Paediatric solid tumours in Nigerian children: A changing pattern?

Na'anlep M. Tanko, Godwin O. Echejoh, Nanfwang A. Manasseh, Mafala B. Mandong, A. F. Uba[1]

ABSTRACT

Background: Childhood cancer is fast becoming an important paediatric problem in Nigeria and several parts of Africa, with the progressive decline of infectious and nutritional diseases. The following study was a 5-year retrospective review of paediatric solid tumours as seen at the Jos University Teaching Hospital, Nigeria. **Objective:** To determine the relative frequencies of childhood solid malignant tumours in Jos, Central Nigeria and compare with reports of previous studies both locally and abroad. **Materials and Methods:** Cancer registers and medical records of patients were used to extract demographic data, specimen number and/or codes. Archival materials were retrieved from the histopathology laboratory and sections were made from paraffin embedded blocks of these specimens. Slides of these histological sections were reviewed and reclassified where necessary. The relative frequencies were then determined. **Results:** One hundred and eighty one solid tumours of children were diagnosed within the study period. Ninety-four (51%) were benign and 87 (49%) malignant. Male: Female ratio was 1.3:1. The commonest malignant tumour diagnosed was rhabdomyosarcoma which accounted for 27 (31%), comprising of 15 (55.6%), 11 (40.7%) and 1 (3.7%) embryonal, alveolar and pleomorphic rhabdomyosarcomas, respectively. Non Hodgkin lymphoma and Burkitt lymphoma accounted for 17 (19.5%) and 12 (13.8%), respectively. **Conclusion:** Based on the result of our study, we conclude that the commonest solid malignancy of childhood in Jos, Nigeria is rhabdomyosarcoma. This has implications for diagnosis, management and prognosis of theses soft tissue sarcomas in our paediatric population.

Keywords: Frequencies, Nigeria, paediatric solid tumours

Departments of Histopathology and [1]Surgery, Jos University Teaching Hospital, PMB 2076, Jos Plateau State Nigeria

Address for correspondence:
Dr. Matthew Na'anlep Tanko,
Department of Histopathology, School of Health Sciences,
Kampala International University Western Campus Ishaka,
P.O. Box 71 Bushenyi, Uganda.
E-mail: comexet@yahoo.co.uk

INTRODUCTION

Malnutrition and infectious diseases remain the major causes of childhood morbidity and mortality in Africa and other developing nations of the world.[1-3] Nevertheless, childhood cancer is beginning to contribute significantly to morbidity and mortality in Africa.[1,2,4-7] This change may understandably be attributed to the reduction in childhood morbidity and mortality due to increased awareness and use of immunisation against childhood killer diseases.

The overall incidence of paediatric solid tumours is difficult to estimate in most parts of Africa because of the lack of vital hospital statistics, poor diagnostic facilities and poor reporting. In Nigeria, differences in incidence of childhood cancer have been observed between the north and south, being relatively higher in the south.[3-4] In Kenya, Tanzania and Ghana, lower incidences have been reported ranging from 0.5 to 2% of all malignant tumours.[5-8] Burkitt lymphoma (BL), non Hodgkin lymphoma (NHL), retinoblastoma, nephroblastoma and rhabdomyosarcoma have been found to be the common malignant tumours of children in the tropics.[1-11] with the peak age of incidence for BL being 5-7 years and that of nephroblastoma 2-3 years. On the other hand, leukaemia and intracranial tumours predominate in developed western nations.[12-14]

Although only 2% of all malignant tumours occur in infancy and childhood, cancer is nonetheless the leading cause of death in children less than 15 years of age all over the world.[15] Unlike their adult counterparts, tumours of children are invariably classified by histologic types rather than their anatomic sites because their prognosis depends on the former. A literature search of the African studies showed that there are few reports on the histologic review of malignant solid tumours of children from our country.

The present retrospective study was carried out to determine the relative frequencies of childhood

malignant solid tumours as seen at the Jos University Teaching Hospital (JUTH), Nigeria.

MATERIALS AND METHODS

The materials for this study consisted of surgical specimens from paediatric patients aged 0-15 years, who were admitted into JUTH and those from private and other hospitals which were referred to JUTH within the study period (January 2002 to December 2006). Pathology registers and case notes from the Cancer Registry and Medical Records were used to extract demographic data and specimen numbers or codes. Paraffin embedded blocks of these specimens were retrieved from the histopathology laboratory archives and sections of 3 μm thick were taken from them. These were deparaffinized by heating at 60°C followed by three washes in xylene. The sections were rehydrated in graded alcohol concentrations and thereafter stained with standard haematoxylin and eosin stains. Special stains such as periodic acid Schiff (PAS), massons trichrome, phosphotungstic acid haematoxylin (PTAH) and reticulin were employed where necessary. The slides were independently re-examined by all the pathologists in the department to confirm the diagnosis and/or reclassify the tumours. Where there was disparity in diagnosis, conference review was carried out until a consensus diagnosis was agreed upon.

RESULTS

A total of 181 solid tumours of children were diagnosed in our institution during the study period. Out of this number, 94 (51%) and 87 (49%) were histologically confirmed to be benign and malignant, respectively. In the malignant category, male children were slightly more affected than females with a ratio of 1.3: 1. Table 1 shows the frequency distribution of malignant solid tumours of childhood as recorded in our hospital.

The commonest malignant tumour of childhood was rhabdomyosarcoma which accounted for 27 (31%) of all the malignant tumours seen in this study [Figure 1]. Fifteen (55.6%) were embryonal, 11 (40.7%) were alveolar and 1 (3.7%) was pleomorphic rhabdomyosarcoma, respectively. This was followed by NHL which constituted 17 (19.5%), and BL 12 (13.8%) in that order [Figure 2]. Others were retinoblastoma 7 (8%), nephroblastoma 4 (5%), Hodgkin lymphoma 3 (3.4%), malignant germ cell tumour 3 (3.4%), osteosarcoma 3 (3.4%), neuroblastoma 2 (3.4%) and others 9 (10.2%).

Table 1: Frequency of malignant childhood tumours

Tumour	Number	Frequency (%)
Rhabdomyosarcoma	27	31.0
Non Hodgkin lymphoma	17	19.5
Burkitt lymphoma	12	13.8
Retinoblastoma	7	8.0
Nephroblastoma	4	5.0
Hodgkin lymphoma	3	3.4
Malignant germ cell tumour	3	3.4
Osteosarcoma	3	3.4
Neuroblastoma	2	3.4
Other	9	10.2
Total	87	100.0

The age distribution showed that the rhabdomyosarcomas were diagnosed with relatively high frequency in all the age groups but more so in the first 6 years of life. The NHLs and BL were more prevalent in the 6-10 years age group. Retinoblastoma, malignant teratoma, nephroblastoma and neuroblastoma were most prevalent in the 0-5 years age group. Osteosarcoma and Hodgkin lymphoma were only seen in children aged 10 years and above [Table 2].

Among the NHLs, 13 were diffuse large cell lymphoma (intermediate grade, working formulation), and 4 were small cleaved cell follicular lymphoma (low grade working formulation).

One out of the 3 germ cell tumours diagnosed was embryonal carcinoma and the remaining 2 were endodermal sinus (yolk sac) tumours.

DISCUSSION

In the present study, 87 cases of childhood solid malignant tumours were encountered over a 5-year period. This gives an average of 17.4 cases per year. This is lower than the 100 cases per year that was previously reported in Ibadan, western Nigeria.[1] The result is however comparable to reports of earlier studies from Lagos, Calabar and Zaria which recorded annual rates of 24.8, 12 and 17.1, respectively.[3]

In Korle Bu Ghana, higher annual rate of 76.9 was recorded over a 3.25-year period.[5] Elsewhere, in the Indian subcontinent; an annual rate of 12.8 was reported,[4] similar to our experience in Nigeria.

Malignant tumours of children accounted for 10% of all malignancies seen in our institution comparing well with 11%, 12% and 12.5% reported in India, Ibadan and Calabar, respectively. Lower incidences have however been reported in Tanzania and Kenya.[7,8]

The commonest malignant tumour in this study was rhabdomyosarcoma (31%), followed by NHL (19.5%)

Table 2: Distribution of malignant tumours by age groups in years

Age group (yrs)	RBD *N* (%)	NHL *N* (%)	BL *N* (%)	RB *N* (%)	NPB *N* (%)	HD *N* (%)	MGCT *N* (%)	OST *N* (%)	NBL	Others	Total
0-5	9 (33.3)	-	-	7 (26.0)	4 (14.8)	-	3 (11.1)	-	2 (7.4)	2 (7.4)	27 (100.0)
6-10	10 (32.3)	8 (25.8)	8 (25.8)	-	-	-	-	-	-	5 (16.1)	31 (100.0)
11-15	8 (27.6)	9 (31.0)	4 (13.8)	-	-	3 (10.3)	-	3 (10.3)	-	2 (7.0)	29 (100.0)
Total	27 (31.0)	17 (19.5)	12 (13.8)	7 (8.0)	4 (5.0)	3 (3.4)	3 (3.4)	3 (3.4)	2 (2.3)	9 (10.2)	87 (100.0)

RBD: Rhabdomyosarcoma, NHL: Non Hodgkin's lymphoma, BL: Burkitt's lymphoma, RB: Retinoblastoma, NPB: Nephroblastoma, HD: Hodgkin's disease, MGCT: Malignant germ cell tumour, OST: Osteosarcoma, NBL: Neuroblastoma



Figure 1: A 10-year old child with embryonal rhabdomyosarcoma (Botryoid type) protruding from the anus

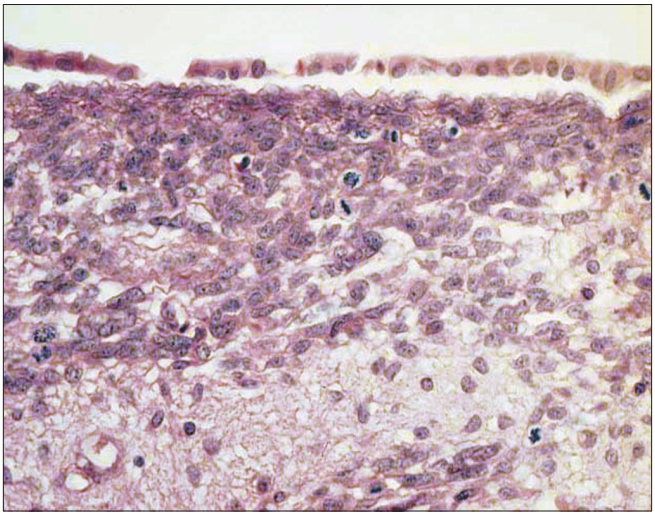


Figure 2: Histology of same patient in figure 1. Embryonal rhabdomyosarcoma (Botryoid type) showing the typical "cambium layer" beneath the epithelium. (H & E stain. 20X objective)

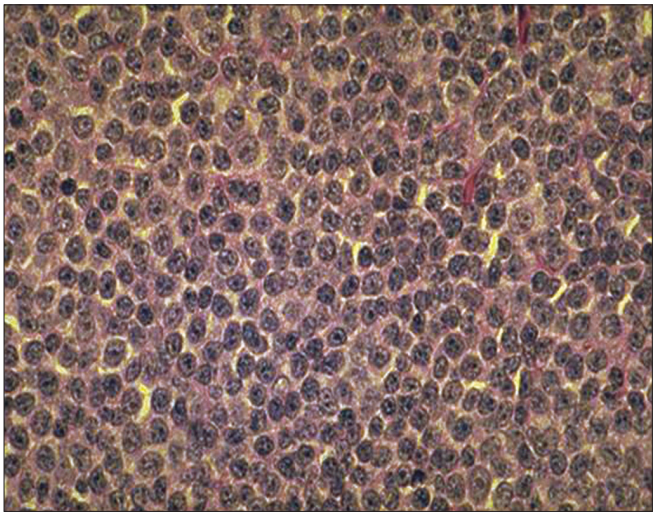


Figure 3: Non Hodgkin's lymphoma; large cell type (intermediate grade working formulation). (H & E stain. 20X objective)

and BL (13.8%) in that order. When these figures were compared with those from previous studies both locally and abroad, it was observed that there is a changing trend in the relative frequencies of these tumours. Whereas BL was consistently being reported in these studies as the most common malignant solid tumour in African children, the present study is in contrast with these findings, BL was found to be third in frequency.

The reason for this changing trend is not apparent from the present study. Are paediatric soft tissue sarcomas truly becoming more common than the traditional reports of the lymphomas on the African continent? If they are, could it be due to recent improvements in diagnostic techniques leading to more accurate classification of these tumours or could it be due to biological factors? Perhaps, some of the small round blue cell tumours that were diagnosed as lymphomas are now diagnosed accurately as rhabdomyosarcomas.

Although soft tissue sarcomas constitute only 6% of all childhood malignancies, rhabdomyosarcomas account for more than half of these tumours.[16,17] The predominant histologic type in this study was embryonal rhabdomyosarcoma which accounted for 55.6%. This was followed by alveolar (40.7%) and pleomorphic (1.7%) rhabdomyosarcomas in that order. This is similar to the 59% frequency for embryonal rhabdomyosarcoma reported in India.[18]

Although the traditional classification of rhabdomyosarcomas was proposed in 1958 by Horn and Enterline[19] which divided the tumour into 4: embryonal, alveolar, botryoid and pleomorphic, the International Classification System[20] for childhood

rhabdomyosarcomas has recently classified this tumour into 3 based on prognosis: 1. Superior prognosis: botryoid and spindle cell types, 2. Intermediate prognosis: embryonal type and 3. Poor prognosis: Alveolar and undifferentiated types.

Generally the prognosis of most of the patients in our study was poor. This could be attributed to late presentation.

We conclude that soft tissue sarcomas (rhabdomyosarcomas) are the commonest solid malignant tumours in our centre and this contrasts with reports from other centres in Nigeria as well as other African countries.

ACKNOWLEDGEMENT

We wish to thank the staff of the Cancer Registry and Medical Records for their assistance with the records of these patients. We also appreciate the staff of histopathology laboratory for providing archival materials for this study, particularly Mr. James Goyit, Mr. Mohammed Dan and Mrs. Laiatu Paul.

REFRENCES

1. Williams AO. Tumours of childhood in Ibadan, Nigeria. Cancer 1975;36:370-8.
2. Mandong BM, Angyo IA, Zoakah AI. Paediatric solid malignant tumours in Jos University Teaching Hospital: A hospital-based study. Nig J Med 2000;9:52-5.
3. Obioha FI, Kaine WN, Ikerionwu SE, Obi GO, Ulasi TO. The pattern of childhood malignancy in eastern Nigeria. Ann Trop Paediatr 1989;9:261-5.
4. Sharma S, Mishara K, Agarwal S, Khanna G. Solid tumours of childhood. Indian J paediatr 2004;71:501-4.
5. Welbec JE, Hesse AA. Pattern of childhood malignancy in Korle Bu Teaching Hospital, Ghana. West Afr J Med 1999;17:81-4.
6. Uba FA, Chirdan LB. Clinical characteristics and outcome of surgical treatment of childhood rhabdomyosarcoma: A 7-year experience. Afr J Paediatr Surg 2008;5:19-23.
7. Mgaya M, Kitinya JN. Histopathology of malignant childhood tumours in Tanzania. East Afr Med J 2000;77:435-9.
8. Kasili EG, Kyambi JM, Onyango JN. Treatment of childhood malignancies in Kenya. East Afr Med J 1984;16:663-4.
9. Nkanza NK. Paediatric solid malignant tumours in Zimbabwe. Cent Afr J Med 1989;35:496-501.
10. Shaba J. Tanzania Cancer Registry 1980-1981. In: Parkin DM, *et al*. editor. International incidence of childhood cancer. USA: IARC; 1988. p. 49-52.
11. Owor R. Uganda; Kampala Cancer Registry 1968-82. In: Parkin DM, *et al*. editor. International incidence of childhood cancer. USA: IARC; 1988. p. 57-61.
12. Jones PG, Campbell PE. Tumours of infancy and childhood. London: Blackwell Scientific Publications; 1976. p. 34-45.
13. Berry PJ. Paediatric solid tumours. In: Recent advances in histopathology. London: Churchill Livingstone; 1990. p. 203-32.
14. Gurney JG, Richmond KS, Scott D, Leslie LR. Incidence of cancer in children in the United States. Cancer 1995;75:2186-21.
15. Schofield D. Diseases of infancy and childhood. In: Cotran RS, Kumar V, Robbins L, editors. Robbins pathologic Basis of Disease. 5th ed. WB Saunders; 1994. p. 456-65.
16. Miller RW, Young JL, Novakovic B. Childhood Cancer. Cancer 1995;75:395-405.
17. Miser JS, Triche TJ, Kinsella TJ, Pritchard DJ. Other soft tissue sarcomas of childhood. In: Pizzo PA, Poplack DG, editors. Principles and practice of paediatric oncology. Philadelphia: Lippincott-Raven; 1997. p. 865-88.
18. Sandeep A. Soft tissue sarcomas in children (Review). Indian J Med Paediatr Oncol 2005;26:21-32.
19. Horn RC Jr, Enterline HT. Rhabdomyosarcoma: A clinicopathologic study and classification of 39 cases. Cancer 1958;11:181-99.
20. Pappo AS, Shappiro DN, Cris WM. Rhabdomyosarcoma: Biology and treatment (Review). Paediatr Clin North Am 1997;44:953-72.

Source of Support: Nil, **Conflict of Interest:** None.