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Childhood cancer in Aden, Yemen

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ABSTRACT

Background: Cancer in children is increasingly recognized as a major and growing health problem in different developed and developing countries. In Yemen, it is still difficult to know the extent of cancer and its determinants among children. This study was conducted to determine the magnitude of childhood cancer in Aden and provide the preliminary baseline data by age and sex.
Methods: Basic epidemiologic data was retrieved from all paediatric cancer <15 years age registered in Aden Caner Registry (ACR), Yemen, from 1997 to 2006.
Results: The results showed a total of 483 childhood cancers <15 years age comprising12.7% of all registered malignancies with a male to female ratio of 1.5:1. The predominant age affected was 5–9 years in (38.3%) children. The most frequent cancer among Yemeni children was leukaemia 160 (33.1%) followed by lymphoma 152 (31.5%), CNS tumors 35 (7.2%) and bone tumours 25 (5.2%). An interesting and unusual finding was the frequency of acute myeloid leukaemia twice more common in female (66.7%) than male (33.3%). Lymphoma was the most common cancer in children >5 years. An interesting comparison was the preponderance of non-Hodgkins's lymphoma over Hodgkin's disease (1.6:1) stronger in female (3:1) than male (1.25:1). Medulloblastoma was the most common CNS tumour followed by astrocytoma, an infrequent finding in childhood cancer. Osteosarcoma was the most frequent bone tumour (male:female ratio of 1.8:1). A female preponderance was noticed in chondrosarcoma that was not yet documented. The blastoma group was common in younger age group. Retinoblastoma and nephroblastoma predominated in female while neuroblastoma, hepatoblastoma and soft tissue sarcomas in male.
Conclusion: It is concluded that there is a lower frequency of childhood cancer in Aden when compared with developed countries. It may explained by the fact that a large number of childhood cancers remain undiagnosed due to limitations of diagnostic facilities or under registration. Central paediatric hospitals should be provided with essential diagnostic and therapeutic services that should be freely available to all children with cancer.

1. Introduction

Cancer is a significant cause of ill health and death among children. Approximately one of every 500 children will develop cancer between birth and the age of 15 years [1–3]. Cancer incidence varies from 100 to 180 per million children under 15 years of age [4,5]. Paediatric cancer differs from adult malignancies in their nature, distribution and prognosis [6]. The distribution of cases by tumour sites varies with age during childhood [7]. Many developing countries documented cancer to be substantially affecting more male than female [8].

Leukaemia, the most common childhood cancer, account for about one-third of paediatric malignancies [9,10]. Brain tumours are second only to leukaemia as the most prevalent solid tumours in this age group [11]. Lymphoma is reported to be the third most common cancer in children in industrialized countries [12,13]. In equatorial Africa, 50% of childhood cancers are lymphomas a result of the very high incidence of Burkitt's lymphomas [6,14].

In Yemen cancer has become a major growing health problem. Little is known about the cancer incidence in less economically developed countries and with a view to providing insight we looked at data from the Aden Cancer Registry, Yemen. This study was conducted with the main objectives to describe the problem of cancer and to assess the different types of cancer by age distribution and sex among Yemeni children.

2. Patients and methods

The Aden Cancer Registry Centre (ACR) established in 1997 is a population based registry covering the four main governorates in Aden with a population of around 2 million (MOPIC, 2005) [16]. This centre collects and registers the epidemiological data of patients with cancer from public and private hospitals, diagnostic centres and abroad treatment archives at Aden. The collected data

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is entered to the computerized package Can Reg-4 and revised for monitoring any duplication or incompleteness. Classification and coding of the neoplasm are carried out according to the ICD-O and ICD-10.

In this study the basic epidemiologic data was retrieved from the records of patients with cancer <15 years of age registered in ACR during January 1997 through December 2006. Analysis included identification of the patient, demographic characteristics, sex, age and year of diagnosis, site, morphology, histology and topography of cancer and place of residence. The different types of Cancer were grouped into 12 major diagnostic groups according to the International Classification of Childhood Cancer (ICCC) [15,17]. Data were entered into computer database SPSS Version 15 for windows. Statistical analysis included quantitative descriptive analysis and summary statistics for describing the frequency of diagnostic group and subgroups of childhood cancer. Quantitative analysis of the studied variables included Chi squares, Fischer exact test and rates stratified by gender and age.

3. Results

A total of 483 childhood cancers of both sexes less than 15 years of age comprising 12.7% of all malignancies (3817) were registered at the Aden Cancer Registry from January 1997 through December 2006. Male comprised 288 (59.6%) and female 195 (40.4%) with a male to female ratio of 1.5:1. The mean (SD) age was 6.8 (4.0) years and the predominant age group was 5–9 years in 185 (38.3%) followed by 0–4 years in 163 (33.7%) children. The most frequent cancer among children based on the ICCC was leukaemia 160 (33.1%) followed by lymphoma 152 (31.5%) and central nervous system (CNS) tumours 35 (7.2%). Soft tissue sarcomas included 16 (3.3%), renal tumours 15 (3.1%), retinoblastoma 13 (2.7%) and sympathetic nervous system (SNS) tumours 12 (2.5%) (Table 1).

Leukaemia and lymphomas were the most common cancers in all age groups. Leukaemia 56 (34.4%) ranked first within 0–4 years followed by lymphoma 39 (23.9%). In the 5–9 years group, lymphoma 75 (40.5%) was followed by leukaemia 66 (35.7%), and CNS tumours 10 (5.4%). At 10–14 years, leukaemia and lymphomas formed equal bulk of tumours each 38 (28.1%), followed by bone tumours 19 (14.1%) and CNS tumours 17 (12.6%). The different types of childhood cancer and their distribution within the three age groups was statistically significant ($p = 0.001$) (Table 1).

The common cancer types among boys in order of frequency were lymphomas 101 (35.1%), leukaemia 89 (30.9%), CNS tumours 22 (7.6%), bone tumours 14 (4.9%) and soft tissue sarcomas 12 (4.2%). The most frequent cancer among girls in descending order was leukaemia 71 (36.4%), lymphomas 51 (26.2%), CNS tumours 13 (6.7%), bone tumours 11 (5.6%) and renal tumours 8 (4.1%) (Table 1).

Acute lymphoblastic leukaemia (ALL) was more frequent in male than female 69 (58%) versus 50 (42%)), while acute myeloid leukaemia (AML) was more common in female than male ((7 (33.3%) versus 14 (66.7%)). The difference between the diagnostic groups of leukaemia and sex was statistically significant ($p = 0.04$) (Table 2). All lymphomas were frequent in males. Non-Hodgkin's lymphoma (NHL) predominated over Hodgkin's disease (HD) with 1.6:1 ratio which was stronger in female (3:1) than male (1.25:1). CNS tumours was common in male except for astrocytoma in females (66.7%) Bone osteosarcoma was more common in male (63.6%) but chodrosarcoma was frequent in females (83.3%). Retinoblastoma and nephroblastoma did not show any sex difference. Skin cancer was common among females (80%). Five females had breast cancer (Table 2).

4. Discussion

This is the first report of data on 483 Yemeni patients with childhood cancer from January 1997 through December 2006 taken from on-going registry of ACR constituting 12.7% of all malignancies. It is comparable with reports from developing countries (4.1–12.6%) [18,19]. A male to female ratio of 1.5:1 was similar to the trends in Africa and Asia but different from western countries [20–22]. This sex pattern difference may be due to the underlying nature of the disease. But in Yemen with limited medical resources, it is still likely that females may be under diagnosed and males may have better access to medical care than girls.

It is reported that some variations occur in the different cancer types due to climatic and geographical changes. In this study, the cancer distribution among Yemen children based on the ICCC showed leukaemia to be the most common (33.1%) followed by lymphomas (31.5%) and CNS tumours (7.2%) similar to some developing countries but different from Sudan and Nigeria with lymphomas the most common cancers [7,10–14,17,22–29].

In general, a variable age specific pattern of Yemeni childhood cancer was documented with highest frequency of leukaemia at less than 4 years while lymphomas within 5–9 years of age. Equal frequency of leukaemia and lymphomas were seen at 10–14years followed by bone tumours and CNS tumours similar to some reports [6,27]. There is likelihood that this difference in cancer trend may be explained by a high proportion of childhood cancer still remains to be undiagnosed, the insufficient diagnostic

Table 1
Distribution of cancer by age and sex according to the International Classification of Childhood Cancer (ICCC), Aden 1997–2006.

ICCC diagnostic group	Leukaemias	Lymphomas	CNS tumours	SNS tumours	Retinoblastoma	Renal tumours	Hepatic tumours	Bone tumours	Soft tissue sarcomas	Germ cell tumours	Carcinomas	Others
Demographic feature N (%)												
Age group in years												
0–4 yrs 163 (33.7)	56 (34.4)	39 (23.9)	8 (4.9)	6 (3.7)	9 (5.5)	8 (4.9)	3 (1.8)	3 (1.8)	8 (4.9)	1 (0.6)	18 (11)	4 (2.5)
5–9 yrs 185 (38.3)	66 (35.7)	75 (40.5)	10 (5.4)	5 (2.7)	4 (2.2)	6 (3.2)	1 (0.5)	3 (1.6)	–	1 (0.5)	11 (5.9)	3 (1.6)
10–14 yrs 135 (28.0)	38 (28.1)	38 (28.1)	17 (12.6)	1 (0.7)	–	1 (0.7)	–	19 (14.1)	8 (5.9)	1 (0.7)	10 (7.4)	2 (1.5)
Sex												
Male 288 (59.6)	89 (30.9)	101 (35.1)	22 (7.6)	8 (2.8)	6 (2.1)	7 (2.4)	3 (1.0)	14 (4.9)	12 (4.2)	1 (0.3)	20 (6.9)	5 (1.7)
Female 195 (40.4)	71 (36.4)	51 (26.2)	13 (6.7)	4 (2.1)	7 (3.6)	8 (4.1)	1 (0.5)	11 (5.6)	4 (2.1)	2 (1.0)	19 (9.7)	4 (2.1)
Total *N* (%)	160 (33.1)	152 (31.5)	35 (7.2)	12 (2.5)	13 (2.7)	15 (3.1)	4 (0.8)	25 (5.2)	16 (3.3)	3 (0.6)	39 (8.1)	9 (1.9)

$p = 0.001$ Difference between the diagnostic group of childhood cancer and age groups.