

Evaluation of iron , magnesium and selenium in sera of acute and chronic myelogenous leukemia Iraqi patients

Azhar Abbas Al-Mulla
Hussam Sleem Khalaf
Collage of education ibn-AL-Haitham
Baghdad University

Abstract

The present study performed on acute myelogenous leukemia (AML) and chronic myelogenous leukemia (CML) attending kadhmiya teaching hospital in addition to 20 healthy individual as control group . The elements Fe , Mg and Se were evaluated in the sera of all above individuals using atomic absorption spectrophotometry .

The results revealed a non significant difference in Fe concentration among all studied groups, while a significant decrease in Mg and Se levels in both patients groups compared to control were found , on other hand no significant difference in Mg and Se levels in sera of AML and CML was notice. A conclusion is that trace element abnormalities occur in both patients groups compared to control.

Introduction

Leukemia is a group of a malignant disorders of the haemopoietic tissue characterized by accumulation of abnormal white cells in bone marrow . it is classified into several types Acute and chronic could consider as essential type that include many types under each term such as lymphocytic , granulocytic and monocytic leukemia (1), Acute leukemia involve an overgrowth of very immature blood cells while chronic leukemia involve an overgrowth of mature blood cells (2)

The maintenance of optimal health require an adequate supply of carbohydrate , proteins and lipids and macronutrients , micronutrients and trace elements.(3)

Trace element (TEs) required in milligrams perday , their action is that (TEs) are constituents of , or interact with enzymes , cofactors , phosthetic groups or hormones that regulate the metabolism of much larger amounts of biochemical substrates(4).

Iron (Fe) is the most important of the essential TEs . Iron is distributed in the body in number of different compartment , including hemoglobin , tissue iron, myoglobin , and alabile pool (5)

Magnesium (Mg) is essential to the basic nucleic acid chemistry of life , and thus is essential to all known living organism , Mg is important for maintaining of DNA. magnesium is extremely necessary for proper ATP synthesis (6,7,8)

Selenium (Se) is a potent antioxidant , an integral part of the body natural antioxidant glutathione peroxidase system , and may help to prevent some forms of cancer and heart disease , and also helps to boost the immune sustem (9)

The aim of the present study is to evaluate the levels of trace elements Fe, Mg and Se in the serum of patients with acute and chronic leukemia compared to healthy individual

Experimental part :-

- Subjects

Blood samples were collect from the patients with acute myelogenous leukemia (AML) and patients with chronic myeloblastic leukemia (CML) from both sexes attending the Kadumea hospital in Baghdad .their age range (40-60) years , the patients were diagnosed by specialist doctors. Twenty healthy individuals matched aged (40-58) years were considered as control group .

Collection of blood :

About five milliliters of venous blood from fasting subjects were drawn by utilizing disposable plastic syringes in the morning and transferred into sterile test tube . the blood was allowed to clot and centrifuged at 3500 for 10 minutes . sera were separates and stored at - 20c until analysis

Analysis is of trace element:-

Determination of Fe , Mg and Se using flame atomic absorption spectrophotometry (shimadzu670 A japan) (AAS)

A standard calibration curve is used for measurement of Fe and Mg and Se , in the sera of groups under this study (AML, CML, and control) the absorption of samples are measured By AAS and the resultant values are plotted on the standard calibration curve for it's concentration to be measured . Hollow cathod lamp at 248.3 nm , 285.2nm,196.00 nm For Fe , Mg , Se respectively, were used

Statistical analysis

Data presented were the means and standard deviations , student -t-test was used to compare the significance of the difference in the mean values of any two groups.

($P \leq 0.05$) was considered statistically significant (10)

Result and discussion :-

Table (1) shows the results of iron , Magnesium and Selenium levels in sera of control AML and CML patients groups

The result showed anon- significant elevation in free iron levels in the sera of both patient groups compared to control group

It is well known that free iron in plasma can consider toxic due to the generation of free radicals (like superoxide anion), since the presence of the radical in high amount leads to releasing of free iron to circulation which attack ferritin, the protein responsible for iron storage (11), also increased serum free iron may be due to the decrease in haemoglobin synthesis during leukemia which lead to anemia , the characteristic of leukemia(12).

The serum Mg level among patient group are significantly lower than in control group.

A study conducted in different leukemic patients suggested high Mg levels compared to control

The decrease in Mg concentration in the present study suggest the diminished of Mg due to the high ATP requirement of the leukemic cells since Mg is known to play an important part as a cofactor in most of the energy producing reactions.

A significant decrease in Se level in both patients groups compare to control group was found The study conducted on leukemic patient showed decrease in Se level in patients could be due to that this trace element is essential for preventing many types of cancer(13)

It was reported that toxic reactive oxygen species increase during leukemic and Se could be decrease and incorporated in the formation of the enzyme glutathione peroxidase which required to scavenging the generated H₂O₂ , so our result are in agreement with results which illustrated that the cancer incident and mortality associated with low levels of serum Selenium (14)

Our results agree with results from studies found Mg deficiency induce the development in animals either benign lesions or periosteal desmoids tumor formation , or malignant defects thymic lymphoma and mycloid leukemia (15,16).

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Fig (1) and table (2) showed correlation relation between Fe and Se in sera of control , AML and CML

+ with statistically difference p value correlation between Fe and Se in control with r value (0.079804)

+ with statistically difference p value correlation between Fe and Se in AML with r value (0.827978)

+ with statistically difference p value correlation between Fe and Se in CML with r value (0.193486)

The conclusion is that the iron concentration in serum of AML and CML were not statistically different from control , while Mg and Se levels of both patient groups were statistically lower than control group , No statistical difference in all elements in the sera of AML and CML was found.

Table (1) the serum concentration of Fe , Mg and Se in AML , CML and healthy control groups

Trace element Groups	Fe concentration Ppm Mean ± SD		Mg concentration Ppm Mean ± SD		Se concentration Ppm Mean ± SD	
Healthy control N=20	0.241± 0.02		41.8±5.3		0.098±0.01	
AML N= 15	0.268±0.03	P<0.05	32.7±6.2	P<0.05	0.058±0.005	P<0.05
CML N=16	0.252±0.01	P<0.05	33.6±3.7	P<0.05	0.069±0.002	P<0.05
		P*>0.05		P*>0.05		P*>0.05

P* value between AML and CML

Table (2)

Correlation relation between Fe and Se in AML, CML and healthy control group.

Trace element Groups	Fe concentration ppm Mean \pm SD	Se concentration ppm Mean \pm SD	P	r
Healthy group n = 20	0.255571 \pm 0.021785	0.121 \pm 0.049114	1.34 $\times 10^{-7}$	0.079804
AML n = 15	0.262286 \pm 0.018382	0.060243 \pm 0.002555	4.06 $\times 10^{-16}$	0.827978
CML n = 16	0.254357 \pm 0.00664	0.066596 \pm 0.001199	7.17 $\times 10^{-21}$	0.193486
P*	0.017673	4.24 $\times 10^{-7}$		

P* is the correlation between AML and CML.

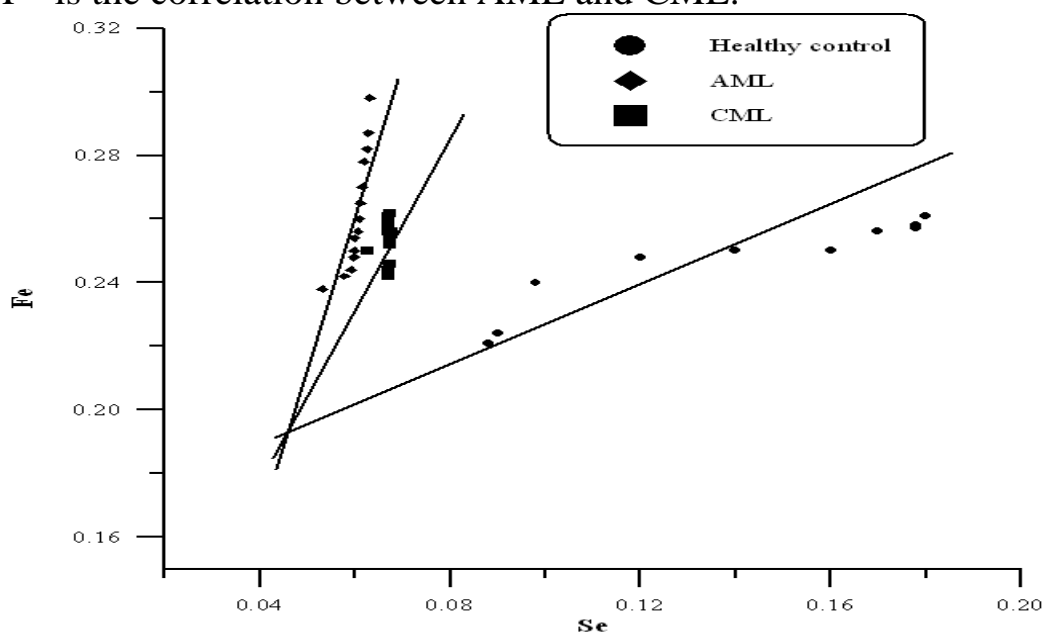


Fig.(1) Correlation relation between Fe and Se.

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تقييم الحديد والمغنسيوم والسلينيوم في مصول المرضى العراقيين

بسرطان الدم الحاد والمزمن

ازهار عباس الملا ، حسام سليم خلف

كلية التربية ابن الهيثم / جامعة بغداد / قسم الكيمياء

الخلاصة :-

اجريت هذه الدراسة على (١٥) مريض مصاب بمرض سرطان الدم الحبيبي الحاد والمزمن للمرضى المراجعين لمستشفى الكاظمية التعليمي بالاضافة الى (٢٠) من الاشخاص الاصحاء كمجموعة سيطرة . تم تقييم العناصر : الحديد ، المغنسيوم، السيلينيوم لمصول جميع الاشخاص بأستخدام تقنية الامتصاص الذري اللهيبي .

اظهرت النتائج عدم وجود فروقات معنوية في تركيز الحديد في مصول المجاميع المدروسة بينما وجدت قلة معنوية في المغنسيوم و السيلينيوم في المرضى مقارنة مع الاصحاء ، من ناحية اخرى لم تظهر فروقات معنوية في تركيز المغنسيوم والسلينيوم بين مجموعتي المرضى و ولذا يمكن ان نستنتج وجود خلل في توازن هذه العناصر في مجموعتي المرضى مقارنة بالأصحاء.