Original article

Pattern of Childhood Malignancies in Ilorin, Nigeria: Challenges and Strategies for Management in a Tertiary Health Institution

Babatunde AS[1], Gobir AA[2], Adeboye MAN[3], Adebayo-Oloko A[4], Durotoye IA[5]

Abstract:

Objective: The study was carried out to document the pattern of childhood malignant tumors which were diagnosed at the University of Ilorin Teaching Hospital, Ilorin, and compare with previous reports from other parts of Nigeria and elsewhere and also highlight the challenges and strategies for effective management of these diseases in our environment. ***Methods***: A ten year retrospective analysis of all cancers diagnosed in children below the age of 18 years at the study centre between January 2000 and December 2009 was carried out. Case folders of all children diagnosed with malignant tumors within the study period were retrieved from the Cancer Registry Department of the Hospital and were analyzed with respect to age, gender, morphological or histological type of malignancy, extent of disease, treatment modality, and survival outcome. ***Results***: Ninety nine (99) children were diagnosed with various malignancies during the study period. Sixty seven (67; 67.7%) were boys and 32 (32.3%) were girls giving a male to female ratio of 2:1. There were 22 cases (22.2%) recorded in children aged below 4 years and 72 cases (72.7%) were diagnosed in children between 4 -14 years. Lymphomas were the most prevalent malignancies encountered accounting for 54 cases (54.5%), Burkitt's lymphoma constituted 43 (79.6%) of all lymphoma cases. The distribution of the five foremost malignancies recorded were as follows: Burkitt's lymphoma (43 cases), Nephroblastoma (10 cases), Retinoblastoma (8 cases), Non Hodgkin's lymphoma (7 cases) and Acute leukaemias (5 cases). Other malignancies included Osteogenic sarcoma (5), Hodgkin's lymphoma (4), and 2 cases each of primary liver cell carcinoma, neuroblastoma, rhabdomyosarcoma and nasopharyngeal tumor. ***Conclusion***: The distribution of the various childhood malignant tumors recorded in this study is similar to the pattern reported in previous studies from Nigeria and other countries. However, there appears to be a lower prevalence of leukemia recorded in this study compared to the earlier findings. The challenges which were identified in the diagnosis, management and overall outcome of our patients included limited number of diagnostic tools, late presentation in the hospital, high patient default rate, poverty, and shortage of chemotherapeutic drugs.

Key words: pattern; childhood; malignancies; strategies; management

Bangladesh Journal of Medical Science Vol.14(3) 2015 p.241-246
DOI: http://dx.doi.org/10.3329/bjms.v14i3.18450

Introduction

Cancer remains a significant cause of morbidity and mortality not only in children but also in adolescents and adults. Worldwide, it is estimated that about 8.1 million new cases of paediatric cancers are diagnosed annually, the greatest burden being borne by the developing countries where more than 90% of the world's children live[1].

The pattern of childhood malignancies is different from adults in relation to histopathology, epidemiology, clinical manifestations, biology, response to chemotherapy and outcome. The different biologic nature of paediatric malignancies may account for their clinical manifestations and prognosis. Though they tend to exhibit short latency periods and are highly aggressive and rapidly growing, they are more

1. Babatunde Abiola Samuel, Department of Haematology and Blood Transfusion
2. Gobir Aishatu Ahmed, Department of Paediatrics and Child Health
3. Adeboye Mohammed Akanbi Nurudeen, Department of Paediatrics and Child Health
4. Adebayo-Oloko Abdulganiy, Department of Paediatrics and Child Health
5. Durotoye Idayat Adenike, Department of Haematology and Blood Transfusion

University of Ilorin Teaching Hospital, P.M.B 1459, Ilorin, Nigeria.

Corresponds to: Babatunde Abiola Samuel, Department of Haematology and Blood Transfusion, University of Ilorin Teaching Hospital, P.M.B 1459, Ilorin, Nigeria.e-mail: asbabs2003@yahoo.com

responsive to combined chemotherapy, radiation or surgery compared to adult malignancies with a high potential for cure in many cases.

In developing countries, childhood malignancies have been reported to constitute about 4-13% of all malignant tumors[2-4] The frequencies at which different types of cancers occur also differ between the developed and the developing countries of the world, and variations have been observed even within the same country. The commonest malignancies among children in the USA and UK are intracranial tumors like astrocytoma and medulloblastoma, and acute leukemias[5-6]. In Nigeria, lymphomas have been reported to be the commonest childhood neoplasm constituting about 40% of all tumors, and Burkitt lymphoma accounts for about 90% of all the lymphomas[4]. Other tumors that have been reported to show high incidence among Nigerian children include the embryonal tumors - nephroblastoma, neuroblastoma, retinoblastoma and teratoma[3-4, 7-8]. The signs and symptoms at presentation depend on the location of the malignancy with abdominal tumors often presenting with pain, vomiting constipation or intestinal obstruction. The lymphomas usually present with lymphadenopathy commonly involving the cervical or axillary lymph nodes[4].

The prevalence of childhood malignancies in Nigeria have been shown to vary from region to region and the pattern appears to be changing. Studies from different parts of Nigeria are starting to report the changing frequency of the different types of tumours, especially the declining incidence of Burkitt's lymphoma and the increasing incidence of the intracranial neoplasms and the leukemias[9-11].

The management challenges in developing countries like Nigeria include late presentation, limited diagnostic and therapeutic facilities as well as difficulties in long term follow-up which all contribute to poor prognosis. The actual prevalence of childhood malignancies in Nigeria has been difficult to ascertain due to limited access to health facilities and poor record keeping by the health facilities.

The purpose of this study is to determine the pattern of malignancies seen in childhood at the University of Ilorin Teaching Hospital, Ilorin, Nigeria over a decade (2000 to 2009) and compare with previous reports from other parts of Nigeria and internationally and also identify the challenges encountered in the diagnosis and management of childhood cancers in our institution.

Materials and methods

This study is a retrospective analysis of all cases of cancer in children aged 0 – 17 years which were seen, diagnosed and managed at the Paediatrics Department of the University of Ilorin Teaching Hospital, Ilorin, over a ten year period from January 2000 to December 2009 inclusive.

Ilorin is the capital city of Kwara State, one of the 36 states in Nigeria, and is situated in the North Central geo-political zone of the country. It is located on the latitude 8.5^0 North and longitude 4.55^0 East with a total population of 814,192 and an annual growth rate of 2.3 %[12].

The University of Ilorin Teaching Hospital (U.I.T.H) is a 600- bed tertiary health institution serving primarily patients from Kwara state and five other neighbouring states of Nigeria.

The materials which were used for the study included data obtained from patients' case folders, histopathology and bone marrow aspiration report forms. The records of all the patients were retrieved from the Records Department of the Hospital, and where necessary, records from the Cancer Registry Unit of the Morbid Anatomy Department as well as the Bone Marrow register from the Haematology Department were also examined.

Each of the cases were characterised with respect to age at diagnosis, sex, morphological or histopathological types, clinical features, extent of disease, diagnostic methods used, duration of follow up and outcome.

Routine histologic and/or histochemical procedures were employed in the processing of tissue biopsy or fine needle aspirate specimens for eventual histological diagnosis, while the peripheral blood and bone marrow samples in the cases of haematological malignancies were processed using standard techniques described by Dacie and Lewis[13]. There were no immunologic or immuno-histochemical markers employed in the process of diagnosis.

Other ancillary investigations which were carried out to help in diagnosis or management of the patients included – X-rays, serum urea, electrolytes and creatinine, full blood counts, erythrocyte sedimentation rate (ESR), liver and renal function tests.

Cases which had incomplete documentation or missing histopathology /bone marrow report forms were excluded from the final analysis.

The information retrieved from the above sources was recorded in pre-coded protocol forms designed for the study, and then entered into a study data base using the SPSS V.15 statistical package. The data was then analysed and results were presented in the

form of frequency tables and bar charts.

Results

A total of 2050 cancer cases were recorded between January 2000 and 31st December 2009 at the University of Ilorin Teaching Hospital (U.I.T.H.) out of which 99 cases of malignant neoplasm were recorded in children aged 0-17 years representing 4.8% of all cancer cases seen within the study period. There were sixty seven males (67.7%) and thirty two females (32.3%) giving a male: female ratio of 2:1. The median age at diagnosis was 8 years (range 11 months to 17 years). The socio-demographic characteristics of the patients are shown in Table I.

Table I: showing the socio-demographic and other characteristics of 99 children with malignancies in Ilorin

Variables	No (Percentage)
Age at diagnosis (median, years)	8
Range	11 months – 18 years
Gender	
Male	67 (67.7%)
Female	32 (32.3%)
Ethnic groups	
Yoruba	83 (83.8%)
Hausa	12 (12.1%)
Igbo	2 (2.0%)
Fulani	1 (1.0%)
Others	1 (1.0%)
Place of Residence	
Urban	63 (63.6%)
Rural	36 (36.4%)
Methods of Diagnosis	
FNAC	58 (58.5%)
Tissue Biopsy	35 (35.4%)
Bone Marrow Aspiration	5 (5.1%)
CT Scan/MRI	1 (1.0%)
Mode of Treatment	
Chemotherapy Only	65 (65.7%)
Chemotherapy +Surgery	17 (17.2%)
Chemotherapy + Radiotherapy	10 (10.0%)
Chemotherapy + Surgery + Radiotherapy	5 (5.0%)
Surgery + Radiotherapy	10 (10.0%)
Supportive measures only	2 (2.0%)
Outcome of Treatment	
Alive	43 (43.4%)
Dead	33 (33.3%)
Lost to Follow-up	23 (23.2%)

The commonest clinical feature at presentation was swelling in various regions of the body (65 cases; 65.7%); fever (t^o 37^0 – 39^0) was demonstrated in 56 patients (56.6%); anaemia (haemoglobin concentration < 8.0g/dl) was found in 4 patients (4%) and thrombocytopaenia in 4 children (4%) . The most prevalent malignancies encountered in our study were the lymphomas which accounted for 54 cases (54.5%). Burkitt's lymphoma was the commonest malignancy recorded (43 cases; 43.4%) and also the predominant lymphoma seen (79.6%). Following Burkitt's lymphoma are Nephroblastoma (10 cases; 10.1%), Retinoblastoma (8 cases; 8.1 %), Non Hodgkin's lymphoma (7cases; 7.1.%), Acute leukaemias (5 cases; 5.1 %), and osteogenic sarcomas (5 cases; 5.1 %). The distribution of the various malignancies is shown in Table II.

Burkitt's lymphoma occurred in all age groups but was found to be commonest in the 5-9 years age group (22. 2%). Nephroblastoma and retinoblastoma were most prevalent in children below 5 years of age. Although Non Hodgkin's lymphoma was evenly distributed in all the age groups, Hodgkin's lymphoma was encountered in children between the ages of 5 -14 years (Table III).

The methods used in diagnosis of patients were Fine needle aspiration cytology (FNAC) in 58 patients (58.5%), Tissue biopsy in 35 cases (35.4%), Bone marrow aspiration (5 cases; 5.1%), and Computerized Tomography (CT) Scan in only one patient.

The treatment modalities for patients in this study were chemotherapy only in 65 patients (65.7%), Chemotherapy and surgery in 17patients (17.2 %), Surgery with radiotherapy in 10 patients (10.1%) and a combination of chemotherapy, surgery and radiotherapy in 5 patients (5. 1%). All patients were in addition to the above had supportive treatment in the form of intravenous fluid therapy, blood transfusion, and counselling. (Table I).

Discussion

The study recorded a total of 99 cases of childhood malignancies over a period of 10 years with an annual average of 9.9 cases per annum. Excluding the five cases of acute leukaemia, the annual average of childhood solid malignancy in this study is 9.4 per annum. In a similar study in south western Nigeria, Agboola *et al*[14] reported an average of 7 cases per annum over a period of 11 years. In Ibadan, also south western Nigeria, Akang[15] reported over 100 cases per annum over a period of 18 years. In Jos, 17.4 cases per annum were reported over a seven year period in a recent survey[16]. Onwasigwe *et al*[11] from the Eastern part of Nigeria reported a total of 31.3 cases per annum among children less than 15 years of age over a period of 10 years. A similar study in Ghana[17] also reported an annual rate of 76.9, which is far above the findings in most part of Nigeria

Table II: showing the numbers of the various types of malignancies recorded in the 99 children by gender

Type of malignancy	Male	Female	Total
Burkitt's lymphoma	30	13	43
Non Hodgkin's lymphoma (NHL)	3	4	7
Hodgkin's lymphoma	4	0	4
Acute lymphoblastic leukaemia (ALL)	4	0	4
Acyte Myeloblastic leukaemia (AML)	0	1	1
Plasma cell leukaemia	1	0	1
Parotid gland tumor	0	1	1
Primary liver cell carcinoma (PLCC)	2	0	2
Osteogenic sarcoma	4	1	5
Neuroblastoma	2	0	2
Neurofibroma	1	1	2
Nephroblastoma	6	4	10
Naso-pharyngeal tumor	0	2	2
Muco-epidermoid tumor	1	0	1
Fibrosarcoma	0	1	1
Bladder sarcoma	1	0	1
Brain stem glioma	0	1	1
Retinoblastoma	6	2	8
Rhabdomyosarcoma	2	0	2
Follicular carcinoma of thyroid gland	0	1	1
Total (%)	67 (67.7%)	32 (32.3%)	99 (100.0%)

except in the study from Ibadan where the annual incidence was 100 cases. The reported differences in prevalence of childhood malignancies in the different regions of the country may be due to varying levels of patronage at the various institutions, and also differences in population and climate of these areas, although the other studies did not specify percentage which the childhood neoplasms constituted in the total admissions.

The male preponderance found in this study was also reported in several other studies [4, 15]. The predominant ethnic group resident in the study areas were the yorubas and they constituted the majority of the patients seen.

The study reported Burkitt lymphoma as the commonest malignancy as was also reported by Agboola *et al*[14]. In an earlier survey, Ojesina *et al*[18] had reported a decline in the frequency of Burkitt lymphoma relative to other childhood malignancies. Burkitt's lymphoma was also found to predominate in the survey from Eastern and western part of Nigeria[6,10,11,14,18] however, the study from Jos, Nigeria found rhabdomyosarcoma to be the commonest childhood malignancy in North central Nigeria[16]. The observed differences in the prevalence between Ilorin and Jos may be as a result of climatic differences in the two places. Rare childhood malignancies seen include thymoma, pineal gland tumor. A case of Kaposi sarcoma was reported in a 4 year old boy with AIDS. The residential location of the majority of patients was urban and this may possibly be attributable to the ease with which they are exposed to passive smoking of tobacco as well as hydrocarbons and other chemicals from industrialization causing atmospheric pollution which are recognized risk factors for the development of malignancies[19-22].

The commonest presentation of childhood malignancies was found to be swellings in various parts of the body. This may be due to the fact that most cases start with a swelling either outside or within the body. In the cases of hematologic malignancies, lymph node enlargements at various sites are also significant manifestations.

Hitherto, anaemia has been generally referred to as one of the cancer triad [23]. This may not necessarily follow in childhood solid malignancies as it was found in only 4 percent of cases under review. Thrombocytopaenia was also demonstrated in 4% of the patients. The commonest method of diagnosis used in the study was Fine Needle Aspiration Cytology (FNAC). This may be due to the less invasiveness, simplicity, safety and comparable diagnostic accuracy of the procedure in most cases of solid malignancies[24].

The commonest treatment modality was chemotherapy only in more than half our patients. Few patients received surgery and/or radiotherapy in addition to chemotherapy. Though most patients received one form of supportive care or another during the course

Table III: showing the numbers of children with various malignancies grouped according to their ages at presentation

Type of malignancy	0-4 yrs (%)	5-9 yrs (%)	10 -14 yrs (%)	>14 yrs (%)	Total (%)
Burkitt's lymphoma	5	22	16	0	43
Non Hodgkin's lymphoma (NHL)	1	2	2	2	7
Hodgkin's lymphoma	0	2	2	0	4
Acute lymphoblastic leukaemia (ALL)	1	2	1	0	4
Acyte Myeloblastic leukaemia (AML)	0	1	0	0	1
Plasma cell leukaemia	0	0	0	1	1
Parotid gland tumor	0	1	0	0	1
Primary liver cell carcinoma (PLCC)	0	0	2	0	2
Osteogenic sarcoma	0	1	3	1	5
Neuroblastoma	1	1	0	0	2
Neurofibroma	0	1	1	0	2
Nephroblastoma	6	3	1	0	10
Naso-pharyngeal tumor	0	1	1	0	2
Muco-epidermoid tumor	0	0	0	1	1
Fibrosarcoma	0	0	1	0	1
Bladder sarcoma	0	0	1	0	1
Brain stem glioma	0	1	0	0	1
Retinoblastoma	8	0	0	0	8
Rhabdomyosarcoma	0	1	1	0	2
Follicular carcinoma of thyroid gland	0	0	1	0	1
Total (%)	22 (22.2 %)	39 (39.4 %)	33 (33.3 %)	5 (5.1 %)	99 (100 %)

of treatment, 2 patients were solely given supportive treatment due to the hopeless nature of the disease at presentation. A major challenge encountered in the management of the patients include unavailability of cytotoxic drugs, high cost where available and the unwillingness on the part of some parents / caregivers to continue spending indefinitely having been told the prognosis of the disease, findings similar to those reported by Uba *et al*[25]. In addition, where needed, specific blood products such as platelet concentrate were not readily available hence fresh whole blood used in most cases which negates the principle of rational use of blood and blood products. Another area of challenge was in long term follow up as many patients were lost to follow up after first course of treatment, and also record keeping because some cases had to be excluded from the analysis due to incomplete records.

Conclusion and Recommendations

The distribution of the various childhood malignancies in our review was similar to those reported from some other parts of Nigeria. Although there was a single report of a possible decline in the incidence of Burkitt's lymphoma from Ibadan, Burkitt's lymphoma still remains the commonest solid malignancy in children as was found in our study and several others from different regions in Nigeria. The limited use of immuno-histochemical and molecular methods in the characterisation of our cases most especially the lymphomas which was observed in this study is a major diagnostic challenge and measures need to be adopted to ensure that these tests are routinely available for adequate and proper characterization of these tumors as this will also ensure optimal treatment for our patients. A strategy for achieving this may be by forming partnerships between our tertiary health institutions and manufacturers of these diagnostic products on a profit-sharing agreement which will make these tests available. There is also the need for more commitments on the part of government agencies to make cytotoxic dugs more readily available at affordable costs.

Conflict of interest : None

References

1. Chirdan LB, Bode-Thomas F, Chirdan OO. Childhood cancers:Challenges and strategies for management in developing countries. *Afr. J. Paed. Surg.* **9**(2), 2009; 126-129. http://www.afrjpaedsurg.org/text.asp?2009/6/2/126/54783

2. Jamal S, Mamoon N, Mushtaq S, Luqman M. Pattern of childhood malignancies: study of 922 cases at Armed Forces Institute of Pathology (AFIP), Rawalpindi, Pakistan. *Asian Pac J Cancer Prev* 2006;**7:**420-2

3. Williams AO. Tumors of Childhood in Ibadan, Nigeria. *Cancer* 1975;**36**:370-8 http://dx.doi.org/10.1002/1097-0142(197508)36:2<370::AID-CNCR2820360212>3.0.CO;2-K

4. Samaila MO. Malignant tumors of childhood in Zaria. Afr. *J. Paed Surg.* 2009; **6**(1): 19-23. http://dx.doi.org/10.4103/0189-6725.48570

5. Little J. Epidemiology of childhood cancers, Lyon, France: International Agency for Research on Cancer; 1999. (Scientific Publication no 149)

6. Parkin DM, Kramarova E, Draper GI et al. International Incidence of childhood cancer. Vol 2. Lyon, France: International Agency for Research on Cancer; 1998. (Scientific Publication no 144)

7. Brown BJ, Oluwasola AO. Childhood Rhabdomyosarcoma in Ibadan, Nigeria: 1984-2003. *Ann Trop Paediatr* 2006;**26**:349-355 http://dx.doi.org/10.1179/146532806X152881

8. Uba FA, Chirdan LB. Clinical characteristics and surgical outcome of childhood rhabdomyosarcoma: a 7 year experience. *Afr J Paediatr Surg* 2008; **5**: 19-23 http://dx.doi.org/10.4103/0189-6725.41631

9. Olisa EG, Chandra R, Jackson MA, Kennedy J, Williams AO. Malignant tumors in American black and Nigerian children: A comparative study. *J. Natl. Cancer Inst* 1975;**55:**281-284.

10. Babatunde AS, Amiwero CE, Olatunji PO, Durotoye IA: Pattern of Haematological Malignancies in Ilorin, Nigeria: A Ten Year Review. The Internet. *J.Hematology.*2009; **5**(2) : 1-10. http://www.ispub.com

11. Onwasigwe CN, Aniebue PN, Ndu AC. Spectrum of paediatric malignancies in eastern Nigeria (1989–1998). *West Afr J Med* 2002; **21**: 31-33.

12. National Population Commission of Nigeria. 2006 Provisional Census Figures. Census News. 2007; 61:16-17.

13. Lewis SM, Bain BJ, Bates I.(ed). Dacie and Lewis Practical Haematology. 2006, 10th edition. London, Churchill Livingstone, pp. 25-55.

14. Agboola AOJ, Adekanmbi FA, Musa AA, Sotimehin AS, Deji-Agboola AM, Shonubi AMO, et al. Pattern of childhood malignant tumors in a teaching hospital in south-western Nigeria. *Med. J. Australia.*2009; **190**(1): 12-14

15. Akang EEU:Tumors of childhood in Ibadan, Nigeria. *Pediatric Path. & Lab Med*. 1996; **16**: 791-800.

16. Obafunwa JO, Akinsete I. Malignant lymphomas in Jos, Nigeria: A Ten year study. *Cent Afr J Med.* 1992; **38**(1): 17-25

17. Nkrumah FK. Paediatric Oncology in the developing world: An African perspective. *Ann Trop Paediatr* 1987;**3**: 155-8

18. Ojesina AI, Akang EE, Ojemakinde KO. Decline in the frequency of Burkitt's lymphoma relative to other childhood malignancies in Ibadan. *Ann Trop Paediatr* 2002;**22**(2): 159-63 http://dx.doi.org/10.1179/027249302125000887

19. Adimora GN, Ikefuna AN, Ejekam GC. Childhood Tumors. In: Azubuike JC, Nkanginieme KEO Eds. Paediatrics and Childhealth in a Tropical region. @nd Edition. Owerri : African Educational services; 2001: 658-66

20. Williams CKO, Bamgboye EA. Estimation of Incidence of human leukaemia sub-types in an urban African population. *Oncology.* 1983; **40**: 381-386 http://dx.doi.org/10.1159/000225769

21. Cartwright RA, McNally RJQ, Rowland DJ, Thomas J. The descriptive epidemiology of leukaemia and related conditions in parts of the United Kingdom 1984-1993. London Leukaemia Research Fund, 1997.

22. Anderson, RE, Ischida K, LI Y, et al. Geographical aspects of malignant lymphoma and multiple myeloma: selected comparisons involving Japan, England and United States. *Am J Path*. 1970**; 61**:85-97

23. Usman GN. Pediatric oncology in the third world. *Curr op pediatr* 2001; **13:** 1-9 http://dx.doi.org/10.1097/00008480-200102000-00001

24. Kusum V, Kusum K. Fine needle aspiration cytology in Pediatric oncology. *Indian J Pediatr* 1988; **55**: 403-407 http://dx.doi.org/10.1007/BF02810362

25. Uba AF, Chirdan LB. Childhood Wilms' Tumour Prognostic factors in North central Nigeria. *West Afr J Med* 2007; **26:**222-225