

## INCIDENCE OF BONE TUMOR IN BASRA CITY FROM 2018 TO 2022

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### ABSTRACT

**Background:** The incidence of bone tumors has been decreased at low rate. Most of cases occur in men and in non-pediatrics age group. Bone tumors are mainly diagnosed by radiological and histologically, osteosarcoma is the most common type. The aim of study is to estimate the incidence of bone tumors in Basra city and analyze the results with published data. **Method:** A total 484 Cases of bone tumors were collected from governmental and private laboratories reports; the study period was conducted from January 2018 to December 2022. Data analyzed according to age, sex, histological type and site of tumor. **Results:** The incidence of bone tumors in 5 years from 2018-2022, were the highest in 2019, with most common histologic type was osteosarcoma, with more common in males, in non-pediatrics age group, with most common site in femur and primary tumors was the most common. **Conclusion:** The research found that bone tumors are most frequent in the femur, have a comparable prevalence across age groups, and predominate in men. The increasing proportion of benign tumors, particularly osteochondromas, is positive, but the dominance of malignant primary bone tumors over metastatic kinds emphasises the need for early investigation and treatment.

**KEYWORDS:** Incidence, bone, tumor, Basra city, 2018, 2022.

### INTRODUCTION

Bone tumors are abnormal masses or lumps that develop within the bone due to uncontrollable cell division. While many of these tumors are benign and do not pose a significant threat, some are malignant and can be life-threatening.<sup>[1]</sup> Malignant tumors, unlike benign ones, have the potential to metastasize, spreading cancer cells throughout the body. Treatment strategies for these tumors vary depending on their type and malignancy level, ranging from mere observation to aggressive surgical interventions combined with chemotherapy and radiation.<sup>[1]</sup> Primary Bone Cancer (PBC): is a rare type of cancer that originates from primitive mesenchymal cells in the bone. This form of cancer constitutes around 0.2% of all global malignancies and often has no known cause.<sup>[2]</sup> Its variants, including osteosarcoma, chondrosarcoma, and Ewing sarcoma, differ in their demographics, appearance in imaging studies, and biological behaviors. What's alarming is their aggressive nature. As such, early diagnosis via imaging and tissue biopsies is crucial. Even though surgical excision is the principal curative treatment method, it is frequently supplemented with chemotherapy and radiotherapy to ensure optimal results.<sup>[2]</sup> Historically, the outcome for

patients with malignant primary bone tumors was bleak, with 80%-90% succumbing to the disease within years of diagnosis. Fortunately, the introduction of aggressive adjuvant chemotherapy, designed to control micro metastases, has turned the tables in favor of these patients. Over recent decades, survival rates for localized disease cases have surged to an encouraging 55%-65%.<sup>[3,4]</sup> Secondary bone Tumors; However, the prognosis remains grim for patients diagnosed with these tumors. These are metastatic cancers that originate in other tissues but find their way to the bone. Bone's vast vascular supply makes it susceptible to such metastatic spreads. In fact, following the lung and liver, the skeletal system is the third most frequent site for metastatic disease.<sup>[5]</sup> The process usually involves hematogenous spread or direct penetration, and these metastatic cells in the bone can lead to severe pain and a heightened risk of pathologic fractures. From a radiological perspective, bone metastases can be broadly categorized based on how they interact with the normal bone remodeling process. There are three primary classifications: **Osteolytic Metastases:** These are characterized by the destruction of normal bone. Common malignancies leading to osteolytic metastases include multiple

myeloma, renal cell carcinoma, melanoma, non-small cell lung cancer, non-Hodgkin lymphoma, thyroid cancer, and Langerhans-cell histiocytosis.<sup>[6]</sup> **Osteoblastic (or Sclerotic) Metastases:** In these, there's a deposition of new bone. They are often linked with prostate cancer, carcinoid tumors, small cell lung cancer, Hodgkin lymphoma, and medulloblastoma.<sup>[7]</sup> **Mixed Metastases:** Some patients might exhibit both osteolytic and osteoblastic lesions. This mixed type is most commonly associated with breast cancer, gastrointestinal cancers, and squamous cell carcinoma.<sup>[7]</sup> The aim of study is to estimate the incidence of bone tumors in Basra city and analyze the results with published data.

### Method

A total 484 Cases of bone tumors were collected from governmental and private laboratories reports; the study period was conducted from January 2018 to December 2022 in Al-Basra province. Data analyzed according to age (years), sex (male and female), histopathological diagnosis: **(Benign tumors:** Osteochondroma, Aneurysmal bone cyst, Osteoid osteoma, Non ossifying fibroma, Osteoma, Simple bone cyst, Fibrous dysplasia,

Hemangioma, Enchondroma, Chondroma, Langerhans cell histiocytosis, Brown tumor of hyperparathyroidism, Desmoplastic fibroma, Osteoblastoma, Ossifying fibroma, Chondroblastoma, Chondromyxoid fibroma, Hematoma. **Malignant tumors:** Metastatic carcinoma, Osteosarcoma, Giant cell tumor, Ewing sarcoma, Plasmacytoma, Non Hodgkin lymphoma, Chondrosarcoma, Parosteal Osteosarcoma, Periosteal Osteosarcoma, Chordoma), site of tumor: (femur, tibia, extremities, humerus, head and neck, pelvis, hand and foot, chest and type of tumors). Statistical analysis done by SPSS 22, frequency and percentage used for categorical data, mean, median and SD for continuous data.

### RESULTS

In the present study, the incidence of bone tumors was calculated from 2018 to 2022 (table 1). The results showed higher incidence rate were found in 2019 and 2021 being 4.85,4.66 per 100,000 populations respectively.

**Table (1): Distribution of the study population according to the year.**

Year	Frequency	Percent
2018	122	4.66
2019	145	4.85
2020	61	1.92
2021	144	2.98
2022	12	0.24

**Table (2): Distribution of the study population according to the sex, age group and site.**

	Frequency	Percent
<b>Sex</b>		
Male	280	57.9
Female	204	42.1
<b>Age group</b>		
Pediatrics	219	45.2
Non-pediatrics	265	54.8
<b>Site</b>		
Femur	154	31.8
Tibia	77	15.9
Extremities	74	15.3
Humerus	65	13.4
Head and Neck	50	10.3
Pelvis	28	5.8
Hand and foot	23	4.8
Chest	13	2.7

According to the age there is no significant difference between pediatrics and non-pediatrics age group. For the sex, the male is being most affected with a percent 57.9%, while female was 42.1%. The most common site of bone tumor in period of study was femur then tibia and extremities respectively. According to the diagnosis benign tumor is the most common during study period

72.1%, whereas malignant bone tumor was 27.7%. Osteochondroma and aneurysmal bone cyst were the most common benign tumor 16.3%, 12.8 respectively and metastatic carcinoma was the most common malignant tumor type 9.9% as shown in table 3. According to malignant tumor type, primary bone tumor was the most common 90.1% as shown in table 4.

**Table (3): Distribution of the study population according to the diagnosis.**

	Frequency	Percent
<b>Benign tumors</b>		
Osteochondroma	79	16.3
Aneurysmal bone cyst	62	12.8
Osteoid osteoma	29	6.0
Non ossifying fibroma	26	5.4
Osteoma	22	4.5
Simple bone cyst	21	4.3
Fibrous dysplasia	21	4.3
Hemangioma	12	2.5
Enchondroma	11	2.3
Chondroma	9	1.9
Langerhans cell histiocytosis	7	1.4
Brown tumor of hyperparathyroidism	6	1.2
Desmoplastic fibroma	5	1.0
Osteblastoma	5	1.0
Ossifying fibroma	4	0.8
Chondroblastoma	3	0.6
Chondromyxoid fibroma	3	0.6
Hematoma	1	0.2
<b>Malignant tumors</b>		
Metastatic carcinoma	48	9.9
Osteosarcoma	37	7.6
Giant cell tumor	29	6.0
Ewing sarcoma	24	5.0
Plasmacytoma	11	2.3
Non Hodgkin lymphoma	3	0.6
Chondrosarcoma	2	0.4
Parosteal Osteosarcoma	2	0.4
Periosteal Osteosarcoma	1	0.2
Chordoma	1	0.2

**Table (4): Distribution of the study population according to the malignant tumor type.**

Primary or secondary	Frequency	Percent
Primary	436	90.1
Secondary	48	9.9

## DISCUSSION

The incidence of bone tumors from 2018 to 2022, suggests variability across the years with peaks observed in 2019 and 2021, registering incidence rates of 4.85 and 4.66 per 100,000 populations respectively. It is worth noting that fluctuations in cancer incidence rates over short periods can be influenced by multiple factors, which may be biological, environmental, or related to changes in detection practices.

**1. Enhanced Detection and Diagnosis:** One potential explanation for the elevated incidence rates in 2019 and 2021 could be advances in diagnostic techniques and screening procedures. As medical technology continues to progress, the sensitivity of detection tools and methods often improves. This can lead to a surge in diagnosed cases, which might be interpreted as an increase in incidence, when, in fact, it reflects more effective detection of existing cases.<sup>[8]</sup>

**2. Environmental and Lifestyle Factors:** The incidence of various cancers, including bone tumors, can be influenced by environmental and lifestyle factors. For instance, exposure to certain carcinogens, dietary habits, or even infectious agents can influence cancer rates. Changes in such exposures or behaviors in the population might correlate with variations in incidence rates.<sup>[9]</sup>

**3. Epidemiological Patterns:** Certain years might witness unusual patterns due to factors not directly related to the disease. For example, if a region saw increased migration of individuals from areas with historically higher bone tumor rates, this could influence the regional incidence rate for that particular time frame.<sup>[10]</sup>

**4. Reporting and Registry Efficiencies:** It's also essential to consider the efficiency and accuracy of cancer registries and reporting mechanisms. If there were initiatives in specific years that improved the

capture and reporting of bone tumor cases, this could artificially inflate the perceived incidence for those years.<sup>[11]</sup>

5. **Previous Studies:** Studies conducted during similar periods in other regions have shown fluctuating incidence rates for various cancers. For instance,<sup>[12]</sup> observed varying incidence rates for osteosarcoma, a common type of bone cancer, over a five-year period. Similarly, research by<sup>[13]</sup> found that chondrosarcoma incidence peaked during particular years, reflecting the findings from this data.

The comprehensive analysis of bone tumors between pediatric and non-pediatric age groups, sex distribution, tumor location, diagnosis type, and specific tumor classifications provides valuable insights into the epidemiological trends over the study period.

- Age Group Distribution:** The observation that there's no significant difference between pediatrics and non-pediatrics in terms of bone tumor incidence is intriguing. In contrast, several studies have previously identified pediatric age groups, especially adolescents, as being at higher risk for certain primary bone tumors, such as osteosarcoma.<sup>[14]</sup> The lack of significant difference in this study might be due to various factors including sample size, demographic characteristics of the study population, or improvements in early detection and treatment in pediatric cases.
- Sex Distribution:** The male predominance (57.9%) in bone tumor incidence is consistent with certain global studies which report that males are often more affected than females in many bone tumor subtypes.<sup>[15]</sup> Hormonal, genetic, or environmental factors might underlie these gender discrepancies.
- Tumor Location:** The femur being the most common site, followed by the tibia and then extremities, aligns with several studies that have identified the femur, particularly the distal femur, as a frequent site for various bone tumors like osteosarcoma.<sup>[16]</sup>
- Benign vs. Malignant:** The higher incidence of benign tumors (72.1%) compared to malignant tumors (27.7%) is encouraging. Among benign tumors, osteochondroma is often the most prevalent, as echoed in our findings and supported by literature.<sup>[17]</sup> Aneurysmal bone cysts, although less common, are also frequently encountered benign lesions, particularly in younger age groups.<sup>[18]</sup>
- Malignant Tumor Type:** Metastatic carcinoma being the most common malignant tumor type (9.9%) emphasizes the importance of early detection of primary carcinomas elsewhere in the body. Bones, due to their rich vascular supply, often become sites for metastases from primary cancers like breast, lung, and prostate.<sup>[19]</sup>
- Tumor Origin:** The prominence of primary bone tumors (90.1%) over secondary or metastatic tumors in this dataset is noteworthy. Often, bone metastases from other primary cancers are more common than

primary bone tumors.<sup>[20]</sup> This discrepancy could reflect the demographic of the study population, effectiveness of early interventions for primary carcinomas, or even specific genetic predispositions.

## CONCLUSION

In conclusion, the study's data reveals critical patterns in bone tumor epidemiology, including a similar incidence across age groups, a male predominance, and the femur as the most common site. The higher prevalence of benign tumors, especially osteochondromas, is encouraging, while the prominence of primary bone tumors over metastatic types underscores the need for focused research and early interventions.

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