Childhood Malignancies Seen in a Paediatric Ward in a Resource Limited Setting: Any Change in Pattern?

Akodu SO and Adekaumbi AF
Department of Paediatrics, Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria.
Ogunlesi TA
Department of Paediatrics, Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria
Ayeni VA
Department of Paediatrics, Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria

Correspondence to: Akodu SO, E-mail: femiakodu@gmail.com
Nig.Hosp Pract Vol. 27 No.1-2, 2021 (3-7)

Summary

Childhood malignancy is fast becoming an important paediatric problem in Nigeria. To determine any change in trends of childhood malignancies seen among patients admitted into the paediatric wards of a teaching hospital in Sagamu, Nigeria.. Ten years retrospective study from 2009 to 2018 of all children hospitalised with malignant conditions aged up to 18 years diagnosed by means of histological or cytological examination. Eighteen cases of childhood malignancies were seen during the ten years period accounting for 0.88% of all admissions into the paediatric wards and giving an average of 2 cases per year. The peak age group of children with cancers was 5 - 9 years (range 1 - 13 years).Male to female ratio is 1:1. The most common childhood malignancy was lymphomas accounting for 27.8%, followed by acute leukaemia (22.2%). About one-tenth of the patients diagnosed with malignancy died in the course of therapy from advanced disease or complications of therapy. Childhood cancers are not uncommon in a Nigerian setting. Lymphomas still remains the most common childhood cancer. Case fatality rate was high among children with cancers in this study. Mobilization of human and material resources towards childhood cancer management is advocated. Lymphomas remains the most common childhood cancer as previously reported. Case fatality was high in this study. Mobilization of resources is advocated.

Key words: Childhood malignancies, Cancers, Lymphomas, pattern, outcome, Nigeria, diagnosis

Introduction

Cancer is relatively less common in children than in adults, comprising less than one percent of all cases of malignant disease.[1] The types and patterns of malignancies seen in children are different from those seen in adults and vary with the age of the child.[2] Due to its lower prevalence and the often non-specific signs and symptoms of malignancy, early detection of cancer in children can be difficult.[3] It is the second most common cause of death among children from infancy to age 15 years in Western countries while in Africa it is not classified among the ten most common causes of deaths.[4] A previous report of childhood morbidities and mortalities conducted at Olabisi Onabanjo University Teaching Hospital, Sagamu demonstrated that 1.8% of all admissions among school age and adolescents were due to malignancies.[5] The comparative analyses of childhood deaths in Sagamu showed that childhood malignancies accounted for 1.6% of all deaths in pre-school age and 7.1% of all deaths in school age and adolescence.[6] Infections, nutritional diseases, HIV and tuberculosis remain the most prevalent paediatric health problems in developing countries. However, 80% of all cancers in childhood occur in developing countries with a considerable lower rate of survival than in the developed countries.[7] Survival after a diagnosis of cancer is dependent on a number of factors such as early detection and access to appropriate and coordinated treatment services.[7]

In developing countries, the management of cancers is still a challenge with the problems of poor diagnostic facilities, high cost of drugs, coupled with ignorance, late presentation and poverty leading to continuing poor patient outcome.[7] There are also few paediatric oncologists and cancer research and treatment units in developing countries.[7] It is estimated that 50% children do not get properly diagnosed and treated. Also 40% of children report at very advanced stages of disease. Further, among the treated, only 50% survive with an overall survival of 15% in childhood cancers.[7,8] There is therefore a need to ascertain the current burden of childhood cancer in Olabisi Onabanjo University Teaching Hospital, Sagamu which may be beneficial in heightening awareness and help in early planning of intervention.

Agboola et al[9] had previously reported the prevalence rates for childhood cancer cases based on review of biopsies processed by morbid anatomy and histopathology department at Olabisi Onabanjo University Teaching Hospital, Sagamu between 1996 and 2006. The present study reports the current and long-term trends in childhood malignancies as seen in the paediatric ward of the hospital using the medical records of all admitted patients with malignancy. It is expected that this review will identify if there are any change in trends in paediatric malignancies in this environment.

Subjects and Methods

The study is a descriptive retrospective cross-sectional facility-based one covering the period from March 2009 to February 2018 in the Department of Paediatrics of Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, Ogun State in South

West Nigeria. We compared the current findings with the results of the 11 years review by Agboola et al [7] on childhood malignancies in Sagamu, South Western Nigeria between 1996 and 2006 and assessed the current patterns in the frequencies of paediatric cancers in same environment.

The Olabisi Onabanjo University Teaching Hospital Sagamu is a tertiary health facility. It is a major referral center serving the whole of Ogun State and neighbouring towns from Lagos state, which is a major point of entry into Nigeria from different parts of the country. There are limited facilities that can adequately diagnose and treat childhood malignancies in the hospital.

The ward records of all patients with malignancy aged up to 18 years admitted into paediatric ward were utilized for the purpose of this study. Data extracted from the records included age, sex, diagnosis and outcome. Outcome was classified as discharge, discharge against medical advice (DAMA), referral, and death. The principal diagnosis was based on the final assessment by the paediatric oncology unit; guided by the presenting clinical features and the results of laboratory tests such as haematological, radiological, histological or cytological examination. The treatment received was based on existing protocol.

The scheme proposed by Oyedeji[8] was used for determination of their social classification. Each subject socio-economic index scores was calculated using the occupational and educational levels of parents with mean of the four scores (two for the father and two for the mother) approximated to the nearest whole number to assign the social class (I to V). Classes I and II were grouped together as upper social stratum, class III was taken as the middle stratum and classes IV and V as lower social strata.

Data collected was entered into a Microsoft Excel spread sheet and was analysed using the Statistical Package for Social Science (SPSS) version 17.0. The mean, standard deviation and proportion were generated as necessary. Level of significance was set at $p < 0.05$.

Results

Demographic characteristics of subjects with childhood malignancies according to gender: A total of 2, 048 children were admitted at the paediatric ward of the hospital during the study period. Eighteen children were diagnosed with malignant tumours-an average of two cases per year, which accounts for 0.88% of childhood illness. Nine were boys (50.0%), giving a male-to-female ratio of 1:1. Table 1 shows the demographic characteristics for all children with childhood malignancy admitted during the study period. The peak age for childhood malignancies was 5-9 years age category followed by 0-4 years age category; and these two age categories together accounted for more than four-fifth of the children with cancer seen during the study period. Ten (55.5%) of the study subjects belonged to the lower socioeconomic strata (Socioeconomic indices IV and V), while 27.8% and 16.7% belonged to the middle (Socioeconomic index III) and upper (Socioeconomic index I and II) socioeconomic strata respectively. The preponderance for childhood malignancies was same irrespective of gender.

Pattern of childhood malignancies: Table 2 shows the distribution pattern of childhood malignancies seen during the study period. The commonest childhood malignancies seen were lymphomas (27.8%) followed by acute leukaemia (22.2%). These two conditions constituted about half of all cases of childhood malignancies seen. Ameloblastoma, rhabdomyosarcoma, and bone tumour were infrequently encountered. Nephroblastoma constituted the most common cancer among 0-4 years age category while acute leukaemia is the most common among 5-9 years age category. Single case each of bone tumour and rhabdomyosarcoma seen were in children aged ≥10 years category and they are all male subjects. Lymphomas and nephroblastomas were most commonly seen among males while neuroblastoma and acute leukaemia occurred more commonly among females.

Mean age at diagnosis of subjects with childhood malignancies: The mean age distribution of the study patients at diagnosis are given in Table 3. Overall, the age of the subjects ranged from one year to 13 years with a mean 6.5 (3.6). The mean age of the male group of 7.3 (4.2) years was not statistically different from 5.7 (2.7) years of the female group ($t = 0.995$, $p = 0.335$). The subjects with nephroblastoma were youngest while subjects with lymphomas were oldest. The age of the children with ameloblastoma, bone tumour, and rhabdomyosarcoma were 9 years, 13 years and 10 years respectively.

Immediate outcome of admission of subjects with childhood malignancies: Table 4 shows the distribution of the immediate outcome of admissions for all children with childhood malignancy admitted during the study period. About one-tenth of patients died (11.1%). Equal proportions of male and female children with childhood cancer were discharged while the two death occurred in the male children with cancer. Two of the discharged patients were yet to be certified disease-free at the time of study because they have not completed courses of chemotherapy based on treatment protocol. Relative survival for all admitted patients with cancers combined was higher among those 5-9 years age category compared with those aged below five years of age and older than nine years of age. Mortality occurred among patients with nephroblastoma and lymphoma, one death each respectively was observed.

Comparison between pattern of childhood malignancies from current and previous study: Table 5 compares the spectrum of pattern of childhood malignancies from current study and previous study. The most prevalent type of childhood malignancies seen in both study was lymphoma. The lymphomas were one and half times greater in the previous study compared with the current study. The embryonic tumour retinoblastoma, medullary thyroid carcinoma, adenocarcinoma of the rectum, invasive mucinous carcinoma of the colon and germ cell cancers were relatively uncommon during the current study period.

Discussion

The present study which is a review of medical records of all children with malignancies admitted into paediatric ward of Olabisi Onabanjo University Teaching Hospital was to analyse the current trends

Table 1: Demographic characteristics of subjects with childhood malignancies according to gender

	Male n (%)	Female n (%)	All n (%)
Age group (years)			
0 - 4	3 (42.9)	4 (57.1)	7 (38.9)
5 – 9	3 (37.5)	5 (62.5)	8 (44.4)
≥10	3 (100.0)	0 (0.0)	3 (16.7)
ALL	9 (50.0)	9 (50.0)	18 (100.0)
Socioeconomic Strata			
Upper	1 (33.3)	2 (66.7)	3 (16.7)
Middle	3 (60.0)	2 (40.0)	5 (27.8)
Lower	5 (50.0)	5 (50.1)	10 (55.5)

Table 2: Pattern of childhood malignancies

Diagnosis	0-4 years n (%)	5-9 years n (%)	≥10years n (%)	ALL n (%)	M/F ratio
Acute leukaemias	2 (28.6)	2 (25.0)	0 (0.0)	4 (22.2)	0.25
Lymphomas	1 (14.3)	3 (37.5)	1 (33.3)	5 (27.8)	0.80
Ameloblastoma	0 (0.0)	1 (12.5)	0 (0.0)	1 (5.6)	0.00
Rhabdomyosarcoma	0 (0.0)	0 (0.0)	1 (33.3)	1 (5.6)	1.00
Nephroblastoma	3 (42.8)	0 (0.0)	0 (0.0)	3 (16.6)	0.67
Neuroblastoma	1 (14.3)	2 (25.0)	0 (0.0)	3 (16.6)	0.00
Bone tumour	0 (0.0)	0 (0.0)	1 (33.3)	1 (5.6)	1.00

Table 3: Mean age at diagnosis of subjects with childhood malignancies

Diagnosis	Mean Age (SD)	Age Range
Acute leukaemias	4.8 (2.2)	2.0 – 7.0
Lymphomas	7.6 (3.6)	3.0 – 12.0
Neuroblastoma	6.7 (3.2)	3.0 – 9.0
Nephroblastoma	2.7 (1.5)	1.0 – 4.0
All	6.5 (3.6)	1.0 – 13.0

SD = Standard Deviation

Table 4: Immediate outcome of admissions of subjects with childhood malignancies

	Discharge n (%)	DAMA n (%)	Died n (%)	Referred n (%)	p-value
Gender					0.446
Male	3 (16.7)	2 (11.1)	2 (11.1)	2 (11.1)	
Female	3 (16.7)	4 (22.2)	0 (0.0)	2 (11.1)	
Total	6 (33.3)	6 (33.3)	2 (11.1)	4 (22.2)	
Age group (years)					0.294
0 – 4	2 (11.1)	4 (22.2)	1 (5.6)	0 (0.0)	
5 – 9	3 (16.7)	2 (11.1)	0 (0.0)	3 (16.7)	
≥10	1 (5.6)	0 (0.0)	1 (5.6)	1 (5.6)	
Total	6 (33.3)	6 (33.3)	2 (11.1)	4 (22.2)	
Diagnosis					0.716
Acute leukaemias	2 (11.1)	2 (11.1)	0 (0.0)	0 (0.0)	
Lymphomas	1 (5.6)	2 (11.1)	1 (5.6)	1 (5.6)	
Ameloblastoma	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.6)	
Rhabdomyosarcoma	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	
Nephroblastoma	1 (5.6)	1 (5.6)	1 (5.6)	0 (0.0)	
Neuroblastoma	1 (5.6)	1 (5.6)	0 (0.0)	1 (5.6)	
Bone tumour	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.6)	
Total	6 (33.3)	6 (33.3)	2 (11.1)	4 (22.2)	

Table 5: Comparison between pattern of childhood malignancies from current and previous study

Diagnosis	Current Study n (%)	Agboola et al[9] n (%)
Acute leukaemias	4 (22.2)	0 (0.0)
Lymphomas	5 (27.8)	31 (40.3)
Ameloblastoma	1 (5.6)	0 (0.0)
Rhabdomyosarcoma	1 (5.6)	3 (3.9)
Nephroblastoma	3 (16.6)	11 (14.3)
Neuroblastoma	3 (16.6)	4 (5.2)
Bone tumour	1 (5.6)	3 (3.9)
Retinoblastoma	0 (0.0)	16 (20.8)
Medullary Thyroid Carcinoma	0 (0.0)	1 (1.3)
Adenocarcinoma of the rectum	0 (0.0)	1 (1.3)
Invasive mucinous carcinoma of the colon	0 (0.0)	1 (1.3)
Germ Cell Cancers	0 (0.0)	6 (7.7)
	18	77

during 2009 – 2018 compared with previous study by Agboola et al[9] from 1996 to 2006 in the same study centre. This study was undertaken to see if the trend coincides with the international data which estimated that by 2020, the number of new cases of cancer will increase to more than 15 million, with cancer-related deaths increasing to 12 million, and the burden of incidence, morbidityand death will be greater in developing countries.[4] There is no available institution-based cancer registering unit in Olabisi Onabanjo University Teaching Hospital to confirm or refute this. It will thus be desirable to have this established.

Only eighteen cases of childhood cancers were recorded during the period 2009 to 2018. The few cases of childhood cancers recorded were probably due to the absence of facilities that can adequately handle some categories of the cases in Olabisi Onabanjo University Teaching Hospital such as lack of neurosurgeons. Majority of suspected cases of childhood cancers were referred to other tertiary health facilities outside Sagamu. The current study only recruited subjects with available confirmatory results of laboratory tests such as haematological, radiological, histological or cytological examination. The higher number of seventy-seven cases seen in Agboola et al[9] may be attributed to the fact that histologic slides from all the wards were reviewed unlike the current study that reviewed records of children in paediatric wards only.

The prevalence of childhood malignancies of 0.88% in the present study was comparable with 0.72% that was previously reported by Agboola et al[9] in the same hospital. This finding implies no obvious change in burden of childhood cancers between the periods of 2002-2006 compared with the current periods of 2009-2018. Since we only studied children with cancers admitted into the paediatric ward, it would have been thought that the true burden of childhood cancers is likely to be higher in the study by Agboola et al[9] who reviewed materials from all clinical departments of the hospital involved with management of childhood cancers for pathological diagnosis. In view of this the observed prevalence rates in the present study might not be a true reflection of the burden of childhood cancer in the centre. In addition, the inclusion of haematological malignancies in the current study might account for the observed slight increase in the prevalence rate of childhood malignancies as against study by Agboola et al[9] where this was excluded.

Lymphomas were the most prevalent childhood cancer diagnosed in this review period. This was similar to previous review conducted by Agboola et al.[9] A similar finding was reported by earlier authors from different part of Nigeria.[10-14] On the contrary among children from Europe,[15] America,[16] Asia,[17,18] Oceania[19] and South Africa,[18] leukaemia is the most prevalent childhood tumour seen. The observed difference is probably an effect of environmental factors. A number of studies have found that residence in areas of higher socioeconomic status is associated with increased risk of childhood acute leukaemia.[20-21]

The age range with most occurrence of childhood cancer was between 0-9 years with the majority occurring between 5-9 years of age. This provides corroboration for the findings of earlier workers in Nigeria[10] and elsewhere[15] to the effect that the burden of childhood cancers was higher in the early childhood. This age specific prevalence of childhood cancers showed no significant change in trend compared with previous study in the hospital by Agboola et al.[9]

The present finding showed no gender preponderance for childhood cancers. It is plausible that the rate of childhood cancer may not be related to exposures such as hormonal and behavioural influence that differs by gender. Hormonal influences between genders differ and these may not be a clue to identify the reason for no gender differences. However, differences in hormonal profile are rarely significant until puberty is achieved and the preponderance of pre-pubertal children in the current study may explain the lack of sex predilection. And of course there are many gender related genetic differences that may all play a part in the identification of childhood malignancies. Although, the results of findings by Agboola et al[9] revealed a pronounced male preponderance, which might be due to its large size, which permits detection of a moderate rate of increase in the gender group. Data from large paediatric cancer registries would have helped to increase the coverage in making a strategic conclusion of gender distribution of childhood cancers within our setting.

Childhood malignancies account for about one percent of childhood illness in Olabisi Onabanjo University Teaching Hospital. The annual rate of two cases per year reported from current study was lower than 10.6 per year documented by Offiong et al[8] at the University of Abuja Teaching Hospital Gwagwalada,

Abuja. Similarly, higher annual rates of 23 per year and 43.8 per year were reported by Okpe et al[10] and Ochicha[11] in Jos and Kano respectively. The observed difference is possibly due to availability of multiple health facilities providing similar services. Within Ogun State, OOUTH is one of three teaching hospitals within Ogun State offering tertiary care to children. Thus the patients herein reported probably represent only a fraction of affected children who require such services.

Although, the results by Agboola et al[9] are largely confirmatory and of large size, the current study are findings from paediatric ward records which helped to include specific data set for childhood haematological malignancies like leukaemia which allow for variations between the current study and that by Agboola et al.[9]The decrease in prevalence was not consistent by cancer type. The most pronounced diversities included the zero prevalence of germ cell tumours, retinoblastoma during the study period. This may be that all the children with retinoblastoma during the study period presented at the ophthalmology department who also manage this category of childhood tumours. On the contrary, increase prevalence was seen in acute leukaemia. It is not surprising therefore that a higher prevalence rate was observed in acute leukaemia as diagnosis of leukaemia by bone marrow aspiration which was the method employed for diagnosis in the study centre and it is mainly carried out by the haematologist.

Mortality due to malignancies portrays a grim picture especially with lymphomas and nephroblastomas. On the contrary, other childhood tumours had higher chance of survival. In comparison with females, more males died from childhood cancer. Many fatalities may be as a result of advanced disease while others were related to complications of therapy.

The lack of personnel like neurosurgeons, multidisciplinary nature of some malignancies which makes them to present first at other department other than paediatrics, and lack of hospital-based cancer registry are barriers to a more definitive assessment of malignant childhood tumours in the study location. Lymphomas still remain as the most common childhood malignancies seen in Olabisi Onabanjo University Teaching Hospital. The age group five to ninee years of age had the peak prevalence for childhood cancer as well as the lowest mortality. More standardized data collection regarding prevalence, mortality and survival rates of childhood cancers should be encouraged within our setting with establishment of hospital based and state cancer registry.

Study limitation

The major limitation of the study is the small number of affected patients with childhood cancer which make it difficult to have conclusive remarks. There is a need for collaborative, multicentre study involving larger pool of children with childhood cancer which further reinforce the needs for establishment of hospital based and state cancer registry in our setting.

Conflict of Interest: None to declare

Source of Funding: Self-fund

References

1. *Stefan DC*. Epidemiology of childhood cancer and the SACCSG tumour registry. CME 2010; 28: 317 – 19.
2. Nazemi KJ, Malempati S. Emergency Department presentation of childhood cancer. Emerg Med Clin N Am 2009; 27: 477 – 95.
3. Ayeni VA, Oladipo AO, Ogunlesi TA Olowu AO, Ogunfowora OB, Fetuga MB, et al. Childhood morbidity and mortality at the Olabisi Onabanjo University Teaching Hospital, Sagamu: Has anything changed? Int Multidiscip Res J 2012; 5 : 15 – 20.
4. Fetuga B, Ogunlesi T, Adekanmbi F, Olanrewaju D, Olowu A. Comparative analyses of childhood deaths in Sagamu, Nigeria: implications for the fourth MDG. SAJCH 2007; 1 106 – 11.
5. Youlden D, Baade P, Ward L, et al. Childhood cancer survival in Australia, 1995-2004. Viertel Centre for Research in Cancer Control, Cancer Council Queensland and the Australian Paediatric Cancer Registry: Brisbane, Queensland 2010.
6. Offiong UM. Childhood malignancies in University of Abuja Teaching Hospital Gwagwalada, Abuja, Nigeria. Niger J Paediatr 2012; 39: 60 – 2.
7. Bhurgri Y. Karachi Cancer Registry Data—Implications for the National Cancer Control Program of Pakistan. Asian Pac J Cancer Prev 2004;5: 77-82.
8. Aziz Z, Sana S, Saeed S. Institution based tumour registry from Punjab: Five year data based analysis. J Pak Med Assoc 2003; 53: 8-11.
9. Agboola AOJ, Adekanmbi FA, Musa AA, Sotunsile AS, Deji-Agboola AM, Shonubi AMO, Oyebadejo TY, Banjo AAF. Pattern of childhood malignant tumours in a teaching hospital in south-western Nigeria. MJA 2009; 190: 12-4.
10. Oyedeji GA. Socio-economic and cultural background of hospitalized children in Ilesha.Nig J Paediatr 1985; 12: 111-7.
11. Onwasigwe CN, Aniebue PN, Ndu AC. Spectrum of paediatric malignancies in eastern Nigeria (1989-1998). West Afr J Med. 2002; 21:31 - 3.
12. Ochemi S, Bioha FI, Ibegbulam OG, Emodi IJ, Ikefuna AN. Changing pattern of childhood malignancies in Eastern Nigeria. West Afr J Med. 2008; 27:3-6.
13. Offiong UM. Childhood malignancies in University of Abuja Teaching Hospital Gwagwalada,Abuja. Nigeria. Niger J Paed 2012; 39: 60-2.
14. Okpe ES, Abok II, Ocheke IE, Okolo SN. Pattern of Childhood Malignancies in Jos, North Central Nigeria. J Med Trop 2011; 13: 109 - 14.
15. Baade PD, Youlden DR, Valery PC, Hassall T, Ward L, Green AC et al. Trends in incidence of childhood cancer in Australia, 1983–2006. Br J Cancer 2010; 102: 620 – 6.
16. Isaevska E, Manuisievska M, Alessi D, Mosso ML, Magnani C, Sacerdote C, et al. Cancer incidence rates and trends among children and adolescents in Piedmont, 1967–2011. PLoS ONE 2017; 12: e0181805.
17. Shabbir A. Childhood Cancers: Experience at a Tertiary Care Hospital. J Rawalpindi Medical College (JRMC); 2011;15:38-9.
18. Ajiki W, Tsukuma H, Oshima A. Survival Rates of Childhood Cancer Patients in Osaka, Japan. Jpn J Clin Oncol 2004; 34: 50–4.
19. Stefan DC. Epidemiology of childhood cancer and the SACCSG tumour registry. CME 2010; 28 : 317–9.
20. Alexander FE, Ricketts TJ, McKinney PA, Cartwright RA. Community lifestyle characteristics and risk of acute lymphoblastic leukaemia in children. Lancet 1990; 336: 1461 - 5.
21. Draper GJ, Vincent TJ, D'Conor CM, Stiller CA. Socioeconomic factors and variation in incidence rates between county districts. In: Draper GJ (editor). The Geographical Epidemiology of Childhood Leukaemia and Non-Hodgin's Lymphoma in Great Britain 1966 – 1983. London: OPCS; 1991: 47 - 56.
22. McWhirter WR. The relationship of incidence of childhood lymphoblastic leukaemia to social class. Br J Cancer 1982; 46: 640 – 5.
23. Ochicha O, Gwarzo AK, Gwarzo D. Pediatric malignancies in Kano, Northern Nigeria. World J Pediatr 2012; 8: 235 -9.