



Assessment of childhood cancer at National Oncology Center in Sana`a city, Yemen

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Abstract

Background: No published studies assessed childhood cancer and obstacles to receive cancer treatment in Yemen. Aim: to assess childhood cancer and obstacles to receive cancer treatment at National Oncology Center (NOC) in Sana`a city, Yemen. Methods: A descriptive cross-sectional study of 119 children with cancer was conducted in the NOC in Sana`a city, Yemen from March to May 2012. Data were collected through face-to-face interview and retrospectively from patients' files. The data regarding socio-demographic characteristics, medical history of childhood cancer and obstacles to receive cancer treatment were collected by structure questionnaire. The collected data were analyzed using the SPSS. A p-value <0.05 (2-sided) was considered statistically significant. Results: One hundred and nineteen children with cancer and their parents were included in our study. The mean age and SD was 8.7±4.5 years. 63.9% of the participants were boys. Lymphomas were the most common cancer diagnosed, represented 35.3% of all childhood cancers followed by leukemias 22.7%, malignant bone tumors 12.6%. A high proportion of childhood cancer was diagnosed at advanced stages constituted for 58%. Tumor grading was mentioned in 25.2% of cases. Histology diagnosis was achieved in 89.1% of cases. 80.7% were not received cancer treatment on regular basis. Conclusion: The study concluded that, the lymphomas were the most common childhood cancer diagnosed, followed by leukemias and malignant bone tumors. The distribution of cancer was more in boys than girls. Poor service/too long time to wait was the main obstacles to received cancer treatment regularly. The study recommended that, national cancer registry should be introduced

Key Words: Childhood cancer, National Oncology Center, Yemen, obstacles to receive cancer treatment

INTRODUCTION:

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells[1]. According to World Health Organization (WHO) the childhood cancer is becoming an increasingly important cause of morbidity and mortality worldwide [2]. Cancer is next to injury, the second most common cause of childhood death in developed countries [3,4]. Cancer may affect people at all ages, even fetuses, but risk for the more common varieties tends to increase with age. Incidence rates are highest among infants, decline until age 9, and then rise again with increasing age [5]. In all age groups, the incidence is significantly higher in boys than in girls; boys have an overall 20-25% excess risk for cancer mainly to a greater risk of lymphomas, leukemias and central nervous system (CNS) tumors [3]. A study conducted by

Bawazir, et al. [6] to study prevalence of cancer in Aden governorate and adjacent governorates through the information registered in the registry for treatment aboard of the Aden health offices (1989-1993). Out of 685 cases of cancer, 69 (10.1%) were children aged 0-19 years. The distribution of childhood cancer by sex were 43 (62.3%) in males and 26 (37.7%) in females. The absence of a national cancer registry means there is a lack of reliable data for evaluating the real situation of childhood cancer in Yemen. There was no national survey in Yemen to estimate incidence of childhood cancer. Despite the rising importance of this disease, there is a lack of studies which characterize the incidence or distribution of different types of childhood cancer in Yemen. To the best of our knowledge, this was the first study was done to assess

childhood cancer and obstacles to receive cancer treatment in Sana'a-Yemen.

Aim of the study:

The aim of the study was to assess childhood cancer and obstacles to receive cancer treatment at National Oncology Center in Sana'a city, Yemen

Methods

The study was conducted at the NOC in Sana'a city, Yemen. The NOC is the first and the only unique public health center in Yemen Republic which provides chemotherapy, radiotherapy and laboratory investigations for patients with cancer. A descriptive cross-sectional study was conducted in the above mentioned setting to assess the childhood cancer and obstacles to receive cancer treatment from March to May 2012. A convenience sample of 119 children with cancer was selected. Children were selected during their attendance to the NOC. The inclusion criteria were both sex children who attended to the NOC for follow-up treatment and approved to participate in the study.

The required sample size has been calculated using EpiCalc program, 2000. When the size of the sample was calculated, researcher depended on the following criteria; proportion of childhood cancer in Gulf center for cancer registration (GCCS) from 1998-2005=8.5% [6]; Precision=5%. A sample size (n) with 95% confidence level was 119 children. A structured questionnaire was compiled adopted questions from published studies and administered in a face-to-face interview with study participants. The questionnaire was consisted of demographic characteristics of children Medical history of childhood cancer and Obstacles to receive cancer treatment. Questions related demographic data and habits and obstacles to received cancer treatment were asked directly in a standard way to ensure data reliability. Medical history of childhood cancer was taken by access to the patients' medical record files to validate the provided data. When there were discrepancies between data sources, the data in the medical record files were

used. In case, some data were not available in the patient's medical record files, the researcher was taken data from the physician who responsible for treatment of the case. The primary site (topography) and histology (morphology) of the neoplasms were classified according to the international classification of childhood cancer-3 (ICCC-3) based on international classification of diseases-oncology-3 (ICD-O-3) [7]. The collected data was analyzed using the SPSS, version 16.0. Fisher's exact test was performed for categorical variables to test for dependency (presence of relationship) between variables. Fisher's exact test is more appropriate than the asymptotic chi-square when the table contains cells with expected counts less than 5. Appropriate test of significance was applied to determine the significance of association. A p value <0.05 (2-sided) was considered statistically significant. Informed consent was obtained from parents of children. The survey was approved by the nursing division and faculty of medicine and health science, Sana'a University.

Results

About four eight (40.3%) of the participated children their age fall between 5-9 years, followed by those with age between 10-14 years with 26.9%, while the least percent (13.4%) was among the age group 15-19 years. The mean age and SD was 8.7 ± 4.5 years (8.7 ± 4.6 years for boys and 8.7 ± 4.5 years for girls). Nearly two thirds (63.9%) of the participants were boys, and more than the half (54.6%) of them were urban residence. As regard, the majority of the children (70.6%) were their birth order <5. (95.8%) of children their gestational age were full-term and 84% without family history of cancer. Table 1.

Table1: Demographic characteristics among children

Demographic characteristics	n	%
Current age		
0-4 years	23	19.3
5-9 years	48	40.3
10-14 years	32	26.9
15-19 years	16	13.4
Sex		
Boys	76	63.9
Girls	43	36.1
Place of residence		
Urban	65	54.6
Rural	54	45.4
Birth order		
<5	84	70.6
≥5	35	29.4
Gestational age		
Full-term	114	95.8
Pre-term	5	4.2
Family history of cancer		
Yes	100	84
No	19	16

Table 2 shows the distribution of the childhood cancer according to types. Lymphomas were the most common cancer diagnosed, represented 42(35.3%) of all childhood cancers followed by leukemias 27(22.7%), malignant bone tumors 15(12.6%), soft-tissue sarcomas 10 (8.4%), renal tumors 8 (6.7%) and CNS neoplasms 5 (4.2%), germ cell tumor 4(3.4%), nervous system tumors 3(2.5%) and hepatic tumors, carcinomas and retinoblastoma, accounted for 2(1.7%), 2(1.7%) and 1(0.8%) respectively. The proportion of different sites showed that, Non-Hodgkin's lymphoma (NHL) was the most frequent represented 28 (23.5%) of cases followed by lymphoid leukemia accounted for 25 (21%), malignant bone tumors 15 (12.6%), Hodgkin's lymphoma (HL) 14 (11.8%), connective/soft-tissue 10 (8.4%), brain/ nervous system 8(6.7%), kidney 8(6.7%) and other sites (Myeloid Leukemia, eye, liver, spinal, thyroid, Ovarian and chest) represented 11(9.2%).

Table 2: Distribution of types of childhood cancer according to ICCC-3

Types of childhood cancer	n	%
Leukemias	27	22.7
Lymphomas	42	35.3
Central Nervous System	5	4.2
Sympathetic Nervous System Tumors	3	2.5
Retinoblastoma	1	0.8
Renal Tumors	8	6.7
Hepatic Tumors	2	1.7
Malignant Bone Tumors	15	12.6
Soft-Tissue sarcomas	10	8.4
Germ cell tumor	4	3.4
Carcinomas	2	1.7
Total	119	100

As regards to distribution of childhood cancer by demographic characteristics among children, Fisher's exact test showed relationship in distribution of childhood cancer by sex, age at diagnosis, governorates, place of residence and child birth order ($P < 0.05$) while no relationship by gestational age and family history of cancer ($P > 0.05$).

As regards to the stages of cancer at diagnosis, the results indicated that, the stages at diagnosis were available for 101 cancer cases (84.9%) (while 18 (15.1%) unknown (Figure 1).

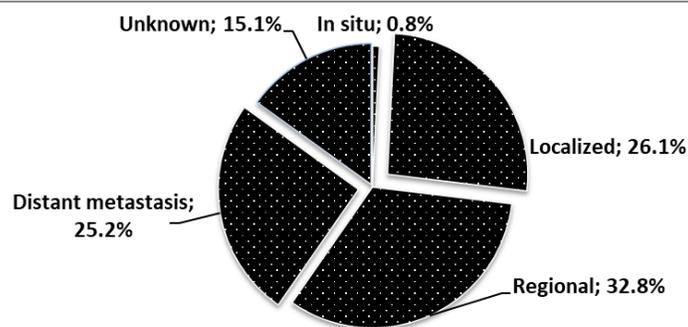


Figure 1: Distribution of childhood cancers by stages at diagnosis

Tumor grading was mentioned in 30 (25.2%) of cases, while the majority of cases 89 (74.8%) were mentioned as cannot be assessed (Figure 2).

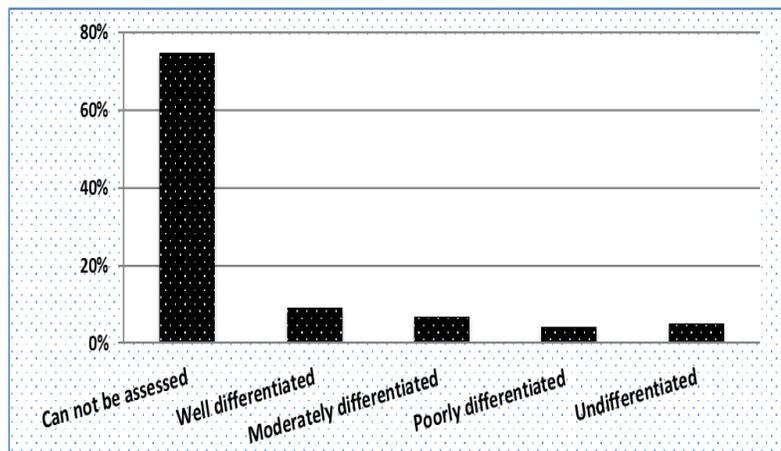


Figure 2: Distribution of childhood cancer by grades at diagnosis

Histology diagnosis was achieved in 106 (89.1%) of cases, compared to 10 (8.4%) of the children who were diagnosed by cytology and only 3 (2.5%) were diagnosed by radiology (Figure 3).

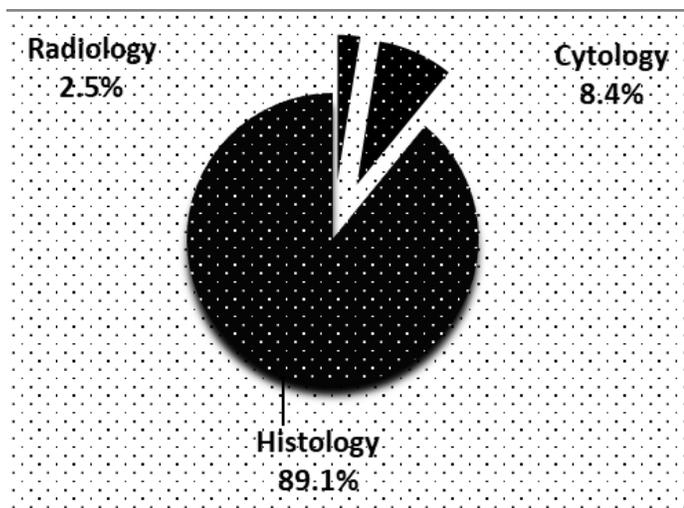


Figure 3: Distribution of childhood cancer by basis of diagnosis

The results of the study regarding obstacles to receive cancer treatment regularly showed that 71 (74%) of study participants stated that the poor service/too long time to wait was the main obstacles. Next 70 (72.9%) was

physical condition trouble of child and 66 (68.8%) lack of resources to travel followed by 44 (45.8%) type of treatment not available, 29 (30.2%) lack of the funds to purchase some cancer drugs, 24 (25%) health care worker not available . more details in figure 4.

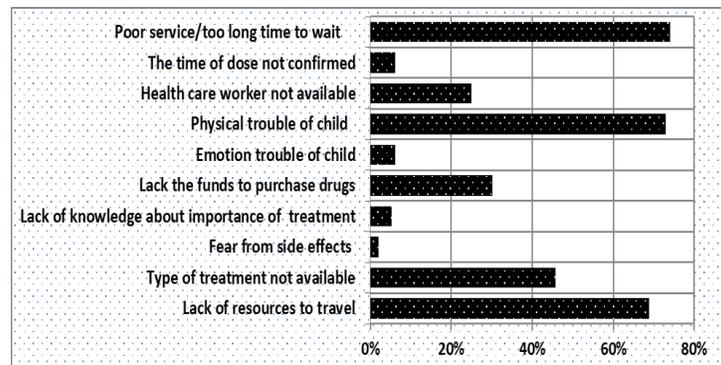


Figure 4: The obstacles to received childhood cancer treatment regularly

Discussion

The results of our study suggest that, the most common forms of childhood cancer were lymphomas, leukemias and malignant bone tumours accounted for about 70.6% of all childhood cancer diagnosed. Lymphomas in our study ranks first among cancer diagnoses for children ages 0 to 19, accounted for 35.3% of all childhood cancer morbidity. The ratio of NHL: HL was 2:1 with male to female ratio was 2:1. The proportion of lymphomas were higher than reported by Surveillance, Epidemiology and End Results (SEER)in United States (US) [8] and other Asian countries but lower than Europe [9] is truly remarkable and novel, and need to be further investigation. There are two main types of childhood lymphomas; Non-Hodgkin's lymphomas, accounted for 23.5% of lymphomas

and Hodgkin's lymphoma accounted for 11.8%. Lymphomas were more in boys than girls and occur at all ages, but the peak is between 5-9 years. Similar study was found by [6] in Aden. This study was consistent with study conducted in Turkey, the distribution of childhood cancer showed that lymphomas have been observed more frequently than leukemias and CNS tumours [10]. Leukemias ranks second among cancer diagnoses for children ages 0 to 19 in our study, accounting for 22.7% of all childhood cancer morbidity. There were two main types of childhood leukemias; acute lymphocytic leukemia (ALL) represents about 92.5% of all childhood leukemias and acute myeloid leukemia accounting for 7.5% of leukemia cases. Leukemias were more common in boys than girls and occur at age ranged from 0-14 years, but the peak was occurs in aged 10-14 years. The proportion of leukemias in our study were lower than reported by SEER [11], by Georgia [12] and by Thailand [13] and higher than reported by Hadramout governorate [14]. Similar result was found by USA [15]. The most common cancer types diagnosed in United States between 1999–2005 was leukemias. In Europe, leukemias constitute approximately one-third of cancers in children (age 0-14 years) and 10% in (age 15-19 years) [16]. This result was higher than reported in the present study. Malignant bone tumors in our study make up the third category of childhood cancers, accounted

for 12.6 percent of all childhood cancers. Malignant bone tumors were approximately same in boys and girls and occur at age ranged from 5-19 years, but the peak was between 10-14 years. Osteosarcoma was the most common cancer in this category, which in children often occurs in the bones around the knee accounted for 60 percent and Ewing's sarcoma was the second bone tumors occur in this category accounted for 40 percent. Bone tumors in our study were higher than reported by MECC countries [17], European countries [18] and SEER areas [19] and in Asia [13]. Soft tissue sarcomas were the fourth childhood cancer accounted for 8.4% of all childhood cancers. The soft tissue sarcomas of children and adolescents arise primarily from the connective tissues of the body, such as fibrous tissue, adipose tissue, and muscle tissue. Rhabdomyosarcomas, a disease in which malignant cells arise from muscle tissue was the most common soft tissue tumor among children younger than 20 years. Other sarcomas in this category were fibrosarcoma. Soft tissue sarcomas were more common in boys than girls and occur at all ages, but the peak was between 0-9 years. The proportion of soft tissue sarcomas were approximately similar than reported by SEER and Rhabdomyosarcoma was the most common soft tissue sarcoma [1]. The result of this study was similar than reported by Turkey [20]. The incidence of soft tissue sarcomas was higher as in other Asian populations [13]. Renal

tumors were the fifth childhood cancer accounted for 6.7 percent of all childhood cancers. Renal tumors occurring in children comprise a spectrum of morphologic subtypes, including some with benign histopathology. Wilms' tumor is by far the most common form of renal cancer in children accounted for 100 % of malignancies of the kidney among children. Wilms' tumor was more common in boys than girls and occurs among children younger than 15 years but the peak was between 5-9 years. The relative frequencies of Wilms tumor in the present study was higher than those reported from Shanghai and western countries [21].

Central nervous system tumors in our study make up the sixth category of neoplasms in children, accounted for 4.2 percent of all childhood cancers. CNS was about equal among males and females and occurs at ages ranged from 0-9 years. The most common types of brain tumor were primitive neuroectodermal tumor (PNET). Other common brain tumor in our study was medulloblastoma. The result of the study was lower than reported by SEER areas [22]. The proportion of CNS tumors in the present study was slightly lower than in other Asian countries [9] and markedly lower than in developed countries [9].

Germ cell tumors rank seventh among cancer diagnoses for children ages 0 to 19 in our study, accounting for 3.4 percent of all childhood cancer morbidity. Germ cell tumors were more

common in girls than boys and occur among children younger than 15 years. Yolk sac tumor and teratoma were the most common tumors in this category found in our study. Germ cell tumors are biologically diverse and histologically heterogeneous [9,23], with a substantial proportion having benign rather than malignant behavior (particularly among young children). Germ cell tumors originate in primordial germ cells, which may undergo germinomatous or embryonic differentiation. The result of the study was lower than reported by SEER areas [24] but similar than reported by Georgia [12].

Sympathetic nervous system tumors. In the present study, sympathetic nervous system tumors were the eighth childhood cancer accounted for 2.5% of all childhood cancers. Neuroblastoma accounted for virtually all cases of cancer in this category. Neuroblastoma is a solid cancerous tumor that begins in nerve tissue in the neck, chest, abdomen, or pelvis, but usually originates in the abdomen in the tissues of the adrenal gland. Two-thirds of children with neuroblastoma are diagnosed when they are younger than 5 years of age [1]. Although neuroblastoma may be present at birth, it does not always proceed to become an invasive malignancy, a circumstance unique to neuroblastoma. In contrast with CNS malignancies, survival is highest among infants under 1 year of age, and declines with increasing

age [1]. The proportion of neuroblastoma in the present study was lower than reported in Thailand [13], Singapore, Japan, China and the Philippines [9]. Hepatic tumors. In the present study, hepatic tumors were the ninth childhood cancer accounted for 1.7% of all childhood cancers and hepatoblastoma was the commonest tumours in this category. All tumors were found in girls. A rare malignancy in childhood, liver tumors account for just over 1 percent of childhood cancers [1]. More than two-thirds of hepatic tumors in children are hepatoblastoma, most of which appear during the first 18 months of life and may be caused by an abnormal gene. Carcinomas were the tenth childhood cancer accounted for 1.7% in our study. Carcinomas are rare in Yemeni children, as they are in Thailand [13]. Thyroid carcinoma accounted for virtually all cases of cancer in this category. Carcinomas are very rare among children [25]. All of the carcinomas combined comprised 9.2% of cancer in children younger than 20 [26]. Retinoblastoma had the lowest frequency, accounted for 0.8 percent of all childhood cancers. Retinoblastoma is a rare tumor involving the retina of the eye, or sometimes the pineal gland [1]. Retinoblastoma most often occurs in younger children, usually before the age of 5 years [1]. The tumor may be in one or both eyes [27]. Retinoblastoma is usually confined to the eye and does not spread to nearby tissue or other parts of the body.

Retinoblastoma in our study was lower than reported by SEER [28], Thailand and in neighboring countries [9].

Obstacles. The results of the study regarding obstacles to receive cancer treatment showed that poor service/too long to wait, physical condition trouble of child, lack of resources to travel/too far to travel, type of treatment not available, lack the funds to pursue some cancer drugs were the main obstacles to received cancer treatment regularly. However, there is extremely scanty data addressing the pattern and impact of abandonment on outcome of childhood cancer from India and other Asian developing countries [29,30]. Pisani and Hery [31] reported that, misdiagnosis, refusal of treatment, abandonment of therapy, toxic death, lack of resources and affordable drugs, and co-morbidities all contribute to a poor outcome alongside other overwhelming challenges. In India, quantifying the burden also faces other barriers: parents may not recognize the signs of cancer, or not have the resources to get the patient to a medical facility [32].

The limitation of the study was many cancer patients in Yemen still prefer to go abroad for treatment and are consequently not recorded. Therefore it would have been unreliable to attempt to calculate the childhood cancer incidence in this study as it would have been an underestimate.

Conclusion

The three most common childhood cancer in our study were lymphomas, leukemias and malignant bone tumors represented more than two third of all childhood cancer. The proportion of childhood cancers was more among boys than girls except for nervous system tumors. More than half of childhood cancer 58% were diagnosed at advanced (regional/metastasized) stages.

Recommendations

National cancer registry should be established to provide reliable cancer incidence rate in Yemen.

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