

# Primary Malignant Bones Cancers in Cote d'Ivoire: Epidemiological and Histopathological Aspects

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## Abstract

Primary bones cancers are rare and ubiquitous malignant tumors. **Aim:** Our study aimed to describe the epidemiological and histopathological aspects of primary malignant bone cancers in Ivory Coast. **Material and method:** This is a retrospective and descriptive study of primary malignant bone cancers diagnosed over the period 1990 to 2013 (24 years). The studied parameters were: epidemiological aspects (frequency, age, sex, topography) and histological aspects. **Results:** Over the study period, primary malignant bone cancers accounted for 1.93% (n = 228) of cancers. The average age was 27.02 years with extremes of 2 and 85 years. The sex ratio was 1.65. They were in the skull and maxilla in 43.9% (n = 105), lower limbs (23.8%), spine and ribs (19.8%), pelvis (5.3%) and upper limbs (2.3%). The clinic was dominated by pain and alteration of general state. Radiology was variable depending on the histological type. In children, primary malignant bone cancers were found in the maxillary (77.9%) and the lower limb (15.8%). Burkitt's lymphomas represented 36.4% (n = 66) of the histological types followed by 22.4% osteosarcomas (n = 51). In adults at histology, sarcomas were the most common (10%), followed by cancers of the hematopoietic and lymphatic organs (8.09%). **Conclusion:** Primary malignant bone cancers are rare in Ivory Coast. They most often affect male children with maxillofacial involvement and predominant lower extremity. Burkitt's lymphoma and osteosarcoma are the often diagnosed histological types.

## Keywords

Cancers, Bones, Epidemiology, Histopathology, Cote d'Ivoire

## 1. Introduction

Primary bones cancers are relatively rare malignant tumors, mainly affecting the big child, the adolescent and the young adult. They represent about 0.2% of adult cancers and 5% of childhood cancers [1] [2].

Their diagnosis is usually based on anatomopathological examination correlated with clinical and radiographic data. These cancers prognosis is often fatal in most countries. Current multidisciplinary therapeutic strategies have improved the prognosis over the last twenty years in developed countries [1] [3].

In Africa, and particularly in Ivory Coast, the health priority remains endemic and epidemic diseases (yellow fever, malaria and today HIV infection). Yet for decades some authors [4] [5] have issued alerts on the extent of the general cancer pathology in our country.

In the West [6], malignant bone tumors are dominated by multiple myeloma. Among malignant bone tumors Daboiko, Nzué [7] [8] point out that bone metastases seem more common than primitive malignant bone tumors. The true incidence of malignant bone tumors primitive seems to be poorly known in Côte d'Ivoire because no studies have been reported so in recent years.

In carrying out this study, we set ourselves the objective of contributing to the optimal management of primary bone cancers in Côte d'Ivoire by describing their epidemiological and histopathological aspects.

In carrying out this study, we had an objective to contribute to the optimal management of primary malignant bone cancers in Cote d'Ivoire by describing their epidemiological and histopathological aspects.

## 2. Material and Method

This is a retrospective and descriptive study carried out in the pathological anatomy laboratories of the Abidjan Universities Hospitals (UHs) in collaboration with three other departments (traumatology, maxillofacial stomatology and rheumatology). This was a retrospective and descriptive study on histologically confirmed cancers and identified from the different registers of pathological anatomy laboratories of the three Abidjan UHs and PISAM. The study period was 24 years (January 1990 to December 2013).

It dealt with the primary cancers of the bones histologically diagnosed and recorded from the logbooks of these services. The study period was 24 years (January 1990 to December 2013).

From the registers survey form has been pre-established for the datacollection. The following information was systematically collected: the epidemiological aspect, the clinical and radiological characteristics, the sample (nature, site, hospital and department requesting the examination) and the histological diagnosis.

The diagnosis of primary bone tumor was made from clinical, radiological, biological and histological findings were tained only primary malignant tumor records with histological confirmation regardless of age, sex and bone location.

Benigntumors and secondary bone localization of osteophyle cancers (bone

metastases) have been excluded the samples were previously fixed with 10% formalin and decalcified according to the usual protocol. Then, they were subjected to standard paraffin embedding, microtome cutting, and Hematoxylin-Eosin staining techniques. In some cases, the immunohistochemistry technique was performed in some wards in France or in North Africa to refine the diagnosis (lymphomas, Ewing's sarcoma and rhabdomyosarcoma). The diagnosis of various malignant tumors and their classifications by apparatus are in accordance with the International Statistical Classification of Tumors proposed by WHO in 1993 (ICD-10). Data processing was done using the SPSS version 2013 software. the parameters taken into account were sociodemographic, clinical, radiological, and histological diagnosis.

### 3. Results

#### 3.1. Frequency

During the study period, we recorded 272 malignant bone tumors cases, of which 228 were primitive.

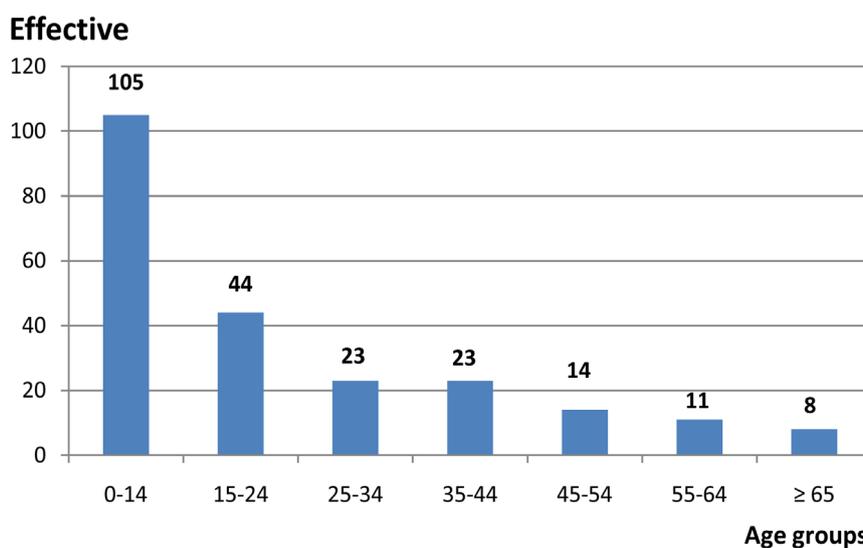
Malignant bone tumors represented 1.93% of all cancers. Among the bone cancers identified, 83.8% were primary malignant cancers and 16.1% were bone metastases.

The annual frequency was 9.5 cases with a frequency peak in 1995 (n = 19 cases).

#### 3.2. Age and Sex

Male subjects represented 62.3% of cases (n = 142), then a sex ratio of 1.65. The patients' average age was 27.02 years with extremes of 2 years and 86 years. The 0 to 14 age group was the most affected with a rate of 46.1% of cases (n = 105).

**Figure 1** shows data for different age groups. In 91.66% of cases the patients are



**Figure 1.** Distribution of primary bone cancers by age group.

under 55 years old.

### 3.3. Topography

The primary malignant bone cancers different localizations were: maxillary and skull (48.7%, n = 111) lower limbs (24.1%, n = 55), spine and ribs (19.7%, n = 45), pelvis (5.3%, n = 12) and upper limbs (2.2%, n = 5). **Figure 2** shows data for different age groups.

In the lower limb these tumors are around the knee in 92.72% of cases.

### 3.4. Clinical and Radiological Aspect

The clinic was dominated by pain and alteration of the general state. Radiology quite variable depending on the histological type.

### 3.5. Histological Type

Burkitt's lymphoma was the most common histological type with 39% of cases (n = 89) followed by osteosarcoma (22.4%), malignant non-Hodgkin's lymphoma (11%) and chondrosarcoma (7.5%).

#### 3.5.1. Correlation of Histological Type According by Topography

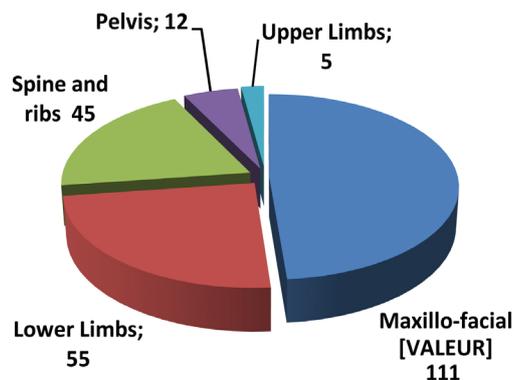
Burkitt's lymphomas were present in 91% cases (n = 81) on the maxillary and skull. Osteosarcomas were localized in the lower limbs in 76.5% of cases (n = 39).

The distribution of the different histological types according to the topography is reported in **Table 1**.

#### 3.5.2. Correlation of Histological Type According to Age Group

Burkitt's lymphomas were most often diagnosed in children (0 - 14 years) at a rate of 31.2% (n = 71). Osteosarcomas were observed in the age group 15 - 24 years (33.3% of cases).

Non-Hodgkin's malignant lymphomas without other indications and osteosarcomas were common in the age groups 0 - 14 years and 15 - 24 years, respectively, with proportions of 36% and 47% of cases.



**Figure 2.** Distribution of primary bones cancers localizations.

**Table 1.** Correlation of histological types by topography.

Histological types	Topography					Total	%
	Maxillo-facial	Lowerlimbs	Spine and ribs	Pelvis	Upperlimbs		
Burkitt's lymphoma	81	1	7	0	0	89	39.0
Osteosarcoma	5	39	4	2	1	51	22.4
NHL with large cell	13	0	8	3	1	25	11.0
Chondrosarcoma	5	2	8	2	0	17	7.5
Rhabdomyosarcoma	1	4	1	1	0	7	3.1
Multiple myeloma	1	0	12	1	0	14	6.1
Plasmocytoma	1	0	4	1	0	6	2.6
Ewing's sarcoma	0	3	0	0	1	4	1.8
Fibrosarcoma	0	2	0	1	1	4	1.8
NHL with small cell...	1	0	1	1	0	3	1.3
Indifferentiated sarcoma	1	1	0	0	1	3	1.3
Synovial sarcoma	0	2	0	0	0	2	0.9
Neuroblastoma	1	1	0	0	0	2	0.9
<b>Total</b>	111	55	45	12	5	228	100

**Table 2** reports the correlation between histological types and age groups.

## 4. Discussion

Our present study aim was to describe the epidemiological and histopathological aspects of primary bone cancers in Ivory Coast by analyzing the medical records of our patients treated for primary malignant bone tumors (PMBT).

The limit of our study is its retrospective nature; however, although the results do not provide national statistics, they provide a basis for future studies on bone tumors. Our study is distinguished by the large sample size which gives this study some value to comment on.

### 4.1. Epidemiology

The incidence of PMBT is very variable from one country to another or from one continent to another [9].

If in Europe and America developed countries it is high, in Asia it seems weak [10] as was the case in our study.

Daboiko *et al.* [8] in Ivory Coast and Omololu [11] in Nigeria also point out this low incidence compared to malignant bone tumors secondary. On the other hand Bahebeck *et al.* [12] reported a high frequency of PMBT (45%) in his series in Cameroon. In our series the actual frequency can not be accurately estimated because of the lack of national registry on bone tumors.

The average age of 27.02 reported in this work is comparable to those of bana *et al.* [9] and ibrahima [13].

**Table 2.** Correlation between histological types and age groups.

Histological type	Age groups (year)							Total	%
	0 - 14	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	≤65		
Burkitt's lymphoma	71	12	5	1	0	0	0	89	39.0
Osteosarcoma	16	17	8	5	1	2	2	51	22.4
NHL with large cell	9	3	2	4	2	3	2	25	11.0
Chondrosarcoma	2	8	3	1	2	1	0	17	7.5
Rhabdomyosarcoma	2	3	1	1	0	0	0	7	3.1
Multiple myeloma	0	0	0	6	5	2	1	14	6.1
Plasmacytoma	0	0	1	3	1	1	0	6	2.6
Ewing's sarcoma	1	1	1	1	0	0	0	4	1.8
Fibrosarcoma	0	0	0	1	1	1	1	4	1.8
NHL with small cell...	0	0	0	0	0	1	2	3	1.3
Indifferentiated sarcoma	2	0	1	0	0	0	0	3	1.3
Synovial sarcoma	0	0	1	0	1	0	0	2	0.9
Neuroblastoma	2	0	0	0	0	0	0	2	0.9
Ameloblastic carcinoma	0	0	0	0	1	0	0	1	0.4
<b>Total</b>	<b>105</b>	<b>44</b>	<b>23</b>	<b>23</b>	<b>14</b>	<b>11</b>	<b>8</b>	<b>228</b>	<b>100</b>

NHL: Non-Hodgkin's lymphoma.

All [9] [12] [14] agree to recognize as Triffaud [15] that the affection occurs in 50% of cases during the 2nd decade of life and in 60% of cases in the man. The male predominance found in our series and that of Effi *et al.* [16] corroborates this statement.

We noticed that only 8.34% of PMBT occur after 55 years. This finding converges with the results of some authors who emphasize instead a clear predominance of bone metastases after 50 years [12] [17] [18].

It follows that in children, adolescents, and young adults, a malignant bone tumor is often primitive [13] [17] [19]. In fact 91.66% of patients were under 55 years old in our series.

## 4.2. Histology

On 228 bone tumor cases collected in our study, primary bone malignant cancers were dominated by Burkitt's lymphoma (89 cases, 39%) and osteosarcoma (51 cases, 22.4%), non Hodgkin's malignant lymphomas without further indication (28 cases, 12.3%) and chondrosarcomas (17 cases, 7.5%).

Osteosarcoma is the second leading cause of PMBT with 22.4% of cases after Burkitt's lymphoma. These results contrast with those of Togo where Kakpovi *et al.* [17] found 34 myeloma cases and 9 osteosarcoma cases in 166 primary malignant bone tumors (PMBT) cases.

In Mexico, Weber *et al.* [20] found a higher frequency of osteosarcoma on Ewing tumors and chondrosarcoma. In Mexico, Baena-Ocampo *et al.* [21] found in their series of malignant bone tumors in order of decreasing frequency, os-

teosarcoma (46.6%), chondrosarcoma (8.7%) and multiple myeloma bones (8.1%). On the contrary, in India, over 5 years, Yeole *et al.* [22] found in terms of frequency related to primary malignant tumors a predominance of Ewing's sarcoma in front of chondrosarcoma and osteosarcoma. In Nigeria, Abdulkareem *et al.* [23] Lagos found a clear predominance of osteosarcoma in the 77 cases of bone tumors collected. These results confirm the variable incidence of osteosarcoma according to the type of population.

Following literature [19], osteosarcoma and Ewing's tumor constitute about 90% of all malignant bone tumors in children. Our results are different because they are Burkitt's lymphoma and osteosarcoma, which predominate respectively 67.61% and 15.23% of cases in children.

For Segbena *et al.* [24] Burkitt's lymphoma accounts for 73.7% of malignant lymphomas and 45.9% of childhood cancers.

In the literature, Burkitt's lymphoma is likely to be the first malignant tumor of children in sub-Saharan Africa [16] [24] [25].

This preferential predilection in children is explained by the contributing factors described by several authors: precarious socio-economic conditions (malnutrition, poor hygienic conditions, promiscuity) geographical location, acquired immune deficiency states (infections with Epstein's virus)-Barr, HIV infection) or hereditary [26] [27] [28].

In our series in adults with histology, sarcomas were the most frequent (10%), followed by cancers of the hematopoietic and lymphatic organs (8.09%). However, Ando *et al.* [19] present that chondrosarcoma is the second most common type of primary bone tumor in adults after osteosarcoma. Chondrosarcoma, represented the fourth with 7.5% of cases, 58.82% of which affected the age group of 0 - 24 years. However, according to the literature, they are exceptional in children since only 3.8% of chondrosarcomas occur before age 20 [19].

Ewing's tumor represents only 1.8% of the cases in our series. This low incidence is in agreement with the literature [19] which emphasizes that Ewing's tumor appears to be 9 times more common in white skin subjects compared to black skin subjects even if, apart from this, there is no factor favoring the occurrence was clearly incriminated.

Finally in our series the histological types in the upper limb and pelvis were mainly sarcomas and lymphomas; (Table 1) making then a singularity.

## 5. Conclusions

Primary bone cancers are rare in Ivory Coast. At the end of this work, the profile of PMBT in Ivory Coast is that of a male child, from a socio-economic background who consults for maxillofacial tumefaction or lower limb evolving in a chronic mode. The clinical picture was dominated by pain and alteration of the general state. Radiology is quite variable depending on the histological type.

Burkitt's lymphoma and osteosarcoma are the often diagnosed histological types they most often affect male children with maxillofacial involvement and

predominant lower extremity.

### Conflict of Interests

The authors declare that they have no competing interests.

### Author's Contributions

All the authors contributed of the writing of this manuscript and have read and approved the final version.

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