Incidence of childhood acute lymphoblast leukemia in the Federation of Bosnia and Herzegovina

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The aim of this paper was to investigate the incidence of acute lymhoblast leukemia (ALL) among children aged 0 to 15 years in the Federation of Bosnia and Herzegovina in the period from 1997 to 2004. The data for this paper were obtained by retrospective analysis of 139 case histories of children who were treated at the Haematology-Oncology Department of the Pediatrics Clinic of University Clinic Centre in Sarajevo in the period from 1 January, 1997 to 31 December, 2004 but also by analysis of the data provided by Cantonal health institutions in the Federation of Bosnia and Herzegovina. The above indicated data were complemented by those of the children who had been sent for treatment to the Clinic-Hospital Centre "Šalata" in Zagreb and the Clinic Centre in Split (the Republic of Croatia) at their parents' request. The data on population samples were taken from the yearly statistical reports of the Federal Statistical Institute. In the area of the Federation of Bosnia and Herzegovina it was recorded that 119 children (83 boys (69,7%) and 36 girls (30,3%) suffered with ALL in the period from 1 January, 1997 to 31 December, 2004.The total ALL incidence rate in children of either sex in the observed period was 3.2/100.000 (95%CI 2.6-3.8). In Posavina Canton the incidence rate was highest, amounting to 6.4/100.000 (95%CI 1.7-16.4), while in Herzeg Bosnia Canton the rate was lowest and it amounted to 0.77/100.000 (95%CI 0.7-4.3). In other Cantons the incidence rate was fairly uniform. Poisson regression indicates that the rates do not differ significantly between the cantons (likelihood ratio χ^2 test =14.88, df=9, P=0.09). The results of our investigation indicate that the average incidence rate of ALL in the area of Federation of B&H, in comparison with similar studies conducted in other countries, does not show statistically significant differences.

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Introduction

Acute lymphoblast leukemia (ALL) occurs when a genome undergoes transformation within a matrix hematopoetic cell. Due to the process of cell division the new cells are produced with the identical biological properties of the initial cell. The clonal population shows advantage in respect of growth and, thus, it suppresses the healthy population. These clonal cells cause the clinically recognizable disease (1, 2). The exact cause of ALL disease is not known but the unfavourable living environment (such as bad socioeconomic conditions, infections, radiation etc.) may play a significant role in provoking this disease (3).

The ALL incidence in the U.S.A. is 3 to 4 cases among 100,000 children below the age of 15 (4), while this rate is highest among children in the 3-5- year-old age group (4). In the overcrowded urban areas a slightly higher incidence rate was recorded.

In the past 20 years an increase in the childhood ALL incidence has been recorded worldwide (4). However, over the past years, thanks to significant achievements in diagnostics and therapy treatment, a high survival rate among ALL sufferers has been recorded.This refers in particular to the sufferers in the 5-9-year-old age group wherein the survival rate exceeds 80% (4).

Thanks to clinical obseravtions and medical documentation of the Pediatrics Clinic of Sarajevo University Clinic Centre an increase in the number of childhood ALL sufferers in the Federation of Bosnia and Herzegovina who underwent treatment in the post-war period was noticed. However, the accurate incidence rate in the said area was not investigated.

Hence, the aim of the present paper was to investigate the ALL incidence rate among children in the 0-15-year-old age group in the area of the Federation of B&H in the 1997-2004 period.

Patients and Methods

Area of research

Bosnia and Herzegovina is a southern European country bordering with Croatia, Serbia and Montenegro. It consists of two administrative units: Federation of B&H and Republika Srpska. The Federation of B&H is composed of ten cantons:Una Sana, Posavina, Tuzla, Zenica Doboj, Bosnia Podrinje, Central Bosnia, Herzegovina Neretva, West Herzegovina, Sarajevo and Herceg Bosnia (Figure 1).

Subjects and Methods

Data for the present study were obtained by retrospective analysis of 119 case histories of children who were treated at the Haematology-Oncology Department of the Pediatrics Clinic of Sarajevo University Clinic Centre in the period from 1 January, 1997 to 31 December, 2004 and by analysis of the data obtained from the respective cantonal health institutions in the Federation of B&H. The above indicated data were complemeted by those of the childhood ALL sufferers from

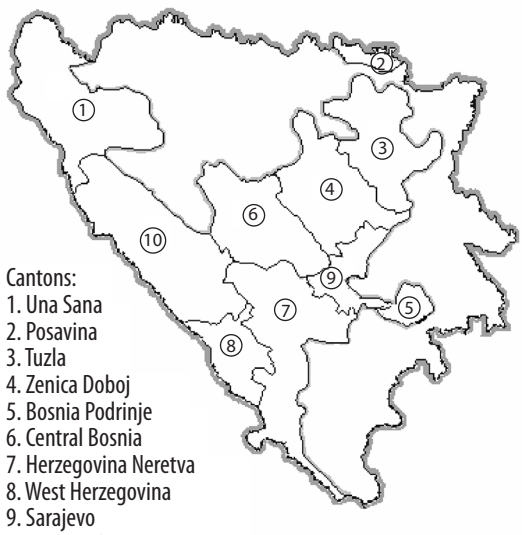

Fig. 1. Map of cantons in the Federation of Bosnia and Herzegovina

the area of the Federation of B&H who were treated at the Clinic-Hospital Centre „Šalata" in Zagreb and the Clinic Centre in Split, respectively, both located in the Republic of Croatia. The population sample data were obtained from the yearly statistical reports of the Federal Statistical Institute (5).

Statistical analysis

Total incidence rate and incidence rates referring to particular cantons within the Federation of B&H but also in respect of age were calculated as the number of ALL patients among 100, 000 children in the 0-15-year-old age group.

Results

In the area of the Federation of B&H 119 children (83 boys (69.7%) and 36 girls (30.3%)) suffered with ALL in the period of 1 January, 1997 to 31 December, 2004.

Table 1 shows the number of ALL patients in the cantons of the Federation of B&H in respect of the patients' sex.

The highest number of childhood patients were recorded in Tuzla Canton (23,5%), followed by Sarajevo Canton (21,0%) and Zenica Doboj Canton (15,9%), respectively.

By analysing the total number of childhood patients in the Federation of B&H in the 1997-2004 period a significantly higher number was observed in the year 2002 while the lowest number was recorded in the year 2004; in other years within the observed time period this number was fairly uniform (Figure 2).

Distribution of childhood ALL patients in respect of age is shown in Table 2. The highest number of patients was recorded in the 2-5-year-old age group and 7-8-year-old age group, respectively, while in other age groups the number was significantly lower.

The ALL incidence among children in the 0-15-year-old age group in the 1997-2004 period in the FB&H is shown in Table 3. The total ALL incidence in the observed period among children of either sex was 3.2/100.000 (95%CI 2.6-3.8). In Posavina Canton the incidence rate was highest, amounting to 6.4/100.000 (95%CI 1.7-16.4), while in Herceg Bosnia Canton it was lowest, amounting to 0.77/100.000 (95%CI 0.7-4.3). In other cantons the incidence rate was fairly uniform. Poisson regression indicates that the rates do not differ significantly between the cantons (likelihood ratio χ^2 test =14.88, df=9, P=0.09).

Table 1. Number of childhood ALL patients in respect of sex in cantons of FB&H* in 1997- 2004 period

Canton	Sex				Total	
	Male		Female			
	n	%	n	%	n	%
Una Sana	5	6.0	4	11.1	9	7.6
Posavina	3	3.6	1	2.8	4	3.4
Tuzla	22	26.5	6	16.7	28	23.5
Zenica Doboj	12	14.5	7	19.4	19	15.9
Bosnia Podrinje	1	1.2	-	-	1	0.8
Central Bosnia	15	18.1	1	2.8	16	13.5
Herzegovina Neretva	6	7.2	8	22.2	14	11.8
West Herzegovina	1	1.2	1	2.8	2	1.7
Sarajevo	17	20.5	8	22.2	25	21.0
Herceg Bosnia	1	1.2	-	-	1	0.8
Total FB&H	83	100.0	36	100.0	119	100.0

*FB&H: Federation of Bosnia and Herzegovina

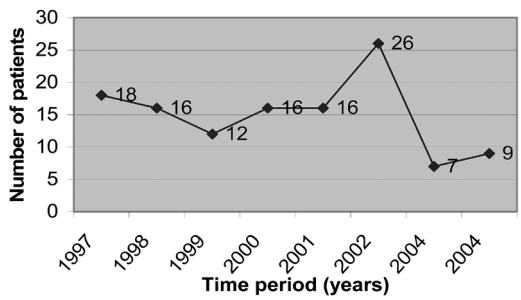

Figure 2. Distribution of Childhood ALL patients in relation to the time period observed in the study

Table 2. Distribution of childhood ALL patients in respect of age in the Federation of Bosnia and Herzegovina

Sex	Distribution of children suffering with acute lymhoblast leukemia in respect of age (years)														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Male	3	6	11	10	10	2	10	10	5	2	3	5	2	4	83
Female	1	2	4	7	2	5	4	3	1	3	1	2	1	-	36
Total	4	8	15	17	12	7	14	13	6	5	4	7	3	4	119

Table 3. Incidence of acute lymphoblast leukemia among children in the 0-15-year-old age group in the 1997-2004 period

Canton	ALL* (n)	Population	Incidence rate (95% CI)
Una Sana	9	525.023	1.7 (0.8-3.2)
Posavina	4	62.197	6.4 (1.7-16.4)
Tuzla	28	839.710	3.3 (2.2-4.8)
Zenica Doboj	19	568.693	3.3 (2.0-5.2)
Bosnia Podrinje	1	54.502	1.8 (0.05-10.2)
Central Bosnia	16	439.414	3.6 (2.0-5.9)
Herzegovina Neretva	14	329.663	4.2 (2.3-7.1)
West Herzegovina	2	135.437	1.5 (0.02-5.3)
Sarajevo	25	570.799	4,4 (2.8-6.4)
Herceg Bosnia	1	129.560	0.77 (0.7-4.3)
Total FB&H	119	3.654.998	3.2 (2.6-3.8)

*ALL: acute lymphoblast leukemia

Discussion

The results of our research show that the total ALL incidence rate among children of either sex from the area of the Federation of B&H in the observed period was 3.2/100.000 (95%CI 2.6-3.8) and it is slightly lower in comparison with the results of the twenty-year researches conducted in Sweden, Germany, Norway, Finland and Iceland where the the ALL incidence rate ranged from 3,8/100.000 to 4/100.000 (6). However, the ALL incidence rate in our research was higher in relation to the total incidence rate of 2,6/100.000 referring to Jerusalem (7) where the legal registration of children suffering from leukemia and related malignant diseases has been carried out since 1982. The increased incidence of leukemia patients was observed in north-western Italy (8) where since 1967 the Childhood Cancer Registry has recorded the annual increase of 2,6% among children suffering with ALL in the 1- 4-year-old age group while no increase in other age groups has been recorded. In our research a significantly higher incidence rate among children suffering with ALL could be related to a deteriorating socio-economic status of parents at the time of inception of sick children (3).

The results of our research show that the average ALL incidence rate obtained in the area of the Federation of B&H does not differ significantly in comparison with similar studies conducted in other countries.

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