Pattern of childhood malignant tumours in a teaching hospital in south-western Nigeria

Ayodeji O J Agboola, Folashade A Adekanmbi, Adewale A Musa, Adetoun S Sotimehin, Anotu M Deji-Agboola, Aderibigbe M O Shonubi, Temitope Y Oyebadejo and Adekunbi A F Banjo

ABSTRACT

Objective: To document general baseline data on the patterns of childhood malignant tumours at a teaching hospital in south-western Nigeria.

Design, setting and participants: A retrospective study of childhood malignancy at Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria, during an 11-year period, from January 1996 to December 2006.

Results: 77 children were diagnosed with malignant tumours (an average of seven diagnoses per year); 46 were boys (60%), giving a male-to-female ratio of 1.5 : 1. The age distribution of patients was 1–18 years. There were 42 diagnoses (55%) in the 1–5-year age group and 68 malignancies (88%) were diagnosed at ages of 12 years or younger. Lymphomas were the most prevalent malignancy identified, accounting for 31 diagnoses (40%). Burkitt's lymphoma constituted the majority of malignancies (28 cases; 36%), followed by retinoblastoma (16 cases; 21%) and nephroblastoma (11 cases; 14%). Other malignancies included germ cell tumours (6), neuroblastomas (4), osteosarcomas (3), rhabdomyosarcomas (3) and non-Hodgkin's lymphomas (3). One case each of medullary thyroid carcinoma, adenocarcinoma of the rectum, invasive mucinous carcinoma of the colon were also identified.

Conclusion: These data suggest that Burkitt's lymphoma is the most common childhood malignant tumour in our geographic area of south-western Nigeria. With the rising incidence of childhood malignancy in resource-poor countries, measuring the baseline occurrence of such tumours is imperative to provide much-needed resource allocation.

MJA 2009; 190: 12–14

The status of child health in resource-poor countries is unsatisfactory. An estimated 600 million children less than 5 years of age are denied good health because of the prevalence of infectious diseases and nutritional disorders.[1,2] However, the role of malignancies in morbidity and death is increasingly being recognised owing to improvements in socioeconomic status and control of infectious diseases, which previously constituted the major causes of morbidity.[3] Worldwide, cancer is one of the leading causes of morbidity and death; it is estimated that by 2020, the number of new cases of cancer will increase to more than 15 million, with deaths increasing to 12 million, and the burden of incidence, morbidity and death will be greater in developing countries.[4]

In 2005, the International Union Against Cancer reported that, worldwide, more than 160 000 children are diagnosed with cancer per year, and about 90 000 die from cancer because of late presentation due to parental ignorance and poverty, and poor health facilities.[5] It has also been estimated that more than 85% of childhood cancer cases occurred in resource-poor countries, and it is possible that this will increase to 90% in the next two decades as a result of an expected rapid increase in the youth population.[6] Geographical variation in the incidence of cancer in African countries, owing to genetic and environmental factors, has also been reported.[7] The exact incidence of childhood tumours has been difficult to determine because of inadequate statistical data.[8]

This study aimed to document general baseline data on the patterns of childhood malignant tumours diagnosed at the Olabisi Onabanjo University Teaching Hospital, in south-western Nigeria.

METHODS

A retrospective study of childhood malignancy was carried out at the Department of Morbid Anatomy and Histopathology at Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria. Cases of malignant tumours that were diagnosed between January 1996 and December 2006 were included in the study. Formal approval was obtained from the Institutional Research and Development/Scientific Ethical Committee.

The materials used included all biopsy specimens of patients aged 18 years or younger in whom a malignancy was previously diagnosed. Tissue blocks that were previously fixed in 10% formalin were processed, and previously prepared slides of 3 μm thick paraffin-embedded sections were retrieved and re-evaluated. In cases where slides were either broken or missing, tissue was re-cut, and re-stained with haematoxylin and eosin. Specialised stains were used for more accurate diagnoses; these included periodic acid–Schiff stain, phosphotungstic acid haematoxylin, Masson trichrome and reticulin stain. No immunological markers were used.

Cases were excluded from the study if documentation was inadequate or if it was not possible to retrieve tissue slides or blocks.

RESULTS

A total of 10 768 children presented at the hospital between January 1996 and December 2006. Seventy-seven were diagnosed with malignant tumours — an average of seven cases per year. Forty-six were boys (60%), giving a male-to-female ratio of 1.5 : 1.

Lymphomas were the most prevalent malignancy, accounting for 31 cases (40%) (Box 1). Burkitt's lymphoma constituted the majority of malignancies (36%), followed by retinoblastoma and nephroblastoma; others included several germ cell tumours, neuroblastomas, osteosarcomas, embryonal rhabdomyosarcomas and non-Hodgkin's lymphomas, as well as one case each of medullary carcinoma of the thyroid gland, adenocarcinoma of the rectum and invasive mucinous carcinoma of the colon.

The age distribution of children with malignant tumours is shown in Box 1. Ages at time of presentation ranged from 1 to 18 years. There were 42 malignancies in the 1–5-year age group, and 68 malignancies

1 Numbers of children diagnosed with malignant tumours by age at presentation

Malignancy	0–5 years	6–12 years	13–18 years	Total
Burkitt's lymphoma	15	10	3	28
Non-Hodgkin's lymphoma	3	0	0	3
Retinoblastoma	10	4	2	16
Nephroblastoma	7	3	1	11
Neuroblastoma	4	0	0	4
Osteosarcoma	0	3	0	3
Embryonal rhabdomyosarcoma	0	1	2	3
Medullary thyroid carcinoma	0	1	0	1
Adenocarcinoma of the rectum	0	1	0	1
Invasive mucinous carcinoma of the colon	0	1	0	1
Germ cell cancers*	3	2	1	6
Total	42	26	9	77

* Germ cell cancers included seminoma, granulosa cell tumour and yolk sac tumour. ◆

(88%) were diagnosed at ages of 12 years or younger.

Burkitt's lymphoma occurred in all age groups, with a peak incidence of 54% (15/28) in the 1–5-year age group. At least half of the retinoblastomas (10/16), nephroblastomas (7/11) and germ cell cancers (3/6) occurred in the 1–5-year age group, and all of the children with neuroblastomas presented at ages of 5 years or younger. Children with osteosarcoma, adenocarcinoma of the rectum, invasive mucinous carcinoma of the colon and medullary thyroid carcinoma presented at ages 6–12 years.

The site distribution of malignancies that occurred in childhood is shown in Box 2. The head and neck region was affected most frequently, accounting for 45% of malignancies (35/77), followed by the abdomen (24/77). The lymph nodes, the pelvis, and the trunk and limbs were affected less frequently (≤ 10% of malignancies), respectively accounting for eight, seven and three cases of malignancy.

DISCUSSION

Cancer is the second most common illness that causes death during childhood in industrialised countries.[9] The number of cases of malignancy diagnosed per year in this study is lower than previously reported for children elsewhere in Nigeria (14.4, 100 and 12 diagnosed cases per year).[7,8,10] However, it is difficult to compare incidence data because of the difficulties associated with retrieving demographic data for previously studied paediatric populations. The finding of male preponderance for malignancy in this study is in agreement with other data from resource-poor countries.[10-12] Gender disparity in the diagnosis of paediatric cancer may be exaggerated in resource-poor countries because of cultural and economic factors; for example, males are usually given more medical attention than females.[6]

Burkitt's lymphoma was the most prevalent tumour in this study, which is in agreement with other studies in developing countries.[6,9,11,12] However, the relative frequency of Burkitt's lymphoma, compared with other malignancies, in this study is lower than reported elsewhere.[7,12,13] We speculate that this could be due to improved malaria control in Nigeria, as risk factors for the development of Burkitt's lymphoma are strongly associated with the immunosuppression caused by malaria.[14,15] The peak age of Burkitt's lymphoma in our study was similar to previous findings, in which more than 90% of cases presented before the age of 12 years.[6,7] The pattern of presentation involved multiple sites, with the head and neck region being affected most frequently. Jaw swelling and dental anarchy were the usual presentation of Burkitt's lymphoma, consistent with previously reported data.[9]

Retinoblastoma has been described as the most common genetically determined orbital tumour. It usually presents in children younger than 5 years of age.[16] It was the second most common malignancy in our study, comparable with data from an earlier Nigerian study.[10] Most patients with retinoblastoma at our hospital presented at 5 years of age or younger, but 38% (6/16) presented late — at ages older than 5 years.

Nephroblastoma was the third most common cancer identified in this study; this is comparable with data from other centres.[17] In comparison, neuroblastoma was not common in our study, which is similar to findings reported elsewhere in Nigeria.[12,13] However, the results we report for neuroblastoma differ greatly from those of studies in resource-rich countries, where a relatively high incidence of neuroblastoma is observed.[18,19] Colorectal carcinoma was rare

2 Numbers of children diagnosed with malignant tumours by site of malignancy

Malignancy	Head and neck	Lymph nodes	Trunk and limbs	Abdomen	Pelvis	Total
Burkitt's lymphoma	15	5	0	7	1	28
Non-Hodgkin's lymphoma	0	3	0	0	0	3
Retinoblastoma	16	0	0	0	0	16
Nephroblastoma	0	0	0	11	0	11
Neuroblastoma	0	0	0	4	0	4
Osteosarcoma	0	0	3	0	0	3
Embryonal rhabdomyosarcoma	3	0	0	0	0	3
Medullary thyroid carcinoma	1	0	0	0	0	1
Adenocarcinoma of the rectum	0	0	0	1	0	1
Invasive mucinous carcinoma of the colon	0	0	0	1	0	1
Germ cell cancers						
Seminoma	0	0	0	0	2	2
Granulosa cell tumour	0	0	0	0	1	1
Yolk sac tumour	0	0	0	0	3	3
Total	35	8	3	24	7	77

in children in our study, in agreement with reports from resource-rich countries.[19,20]

Malignancies of the central nervous system were not identified in this study because our centre did not have the neuroimaging facilities required for diagnosis (eg, magnetic resonance imaging and computed tomography scanners). Most of the patients who were suspected as having central nervous system malignancies were referred to other teaching hospitals. It has been reported that there is only one high-energy radiotherapy machine for every 20–40 million people in resource-poor countries.[21]

The low hospital autopsy rate of 3.6% in our centre (compared with the international rate of 10%) contributes to the lack of data on these tumours. Cultural beliefs in these environments make it difficult for relatives to accept postmortem examinations of children, hence they are disallowed.

This study suggests that Burkitt's lymphoma is the most common childhood malignant tumour in our geographical area of south-western Nigeria, Africa. The lack of imaging equipment, a cultural aversion to autopsy examination, and a deficiency in statistical data are barriers to a more refined assessment of malignant childhood tumours in resource-poor countries. We have first-hand experience of these barriers, but have attempted to provide a snapshot of the incidence of childhood malignancies in south-western Nigeria within our scope and ability.

COMPETING INTERESTS

None identified.

AUTHOR DETAILS

Ayodeji O J Agboola, MB ChB, MSc, Oncologist and Lecturer
Folashade A Adekanmbi, MB BS, FWACP, Paediatrician
Adewale A Musa, MB BS, FWACS, Surgeon
Adetoun S Sotimehin, MB BS, FWACP, Paediatrician
Anotu M Deji-Agboola, BSc, MSc, PhD, Medical Microbiologist
Aderibigbe M O Shonubi, MB BS, FWACS, Surgeon
Temitope Y Oyebadejo, MB BS, FMCPath, Pathologist
Adekunbi A F Banjo, MB BS, FMCPath, Pathologist
Obafemi Awolowo College of Health Sciences, Olabisi Onabanjo University, Sagamu, Ogun State, Nigeria.
Correspondence: johndeji2001@yahoo.co.uk

REFERENCES

1 Nahata MC. Status of child health worldwide. *Ann Pharmacother* 1992; 26: 559-561.
2 UNICEF. The progress of nations 2000. New York: UNICEF, 2000.
3 Tijani SO, Elesha SO, Banjo AA. Morphological patterns of pediatrics solid cancer in Lagos, Nigeria. *West Afr J Med* 1995; 14: 174-180.
4 Kanavos P. The rising burden of cancer in the developing world. *Ann Oncol* 2006; 17 Suppl 8: viii15-viii23.
5 International Union Against Cancer. The "my child matters" initiative [press release]. Geneva: UICC, 2005; 30 Jun. http://www.uicc.org/index.php?option=com_content&task=view&id=15898&Itemid=43 (accessed Nov 2008).
6 Yaris N, Mandiracioglu A, Büyükpamukcu M. Childhood cancer in developing countries. *Pediatr Hematol Oncol* 2004; 21: 237-253.
7 Seleye-Fubara D, Akani NA. Solid malignancies in children and adolescents: experience at the University of Port Harcourt Teaching Hospital. *Niger J Paediatr* 2004; 31: 43-47.
8 Williams AO. Tumors of childhood in Ibadan, Nigeria. *Cancer* 1975; 36: 370-378.
9 Akang EE. Tumors of childhood in Ibadan, Nigeria (1973–1990). *Pediatr Pathol Lab Med* 1996; 16: 791-800.
10 Ekanem IA, Asindi AA, Ekwere PD, et al. Malignant childhood tumors in Calabar, Nigeria. *Afr J Med Med Sci* 1992; 21: 63-69.
11 Pearce MS, Parker L. Childhood cancer registrations in the developing world: still more boys than girls. *Int J Cancer* 2001; 91: 402-406.
12 Ocheni S, Okafor CO, Emodi IJ, et al. Spectrum of childhood malignances in Enugu, Nigeria (1999–2004). *Afr J Med Med Sci* 2005; 34: 371-375.
13 Onwasigwe CN, Aniebue PN, Ndu AC. Spectrum of paediatric malignancies in eastern Nigeria (1989–1998). *West Afr J Med* 2002; 21: 31-33.
14 Magrath I, Jain V, Bhatia K. Epstein–Barr virus and Burkitt's lymphoma. *Semin Cancer Biol* 1992; 3: 285-295.
15 Whittle HC, Brown J, Marsh K, et al. T-cell control of Epstein–Barr virus-infected B cells is lost during *P. falciparum* malaria. *Nature* 1984; 312: 449-450.
16 Shija JK. Paediatric malignant tumours seen in Dar es Salaam, Tanzania. *East Afr Med J* 1984; 61: 212-219.
17 Mandong BM, Angyo IA, Zoakah AI. Paediatric solid malignant tumors in JUTH, Jos (hospital-based histopathology study). *Nig J Med* 2000; 9: 52-55.
18 Little J. Epidemiology of childhood cancer. Lyon, France: International Agency for Research on Cancer, 1999. (IARC scientific publications No.149.)
19 Barr RD. The challenge of childhood cancer in the developing world. *East Afr Med J* 1994; 71: 223-225.
20 Karnak I, Ciftci AO, Senocak ME, Büyükpamukçu N. Colorectal carcinoma in children. *J Pediatr Surg* 1999; 34: 1499-1504.
21 Hanson GP, Stjernswärd J, Nofal M, Durosinmi-Etti F. An overview of the situation in radiotherapy with emphasis on developing countries. *Int J Radiat Oncol Biol Phys* 1990; 19: 1257-1261.

(Received 19 Jun 2008, accepted 7 Oct 2008) ❑