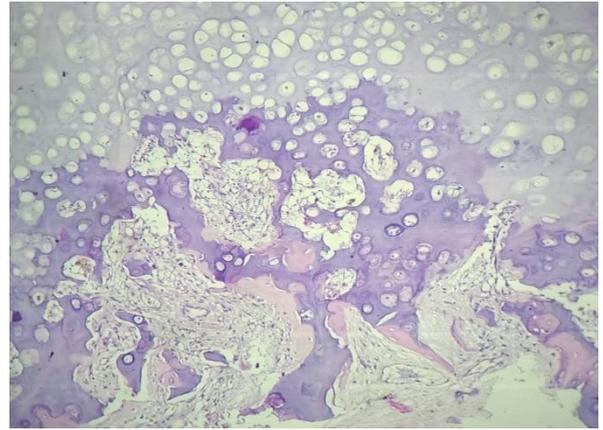
**Fig No 3(A)** (Chondroblastoma): intraoperative photograph of chondroblastoma of right distal radius.

**Microscopy**



**Fig No3 (B)** (Chondroblastoma) . Section study shows polyhedral chondroblasts with abundant pink cytoplasm and variable pigment, well defined cell borders and hyperlobulated nuclei with grooves in mineralized, chicken wire matrix that surrounds chondroblasts along with giant cells.

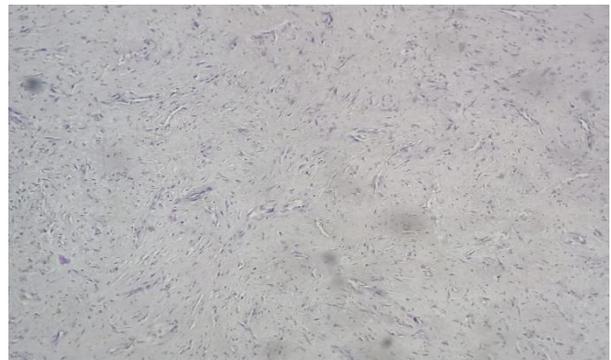
**Osteochondroma**



**Fig No 4(B)** (Osteochondroma) Section study shows mature hyaline cartilage with overlying fibrous perichondrium, transition between bone and cartilage cap resembles growth plate, showing endochondral ossification into mature bone.

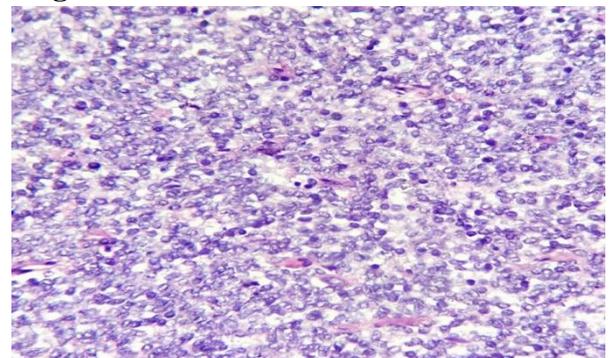
**Non ossifying fibroma**

**Microscopy**



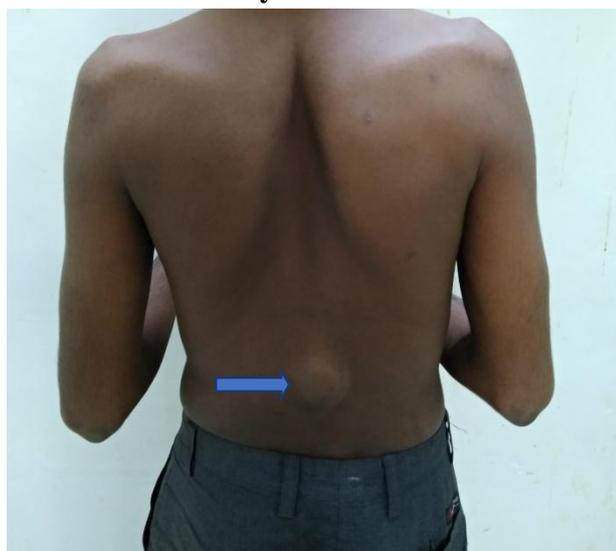
**Fig No. 5** (Non ossifying fibroma). Section study shows fibroblastic spindle cells in whirled or storiform pattern, fibroblastic connective tissue background

**Ewing sarcoma**



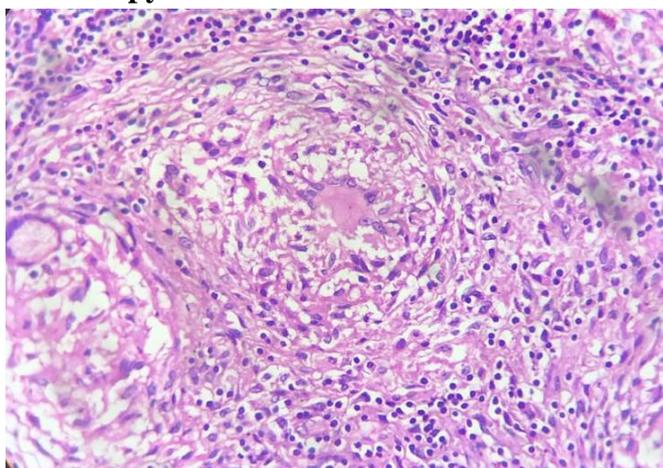
**Fig No 6.** (Ewing sarcoma). Section study shows sheets of small, round, uniform cells having round nuclei with indentations, small nucleoli with indistinct cell membranes and scant cytoplasm. At places few mitoses seen.

**Tuberculous osteomyelitis**



**Fig No 7(A).** photograph of pots spine showing bulge over lumbar spine(blue arrow).

**Microscopy**



**Fig No7 (B).**(tuberculous osteomyelitis). Section study shows occasional granulomas composed of epithelioid cells and Langhans giant cells with surrounding lymphocytes.

**Discussion**

**Table No 5:** Comparison of Age wise distribution of bone lesions

Age ( years)	V Manoja et al	Saadvi Kethireddy et al	Present study
< 20	22	20	19
21-40	14	13	17
41-60	9	8	16
>60	5	5	8
Total	50	48	60

Bone lesions were more common in < 20 years age group (31.66%) which is similar with study

done by V manoja et al (44%), Saadvi Kethireddy et al (41.66%).

**Table No 6:** Comparison of Sex distribution of bone lesions

Auther	Male	Female	Total
V Manoja et al	31	19	50
Saadvi Kethireddy et al	28	18	46
Modi D et al	68	34	102
Present study	36	24	60

Males (36 out of 60 cases, 60%) were affected more commonly than females (24 out of 60 cases, 40%) with M:F ratio as 1.5:1, which is similar with the study by V Manoja et al (M:F=1.6:1), Saadvi Kethireddy et al (M:F=1.6:1), Modi D et al (M:F=2:1).

**Table No 7:** Comparison of site distribution of bone lesions

Location	V Manoja et al	Saadvi Kethireddy et al	Present study
Femur	27(54%)	25(54.34%)	20(33.33%)
Tibia	12(24%)	11(23.9%)	15(25%)
Humerus	7(14%)	4(8.69%)	11(18.33%)
Radius	2(4%)	2(4.34%)	7(11.66%)
Ulna	1(2%)	2(4.34%)	4(6.66%)
Small bones	1(2%)	2(4.34%)	3(5%)
Total	50(100%)	46(100%)	60 (100%)

The most common site of bone lesion is femur (33.33%), which is similar with the study by V Manoja et al and Saadvi Kethireddy et al which shows most common site is femur (54% and 54.34% respectively).

**Table No 8:** Comparison of different non-neoplastic lesions of bone

Saadvi Kethireddy et al	V Manoja et al	Present study
osteomyelitis -7	Osteomyelitis -6	Osteomyelitis- 16
Tuberculous osteomyelitis -4	Tuberculous osteomyelitis-3	TB osteomyelitis - 8
Aneurysmal bone cyst-3	aneurysmal bone cyst - 2	Aneurysmal bone cyst- 5
Fibrous dysplasia- 2	Simple cyst- 1	Nonossifying fibroma-1
Simple cyst- 1	Fibrous dysplasia-1	Simple bone cyst- 2
Non-ossifying fibroma-1		
Total-18	Total-13	Total- 32

In our study the most common non- neoplastic bone lesion is osteomyelitis (16/32), followed by tuberculous osteomyelitis (8/32), aneurysmal bone cyst (5/32), simple cyst (2/32), Non-ossifying fibroma (1/32).

Which is similar with study done by Saadvi Kethireddy1 et al the most common non- neoplastic bone lesion is osteomyelitis (7/18), followed by tuberculous osteomyelitis (4/18), aneurysmal bone cyst (3/18), fibrous dysplasia (2/18), simple cyst (1/13), Non-ossifying fibroma(1/18).

According to study done by V Manoja et al which shows the most common non- neoplastic bone lesion is osteomyelitis (6/13), followed by tuberculous osteomyelitis (3/13), aneurysmal bone cyst (2/13), simple cyst (1/13), fibrous dysplasia (1/13).

**Table No 9:** Comparison of different benign tumors of bone

Saadvi Kethireddy1 et al	V Manoja et al	Present study
Giant cell tumor -12	Osteochondroma- 22	Osteochondroma- 8
Osteochondroma -6	Osteoclastoma-10	Giant cell tumor – 7
Osteoma- 3	Osteoid osteoma- 1	Osteoid osteoma- 4
Chondroblastoma-2	Enchondroma- 1	Chondroblastoma-2
Enchondroma- 2		
Total-25	Total-34	Total-21

According to our present study the most common benign neoplastic tumor is osteochondroma (8/21) which is similar with the study done by V manoja et al which shows osteochondroma (22/34). Study by Saadvi Kethireddy1 et al shows most common benign tumor is giant cell tumor (12/25).

**Table No 10:** Comparison of different malignant tumors of bone

Saadvi Kethireddy1 et al	V Manoja et al	Present study
Osteosarcoma -2	Osteosarcoma-1	Osteosarcoma -2
Ewing’s sarcoma- 1	metastasis- 1	Metastasis -2
	Ewing’s sarcoma-1	Ewing sarcoma-2
		Chordoma-1
Total- 3	Total- 3	Total- 7

Our present study shows osteosarcoma, ewing’s sarcoma and mets (2 cases each) followed by

chordoma which is similar with the study done by osteosarcoma (2/3) and osteosarcoma (1/3).

**Conclusion**

The most common lesions are non neoplastic followed by benign neoplastic tumors then malignant neoplastic tumors. Out of all the bone lesions osteomyelitis found to be most common. The most common site involved is femur. Bone lesions are more common in male than female. The histopathological examination is the gold standard to diagnose bone lesion when it is combined with relevant history and clinical data.

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