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Childhood cancer survival 1990-1997: Dr. Behçet Uz Children's Hospital registry

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The study of incidence patterns and survival rates in childhood malignancies is important in assisting the planning of treatment centers and in gaining clues about the etiology. Because there were only few reports about childhood cancer survival in our country, we reported the results of 7-years follow-up of childhood cancer in our center. An analysis of the patterns and survival rates of 320 children, who have been diagnosed between January 1990 and December 1997 were evaluated. The median age was 6 years (M/F=1.4). One hundred twenty-one (37.9%) of these patients suffered from lymphoma, 42 (13.1%) had renal tumors, 34 (10.6%) had neuroblastoma, 33 (10.3%) had tumors of the central nervous system (CNS), 26 (8.1%) had bone tumors, 18 (5.6%) had soft tissue tumors, 11 (3.4%) had retinoblastoma, 10 (3.1%) had germ cell tumors and 25 (7.9%) had other tumors, respectively. Ninety-six children (30%) have been lost to follow up. Five-year overall survival (OS) for all patients was 64%, however, the 5-year OS rates for lymphomas and solid tumors were 71% and 60%, respectively. We conclude that lymphomas were the most common tumor type in our center, being similar to other cancer reports from Turkey and some developing countries. Although our results revealed comparatively high rates for Wilms' tumor and neuroblastoma, a deficit of cases was seen for CNS tumors. [Turk J Cancer 2000;30(2):68-74]

Key words: Childhood cancer, epidemiology, survival rates

Over the last decades, with the improvement in survival of childhood cancer, there are adult survivors and this number is increasing per year. Most survivors are fit and well and can lead normal life with risk of late effects of therapy. Basic information on the incidence of childhood cancer is required for planning health services. The impact of developments in treatment on the prospects for survival

of children with cancer can be assessed only by studying a series of patients based on a geographic population. The registry data provide an excellent overview of national trends in pediatric cancer survival. Multicentric data collection such as SEER, EUROCARE and ITACARE decreases the possibility of geographic bias in data analysis (1-3).

Since there were only a few reports about epidemiologic studies of childhood malignant tumors in our country, we reported the results of seven-years follow-up of childhood cancers in our center.

Patients and Methods

An analysis of the patterns and survival rates of 320 children, who have been diagnosed of lymphoma and solid tumors between January 1990 and December 1997 were evaluated. Cases for the study were ascertained from the cancer registry of the department. The cases included all lymphomas and solid tumors, excluding leukemias. The histological diagnosis and date of diagnosis, together with initial treatment follow-up and other clinical data, are verified and amended where appropriate using the records held by the department of pediatric oncology. Statistical studies including discriminant analysis and estimates of overall survival rates and plots were constructed using the univariate analysis and the method of Kaplan and Meier, respectively. Statistical difference between groups was assessed using the log-rank test.

Results

Approximately 50 new cases including 0-18 age groups are registered yearly. Boys were effected 1.4 times as frequently as girls. The median age at diagnosis was 6 years. Almost 35% of the cancers affect children below five years of age (Figure 1).

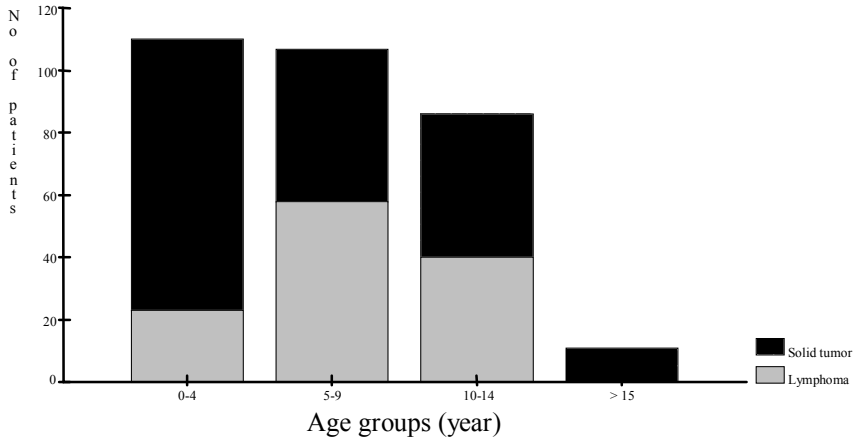

Fig 1. Percentage of childhood cancers by diagnostic group and age groups, 1990-1997

Lymphomas were the most common class, with NHL predominance. Next in the order of incidence were renal tumors, neuroblastoma and brain tumors. One hundred twenty-one (37.9%) of these patients suffered from lymphoma, 42 (13.1%) children had renal tumors, 34 cases (10.6%) had neuroblastoma, 33 (10.3%) had tumors of the central nervous system (CNS), 26 (8.1%) had bone tumors, 18 (5.6%) had soft tissue tumors, 11 (3.4%) had retinoblastoma, 10 (3.1%) had germ cell tumors and 25 (7.9%) had other tumors, respectively (Table 1, Figure 2).

Table 1
Percentage of childhood cancers
by diagnostic group and gender,1990-1997

Tumor type	Gender		No. of patient
	Male	Female	(%)
Lymphoma	79	42	121 (37.9)
Renal tumors	16	26	42 (13.1)
Neuroblastoma	20	14	34 (10.6)
CNS tumors	17	16	33 (10.3)
Malignant bone tumors	16	10	26 (8.1)
Soft tissue tumors	12	6	18 (5.6)
Retinoblastoma	8	3	11 (3.4)
Malignant GCT	4	6	10 (3.1)
Other	13	12	25 (7.9)

CNS: central nervous system; GCT: germ cell tumors

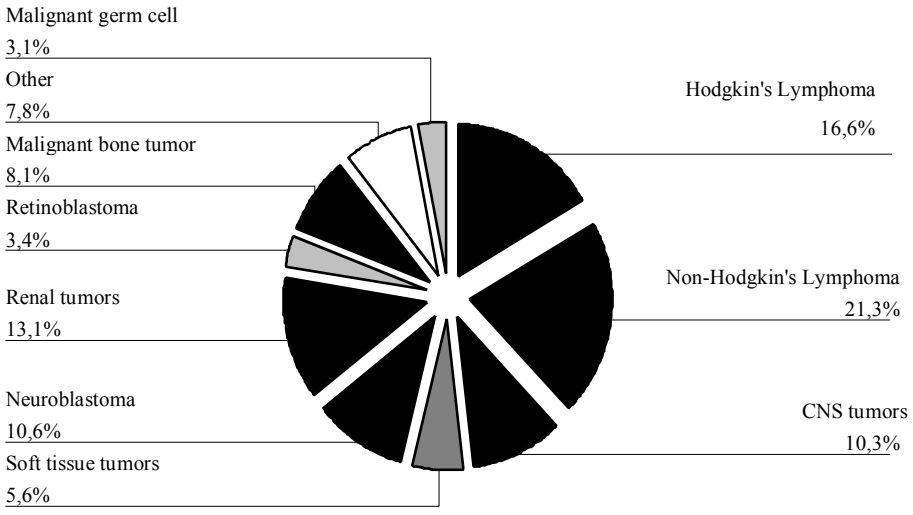

Fig 2. Percentage of childhood cancers by diagnostic group, 1990-1997

The major group was lymphomas accounting for approximately one third of all registrations. Of these, 56% (68 patients) were non-Hodgkin's lymphoma. Immunophenotype was only specified for 48% of children with NHL and so no conclusions could be drawn. There was male predominance (2.5:1) with a median age of 7 (1,5-14) years in patients with Hodgkin's disease. Sixty-five percent of the patients were under 10 years of age. Histological subtype was specified for all of the children. While mixed cellularity was the commonest subtype, accounting for 45%, lymphocyte depleted histology accounted for only 17% of cases among either sex. The 5-year overall survival (OS) and event-free survival (EFS) rates for all patients were 95% and 78%, respectively. The 5-year OS in sI and sII was 100 % and in sIII and sIV was 89%; 3-year EFS in sI and sII was 96% and in sIII and sIV was 72%.

Brain and spinal tumors accounted for 10.3% of all registrations. Of the 52% children classified as having medulloblastoma, 30% had astrocytoma.

The great majority of sympathic nervous system tumors were neuroblastoma. Of the remainder, 8 patients were PNET's, including Askin's tumor.

Of the 11 patients with retinoblastoma, 10 had unilateral and only one had bilateral tumors. A family history of retinoblastoma was not recorded in any case.

Over 40 (95%) of renal tumors were Wilms' tumor. Within this group there were one patient with clear cell sarcoma of kidney and one patient with renal cell carcinoma.

Hepatoblastoma was the most common liver tumor (3/3 patients), with 66% of cases occurring below five years of age.

Nearly all malignant bone tumors were osteosarcoma and Ewing's sarcoma. Osteosarcoma was overwhelmingly a tumor of the long bones of the leg (14/16, 87%) and a further 2/16 of tumors were in the long bones of the arm. Ewing's sarcoma also showed a predilection for the leg bones, although less markedly (6/9, 66%).

Rhabdomyosarcoma was the commonest soft tissue sarcoma with a median age of 7 (2-14) years. Embryonal rhabdomyosarcoma accounted for 73% (8/11) of registrations and alveolar rhabdomyosarcoma was present in 9% of cases. Embryonal rhabdomyosarcoma predominated in all age groups, but there was a decrease with age in the proportion of embryonal tumors and a corresponding increase in the proportion of alveolar. Three (17%) of the soft tissue tumors were classified as fibrosarcomas. Of the cases classified as other and unspecified soft tissue sarcoma, one (5.5%) were synovial sarcoma, 2 (11%) were liposarcoma, one (5.5%) were Kaposi's sarcoma.

Among children with malignant germ cell tumors, the only non-gonadal site was sacrococcygeal region (1/10, 10%). Malignant gonadal germ cell tumors were the only diagnostic group for which the age distribution differed markedly between the sexes. Among boys, all of those affected were aged 0-4, whereas among girls all patients were aged 10-14.

The commonest sites for carcinoma were nasopharynx 9/10 (90%) and thyroid 1/10 (10%).

The median follow-up for patients alive at last contact was 13 months. Ninety-six children (30%) have been lost to follow up. Of these cases twenty-

seven patients (8%) have been lost to follow up within a month of period. Seventy-six cases (24%) died of neutropenic sepsis, underlying disease etc.

OS for all patients was 64% at 5-years (Figure 3). The 5-year OS rates for lymphomas and solid tumors were 71% and was 60% respectively. Additionally, the 5-year OS rates for Hodgkin's disease, non-Hodgkin's lymphoma and Wilms' tumor were 88%, 56% and 73% respectively.

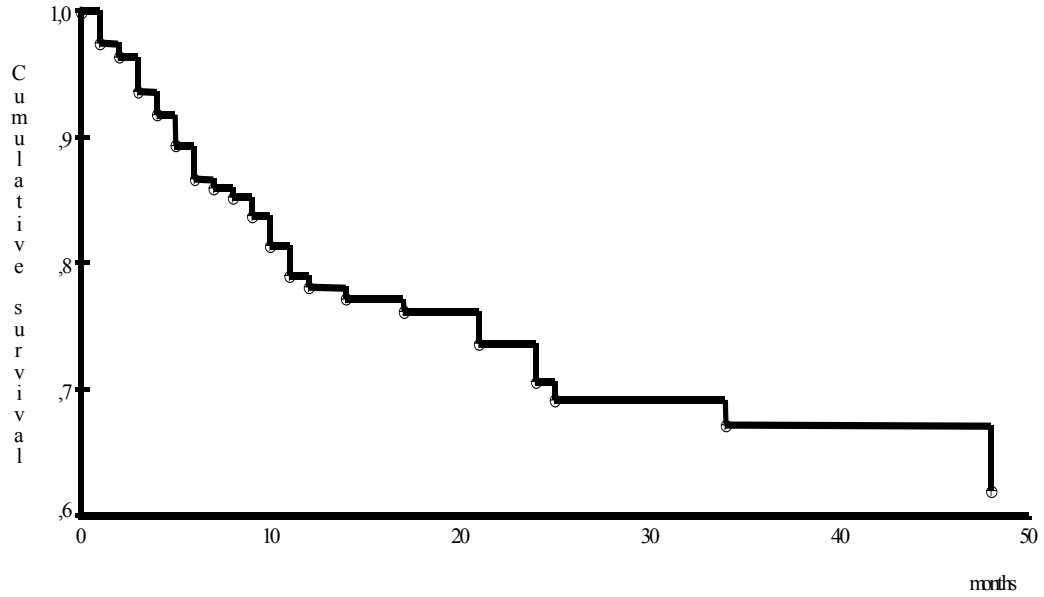

Fig 3. Overall survival in children with cancer, 1990-1997

Discussion

World age standardised overall incidence rate of childhood cancer is 137 cases/million/year. Although the incidence of childhood cancer is estimated for 2100 cases/year, in Turkey, there were 1796 cases registered in 1995, according to the cancer registry of the Ministry of Health (4). Our cases accounted only for 2.2% of these patients.

Lymphomas are the third most common cancer following leukemias and CNS tumors in developed countries (1-3,5,6). We conclude that lymphomas were the most common cancer diagnoses, excluding leukemia, in children aged 0-14 years, being similar to other cancer reports from Turkey and some developing countries in contrast to developed countries (2,3,5-10). The comparison of our results with the results reported by some centers was shown in Table 2 and 3 (2,3,7-10). While our results revealed comparatively high rates for Wilms' tumor and neuroblastoma, a deficit of cases was remarkable for CNS tumors since there was no Neurosurgery department. Stiller et al. (6) drew attention to the fact that occurrence of retinoblastoma, Wilms' tumor and Hodgkin's disease in early childhood is apparently related more to ethnicity than

to geographical location and may reflect genetic factors or environmental exposures specific to the lifestyle of particular ethnic groups.

The incidence of tumors compared in years has been relatively constant. We did not find any significant changes in trends in our center. The large numbers of patients lost to follow up pointed out social and economic problems we have encountered. Low family income, low educational status of parents as well as some cultural and traditional factors may interfere with the successful treatment of children with cancer in our country. Community resources, healthcare services, medical insurance, financial assistance for treatment expenditures for the families who have children with cancer are extremely limited. Despite impressive improvements, major problems remain to be solved.

Table 2
Comparison of the percentage of childhood cancers by diagnostic group and pediatric oncology centers

Tumor type	Behçet Uz C. H. 1990-97 (n: 320)	Dokuz Eylül Univ. 1988-95 (n:220)	Ege Univ. 1993-97 (n: 260)	Hacettepe Univ. 1991-96 (n:1105)
Lymphoma	37.9	15.9	10.7	31.8
Renal tumors	13.1	2.7	3.6	7.1
Neuroblastoma	10.6	4.1	3.6	9.0
CNS tumors	10.3	22.3	54.6	18.5
Malignant bone tumors	8.1	5.0	14.6	5.3
Soft tissue tumors	5.6	8.2	2.6	8.6
Retinoblastoma	3.4	3.6	1.1	2.8
Other	11.0	11.8	9.2	16.4

CNS: central nervous system; GCT: germ cell tumors

Table 3
Comparison of the percentage of childhood cancers by diagnostic group in some countries*

Tumor type	Behçet Uz C. H. 1990-97 (n: 320)	NCI U.S.A. 1985-93 (n: 15.413)	Itacare 1978-89 (n: 1163)	S. Arabia 1977-82 (n:450)
Lymphoma	37.9	15	21.6	36.8
Renal tumors	13.1	9.3	9.0	7.1
Neuroblastoma	10.6	8.5	12.8	6.3
CNS tumors	10.3	33.4	29.6	20.2
Malignant bone tumors	8.1	7.3	14.5	5.1
Soft tissue tumors	5.6	10.5	9.6	5.1
Retinoblastoma	3.4	2.8	2.9	10.2
Other	11.0	9.2	-	9.2

*The values presented as percent; the cases with leukemia were not included

In our results the 5-year OS for all patients was 64%. The 5-year OS rates

for lymphomas and solid tumors were 71% and 60%, respectively. Comparison of overall survival rates for all cancers (except leukemia) revealed a substantially higher value compared to that reported by Muir et al. (5) for West Midlands. Magnani et al. (3) have reported the 5-year OS for pediatric cancer, Hodgkin's disease, non-Hodgkin's lymphoma, and Wilms' tumor as 69%, 87%, 64% and 78% for the period 1986-1989. Our survival rates were similar to that observed in other population-based surveys in Italy.

In conclusion, our results revealed the institutional differences. Population-based studies of survival are required to assess the impact of modern methods of care on all patients diagnosed with a particular disease; studies that only include those in clinical trials or selected hospital series are likely to be biased. The investigation of variations in survival with type of hospital and degree of standardization of treatment are important for developing policy on the provision of services. There is need for establishment of a data base composed of the member institutions of the childhood cancer consortiums.

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