



## Frequency of ABO-Rh Blood Group in Leukemia

### KEYWORDS

Blood group, Leukaemia

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**ABSTRACT** Background and objective : This study was carried out to assess the relation between Blood Group and Leukemia.

*Material and Method :* This study was conducted in Medical ward of Oncology Department, Civil Hospital Ahmedabad. 37 patients of leukemia diagnosed with bone marrow biopsy were included in the study. Data was collected from those patients who met inclusion criteria who were admitted in oncology department

*Result :* Out of 37 cases Blood Group of 18 patients were A+ve , 6 patients had O+ve blood group , 6 patients had B+ve blood group , 4 had AB+ve blood group , 3 patients had O-ve blood group.

*Conclusion:* Leukemia is significantly associated with A+ blood group

### INTRODUCTION:

The ABO-Rh blood group is the most important type of blood grouping system in transfusion medicine. Different phenotype of blood group system is controlled by genes located on chromosome 9 [1]. Distribution of these phenotype is also race dependent.[2] People have different blood types, known as blood groups. The ABO blood group system is the most important blood grouping system in human [blood transfusion](#). In 1900, Karl Landsteiner first described the existence of serologic difference between individuals, and classified people into four groups depending on whether their RBC cell membrane contained agglutinin (antigens) "A," agglutinin "B," neither A nor B (group O) or both A and B (group AB) followed by discovery of Rh antigen. There are differences in the distribution of ABO, and Rh (D) blood groups amongst different populations. Although human population shares the same blood systems, they differ in the frequencies of specific types. Some variations may occur in different areas within one country. For e.g. It was reported that Group O was found to be more common in India although studies have reported that group B was common in Northern India while Group O was more prevalent in South India. The ABO blood group system is the only system in which antibodies are consistently and predictably present in the serum of normal individuals whose red cells lack the antigens. Different blood groups have been shown to be particularly associated with different diseases as well. The relationship between ABO and Rh blood groups and susceptibility of various diseases has been studied for at least the past 60 years. Faser Roberts discussed the relationship between ABO blood group and susceptibility to chronic disease as an example of genetic basis for family predisposition. In India and Western countries, many workers have tried to find out the relationship between ABO blood group and various systemic diseases, and the results showed that some diseases like peptic ulcer[3] dental caries, salivary gland tumors, chicken pox, malaria, oral cancer, hematological malignancies, ischemic heart disease, cholera, etc., had significant association. It is expected that performing investigations in this research area will make it possible to better understand the risk factors of periodontal diseases and to predict the effective methods of pre-

vention and treatment of periodontal diseases.

The purpose of the present study was to explore such a possibility to determine the prevalence of leukemia diseases among different blood groups using ABO system. Etiology of leukemia is still unknown and known risk factors explain small proportion of cases. Therefore studying ABO-Rh blood group distribution may be helpful to assess relative risk of leukemia in particular blood groups.

### METHODS:

The study was conducted in Medical ward of Oncology Department, Civil Hospital Ahmedabad. Total 37 patients of leukemia diagnosed by bone marrow biopsy were included in the study. Data was collected from those patients who met inclusion criteria who were admitted in oncology department. For reference value, ABO-Rh blood group data of 2090 blood donors from Blood Bank, Civil Hospital was collected. Distribution of blood group in percentage was calculated from 2090 blood group data from blood donors (as healthy control).

### RESULTS:

Out of total 37 patients 19 were male and 18 were female. From total 37 subjects, 18 subjects were A+, 6 were O+, 6 were B+, 4 were AB+ and 3 were O- blood group. This is shown in table 1.

**Table-1 Blood group distribution in cases and control**

Blood group	Observed Blood group in Leukemia	Observed Blood group in controls	Total	Expected Blood group in Leukemia
A+ve	18(48%)	20	38	7.4
A-ve	0	1	1	0.37
B+ve	6(16.22%)	35	41	12.95
B-ve	0	2	2	0.74
AB+ve	4(10.8)	9	13	3.3
AB-ve	0	1	1	0.37
O+ve	6(16.22%)	30	30	11.1
O-ve	3(8.11%)	2	5	0.74

**Table-2 Expected frequency in different blood group**

Blood Group	Observed result	Expected result	O-E	(O-E) <sup>2</sup> /E
A+ve	18	7.4	10.6	15.18
A-ve	0	0.37	-0.37	0.37
B+ve	6	12.95	-6.95	3.73
B-ve	0	0.74	-0.74	0.74
AB+ve	4	3.3	0.7	0.15
AB-ve	0	0.37	-0.37	0.37
O+ve	6	11.1	-5.1	2.34
O-ve	3	0.74	2.26	6.9

Degree of freedom for this study is = (c-1) (r-1) = (2-1) (8-1) = 7

Table value for probability of 0.05 is 14.07. Chi square value is 29.78 So study result is significant.

Means there is relation between ABO-Rh blood group and leukemia and difference in distribution pattern is not by chance. Individual blood group significance of blood group A+ve for P 0.05 (3.84)

**Table-3: 2x2 table for A+ blood group comparison**

Blood group	Leukemia cases	Healthy controls	Total
A+ve	18	20	38
Non A+ve	19	80	99
	37	100	137

In this comparison group, Expected number of blood group having leukemia =  $37/137 \times 38/137 = 10.26$ . Chi-square =  $(O-E)^2/E = (18 - 10.26)^2/10.26 = 5.8$  Degree of freedom here is 1 and for this dF p 0.05 is 3.84 < 5.8 Here test is significant. Similarly, Chi square test applied to other remaining blood groups of ABO-Rh system. Their p-value was greater than 0.05 thus result was not significant.

#### DISCUSSION:

Nagy and colleagues[7] showed an increase in the proportion of O blood group among female patients with acute leukemia. Shirley and Desai[5] reviewed several previously published data and found no statistically significant difference in the distribution of

A blood group with respect to O blood group in patients with acute leukemia when compared with the respective controls of each study reviewed. These conflicting findings can be explained in the ground of ethnic differences between the studied populations Equally important, ABO alleles may represent immunogenetic predisposing factors for leukemias and lymphomas, and such predisposition require an environmental trigger, which may differ from population to other or may favors a specific ABO allele for interaction to precipitate the disease ABO blood groups are still fruitful research strategy in understanding the etiology of hematological malignancies, especially if they are evaluated in the ground of recent molecular typing of such genetic polymorphism. Such suggestion has been recently challenged by Novaretti et al.[8] who demonstrated that ABO molecular genotyping in leukemia patients reveals new ABO variant alleles, and elucidation of the diversity of these alleles in leukemia and in other diseases is important for the determination of the effect of changes in an amino acid residue on the specificity and activity of ABO glycosyltransferases and their function.

#### CONCLUSION:

Out of 37 cases of leukemia distribution of A+ve blood group was 48.6% , & distribution of O+ve , B+ve , AB+ve , O-ve blood groups were 16.2% , 16.2% , 10.8 % , 8.1% respectively.

There is significant association between blood group A+ve and Leukemia.

The common type of leukemia in this study was found AML type (54.5%) and blood groups of 45% cases of AML were A+ve.

Next common type of leukaemia was observed ALL type and 58.3% ALL patients had A+ve blood group.

Larger scale study will further help to evaluate distribution of ABO-Rh blood group in patients of leukemia in our country India.

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