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Relationship between ABO Blood Groups and Acute Lymphoblastic Leukemia

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ABSTRACT

Blood cancer is one of the types of cancer that affects the body through the blood. Consequently, it is necessary to address this disease from all angles and its causative factors, including blood, to reduce its incidence. The objective of the Study: is to determine the extent to which leukaemia is related to blood groups and the Rh factor, Determine the blood type most likely to develop leukaemia and determine the most cancer-resistant blood type. Results: The results of this current study showed that the highest incidence of cancer was with blood group A 64.7%, followed by blood group AB 40%, followed by blood group O 10%, and the lowest incidence rate was with blood group B. As a result, the highest category of patient's falls in the age group 16-30 years and 31-50 years, with a rate of 33.3% compared to other age groups. 20.0% are over fifty years old, and the lowest percentage is between 8 and 15 years. The results of this current study show that the highest incidence of leukaemia is 60%. It was male and it was 40% lower for females. The result of this current study is the duration, the mean duration of patients with hematomas was 9.03 ± 3.92 years, with approximately 46.7% of patients suffering between 6-10 years, 33.3% suffering between more than 10 years, and 20.0% suffering between one and five years. As a result of this study, there was half of 50.0% of acute lymphoblastic leukaemia patients, 26.6% of chronic lymphocytic leukaemia, 16.7% of acute myeloid leukaemia and 6.7% of chronic myeloid leukaemia. Conclusion: This study that there is a correlation between leukaemia rates, blood group A+, types of hematomas, duration of disease diagnosis, age, and incidence of chronic diseases.

1. INTRODUCTION

Cancer is one of the most widespread diseases currently in all parts of the world, which poses a threat to the lives of many, because most of them are not treatable or may be malignant, and therefore we think that we have cured the disease and then the symptoms return to appear again, but in other organs, and therefore cancer is A pest that has multiple forms, and therefore to treat it, we need special methods and multiple methods for each type of it. In tumour cells, an imbalance occurs, which leads to continued cell proliferation and loss of differentiation. Malignant (cancer) tumors result from a genetic defect in somatic cells that transforms them into cancerous cells out of control, as they grow and divide in the wrong place and time, leading to the formation of tumours (Bassan, R. et al. 2011, Pui, C. et al. 2009).

Initiation stage, development stage invasion and spread stage, Blood is the most effective tool in transporting food and oxygen to all cells of the body, and it is one of the most vulnerable things in the human body to infection with many diseases, including what is “hereditary” sickle cell anaemia, slow blood clotting, or be acquired such as leukaemia (Aird, I. et al. 1953). Leukaemia is considered one of the types of cancer that require special methods of treatment, and even in these special methods of treating leukaemia, we also need to distinguish between its types which are: (ALL), (AML), (CLL), (CML), each of which requires a specific method of treatment, which may or may not succeed (Cohen, W. et al. 2012). It is untreatable (fatal), but in general, it is a basis for being able to treat any disease that must be discovered quickly, and its symptoms and complications that it will cause are known, concerning leukaemia, it is a disease developing, and therefore methods of treating this disease must be developed to stop the cases of disease caused by it (Wu, O. et al. 2008). Many studies linked certain types of blood to an increased risk of cancer, and among the factors that can determine the risk of cancer are the types of blood groups (Pui, C. H. et al. 2004). In our research, we will discuss the acute lymphoblastic type. Acute lymphoblastic leukaemia is a cancerous disease that results in the uncontrolled division of cancer cells (Garcia-Manero, G. et al. 2009). The cells are white blood cells called lymphoblasts. This is the most common leukaemia among children, and it accounts for 20% of all different types of leukaemia in adults (Huang, X. J. et al. 2009). In recent years, methods of diagnosis and treatment of leukaemia have developed, and nowadays two-thirds of children and between a quarter and half of adults recover from acute lymphoblastic leukaemia (Storry, J. R. et al. 2009). Lymphoblastic leukaemia is classified into subgroups according to the results of the examinations, and the classification is for acute leukaemia (T) or type (B), and each of these two groups is classified into other subgroups according to the stage of development in which the original cancer cell is located (Wolpin, B. et al. 2009). The majority of symptoms that appear in the disease are caused by bone marrow failure, and include the following: pale skin, Weakness and fatigue due to anaemia, Signs of bleeding due to thrombocytopenia, Frequent infections due to neutropenia, i.e., a low level of white blood cells, bleeding gums, Bone pain, Fever, Frequent or severe nosebleeds. Lumps are caused by swollen lymph nodes in and around the neck, armpits, abdomen, or groin, shortness of breath, Weakness, tiredness, or a general lack of energy. Signs and symptoms of anaemia, such as Paleness, Tired, dizziness, palpitations, heart murmur, Shortness of breath with mild exertion, disseminated intravascular coagulation at diagnosis, blood clots, Lymphadenopathy, Bone pain, splenomegaly, Respiratory distress and altered mental status, Renal failure in patients with a high tumour burden, Infections, including pneumonia, bruises, a Skin rash caused by skin infiltration with leukaemia cells (Zuppa, A. et al. 2010, Novaretti, M. C. et al. 2008, Amundadottir, L. et al. 2009 and Nagy, P. et al. 1981). Acute lymphoblastic leukaemia occurs when a bone marrow cell develops changes, i.e. mutations, in its genetic material or DNA. The cell's DNA contains the instructions that control the functioning of the cell. Usually, the instructions include cell growth at a specific rate and death at a specific time, but in acute lymphoblastic leukaemia, the cell death instructions are not present, but because of mutations, the cell continues to grow and divide. When this happens, the production of blood cells becomes out of control (Iodice, S. et al. 2010). The bone marrow produces immature cells that develop into leukemic white blood cells called lymphoblasts, these abnormal cells are unable to function properly and can build up and crowd out healthy cells (Macmahon, B. et al. 1957, Feinleib, M. et al. 1960 and Mustacchi, P. et al. 1960). The study aims to determine the extent to which leukaemia is related to blood groups and the Rh factor, determine the blood group most susceptible to leukaemia and determine the most resistant blood type to cancer.

2. METHOD

Place of Study

This study was conducted In Tripoli and Sabratha Cities and targeted Tripoli Hospital (oncology department) and Sabratha Oncology Hospital, where data were collected from people with leukaemia.

Study population

The study included 30 patients with leukaemia cancer who were interviewed and reviewed in the oncology department at Tripoli and Sabratha Oncology Hospital.

Time limits

This study lasted for a period of three months, starting from the end of March 2023 to June 2023, during which data were collected.Data control and statistical analysisData were taken from people with leukaemia, which included age, marital status, place of residence, history of leukaemia, type of leukaemia, presence of symptoms, family history, and other diseases. These data were collected in a questionnaire ،this study targeted 30 patients with leukaemia ،The data were processed and analyzed statistically Using the Statistical Package Program (SPSS) Version 25.

3. RESULT

Demographic characteristic of participants
A total of 30 patients participated in the study with leukemia cancer at Tripoli and Sabratha oncology hospital, Libya.

Gender
In total of patient with leukemia cancer (n = 30), the study showed that male's percentage was about 60 % (n = 18) and females about 40 % (n = 12) as showed in figure 1.

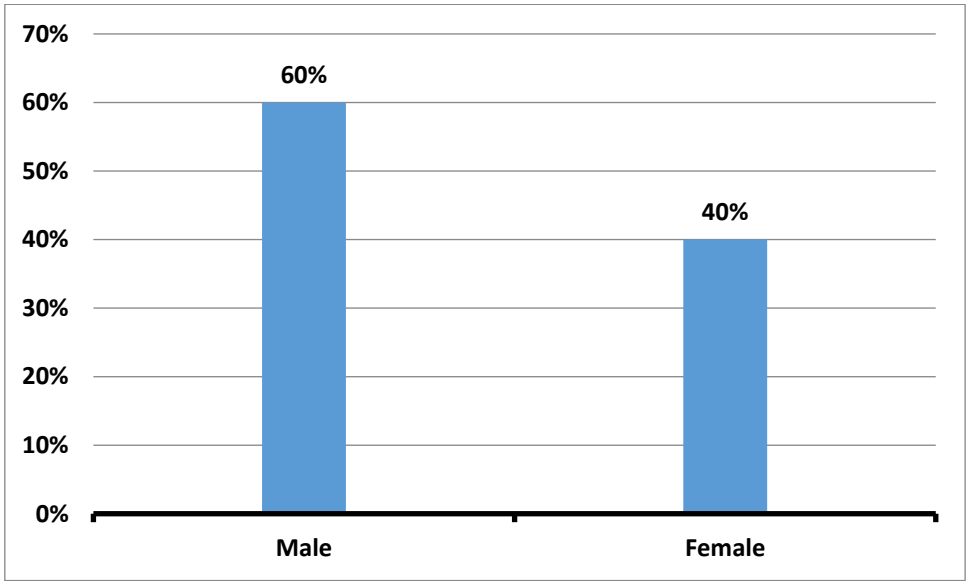


Figure 1: Distribution of patients according to sex.

Age
The survey showed that the minimum age was 8 years whereas the maximum age where 63 years. According to the distribution of age ranges, the highest group of patients were in age range 16-30 years and 31 -50 years by 33.3% in compare to other age ranges older than 50 years was 20.0%, and the lowest percentage was in age between 8 – 15 years old by 13.4% as showed in Figure 2.

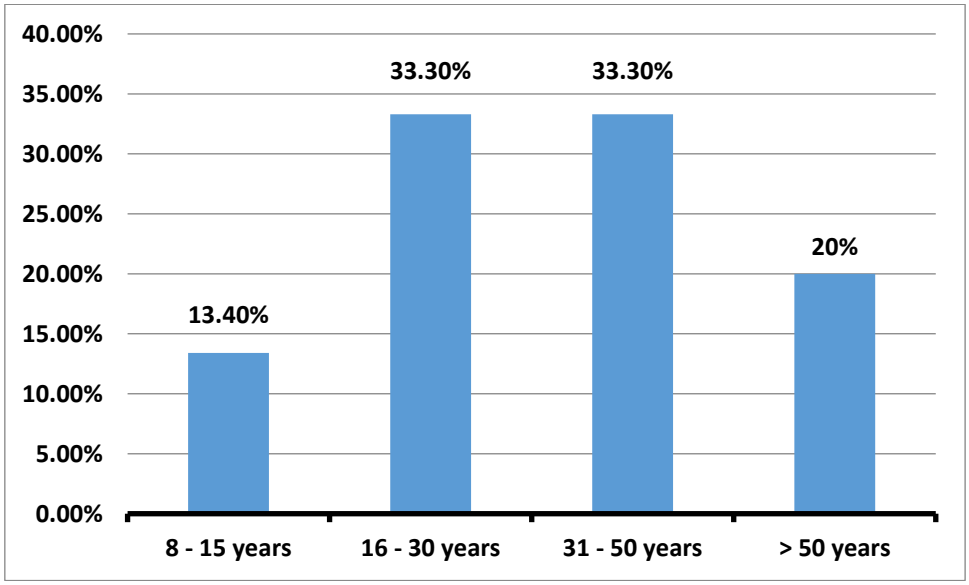


Figure 2: Distribution of patients according to age group.

Family history of disease

It was observed that (n = 22), 73.3% of them were found to have a family history of hypertension among their families, and (n = 8), 26.7% of them weren't found to have a family history of disease as showed in fiqure 3.

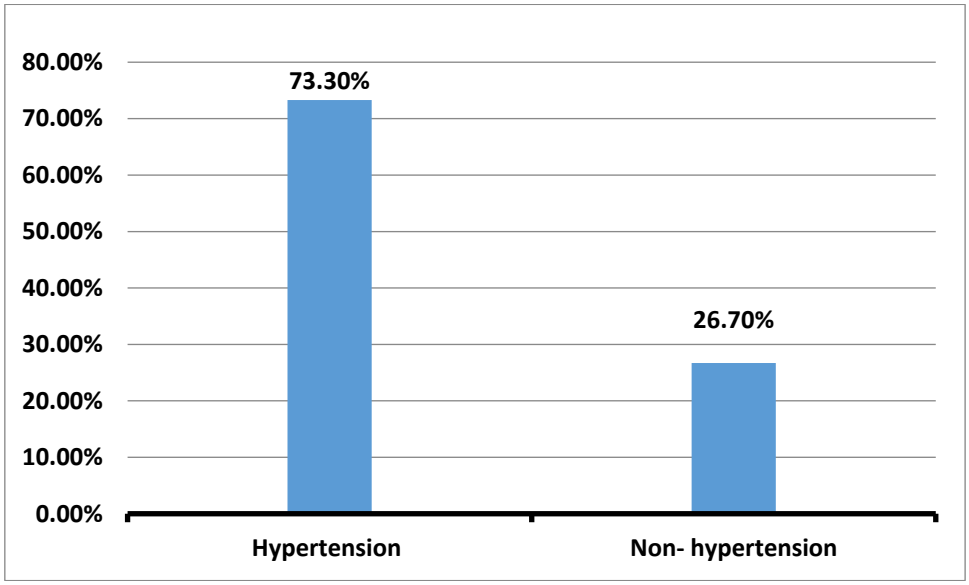


Figure 3: Distribution of patients according to family history of disease.

History of chronic disease

It was observed that (n = 14), 46.7% of them were found to have a history of chronic disease, and (n = 16), 53.3% of them didn't have a history of chronic illness as shown in fiqure 4.

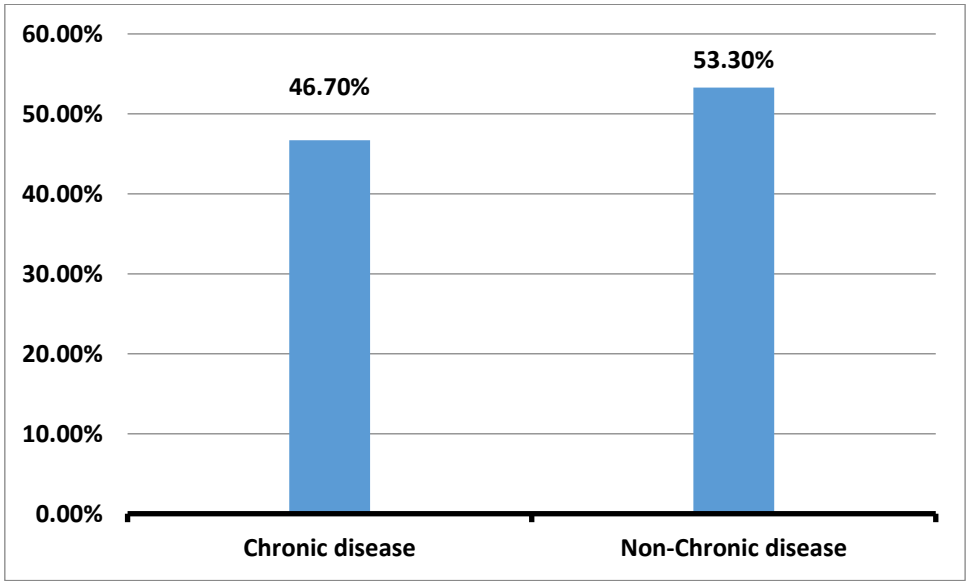


Figure 4: Distribution of patients according to history of chronic disease.

Blood group type

Figure 5, shows that the most frequent blood group was blood group A; 46.7% (n = 14), followed by blood group AB; 40.0% (n = 12), blood group O; 10.0% (n = 3), and only one patient had blood group B; 3.3% (n = 1).

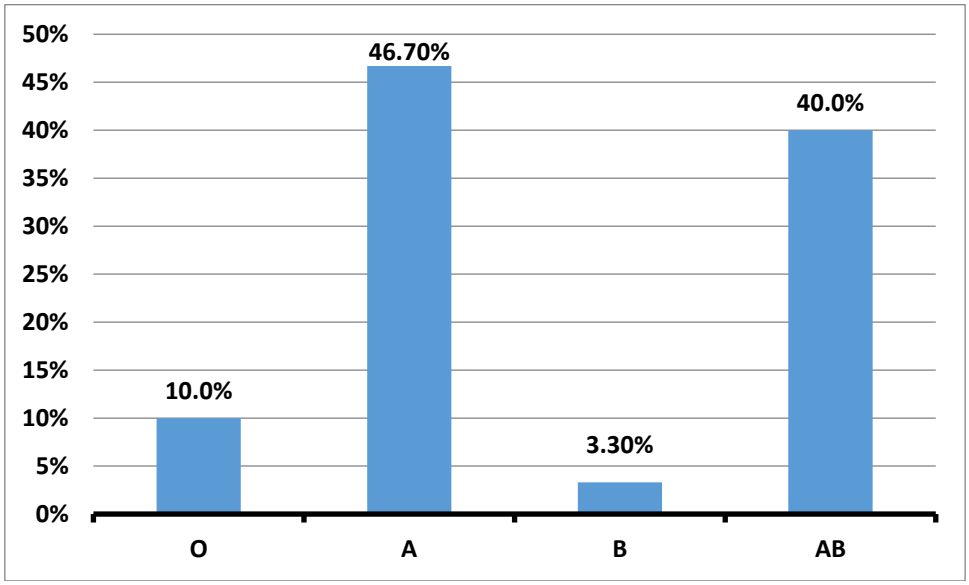
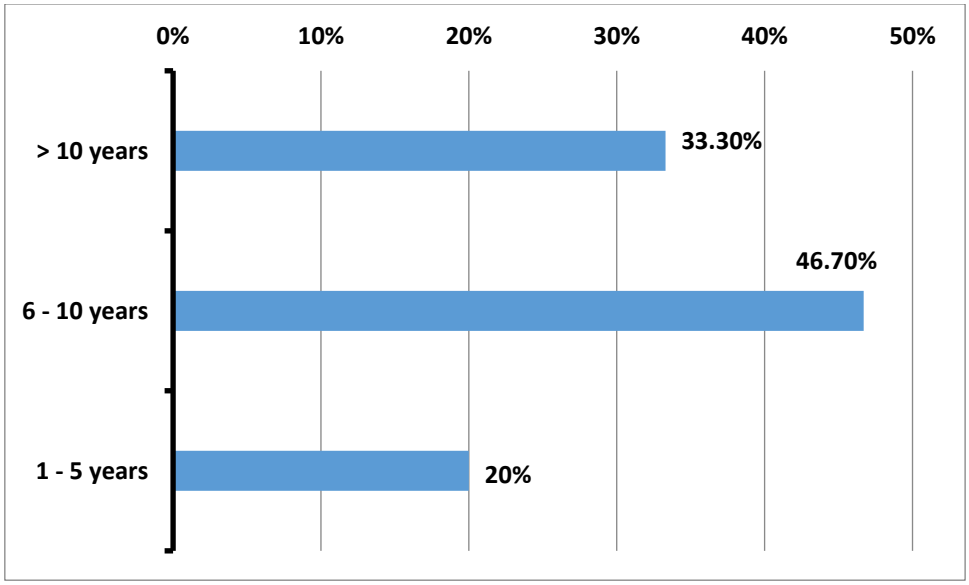


Figure 5: Distribution of patients according to blood group.

Duration of diagnosis of disease

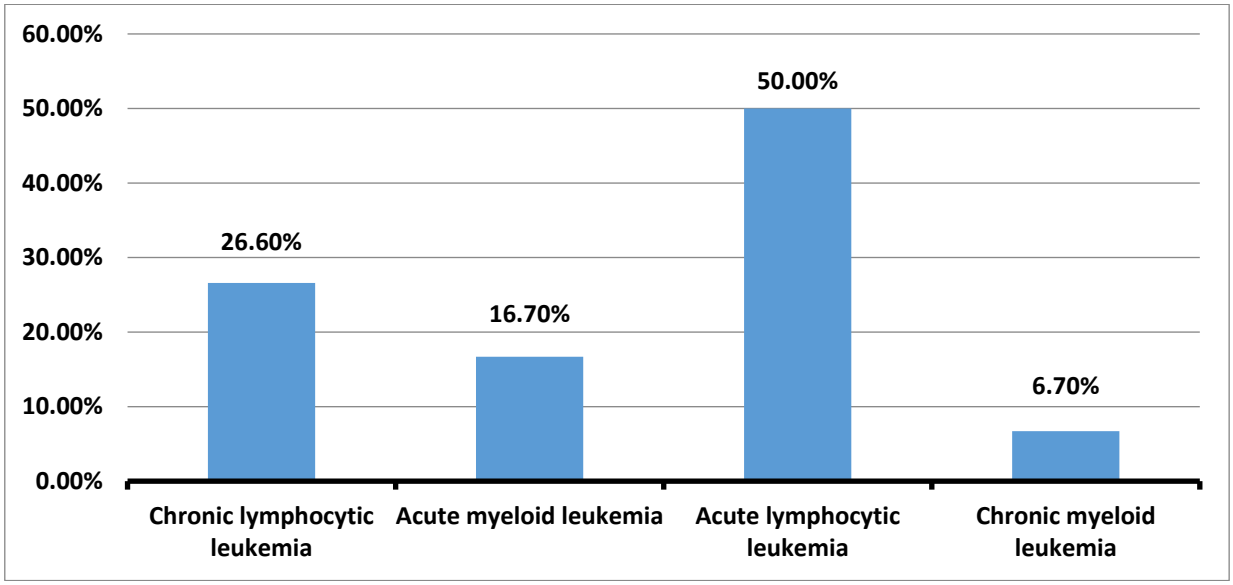
Patients with hematology oncology had a mean duration of 9.03 ±3.92years, with almost patients (n = 14), 46.7% suffering between 6 -10 years, (n = 10), 33.3 % of them suffering between more than 10 years, and (n = 6), 20.0% suffering between one year and five years as shown in fiqure 6.



Fiqure 6: Distribution of patients according to duration diagnosis of disease.

Types of hematological oncology

There were half (n = 15), 50.0% of patients with Acute lymphocytic leukemia, (n = 8), 26.6% chronic lymphocytic leukemia, (n = 5), 16.7% acute myeloid leukemia, and (n = 2), 6.7% chronic myeloid leukemia as shown in fiqure 7.



Fiqure 7: Types of hematological oncology.

Distribution of blood group in different of leukemia patients.

Regarding blood type O, there were 66.7% of patients with acute myeloid leukemia and 33.3% of patients with chronic lymphocytic leukemia. Blood type A: the majority 50.0% of patients with acute lymphocytic leukemia, 47.9% of patients with chronic myeloid leukemia, and 7.1% of patients with acute myeloid leukemia. Only those with chronic lymphocytic leukemia are B blood group 100%. Acute lymphocytic leukemia is present in 50% of blood group AB patients, chronic myeloid leukemia in 52.1%, acute myeloid leukemia in 26.2% and acute lymphocytic leukemia in 50.0%.

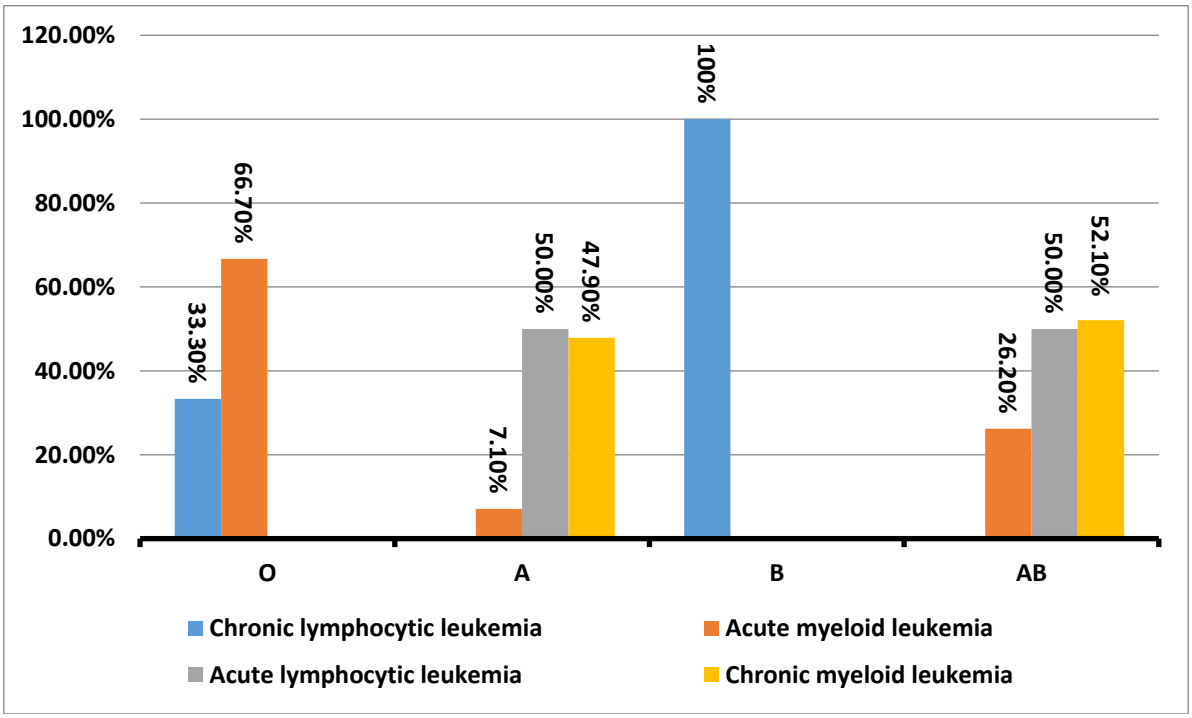


Figure 8: Distribution of ABO blood groups in different leukemia patients.

Comparison table Between Normal range of CBC analysis and a person with type A acute lymphoblastic leukemia

The table 1 shows that there is a difference in the results of the complete blood analysis of an acute lymphoblastic leukemia patient and a healthy person, as it shows a significant decrease in platelets in a leukemia patient, it also shows a higher percentage of white blood cells than the normal range in some patients, and a decrease in the percentages of red blood cells by a few percentages from the normal range of some patients, and shows a sharp decrease in hemoglobin, while the rest of the results are raised and decreased in small proportion from the normal rate.

Table 1: comparison table between normal range of CBC analysis and person with type A acute lymphoblastic leukemia

Blood group		A+	A+	A-
Ages		62 Y	58 Y	28 Y
RBC	3.50 to 16.00	2.09	2.68	3.18
WBC	3.5 to 10.0	12.2	6.2	14.2
PLT	150 to 400	37.8	107	105.6
Hgb	13.3 to 16.6	10.6	8.45	8.3
Mchc	31.5 to 36.0	31.8	43.6	35.7
Mch	26.0 to 34.0	28.2	40.4	36.8
Mcv	80.0 to 100.0	88.5	92.8	102
Pct	0.10 to 0.28	0.18	0.03	0.10
Mpv	6.5 to 12.0	9.9	10.2	10.9
Lym	20.2 to 40.0	49.70	95.04	6.38

4. DISCUSSION

Many previous studies showed the existence of an association between blood groups and many types of cancer. The results of this study showed that the average age of patients with leukaemia was 34.13%, between the ages of 16-30 years and 31-50 years. The results of this current study show that the highest incidence of cancer was with blood group A 64.7%, followed by blood group AB 40%, followed by blood group O 10%, and the lowest incidence rate was with blood group B. The result that the highest group of patients is in the age group 16-30 years and 31-50 years, with a rate of 33.3% compared to other age groups; 20.0% were over 50 years old, and the lowest percentage was between 8-15 years old. The results of this current study show that the highest incidence of leukaemia is 60%. It was of the male sex, and the lowest percentage was 40% of the females. As for the result of this current study that the duration the mean duration of patients with hematomas was 9.03 ± 3.92 years, with approximately 46.7% of patients suffering between 6-10 years, 33.3% suffering between more than 10 years, and 20.0% suffering between one year and five Years. As for result of this study, there were half of 50.0% acute lymphoblastic leukemia patients, 26.6% chronic lymphocytic leukemia, 16.7% acute myeloid leukemia, and 6.7% chronic myeloid leukemia. As for the result of this study regarding blood group O, there were 66.7% of patients with acute myeloid leukaemia and 33.3% of patients with chronic lymphocytic leukaemia. Blood type A: the majority 50.0% of patients with acute lymphoblastic leukaemia, 47.9% of patients with chronic myeloid leukaemia, and 7.1% of patients with acute myeloid leukaemia. Only those with chronic lymphocytic leukaemia are in blood group B. Acute lymphoblastic leukaemia was found in 50% of patients with blood group AB, chronic myeloid leukaemia in 52.1%, and acute myeloid leukaemia in 26.2%. As for the result of this study (n = 22), 73.3% of them were found to have a family history of high blood pressure among their families, and (n = 8), 26.7% of them had no family history of the disease. As for the result of this study (n = 14), 46.7% of them were found to have a history of chronic diseases, and (n = 16), 53.3% of them had no history of chronic diseases.

5. CONCLUSION

We conclude from this study that there is a correlation between the rates of leukaemia, blood group A+ types were more likely and blood group B Was less likely, types of hematomas, duration of disease diagnosis, age, and incidence of chronic diseases.

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