

Profile of Paediatric Malignancies in Yangon Children's Hospital: 2012-2014

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Although the incidence of paediatric malignancy is on rise, little is known about the epidemiology of pediatric cancer especially in low and middle income countries. In Myanmar, reports on the pattern and incidence of childhood cancer are very few. Reliable paediatric cancer data are essential for assessing the magnitude of this problem and for paediatric cancer care. Therefore, this study was aimed to describe the relative frequencies of various paediatric malignancies in Yangon Children's Hospital (YCH) and their distributions according to age and sex. This hospital-based retrospective study covered all children aged 0 to 14 years with confirmed malignancies. We reviewed hospital records of Haematology-Oncology Unit, YCH from January 2012 to December 2014. A total of 609 patients were diagnosed as cancer during study period. Among them, 379(62.2%) were haematological malignancies and 230(37.8%) were solid tumours. Acute lymphoblastic leukemia (27.5%), acute myeloblastic leukemia (14.3%), Non-Hodgkin's lymphoma (14%) and retinoblastoma (9.7%) were four most common childhood malignancies. Wilm's tumour (6.8%), neuroblastoma (6.7%), germ cell tumour (4.1%) and rhabdomyosarcoma (3.6%) were also common. Less common were brain tumours (2.1%), Hodgkin's lymphoma (1.5%) and Burkitt's lymphoma (1.0%). Prevalence was higher in boys (58.6%) than girls (41.4%) with male to female ratio 1.5:1. About half (50.9%) of the patients were younger than 5 years and prevalence was less in more than 10 years age group (15.7%). As data were collected from hospital, not from population, findings from this study might not be the representation of our national statistics. But as Haematology-Oncology Unit in YCH is one of the two paediatric oncology centers in Myanmar and patients from most regions of the country attend this hospital for specialist care, these findings might reflect the burden of paediatric malignancy in Myanmar.

Key words: Paediatric malignancies, Yangon Children's Hospital

INTRODUCTION

The incidence of childhood tumour and type vary greatly throughout the world.¹ Although it is relatively rare, comprising less than 1% of cases of malignant disease,² its incidence is on rise.³ Surveillance, Epidemiology, and End Results (SEER) reports from the National Cancer Institute (NCI) indicated that approximately 164 cases of cancer occur per 1 million populations less than 20 years of age.⁴ Paediatric malignancies come next to accident as the leading cause of

death among children in the developed world, remaining one of the major causes of death in children between the ages of 0 to 14 years.¹ In developing countries like India childhood mortality is still due to malnutrition and infections, but paediatric tumors are also rising in number.⁵

With the major advances in the diagnosis, multi-modality therapy, development of

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rational use of combined chemotherapy and improved supported care, the cure rate in childhood cancer has increased tremendously and over 60% of all childhood cancers are now curable.⁶ In developed countries, childhood cancer cure rate increased up to 80%⁷ and five-year survival for certain cancers for example, Hodgkin disease and retinoblastoma, was 95% in 2007.³ However, over 80% of the world's children with cancer live in less privileged countries,⁷ where the cure rate is much lower. Moreover, very little is known about the epidemiology of pediatric cancer in low- and middle-income countries (LMICs). Cancer registries are almost nonexistent, and underdiagnosis and underregistration are additional barriers; the development of childhood cancer registries in LMICs should be prioritized.⁸ There is a lack of nationwide population based cancer registries on the incidence and patterns of childhood cancer in developing countries⁹ and this also limits our knowledge of the epidemiology of pediatric cancer. Additionally, good quality-population level statistics on the occurrence of cancer at young age have been more difficult to obtain than in adult.¹⁰ Serious under reporting, even in western countries, has been documents.^{11, 12}

Due to these difficulties, costs, and uncertainties associated with accurate population based cancer registries, hospital registries are the only available source of information for assessing the disease pattern in community, also serving as a practical first step toward a possible population-based assessment of cancer incidence rate.^{13, 14} As reduction of child mortality is one of the Millennium Development Goals; initiatives aimed at reducing the burden of non-communicable diseases, including childhood cancer, are needed to be developed.⁸

Myanmar is the second largest country in Southeast Asia with an estimated total population in 2010 of 59.13 million of which 18.84 million were children <15- years- old.¹⁵ There are two pediatric oncology and hematology centers in

Myanmar located at Yangon and Mandalay Children's Hospitals serving the southern and northern regions of the country, respectively but there is no national population based pediatric cancer registry.¹⁶ Reliable paediatric cancer data is essential for assessing the magnitude of this problem and for qualified paediatric cancer care.⁸ Although many papers have been published on this in some developing countries,¹⁰ reports on the pattern and incidence of childhood cancer in Myanmar are very few. The aim of this study was to describe the relative frequencies of various paediatric malignancies and their distribution according to age and sex. It can help assessing the burden of paediatric malignancies in Myanmar and the information collected has the potential to assist scientific analysis, planning and research.

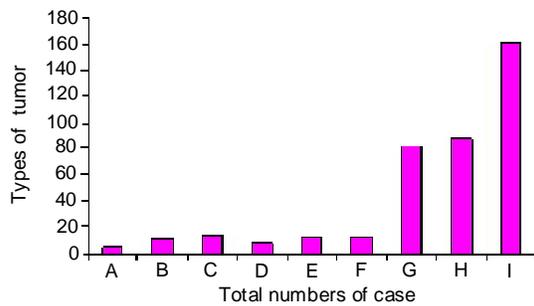
MATERIALS AND METHODS

In this retrospective study, 3-year hospital records of Haematology-Oncology Unit, Yangon Children's Hospital, from January 2012 to December 2014 were used. All children with cancer, aged 0 to 14 years diagnosed by means of histological or cytological examination during that period were included in the study. Tumour types were classified according to SEER (Surveillance, Epidemiology and End Results) modification of ICCC (International Classification of Childhood Cancer) by National Cancer Institute (NCI).¹⁷ Data were extracted from the hospital records using the predesigned proforma. The profile of childhood cancer was studied focusing on the prevalence of tumors according to age, sex and type of tumors.

RESULTS

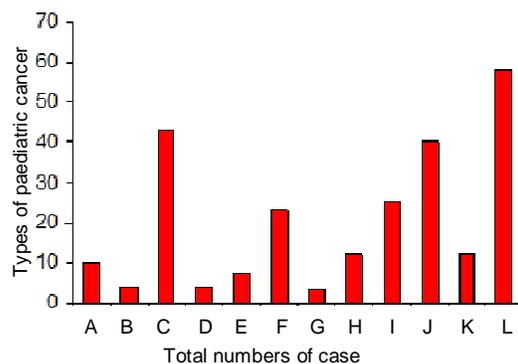
From January 2012 to December 2014, a total of 609 children were admitted to Haematology-Oncology Unit, Yangon Children's Hospital, with confirmed malignancies, of which 379 cases (62.2%) were haematological malignancies and 230 cases (37.8%) were solid tumours.

Leukemia constituted 43.5% (265 cases) of all childhood malignancies; among them Acute lymphoblastic leukaemia was the most frequent leukemia, accounted for 63% (167 cases) of all leukemia cases. The next most common leukemia was acute myeloid leukemia accounted for 32.8% (87 cases) of total leukaemia patients. Among lymphomas, Non-Hodgkin lymphomas were more prevalent (85%, 85 cases) than Hodgkin's lymphoma (9 cases, 9%) and Burkitt's lymphoma (6 cases, 6%) (Fig.1). Retinoblastoma was the most frequently found solid tumour (59 cases, 9.7%) of



- A = Juvenile myelomonocytic leukemia
- B = Bukitt's lymphoma
- C = Langerhan cell histiocytosis
- D = Haemophagocytic lymphohistiocytosis
- E = Chronic myeloid leukemia
- F = Hodgkin's lymphoma
- G = Non-Hodgkin's lymphoma
- H = Acute myeloblastic lymphoma
- I = Acute lymphoblastic

Fig.1. Common haematological malignancies in YCH during the study



- A = Others
- B = Ovarian cancer
- C = Wilm's tumour
- D = Colon cancer
- E = Osteosarcoma
- F = Rhabdomyosarcoma
- G = Pancreaticoblastoma
- H = Hepatoblastoma
- I = Germ cell tumour
- J = Neuroblastoma
- K = Brain tumour
- L = Retinoblastoma

Fig. 2. Common solid tumours in YCH during the study

all cancer patients admitted to Yangon Children's Hospital. Second common solid tumours were Neuroblastoma (41 cases, 6.7%) and Wilm's tumour (41 cases, 6.7%) followed by germ cell tumour (25 cases, 4.1%), rhabdomyosarcoma (22 cases, 3.6%) and brain tumour which accounted for only 2.1% of all childhood malignancies, 13 cases (Fig. 2). The prevalence of paediatric malignancies in Yangon Children's Hospital became higher in 2013 than 2012 but it was slightly lower down in 2014 (Table 1).

Table 1. Number of childhood cancer cases in YGH (2012-2014)

Year	Male	Female	Total
2012	103	78	181
2013	138	88	226
2014	115	87	202

Table 2. Gender distribution of paediatric cancer patients admitted to Yangon Children's Hospital during the study period

Tumour types	F	%	M	%	Total	%
Acute lymphoblastic leukemia	68	11.2	99	16.3	167	27.5
Acute myeloblastic leukemia	40	6.6	47	7.7	87	14.3
Chronic myeloid leukemia	4	0.6	5	0.8	9	1.5
Juvenile myelomonocytic leukemia	1	0.2	1	0.2	2	0.3
Non-Hodgkin's lymphoma	23	3.8	62	10.2	85	14.0
Hodgkin's lymphoma	0	0	9	1.5	9	1.5
Burkitt's lymphoma	0	0	6	1.0	6	1.0
Langhan cell histiocytosis	3	0.5	6	1.0	9	1.5
Haemophagocystic lymphohistiocytosis	4	0.6	1	0.2	5	0.8
Brain tumour	8	1.3	5	0.8	13	2.1
Primitive neuroecto-dermal tumour	0	0	2	0.3	2	0.3
Neuroblastoma	17	2.8	24	4.0	41	6.7
Malignant nerve sheath tumour	0	0	1	0.2	1	0.2
Retinoblastoma	31	5.1	28	4.6	59	9.7
Wilm's tumour	16	2.6	25	4.1	41	6.7
Heptoblastoma	5	0.8	7	1.2	12	2.0
Osteosarcoma	3	0.5	1	0.2	4	0.7
Rhabdomyosarcoma	11	1.8	11	1.8	22	3.6
Liposarcoma	0	0	1	0.2	1	0.2
Germ cell tumour	13	2.1	12	2.0	25	4.1
<i>Others malignant epithelial neoplasms</i>						
Adrenal carcinoma	1	0.2	0	0	1	0.2
Paranasal sinus tumour	1	0.2	0	0	1	0.2
Squamous cell carcinoma	0	0	1	0.2	1	0.2
Colon cancer	1	0.2	1	0.2	2	0.33
Pancreatoblastoma	0	0	2	0.3	2	0.33
Ovarian cancer	2	0.3	0	0	2	0.33
Total	252	41.4	357	58.6	609	100

M=Male, F=Female, %=Percentage

Paediatric malignancies were affected more in boys (58.6%) than girls (41.4%) with the ratio of 1.5:1 (Table 2).

Table 3. Age distributions of paediatric cancer types among 609 patients in YGH

Tumour types	Age (Years)			Total	%
	<5	5 to 10	>10		
Acute lymphoblastic leukemia	77	57	33	167	27.4
Acute myeloblastic leukemia	29	40	18	87	14.3
Chronic myeloid leukemia	1	4	4	9	1.5
Juvenile myelomonocytic leukemia	1	0	1	2	0.3
Non-Hodgkin's lymphoma	26	41	18	85	14
Hodgkin's lymphoma	2	5	2	9	1.5
Burkitt's lymphoma	6	0	0	6	1
Langhan cell histiocytosis	8	1	0	9	1.5
Haemophagocytic lymphohistiocytosis	4	1	0	5	0.8
Brain tumour	1	11	1	13	2.1
Primitive neuroectodermal tumour	0	2	0	2	0.3
Neuroblastoma	34	5	2	41	6.7
Malignant nerve sheath tumour	0	1	0	1	0.2
Retinoblastoma	51	7	1	59	9.7
Wilm's tumour	34	7	0	41	6.7
Heptoblastoma	9	0	3	12	2
Osteosarcoma	0	1	3	4	0.6
Rhabdomyosarcoma	12	9	1	22	3.6
Liposarcoma	0	0	1	1	0.2
Germ cell tumour	14	6	5	25	4.1
Adrenal carcinoma	1	0	0	1	0.2
Paranasal sinus tumour	0	0	1	1	0.2
Squamous cell carcinoma	0	1	0	1	0.2
Colon cancer	0	0	2	2	0.3
Pancreatoblastoma	0	2	0	2	0.3
Ovarian cancer	0	2	0	2	0.3
Total (%)	310 (50.9)	203 (33.3)	96 (15.8)	609	100

About 51% (309/607) of all patients belonged to below 5 years age group, one third (34%, 203/607) were aged 5-10 years and 15% (95/607) were more than 10 years. Acute lymphoid leukaemia (ALL) was peaked (25%, 77/309) before the age of 5 years, followed by retinoblastoma (16.5%, 51/309) and neuroblastoma (11.0%, 34/309). From 5 to 10 years, ALL (28%, 57/203), NHL (20.2%, 41/203) and AML (14.2%, 29/203) were three most prevalent malignancies. After the age of 10 years, 133 the most frequent neoplasm remained ALL (34.7%, 33/95) but among solid tumours, epithelial neoplasm like ovarian cancer, bone tumour and colon cancer became more frequent (Table 3).

DISCUSSION

The three most common malignancies in this study were leukemia (43.5%), lymphoma (16.5%) and retinoblastoma (9.7%). Jabeen, *et al.* also revealed in their hospital based retrospective study that lymphoma (24.2%), retinoblastoma (17.4%) and leukaemia (14.3%) were commonest childhood cancer in their centre.¹⁸ It was observed that these hospital-based data differed from population-based data as Cancer Facts & Figures 2014 by American Cancer Society described that cancers most common in children ages 0-14 are acute lymphocytic leukemia (26%), brain and CNS (21%), neuroblastoma (7%), and non-Hodgkin lymphoma (6%).¹

Brain tumour is the third most common childhood malignancy and commonest malignancy among solid tumours in USA, UK and also in some centers from India.¹⁹ But, it stood as sixth commonest tumour in the centre (13 cases, 2.1%). This might be related to the referral pattern. In Myanmar, children with brain tumour are usually referred to Neurosurgical Department and Radiotherapy Department of Yangon General Hospital. After surgery and/or radiotherapy most of the patients failed to seek further treatment with chemotherapy. Similar finding was seen in a Turkish study done in 2013 by Kutluk, *et al.*⁷ where they described that some of the children with CNS tumour who required chemotherapy were not referred to Paediatric Oncology Clinic.

Hodgkin's lymphoma was commonest in children between age 5 to 10 year and most of the adolescent cases were expected to be taking treatment at adult oncology centers. Burkitt's lymphoma is the least common lymphoma, constituted only 3% of total lymphoma cases and 1% of all malignant cases as our center is not in endemic area. Although osteosarcoma was top eight paediatric malignancy, encompassing 2% of the total cases, other bone tumours like chondrosarcoma, Ewing's sarcoma were not seen in this study.

Retinoblastoma occurs in children under 5 years (86.4%) and this proportion seems to be high. This could also be associated with the pattern of referral as there is a good relationship between paediatric oncologists and paediatric eye surgeons from Yangon Eye Hospital. This result is almost similar to paediatric malignancies profile study carried out by *Jabeen, et al.* where they found that 17.4% of all solid tumours were retinoblastoma which stood the first among all solid tumours.¹⁸

Hepatoblastoma is listed as a rare disease by the Office of Rare Diseases (ORD) of the National Institutes of Health (NIH). The incidence of hepatocellular carcinoma in the United States is 0.8 in children between the ages of 0 and 14 years.²⁰ But, it was not an uncommon cancer in Yangon Children's Hospital and 2% (12 cases) were reported as hepatoblastoma during study period. No hepatocellular carcinoma case was seen during this study. Due to incomplete data record, information regarding the stage, family history and referred regions could not be described in this study.

Conclusion

As data were collected data from hospital, not from population, findings from this study may not be the representation of the national statistics. However, as Haematology-Oncology Unit in Yangon Children's Hospital is one of the two major academic paediatric oncology centers in Myanmar and patients from most regions of the country attend this government hospital for specialist care and cure, these findings could reflect the burden of paediatric malignancy in Myanmar. These basic data could be a support for health planning, resource allocation and further paediatric oncology researches.

It also highlighted the importance of careful documentation and completeness of data in hospital based cancer registry and moreover, it can serve as a potential platform for a nationwide population-based cancer registry.

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