



### Malignant Childhood Solid Tumours in Benin City, Nigeria

*Les tumeurs solides malignes enfance au Bénin City, Nigeria*

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#### ABSTRACT

**BACKGROUND:** Tumours are uncommon in childhood; malignancies are even more uncommon. Yet malignancies are among the leading causes of childhood death in many parts of the world. The pattern of these tumours in Benin City Nigeria, however, is not known.

**OBJECTIVE:** To describe the pattern and histological types of childhood tumours in a Nigerian teaching hospital.

**METHODS:** All histologically diagnosed cases of malignant solid tumours in children less than 15 years of age seen over a 10-year at the University of Benin Teaching Hospital (UBTH) Benin City of southern Nigeria were analysed in order to determine their histological patterns.

**RESULTS:** Eighty-four cases of malignant tumours were seen during the 10-year period (1993–2002) in children less than 15 years of age at the UBTH Benin City. Forty-nine (50.3%) cases occurred in males and 35 (41.7%) in females. There was a decline in the frequency of childhood cancer with increasing age. The histological types, in descending order of frequency, were lymphoma 28 (33.3%), nephroblastoma 18 (21.4%), retinoblastoma, rhabdomyosarcoma 12 (14.3%) each, and carcinoma 9 (10.7%). The head and neck region was the commonest location for all the various histological types (except tumours arising from tissues specific to other regions e.g. nephroblastoma). About 40% of all tumours occurred in the head and neck compared to 32% that occurred in the abdomen.

**CONCLUSION:** Malignant childhood solid tumour pattern in Benin City Nigeria is similar to that observed in other third world countries. *WAJM* 2009; 28(4): 222–226.

**Keywords:** Childhood, tumours, malignant, histological pattern.

#### RÉSUMÉ

**CONTEXTE:** Les tumeurs sont rares dans l'enfance; tumeurs malignes sont encore plus rares. Pourtant, des tumeurs malignes sont parmi les principales causes de décès chez les enfants dans de nombreuses régions du monde. Le motif de ces tumeurs au Bénin City Nigeria, toutefois, n'est pas connue.

**OBJECTIF:** Décrire la structure et les types histologiques des tumeurs chez l'enfant dans un hôpital universitaire nigérian.

**MÉTHODES:** Tous les histologiquement diagnostiqué des cas de tumeurs malignes de l'enfant de moins de 15 années d'âge vu au-dessus de 10 ans à l'Université du Bénin à l'hôpital universitaire (UBTH) Bénin ville du sud du Nigeria ont été analysées afin de déterminer leurs modes histologiques.

**RÉSULTATS:** Quarante-neuf cas de tumeurs malignes ont été observées au cours de la période de 10 ans (1993–2002) chez les enfants de moins de 15 ans au moment de la Ville Bénin UBTH. Quarante-neuf (50,3%) cas sont survenus chez les mâles et 35 (41,7%) chez les femelles. Il ya eu une baisse de la fréquence des cancers de l'enfant avec l'âge. Les types histologiques, par ordre décroissant de fréquence, étaient lymphome 28 (33,3%), néphroblastome 18 (21,4%), le rétinoblastome, rhabdomyosarcome 12 (14,3%) chacun, et le carcinome 9 (10,7%). La tête et du cou est l'endroit les plus communes pour tous les types histologiques (à l'exception des tumeurs provenant de tissus spécifiques à d'autres régions, par exemple néphroblastome). Environ 40% de toutes les tumeurs sont survenues dans la tête et du cou, contre 32% qui ont eu lieu dans l'abdomen.

**CONCLUSION:** la petite structure de tumeurs malignes solides au Bénin City Nigeria est similaire à celle observée dans les pays du tiers-monde. *WAJM* 2009; 28(4): 222–226.

**Mots-clés:** l'enfance, les tumeurs malignes, modèle histologique.

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Abbreviations: ICD, International Classification of Diseases; UBTH, University of Benin Teaching Hospital.

## INTRODUCTION

About one out of every two persons in third world countries is a child under the age of 15 years, whereas this group constitutes about one of every five persons in advanced countries.<sup>1,2,3</sup> Childhood diseases, of which cancer is one, produce considerable social and economic stresses on the immediate family of the patient and the society at large. Indeed a significantly high proportion of morbidity and mortality in the society is accounted for by the paediatric age group.<sup>4</sup> In industrialised countries, cancer is the leading cause of death in childhood<sup>5-7</sup> and it has been observed that in several parts of Africa, cancer is emerging as a significant paediatric problem,<sup>8-10</sup> being the fourth leading cause of childhood death in Nigeria.<sup>11</sup>

Just as the rates of malignant childhood tumours differ in different countries, ranging from 2% of malignancies in the United Kingdom<sup>12</sup> to 10% in some African countries<sup>13,14</sup> so do the histological types encountered in different age groups vary from one geographic region to another.<sup>9,15,16</sup> The tumour pattern in Benin City Nigeria, however, is not known. This study, was therefore, undertaken to describe the frequency and histological types of such tumours as seen in the Histopathology department of University of Benin Teaching Hospital (UBTH), Benin City. It is hoped that our findings will contribute to the pool of knowledge and enhance the practice of paediatric pathology in our environment. The results may also help clinicians to be aware of the common tumours to expect in this age group in Benin and environs where only few hospitals have access to histopathological facilities.

## SUBJECTS, MATERIALS, AND METHODS

Histologically diagnosed cases of tumours in children less than 15 years over a 10-year period (January 1993 to December 2002) constituted the materials for the study. These were specimens of tumours in childhood received in the Histopathology Department of UBTH, Benin City. This centre serves the Teaching Hospital and also receives

specimens from other hospitals in the city and parts of the South-East, South-West and Niger Delta Zones of Nigeria. The pathology request cards were retrieved in order to obtain data on age, sex, and other relevant information. The original slides were retrieved and examined histologically. Fresh sections from archival blocks were made where original slides could not be found and stained with haematoxylin and eosin. Other special stains such as periodic acid Schiff, reticulin and phosphotungstic acid haematoxylin were employed as necessary. All slides were reviewed using standard light microscopy and the neoplasms classified based on the International Classification Scheme for Childhood Cancer<sup>17</sup> and the International Classification of Diseases for Oncology (ICD-O).<sup>18</sup>

## RESULTS

Between January 1993 and December 2002, 9494 surgical specimens were received in the Department of Histopathology, UBTH out of these 3309 (34.0%) were neoplastic lesions. 193 (5.9%) of these neoplasms occurred in children less than 15 years, of which 160 of the One hundred and ninety three tumours met the criteria for inclusion in the study. Thirty-three (17.1%) were excluded for reasons of unavailable blocks and slides. Malignant tumours

made up 84 (52.5%) of the 160 neoplasms with the rest (47.5%) being benign tumours. Table 1 shows the distribution of the various histological types of malignant tumours by age and sex.

The most common histological group of malignant tumours in this study was lymphoma, which constituted 28 (33.3%) of malignancies seen, with a male to female (M:F) ratio of 1:1. There was a preponderance of non-Burkitt, non-Hodgkin's lymphoma, which accounted for 15(53.6%) of the lymphomas seen. Fourteen of these cases were lymphoblastic lymphomas, while the remaining case was a large cell lymphoma. There were 11(39.3%) cases of Burkitt's lymphoma. Only two cases (7.1%) of Hodgkin's lymphoma were recorded. The majority of lymphomas (53.6%) occurred in the 5-9 years age group.

Next in order of frequency was nephro-blastoma, which accounted for 18(21.4%) of malignancies. Ten of these occurred in males and eight in females giving a M:F ratio of 1.3:1. A decreasing frequency with advancing age was observed as 11(61%) of these tumours occurred in the pre-school age group, six cases in the 5-9 years age bracket while the 10-14 years age group recorded only one case.

Retinoblastoma and rhabdomyosarcoma were the next most frequent malignant tumours recorded in this study.

**Table 1: Age and Sex Characteristics of Children with Malignant Tumours**

Tumour Type	Number			Number by Age Group			
	Male	Female	M:F	0-4	5-9	10-14	Total (%)
Lymphoma	14	14	1:1	5	15	8	28(33.3)
Non-Hodgkin, non-Burkitt's	8	7	1.1:1	3	5	7	15
Burkitt's	5	6	0.8:1	2	7	2	11
Hodgkin	1	1	1:1	-	-	2	2
Nephroblastoma	10	8	1.3:1	11	6	1	18(21.4)
Retinoblastoma	4	8	1:2	10	1	1	12(14.3)
Rhabdomyosarcoma	10	2	5:1	4	3	5	12(14.3)
Carcinomas	6	3	2:1	1	1	7	9(10.7)
Nasopharyngeal carcinoma	5	-	5:0	-	-	5	5
Mucoepidermoid carcinoma	1	1	1:1	-	-	2	2
Adenocarcinoma	-	1	0:1	1	-	-	1
Malignant melanoma	-	1	0:1	1	-	-	1
Osteogenic sarcoma	3	-	3:0	1	-	2	3 (3.6)
Neuroblastoma	2	-	2:0	1	-	1	2 (2.4)
<b>Total</b>	<b>49</b>	<b>35</b>	<b>1.4:1</b>	<b>33</b>	<b>26</b>	<b>25</b>	<b>84(100.0)</b>

Each accounted for 12(14.3%) of the malignant tumours. Retinoblastoma was preponderant in females (8 out of 12) with a male to female ratio of 1: 2. The majority 10(83%) were found in the 0–4 year's age group. Rhabdomyosarcoma occurred predominantly in males (M: F ratio 5:1), with a peak incidence in the 10–14 years age bracket. Ten (83.3%) of the rhabdomyosarcomas were embryonic, while one case each (8.3%) was alveolar and pleomorphic.

Carcinomas occurred in nine children with a male to female ratio of 2:1. Five cases were nasopharyngeal carcinomas, two were mucoepidermoid carcinomas of the salivary gland, and there was a case each of adenocarcinoma of the small intestine and malignant melanoma of the skin. A rarity of carcinomas before the age of ten years was noted as seven cases (out of 9) were found in children aged 10–14 years. Other malignancies found in this study included osteogenic sarcoma (three cases) and neuroblastoma (two cases). They all occurred in males and accounted for 3.6% and 2.4% of malignancies respectively.

On the whole, Table 1 shows a slight male preponderance for malignancies. Males accounted for 58.3 % cases (49 out

of 84), with a male to female ratio of 1.4:1. A decline in frequency of malignancies with advancing age was also observed with the highest frequency of 33 out of 84 (39.3%) occurring in the 0–4 years age group, 26 (31%) in the 5–9 years age group and 25 (29.7%) in the 10–14 years age group.

Table 2 shows that malignancies were most common in the head and neck region of the body. Thirty-four head and neck malignancies were recorded accounting for 40.5% of cases. These included all the 12 cases of retinoblastoma encountered in this study, seven (out of 11) cases of Burkitt's lymphoma presenting as jaw masses and seven carcinomas (five nasopharyngeal carcinomas and two mucoepidermoid carcinomas of the salivary gland). The head and neck region was also the commonest site for rhabdomyosarcoma. It harboured four of the 12 cases recorded in this study. Other malignant tumours found in this body region included non-Hodgkin's lymphoma (two cases), one case each of Hodgkin's lymphoma and neuroblastoma.

Twenty-seven (32.1%) malignancies found in the abdomen in this study made this region the second most common anatomical region to be involved with

childhood malignant tumours. Common abdominal malignant tumours included all the 18 cases of nephroblastoma, three ovarian Burkitt's lymphomas, three cases of rhabdomyosarcoma (all occurring in the bladder) and the only case of adenocarcinoma, which presented as an ileal polyp in a seven-year-old girl. There was also a case each of retroperitoneal neuroblastoma and non-Hodgkin's lymphoma involving the mesenteric lymph node.

The lower limb followed the abdomen in order of frequency of involvement by malignancies. There were seven (8.3%) malignant childhood tumours in this region. These included three non-Hodgkin's lymphoma and one Burkitt's lymphoma, all involving inguinal lymph nodes and one rhabdomyosarcoma involving the thigh. Two of the three osteogenic sarcomas in this present study involved the femur.

There was only one case of upper limb malignancy (rhabdomyosarcoma) and none in the thorax in this study while the anatomical region of 15 (17.9%) cases was not specified.

## DISCUSSION

A total of 84 histologically confirmed malignant childhood solid tumours received in the University of Benin Teaching Hospital (UBTH) over a 10-year period were reviewed in this study. This gave an average of eight cases per year. The male to female ratio of 1.4:1 obtained in this study is similar to those obtained by workers in Nigeria and other parts of Africa, which show an overall male predominance for childhood cancer.<sup>5,17-19</sup>

Female preponderance, however, is noted for childhood malignancies in Senegal.<sup>20</sup>

The common malignancies in this series were lymphoma, nephroblastoma, retinoblastoma and rhabdomyosarcoma. Although there are variations in their relative frequencies, they were also the most common childhood malignancies reported from other parts of Nigeria.<sup>9</sup> Lymphoma, with a relative frequency of 33.3%, a male to female ratio of 1:1 and a peak incidence in the second quinquennium of life, was the most common histological type of malignant tumour in this study. It is also the most common malignant solid tumour in other

**Table 2: Distribution of Histological Types of Childhood Tumours by Anatomical Region**

Histological Type	Number						Total
	Head and neck	Abdomen	Lower Limb	Upper Limb	Thorax	Unspecified Anatomical Site	
Lymphoma	10	4	4	–	–	10	28
Non-Hodgkin, Non-Burkitt's	2	1	3	–	–	9	15
Burkitt's	7	3	1	–	–	–	11
Hodgkin	1	–	–	–	–	1	2
Nephroblastoma	–	18	–	–	–	–	18
Retinoblastoma	12	–	–	–	–	–	12
Rhabdomyosarcoma	4	3	1	1	–	3	12
Carcinomas	7	1	1	–	–	–	9
Nasopharyngeal carcinoma	5	–	–	–	–	–	5
Mucoepidermoid carcinoma	2	–	–	–	–	–	2
Adenocarcinoma	–	1	–	–	–	–	1
Malignant melanoma	–	–	–	–	–	1	1
Osteogenic sarcoma	–	–	2	–	–	1	3
Neuroblastoma	1	1	–	–	–	–	2
<b>Total</b>	<b>34</b>	<b>27</b>	<b>7</b>	<b>1</b>	<b>–</b>	<b>15</b>	<b>84</b>

series from Nigeria<sup>5,8-10,21,22</sup> and Ghana.<sup>23</sup> Male preponderance was however reported in these studies. In contrast also, non-Burkitt's, non-Hodgkin's lymphomas were the most common subtype in this series (17.9%) with Burkitt's lymphoma accounting for 13.1% and Hodgkin's lymphoma 2.3%. The reasons for the relatively low incidence of Burkitt's lymphoma in this study are not clear. However, a decline in the frequency of this tumour has been reported previously.<sup>5,8-10</sup> Reasons adduced for this decline include improved standard of living, as Burkitt's lymphoma is observed to be more prevalent among the low socio-economic class, and a decrease in the frequency of exposure to predisposing factors to Burkitt's lymphoma. There were only two cases of Hodgkin's lymphoma (mixed cellularity and nodular sclerosis). Both occurred in males in the third quinquennium. Similar findings were obtained by Adelusola *et al*<sup>21</sup> but slightly dissimilar from that of Tijani *et al*<sup>9</sup> where lymphocyte predominance was the most common subtype.

Nephroblastoma, the second most common tumour in this study was also second in Calabar<sup>22</sup> and third in other centres in Nigeria<sup>5,8-10,21</sup> and Ghana.<sup>23</sup> The slight excess of male patients obtained in this series contrasts what was found by these other investigators who noted slight female preponderance. With a decreasing frequency with increasing age and over 60% occurring in preschool children, it was the most common tumour in this age bracket. A similar picture was seen among Caucasian children in America<sup>15</sup> and the United Kingdom<sup>17</sup> and other parts of Africa.<sup>5,8-10,21,24</sup> The relative frequency of 21.4% obtained in this study is high compared to that obtained by Adelusola *et al*<sup>21</sup> in Ife, Akang<sup>5</sup> in Ibadan, and Welbeck and Hesse<sup>23</sup> in Ghana but compares well with that of Mandong *et al*<sup>10</sup> in Jos and Ekanem *et al*<sup>22</sup> in Calabar. This further confirms the fluctuations in geographic incidence being recorded for this index childhood tumour previously believed to have a uniform worldwide incidence.<sup>5,23</sup>

Retinoblastoma, the most common tumour after lymphoma and nephroblastoma, with a relative frequency of 14.3%, occupies the second position in

other Nigeria reports.<sup>5,9,10</sup> The decreasing frequency with increasing age observed in this series is in consonance with reports from the United Kingdom<sup>16</sup> and America<sup>15</sup> and other parts of Africa.<sup>23</sup> Female preponderance observed in this series as well as in others from Nigeria<sup>5,9,21</sup> contrasts with findings among Caucasian children in the United Kingdom<sup>16</sup> and America.<sup>15</sup>

The incidence of rhabdomyosarcoma varies from one region to another. The relative frequency of 14.3% is similar to the 13.1% from Jos<sup>24</sup> but contrasts with those of Calabar,<sup>22</sup> Ife,<sup>21</sup> and Ghana<sup>23</sup> with relative frequencies of 7%, 6% and 0.7% respectively. All the cases found in Ife and Ghana occurred in males and in this study a clear male preponderance with a male to female ratio of 5:1 is recorded. The reverse is the case in Calabar, where there was a female preponderance. Ten of the 12 cases in the present series and all the cases in the Calabar study were of embryonal variant. In contrast to the series from Ife, where the alveolar variant predominated, only one was found in this study.

Epithelial malignancies, though rare in childhood occupied the fifth position in this study with a relative frequency of 10.7% and they occurred predominantly in the 10–14 year age group. This agrees with earlier observation of a rising incidence of carcinomas especially in the 10–14 year age bracket.<sup>9</sup> It is also one of the most common malignancies in Tanzania<sup>14</sup> where it is third with a relative frequency of 9%. Five of these nine cancers arose from the nasopharynx, two from the salivary gland while the remaining two involved the skin and small intestine. These (except the small intestine) were among the sites of cancers in the 31 children who had these tumours in Ibadan.<sup>5</sup>

Apart from haematopoietic malignancies, osteogenic sarcoma is the most common primary bone malignancy.<sup>19,25,26</sup> Though it occurs at any age, patients between the ages of 10 and 25 years are mostly affected.<sup>19</sup> In this study, it was the only bone malignancy as well as in the series by several other reports.<sup>10,21,22</sup> Seventeen of the 24 primary bone tumours found by Akang<sup>5</sup> were also osteogenic sarcoma. In consonance with

previous reports,<sup>5,22</sup> the three patients in this series were all males although females predominated in the report by others.<sup>21</sup>

Amusa *et al*<sup>27</sup> had earlier reported a high incidence of childhood malignant tumours in the head and neck region of Nigerian children. This study also recorded a very high frequency of head and neck tumours. It was the most common site for the various histological types (except organ specific tumours like nephroblastoma) with half of each tumour type being located in head and neck region of the body. The reasons for this high incidence of head and neck tumours are not clear. However, it may not be unconnected with the high vascularity of this body region.

### Conclusion

This study has shown that not much variation exists in the patterns of childhood malignant neoplasms in the different parts of the third world. This probably reflects a common genetic abnormality or exposure to similar environmental factors or both. To arrest the rising burden associated with these tumours there is need for collaborative work requiring the cooperation of pathologists, epidemiologists, geneticists and clinicians to determine the aetiopathogenetic factors. Until this is done morbidity and mortality associated with malignant childhood diseases would continue to rise and cancer may conceivably attain the status of number one killer disease among our children, similar to what presently obtains in advanced countries of the world.

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