



Evaluation of Enzymatic Antioxidants in Leukemia Patients in Al-Anbar Governorate

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KEYWORDS

Acute leukemia,
Superoxide
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ABSTRACT:

Background : Leukaemia patients have excessively high WBC counts in their bone marrow and blood. Symptoms of aberrant cells caused by bone marrow loss (i.e.: anaemia, neutropenia and thrombocytopenia). Infiltration (b) (e.g. liver, spleen, lymph nodes, brain, skin or testes). Aerobic organisms have a well-known antioxidant defence system. Oxidative stress causes several biochemical changes and is linked to many chronic diseases such as atherosclerosis, cardiovascular disease, mutagenesis, and cancer In mammalian cells. Recently, free radicals, particularly oxygen radicals, have been linked to the multistep carcinogenesis process. Several antioxidants have been found to prevent neoplastic.

Aim of thesis: In this project will be to investigate the activity of antioxidant enzymes including: superoxide dismutase (SOD), and catalase (CAT) in leukemic patients, in Iraqi patients.

Material and methods: Our research participants through the utilization of study participants at the National Center for Hematology ,Ramadi- Teaching Hospital. Patients between the ages of 13 and 72 with acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) were enrolled in the study.

there are three main divisions:

Group A (GA): acute Lymphoblastic Leukemia (ALL) 50

Group B (GB): acute myeloid leukemia (AML) 50

Group C (GC): healthy control groups 50 (Controls group)

The control group consisted of thirty-four adults ranging in age from 19 to 59, all of whom looked to be volunteers. They were divided into two groups: the experimental group and the control group. No one had any clinical or laboratory evidence that could have an impact on the parameters that were going to be evaluated.

Results : The study included the determination of the antioxidants levels . and relationship between enzymatic correlation with leukemia patients. Patients had higher SOD activity than healthy controls (p 0.001) for ALL and AML. The total serum catalase activity of AML and ALL patients was considerably lower than that of healthy controls (P<0.01). The AML and ALL mean levels have grown considerably (p<0.001) for both ALL and AML had high amounts of ceruloplasmin.

Conclustions : Serum SOD activity rises significantly in both types of acute leukemia. Oxidative stress may be a contributing factor. On the other hand, differences between AML and ALL may be related to the severity of the disease. Probably around 65 years of age.

1.Introductions :

Leukaemia patients have excessively high WBC counts in their bone marrow and blood. Symptoms of aberrant cells caused by bone marrow loss (i.e.: anaemia, neutropenia and thrombocytopenia). Infiltration (b) (e.g. liver, spleen, lymph nodes, brain, skin or testes). Acute

and chronic leukemias are lymphoid or myeloid (Shroff *et al.* 2019).

At diagnosis, acute leukemia patients have more than 30% blast cells in their bone marrow. Acute myeloid leukaemia (AML) and acute lymphoblastic leukaemia (ALL) are subtypes of leukemia (Laosai and



Chamnongthai 2018). Aerobic organisms have a well-known antioxidant defence system. Oxidative stress causes several biochemical changes and is linked to many chronic diseases such as atherosclerosis, cardiovascular disease, mutagenesis, and cancer (Sharifi-Rad *et al.* 2020).

The antioxidant systems, both enzyme-dependent and non-enzymatic, have been associated with many malignancies. Superoxide dismutase, an intracellular enzyme, may allow anticancer drugs and radiation to avoid leukaemia and malignant cells (SOD). The absence of Mn-SOD activity was revealed as a tumor cell phenotypic characteristic (Griess *et al.* 2017).

In mammalian cells, glutathione peroxidase appears to be an essential antioxidant enzyme, but superoxide dismutase, catalase, and peroxidase are all critical. It is thought that enzymes are highly segregated in the cell. Copper and zinc-containing SOD reside in the cytoplasm, while manganese-containing SOD is found in mitochondria. Mn-SOD and CAT activity are reduced in tumor cells, as is Cu, Zn-SOD activity (Kinnula and Crapo 2003).

Recently, free radicals, particularly oxygen radicals, have been linked to the multistep carcinogenesis process. Several antioxidants have been found to prevent neoplastic growth (Kehrer and Klotz 2015).

2- Material and methods:

2.1 Material:

These findings were obtained through the utilization of study participants at the National Center for Hematology, Ramadi- Teaching Hospital. Patients

between the ages of 13 and 72 with acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) were enrolled in the study.

There are three main divisions:

Group A (GA): Acute Lymphoblastic Leukemia (ALL) 50.

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Group C (GC): Healthy control groups 50 (Controls group).

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3. Results and Discussion.

3.1 Demographics and Clinical Characteristics

The clinical characteristic and demographics of patients are presented in Table 1. Fifty Acute lymphoblastic leukemia patients were investigated, there were 23 out of 50 (46%) patients with age group <50 years and 27 out of 50 (54%) patients with age group >50 years. The age more than 50 is more frequent for leukemic patients (ALL). Whereas the AML age below 50 is more frequent with this situation. Our project shown the BMI have a no correlation between obese and overweight group with ALL groups 9 (18%), 8 (16%) respectively. Whereas a slightly correlation may exist with AML in obese and overweight 12 (24%), 11 (22%) respectively as shown in Figure 1. and Figure 2.

Table1 clinical frequency of aging and BMI in present study groups

Clinical characteristic		Acute Lymphoblastic Leukemia (ALL) No. 50	Acute Myeloid leukemia (AML) 50	Healthy control groups 50 (Controls group)
Aging	<50	23 (46%)	35 (65%)	33(66%)
	>50	27 (54%)	15 (35%)	17(34%)
BMI	Normal	33 (66%)	27 (54%)	29 (58%)
	Overweight	8 (16%)	11 (22%)	17 (34%)
	Obese	9 (18%)	12 (24%)	4 (8%)

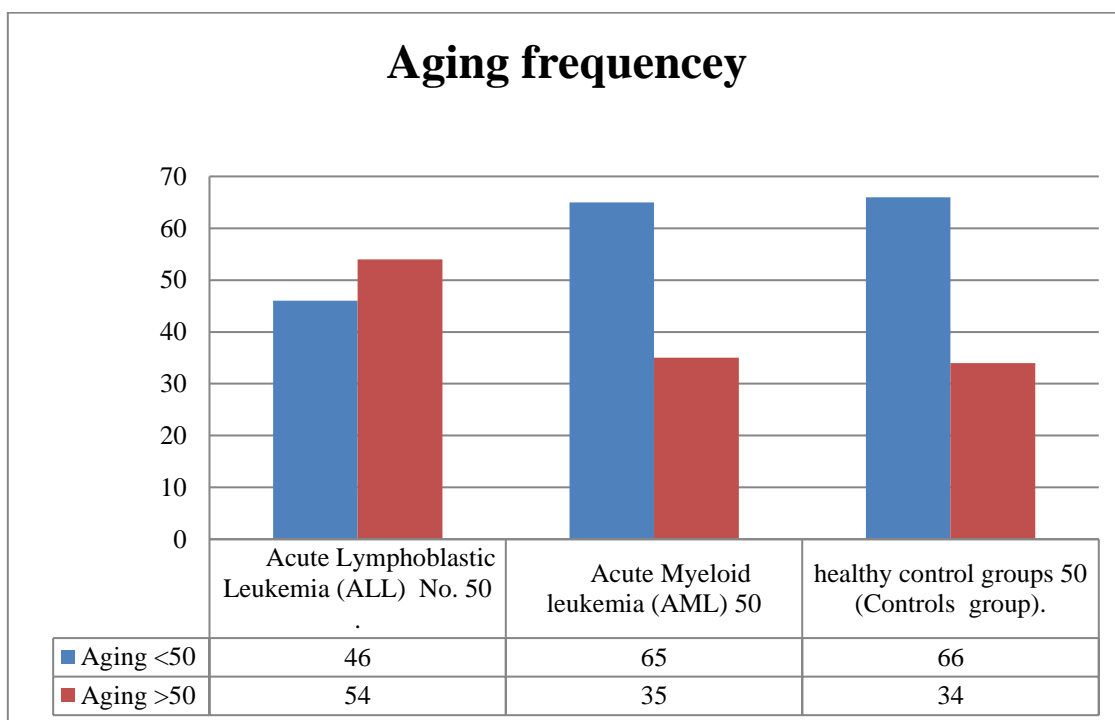


Figure 1 Frequency of age in studied groups

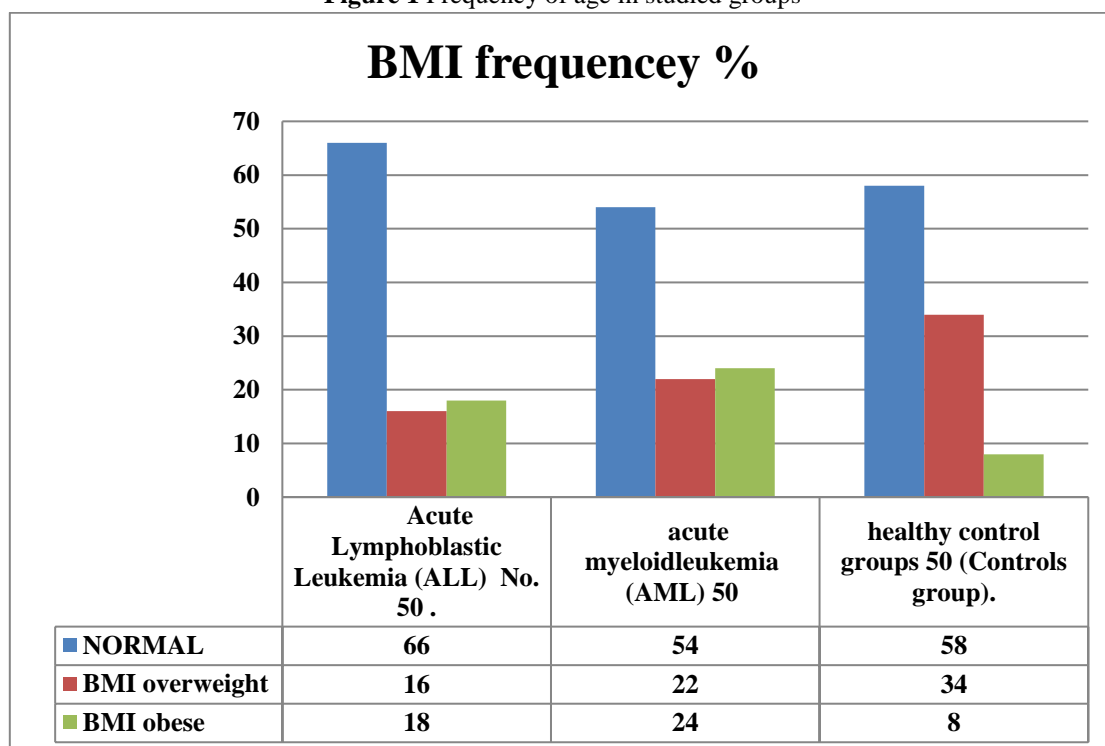


Figure 2. Frequency of BMI in studied groups

3.2 Enzymatic Antioxidant In Stedied Groups.

Serum total SOD activity is indicated in Table 2. and Figure 3.in this study SOD activity was found to be

significantly greater in patients when compared to healthy controls ($p < 0.001$) (mean 8.42 ± 1.8 , 6.76 ± 1.22 U/mL) are the mean values for ALL and AML



respectively. The controls had an average concentration of (Mean 2.50 ± 0.63 U/mL). Table 2 . shows that AML and ALL mean values differ nonsignificantly ($P > 0.05$). Table 2. and Figure 3. show the total serum catalase activity AML and ALL patients' catalase activity was significantly lowered when compared to that of healthy controls ($P < 0.01$). Both ALL and AML had an average value of (0.028 ± 0.009 and 0.032 ± 0.006 U/mL). This is the average for the controls (mean 0.11 ± 0.022 U/mL).

Mean plasma ceruloplasmin levels in patients and healthy controls are shown in Table2. and Figure 3. In compared to healthy controls, AML and ALL median levels have no-significantly ($p > 0.001$). There is a lot of ceruloplasmin in AML mean levels of $p = 0.04$ as compared with healthy control groups. There was no statistically significant difference in the mean concentration of ceruloplasmin between AML and ALL. Table 2. mean & SD of enzymatic antioxidants in studied group .

Table 2 mean & SD of enzymatic antioxidants in studied group

Enzymatic antioxidant parameter	Acute Lymphoblastic Leukemia (ALL)	Acute Myeliod Leukemia (AML)	Healthy control groups	p-value		
				1x2	1x3	2x3
SOD	8.42 ± 1.8	6.76 ± 1.22	2.50 ± 0.63	0.76	0.003**	0.012*
CAT	0.028 ± 0.009	0.032 ± 0.006	0.23 ± 0.02	0.55	0.001**	0.001**
Ceruloplasmin	0.33 ± 0.06	0.39 ± 0.05	0.25 ± 0.01	0.72	0.40	0.040*

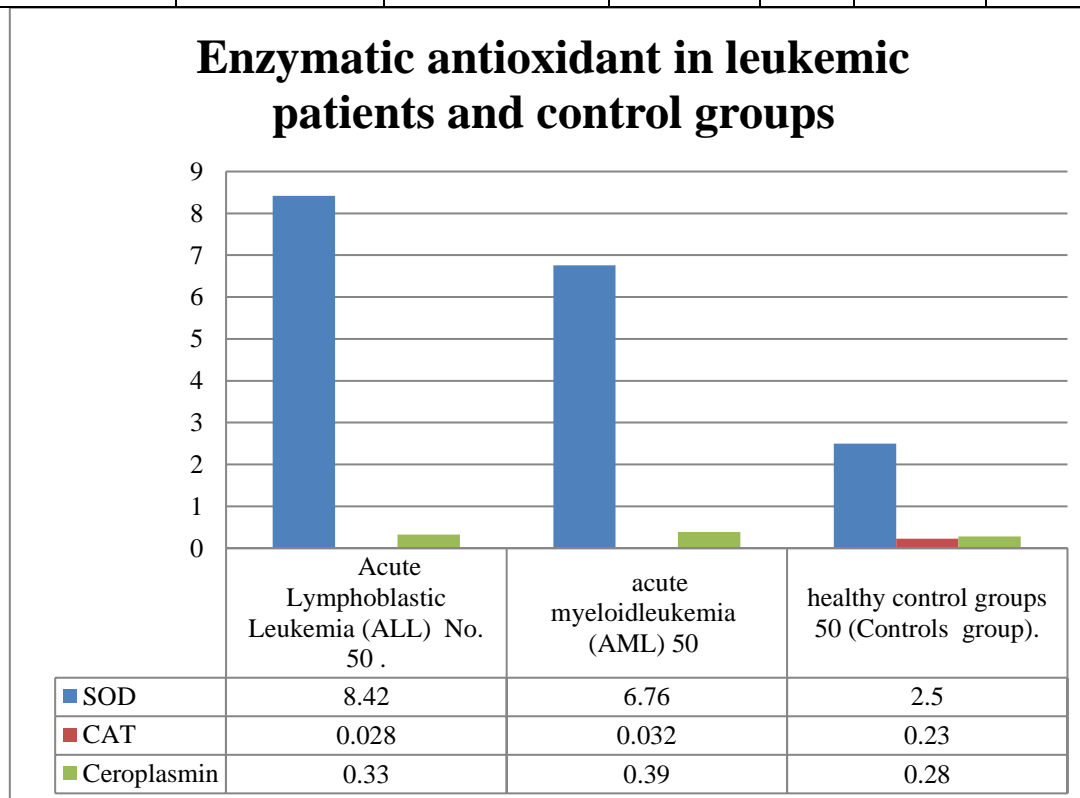


Figure 3. mean and SD of enzymatic antioxidant in studied groups

Discussions:

Elderly patients had a lower survival rate than younger patients even in the same phase of the disease. A strong

correlation between age and survival rates was found in this study. Although IFN production is lower in the elderly, suggesting an increase in TH2 cytokine



production, IL-4 and IL-10 production in the elderly is higher than in the younger patients Barlas et al., (2020). There is a chance that geographical differences in acute leukemia incidence rates between developing and developed regions of the world are to blame for the observed age disparity in certain studies, although sample size or study design problems could also be to blame. As recently as a few decades ago, cancer was viewed as a sickness that exclusively affected the elderly. Pollution and other carcinogens were found to be more common in younger people than previously assumed, leading to an increase in cancer cases Yu, C. Et al (2020). Only 3% of the population was above the age of 65, despite a large rise (59.5 percent) in the number of people aged 15 to 64.

highly reactive free radicals, known as superoxide anions or hydroxyl radicals, can destroy the structural, morphological, and functional integrity of cells. In untreated leukemia patients, H₂O₂ and polymorphic nuclear leukocyte superoxide anion generation is elevated. leukemia blast cells create more superoxide anion. Similar to these findings, also increase in the buildup of superoxide anion.

The levels of superoxide dismutase (SOD) and lipid peroxidation are elevated in untreated leukemia patients. People with leukemia had significantly higher blood levels of SOD, according to previous studies.

The increased production of SOD in this study's participants could be attributed to a more effective antioxidant response to oxidative stress. MDA (malonaldehyde) levels may be connected to a decrease in catalase activity, which maintains normal MDA levels by utilizing catalase as substrates and producing alcohol.

another studied who discovered that patients with various intestinal cancers had considerably elevated blood SOD levels, are also in agreement with the current study's finding of increased SOD activity (gastric, colorectal, biliary tract and esophageal cancer). Those with malignant lymphoma, on the other hand, exhibited decreased SOD activity levels.

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