



## Socio-Demographic and Blood Group Findings in Children with Acute Leukemia: a single cancer center experience

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### Abstract

Leukemia is a cancer of white blood cells, in which the bone marrow produces irregular white blood cells. These cells swarm out the solid blood cells. In intense leukemia, the cells are highly irregular, and their number increments quickly. Acute lymphocytic leukemia (ALL) most common childhood malignancy in most parts of the world. The etiology of childhood leukemia is unknown and is probably multifactorial. Leukemia can often be cured. However, the association between this type of cancer and ABO blood group is not established. The present study aimed to identify the association between blood groups and Rh types with childhood leukemia. For this purpose, a quantitative design retrospective study was conducted between the 1st December 2019 and the 30th January 2020 on the records of 100 patients who were under 18 years old with diagnosed leukemia, treated, and followed at the pediatric unit of Hiwa Hospital in Sulaimaniyah. Data on patients' age, gender, residence, age at diagnosis, and blood group were collected. According to the retrospective analysis, 100 patients who met the diagnosis of ALL and acute myeloid leukemia (AML) were 18 years or younger, most of them had ALL (81%), 85% lived in urban areas, 63% were male, and A+ was the most common blood group (36%). Also, there was no statistically significant association between ABO blood group and diverse autonomous factors with childhood leukemia. ABO blood groups can be used as an effective technique to understand the etiology of hematological malignancies, particularly if they are assessed within the ground of later atomic writing of such hereditary polymorphism.

### Introduction

Leukemia is a type of blood cancer that starts when the bone marrow begins to rapidly-produce irregular white blood cells called leukemia cells. These irregular cells may swarm out ordinary white blood cells, ruddy blood cells, and platelets, making it difficult for typical cells to do their work [1]. The type of leukemia is determined based on how rapidly the infection develops and becomes more awful, persistent, or intense. Its type also depends on the sort of WBC that it influences. Leukemia that influences lymphoid cell is called lymphocytic or lymphoblastic leukemia, and leukemia that influences myeloid cell is called myelogenous or myeloblastic leukemia [2]. Intense lymphoblastic leukemia (ALL) is the most common childhood cancer around the world. It is not yet known what causes childhood leukemia; however, it is likely to develop due to multiple factors. Previous studies stated that genetic and environmental factors play a role [3].

Different familial, hereditary, lifestyle and natural components can affect leukemia development. It can also develop as a result of exposure to chemicals, such as benzene and herbicides [4]. To avoid these dangers to a large extent, it would be advantageous to anticipate the illness thoroughly.

Even though hereditary risks are still likely to be found, less than 10% of childhood leukemia cases have been attributed to the impact of hereditary qualities, counting to hereditary disorders such as Down syndrome [5]. Besides, according to recent childhood leukemia rates which are not completely clarified by symptomatic patterns, there has been an increase in childhood leukemia rates within the last few decades. Since hereditary components do not alter on this time scale, natural components are likely to play a critical part in the etiology of childhood leukemia and its later upward trends [6]. The significance of devising an approach to essential avoidance of childhood leukemia rotates on diminishing exposure to natural hazard components inducing the infection [7]. In-utero presentation to low-dose radiation conveyed from restorative X-rays is one of the few broadly recognized hazard components for childhood leukemia [8].

Eating less is connected to a few cancers in grown-ups and children. These perceptions may be clarified by a different organic instrument, such as introduction to dietary mutagens, mutagenesis due to supplement insufficiencies, and intake of micronutrients and other dietary components that ensure against the development of cancer by supporting cellular judgment, diminishing irritation, and progressing safe reaction [9].

Determination of leukemia is based on reused total blood scores and bone marrow examinations taken after the indications are perceived. Sometimes blood tests may not show that an individual has leukemia, particularly within the early stages of the illness or amid reduction. A lymph node biopsy can be performed to analyze a certain sort of leukemia in certain circumstances. After the conclusion of the blood test, chemistry tests can be utilized to decide the degree of liver and kidney harm or the impacts of chemotherapy on the individual. When concerns and other harms emerge due to leukemia, an X-ray, MRI, or ultrasound is utilized. Numerous individuals have not been diagnosed since a large number of the indications are unclear and non-specific and can allude to other maladies. For this reason, the American Cancer Society gauges that at least one-fifth of the individuals with leukemia have not been analyzed [10].

Certain types of leukemia may be asymptomatic in their initial stages. Indications of leukemia depend on whether the leukemia is intense or unremitting. Intense types of leukemia tend to develop faster than persistent ones. Intense leukemia is associated with flu-like indications in its beginning stages, while constant leukemia barely causes any indications. Unremitting types of leukemia are regularly recognized through scheduled blood tests. A few of the common signs and symptoms include weariness, disquietude, craving and weight misfortune, fever, shortness of breath, pallor, palpitations, simple bruising and dying, tipsiness, vulnerability to cold, sore throat, sickness, cerebral pains, issues in vision, night sweats, torment in joints, and distress in the abdomen. Feeling of completion in guts, purpura, leukocytosis, weakness, splenomegaly, and thrombocytosis are other commonly experienced complications [11].

A blood sort (also called a blood bunch) refers to the classification of blood-based on the nearness or nonappearance of acquired antigenic substances on the surface of ruddy blood cells (RBCs). An arrangement of related blood sorts constitutes a blood bunch framework, such as the Rh and ABO framework [12]. Blood group varies in different populations. In the US, the most common type is O+ (meaning O in the ABO system and positive in the Rh system) [13]. The association between blood groups and this type of cancer is not well established, while several well-known associations exist between ABO blood groups and certain diseases. For example, gastric carcinoma is found to occur mostly in individuals with the blood group of A, whereas duodenal ulcer is found to occur more commonly in those with the blood group O [14].

If the risk of several different diseases is known for different ABO groups, it could serve as a primary screening aid to identify high-risk populations [15]. Treatment choices depend on a few variables, such as age, general wellbeing, leukemia type, and whether the infection has metastasized. In chemotherapy which is a worthy treatment methodology for leukemia, the leukemia cells are by and large devastated. For this purpose, a single sedate or a combination of drugs is employed. Normally immunotherapy or natural treatment is given to annihilate the leukemia cells. Appropriate treatments focus on the inside of leukemia cells, which can be performed using drugs. Radiation treatment can be given to one specific location plagued with leukemia cells or to the whole body. Treatment of AML includes an introductory broad acceptance. In this treatment method, the focus is on decreasing the number of dangerous cells, which is performed through solidification treatment and upkeep treatment [16].

## **Material and Methods**

### ***Design of study A***

A quantitative design retrospective study was conducted from the 1st December 2019 to the 3<sup>0th</sup> January 2020 in Hiwa Hematology/Oncology Hospital (pediatric unit) to assess the association between blood groups and leukemia.

### ***Administrative arrangement B***

This study was approved by the scientific committee of the College of Nursing, the University of Sulaimani. Moreover, official permission to collect data was obtained from the Nursing College.

### ***Ethical consideration C***

Written consent was gained from Hiwa Hematology/Oncology Hospital. After the purpose and objectives of the study were explained, the confidentiality of the information was ensured.

### ***The setting of study D***

The data obtained from Hiwa Hematology/Oncology Hospital (pediatric unit). This hospital which is located in Qrga, Sulaimaniyah city was established in 2007 and consists of an oncology ward, a hematology ward, a palliative ward, a pediatric ward, an adult isolation ward, pediatric isolation ward, outpatient ward, and chemotherapy preparation. It also has many clinics for patients follow-up.

### ***Study sample E***

According to the objectives of the study, a purposive sampling method was used to select the study sample from among the leukemia patients who attended to the pediatric unit of Hiwa Hematology/Oncology Hospital from the 1<sup>st</sup> of December 2019 to the 3<sup>10h</sup> January 2020. The final study sample was chosen after oral consent was obtained from 100 patients who agreed to participate in the study. The inclusion criteria were all children who had leukemia and those whose complete data were recorded in the database of Hiwa Hematology/Oncology Hospital. Died children were excluded from the study

### ***Method of the Data Collection F***

After the administration of Hiwa Hematology/Oncology Hospital was referred to for permission to collect required data from the hospital's database, an adopted and a questionnaire was used to collect the data from the database.

### ***Data collection instruments G***

Required data were collected through a questionnaire that was designed by the researcher by reviewing the literature and according to the purpose of the study. The questionnaire consisted of one part including items to collect data on the patients' age, gender, residency, blood groups, and type of leukemia.

### ***Statistical analysis H***

The collected data were analyzed using the Statistical Package for Social Science (SPSS version 22.0). For this purpose, statistical procedures were used. A  $p \leq 0.05$  was regarded to be statistically significant. All statistical procedures were carried out on the probability of  $p > 0.05$  as non-significant,  $p \leq 0.05$  as significant, and  $p < 0.01$  as highly significant.

## **I. Validity of the questionnaire**

The questionnaire was validated by a panel of special experts in the field. The panel also reviewed the content of the questionnaire for its clarity, relevancy, and adequacy. The comments of the panel were used to modify the questionnaire.

## **J. Reliability of the questionnaire**

Internal consistency was performed to determine the reliability of the questionnaire. For this purpose, the Pearson Correlation Coefficient ( $r$ ) was used, and the reliability of the study instrument was found to be

$r=0.98$ . The following formula was used to estimate the reliability stability of the questionnaire [17].

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where

$r$  = the correlation coefficient for variables  $x$  and  $y$

$n$  = number of samples

$x$  = an individual score for variable  $x$

$y$  = an individual dual score for variable  $y$

$\Sigma$  = the summation of

## Results and Discussion

The results obtained from data analysis were presented systematically in tables that correspond with the objectives of the study. Table (1) shows that the majority of children with leukemia belonged to the age group 1-5 years (45%), followed by the age group 6-12 years (38%), and the smallest age group was 13-18 years (17%). The males and females accounted for (63%) and (37%) of the study sample, respectively. Moreover, most of the children were from urban areas (85%), followed by (15%) living in a suburban area.

Table 1: Distribution of socio-demographic characteristics of children with leukemia.

<i>Variable</i>	<i>Frequency (n)</i>	<i>Percentage (%)</i>
<b>Age</b>		
<i>1-5</i>	45	45.0
<i>6-12</i>	38	38.0
<i>13-18</i>	17	17.0
<i>Total</i>	100	100.0
<b>Gender</b>		
<i>Male</i>	63	63.0
<i>Female</i>	37	37.0
<i>Total</i>	100	100.0
<b>Residency</b>		
<i>Urban</i>	85	85.0
<i>Suburban</i>	15	15.0
<i>Total</i>	100	100.0

Table (2) describes the distribution of blood groups, including Rh type among the children. As seen, 36 children (36%) belonged to (A) positive group, followed by (B) positive in 30 children (30%), (O) positive in 26 cases (26%), and (AB) positive in 5 cases (5%), (B) negative in 2 children (2%), and (A) negative in 1 case (1%).

Table 2: Type of blood groups of children with leukemia.

<i>Blood groups</i>	<i>Frequency (n)</i>	<i>Percentage (%)</i>
<i>A+</i>	36	36.0
<i>B+</i>	30	30.0
<i>O+</i>	26	26.0
<i>AB+</i>	5	5.0
<i>B-</i>	2	2.0
<i>A-</i>	1	1.0
<i>Total</i>	100	100.0

Table (3) presents the results of the types of leukemia. As indicated, 81 children (81%) have acute lymphoblastic leukemia (ALL), and 19 (19%) have acute myeloid leukemia (AML).

Table 3: Types of leukemia.

<i>Type of leukemia</i>	<i>Frequency (n)</i>	<i>Percentage (%)</i>
<i>ALL</i>	81	81.0
<i>AML</i>	19	19.0
<i>Total</i>	100	100.0

Table (4) indicates the relation between blood groups and types of leukemia. According to these results, there is no relation between blood groups and types of leukemia (p=0.173).

Table 4: Relation between blood group of children and types of leukemia.

<i>Type of Leukemia</i>	<i>Type of blood group</i>						<i>Total</i>	<i>Chi-square</i>	<i>Degree of freedom</i>	<i>P-value</i>
	<i>A+</i>	<i>B+</i>	<i>AB+</i>	<i>O+</i>	<i>A-</i>	<i>B-</i>				
<i>ALL</i>	26	28	5	19	1	2	81	7.705 <sup>a</sup>	5	0.173
<i>AML</i>	10	2	0	7	0	0	19			
<i>Total</i>	36	30	5	26	1	2	100			

Table (5) demonstrates the relationship between children's age and the types of leukemia. As seen, there is no significant relationship between age and types of leukemia (p=0.27).

Table 5: Relation between Age of children and types of leukemia.

<i>Age</i>	<i>Type of Leukemia</i>		<i>Total</i>	<i>Chi-square</i>	<i>Df</i>	<i>P-Value</i>
	<i>ALL</i>	<i>AML</i>				
<i>1-5</i>	40	5	45	7.260 <sup>a</sup>	2	0.27
<i>6-12</i>	31	7	38			
<i>13-18</i>	10	7	17			
<i>Total</i>	81	19	100			

Table (6) presents the relation between the children's gender and the types of leukemia. As indicated, there is no relationship between gender and types of leukemia (p=0.609).

Table 6: Relation between Gender of children and types of leukemia.

<i>Gender</i>	<i>Type of Leukemia</i>		<i>Total</i>	<i>Chi-square</i>	<i>Df</i>	<i>P-value</i>
	<i>ALL</i>	<i>AML</i>				
<i>Male</i>	62	11	63	2.62	1	0.609
<i>Female</i>	29	8	37			
<i>Total</i>	81	19	100			

Table (7) presents the relation between the children's place of residence and types of leukemia. It shows that there is no relation between the children's place of residence and types of leukemia (p-value=0.915).

Table 7: Relation between the Residency of children and types of leukemia.

<i>Type of leukemia</i>	<i>Place of residence</i>		<i>Total</i>	<i>Chi-square</i>	<i>Df</i>	<i>P-value</i>
	<i>Urban</i>	<i>Suburban</i>				
<i>ALL</i>	69	12	81	0.11 <sup>a</sup>	1	0.915
<i>AML</i>	16	3	19			
<i>Total</i>	85	15	100			

The purpose of this study was to show the association between blood groups and types of childhood leukemia among children treated in Hiwa Hematology/Oncology Hospital. Blood group antigens have been reported to play an important role in the development of certain diseases, such as cancer, ulcer, and allergies [18]. The patients' age was between 1-18 years, and the results of the study showed that (45%) of them were 1 to 5 years old. The association between age groups and leukemia was not statistically significant (p=0.27).

In the present investigation, most of the patients were found to suffer from ALL. Likewise, an association was found between pediatric patients aged 1-18 years and suffering from ALL (81%). This can be because this disorder constitutes 25% of all types of cancer, being the most frequent type of childhood cancer [19].

Many other studies have published inconsistent results on the distribution of blood types in different

diseases [20]. Some reports have mentioned the probable association between ABO blood groups and leukemia; however, the reported results are mostly non-conclusive. According to a study conducted in Iraq, there is not an association between ABO and Rh groups and leukemia; however, patients with (B) blood groups are more susceptible to ALL [21].

A study carried out in Iraq for the distribution of ABO blood groups in Iraqi samples of leukemia patients, and the results showed that (O) blood group was the main blood group, followed by (A), (B), and (AB). This figure was different from the current study where type (A) was the most frequent blood type [22]. The results showed that there is no significant association between blood groups and leukemia ( $p > 0.05$ ). This study demonstrates an association between ABO blood groups and specific hematological malignancies, but since the data in the present study were collected in a single hospital, it is necessary to carry out further research in a large population-based prospective study [23].

## Conclusions

According to the results of the present study, the majority of the children with leukemia in the sample aged between 1 and 5 years. The majority of them were males (63%), followed by females (37%). Most of the children were from urban areas (85%), followed by (15%) living in suburban areas. The most common blood group was (A+). The majority of children (81%) had acute lymphoblastic leukemia (ALL), followed by acute myeloid leukemia (AML) (19%). The results of the study showed that leukemia types had no significant relationship with the children's blood group, age, gender, or place of residence ( $p > 0.05$ ).

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## Conflict of interest

The authors declare that there is no conflict of interest in this study.

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