

# Distribution of ABO blood group in children with acute leukemias

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## Abstract

**Introduction:** This study is the first study about the distribution ABO blood types at children with acute leukemia in Federation of Bosnia and Herzegovina. The aim of the study is to point out distribution of blood type groups at children with acute leukemia (AL)

**Methods:** The number of children in this study was the following: 145 children with acute leukemia and 27 of children with acute myeloblastic leukemia (AML). All of the children were treated at Hemato- Oncology Unit of Pediatric Clinic in Sarajevo, in the period January 2000 until December 2010. Age of children was between 1 month and 15 years.

**Results:** The results showed that different blood types were registered in 93.1% of children who got ill and treated from acute leukemia for the mentioned period. At 6.9% of children, none of the blood types were registered. It was noticed that 40.9% children who have registered blood type O, 37% blood type A, 16% blood type B and 6.5% blood type AB had AL, too. It has been observed that children with following blood types had AML: O, 47.8%, A, 47.7% and AB, 30.4%.

**Conclusion:** Significance ABO types distribution was confirmed for children with ALL,  $p < 0.05$ . The analysis of the distribution of ABO types based on gender showed that significance was confirmed at females with both ALL and AML ( $p < 0.05$ ). © 2012 All rights reserved

*Keywords: ABO types, distribution, acute leukemia, children, Federation of Bosnia and Herzegovina*

## Introduction

Acute leukemia is the most common disease at child's age. During one-year period 3 to 5 out of 100 000 children age between 0-15 get this disease. Incidence of this disease in Federation of Bosnia and Herzegovina is 3.1 per 100000 in the retrospective study, for the period 1997-2005. In the world this disease is more frequent at boys population 1.2:2 to girls population, while Federation of Bosnia and Herzegovina it is 4:1 (1). Lower rate of leukemia is recorded among Afro-American population, while different variations of incidence have been noticed among caucasian children. Higher incidence of disease has been recorded in New Zealand and Australia compared to Europe. Distribution of all diseases, including leukemia, has been followed through the distribution of blood type.

Blood types are more known since 19<sup>th</sup> century, when the science on blood transfusion was more successful than previous years and centuries. In 1492, Stefano Infessura described first historical attempt of blood transfusion. In the 17<sup>th</sup> century when Willian Harvey has discovered blood circulation through the men's body, and it was period when the research of blood transfusion was more detailed and has succeeded with first experiments on the animals. First documented transfusion was imputable to Jean-Baptist Denys, who had transfused blood of the sheep to the blood system of the fifteen years old boy in the 1667 (2). James Blundel, British obstetrician did first human blood transfusion successfully in 1818. In 1840 first successful blood transfusion efficiently cured hemophilia. Thanks to the science on BT, there has been found representation of BT by blood analyses, and representation of BT 'O' was represented at 40%, BT "A" at 30%, BT "B" at 24%, BT "AB" at 6% of population. Some of the nations such as Brazilians have

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Submitted 20 June 2012 / Accepted 17 November 2012

100% representation of BT "O". Malignant diseases such as belly, intestine cancer, hematologica malignant diseases are connected to the different blood types (3-6). The purpose of this study is to indicate distribution ABO groups at children with leukemia in Federation of Bosnia and Herzegovina

## Methods

This is retrospective study which includes all the children who have been cured from acute leukemia on the Department Haematology of the Pediatric Clinic in Sarajevo. It has been included 145 of sick children who were sick with acute lymphoblastic leukemia and 27 of children with acute myeloid leukemia. All the children were treated in the period from 2000 to December 2010. Blood types were recorded at 160 children (137 children treated from acute lymphoblast leukemia and 23 children treated from acute myeloid leukemia). Blood type was not recorded at 12 children, most probably reason for that was technical issue. Determination of blood type was for the purpose of blood transfusion in the most number of the cases.

## Results

Distribution of blood types at children with acute lymphoblastic leukemia and acute myeloid leukemia was analyzed on the Pediatric Clinic during the period that has been mentioned previously in the text. ALL was confirmed at 84.3 % of children while AML was noticed at 15.6 % of children. (Table 1) Table 2 shows that blood types were confirmed at 93.1 % of children, while at 6.9 % of children blood types were not confirmed probably because of the technical reasons.

In the further analyses blood type distribution has been confirmed at children with ALL and AML according to the diagnosis and gender of the sick children. (Table 4)

Boys have been more frequently sick with ALL (2:1) compared to the girls, while that percentage at sick children with AML was equal between boys and girls. (Table 4).

Table 5 and Chart 1 points distribution of the ABO at sick children.

BT "O" was represented at 40% of children with ALL and BT "A" was nearly similar 37% , BT "B" 16 % and BT "AB" 6.5%.

TABLE 1. ALL and AML sick children

ALL	AML	Total
145	27	172
84.3%	15.6%	100%

TABLE 2. Confirmed Blood types:

	ALL	AML	Total
Confirmed BT	137	23	160(93.1%)
BT that were not confirmed	8(5.5%)	4(14.8%)	12(6.9%)
Total	145	27	172

TABLE 3. Points percentage of confirmed blood types according to the diagnosis of sick children

ALL	AML	Total
137/145	23/27	160/172
85.65%	14.47%	93.02%

TABLE 4. Children sick with ALL and AML based on the gender

	ALL	AML	Total
M	94 (68.7%)	11 (47.8%)	105
F	43 (31.4%)	12 (52.1%)	65
Total	137	23	170

TABLE 5. Distribution of blood types

Blood types	ALL	AML
O	55/40.9%	11/47.8%
A	51/37.2%	5/21.7%
B	22/16%	7/30.4%
AB	9/6.5%	0
Total	137	23

For ALL:  $X=34.2$   $SD=19.4$   $T=3.5$   $p<0.05$

For AML  $x=5.7$   $SD=4.0$   $T=2.85$   $p>0.05$

TABLE 6. Distribution of blood types based on the gender

Blood types	ALL		AML	
	M	F	M	F
O	37 (67.2%)	18 (32.7%)	7 (63.6%)	4 (36.3%)
A	37 (72.5%)	14 (27.4%)	2 (40%)	3 (60%)
B	14 (63.6%)	8 (36.3%)	2 (28.5%)	5 (71.4%)
AB	6 (66.6%)	3 (33.3%)	0	0

For ALL M:  $X=2.35$   $SD=18$   $T=2.6$   $p>0.05$  For AML M:  $X=2.75$   $SD=6.69$   $T=0.8$   $p>0.05$

F  $X=10.7$   $SD=5.7$ .  $T=3.77$   $p<0.05$  F:  $X=3$ ;  $SD=1.8$   $T=3.3$   $p<0.05$

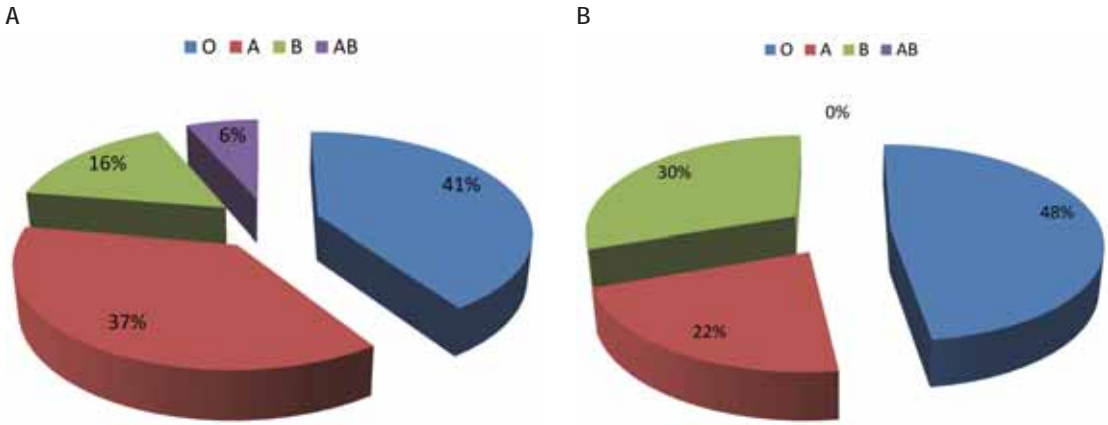


FIGURE 1. Gender distribution of ALL (A) and AML (B) in children in FBiH

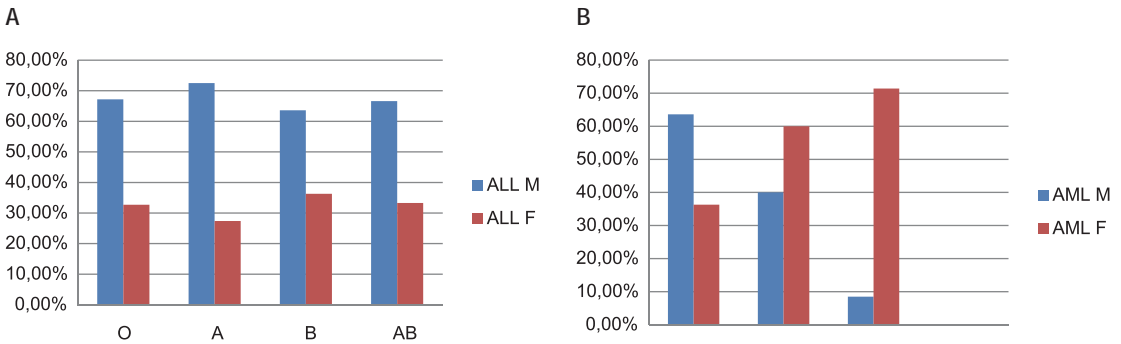


FIGURE 2. Distribution of blood types in ALL (A) and AML (B) based on gender.

AML occurred among children with blood types: “O” 47.8%, and it was much higher than at children with “A” blood type who had 21 % while blood type “AB” was not represented. Statistical analysis showed that sick children with ALL shows significance compared to the children with AML where significant of sick children according to the ABO groups has not been confirmed. Analysis of the distribution of ABO groups, based on gender of the sick children shows that boys with ALL had higher percentage of “A” blood type, while boys with AML had higher percentage of blood type “O”. (Table 6 and Figure 2)

**Discussion**

Different studies have been published inconsistent results on the distribution of blood types in children with acute leukemia. In this study chil-

dren with ALL have equal percentage of blood type O, and blood type A. At children with AML most percentage were with blood type O, and then blood type B. The Alvi S study (7) shows higher percentage of blood type O, and lower percentage of blood type A versus B in children with ALL. This study shows that higher percentage of children with blood type A had AML. That is what study (3) was presenting. Some of the previous studies on acute leukemia did not show significant difference with ABO blood types distribution between patients with leukemia and healthy ones (8,9). Some of the studies discovered significant difference and higher percentage of O blood type of the patients with acute leukemia. On the other side Jackson and associates (12) have reached different results in their study. Study from Turkey, based on 166 sick children with ALL and

184 patients with AML did not show significant differences in distribution of blood types (13). Study 7 shows significant difference in distribution of the ABO groups between genders of the children with acute lymphoblast leukemia, while significant number of children with myeloid leukemia was not confirmed among gender. Significant between the blood types was confirmed in this study between girls with ALL and girls with AML.

### Conclusions

It was almost equal percentage of sickness among the children with ALL with BT "O" 40 % and BT "A" 37% , and this shows significant difference to the other blood types. The highest percentage of chil-

dren with AML had BT "O" 47.8 % than follows BT "B" 30%. Statistical analysis did not show significant difference between the blood types. Based on gender: boys with ALL had same percentage of sickness among BT "A" and "O", while among the girls who had ALL the percentage of blood type "O" was higher then the other blood types. Considering children with AML it was noticed that higher percentage of boys with this disease had blood type "O" and higher percentage of girls with this disease had blood type "B". Significant was shown for female children who had both ALL and AML.

### Competing interests

None to declare.

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