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Study of the Relationship between Interleukin 17 Levels and Iron Status in Patients with Chronic Myeloid Leukemia

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Abstract: Leukemia is one of the most dangerous diseases. It is an abnormal growth of blood-forming stem cells. The bone marrow normally produces many blood cells that do not function normally. The aim of this study was to investigate the relationship between interleukin 17 (IL-17) and iron levels in patients with chronic myeloid leukemia (CML). The study period was from February 25, 2023 to February 5, 2025, and it was conducted at Al-Sadr Medical City in Najaf, Iraq. A blood sample was taken, and iron levels were measured. Serum was also taken from the patients to measure IL-17 levels. The number of patients was 60, and the results were compared with 30 individuals who were considered a control group. The results showed a significant decrease ($P < 0.05$) in iron levels in blood patients. However, the opposite was true for CML patients, who were significantly lower in IL-17 levels when compared to the control group. The study results indicate a close correlation between iron status and interleukin 17 (IL-17) levels in patients with chronic myelogenous leukemia (CML). Iron metabolism and inflammatory pathways mediated by IL-17 may be indicative of the disease and its health status in CML. These two markers can be used as biomarkers for further study and treatment.

Key points: interleukin 17, Iron state, CML.

Introduction

Blood cancer is an abnormal growth of blood-forming stem cells located in the bone marrow, which is the primary factory that produces blood cells that do not function normally. For the most part, these blood cells haven't fully grown yet. They are called blast cells or leukemia cells(Barreto et al.,2022). Clonality is a biological trait that leukemia and other cancers share. The molecular changes needed for a malignant disease to develop are very rare when you think about how many target cells are vulnerable to this condition. To put it another way, a single genetic change is rarely enough to cause a malignant growth to form. Changes in several oncogenes in tumor suppressor genes or microRNA genes in cancerigen cells are thought to happen in a series of steps (Kandarakov *et al.,* 2022).

A major structure for making blood cells is the bone marrow (BM). It is very important for the body to keep the balance between making reactive oxygen species (ROS) and getting rid of them in normal hematopoietic stem cells (HSCs) in a hypoxic BM niche. There is enough data to show that redox equilibrium changes play a role in the development, spread, and recurrence of leukemia (Shin , 2022; Rahimi and Rezaei, 2024).

Chronic myeloid leukemia (CML) is a myeloproliferative tumor that affects about 1 to 2 out of every 100,000 people(Jabbour and Kantarjian, 2022). About 15% of newly identified cases of leukemia in people are this type (Ahmed et al.,2022). In Western countries, the average age at which someone is diagnosed with CML is between 56 and 57 years. More than 20% of the patients are over 70 years old. The normal age in growing countries with young people is less than 50 years (Roy et al.,2025). Modern treatments for CML patients have a life span that is close to that of

controls of the same age. Because of this, the number of people with CML in the U.S. is expected to reach 180,000 by 2050, making it the most common myeloid tumor. Radiation that ionizes particles is the only known risk factor for getting CML (Apperley et al.,2025).

The aim of this study was to find the relationship between interleukin 17 levels and Iron state in Chronic myeloid leukemia.

Materials and Methods

The study period was from 2/25/2023 to 2/5/2025, in Al-Sadr Medical City in Najaf, Iraq. A blood sample was taken, and iron levels and other iron-related markers were measured. Serum was also taken to measure interleukin 17 levels. The number of patients was 60 while the results were compared with the control group and were 30.

Results and Discussion

Table (1) shows the mean of serum iron profile levels in Chronic myeloid leukemia and healthy (control) groups. Where the results of this table appeared to indicate a significant decrease in *P*-value < 0.05 of serum iron level in Chronic myeloid leukemia group that was low when compared to the control group.

The results of table (1) show also the mean of serum ferritin levels in the study groups that have shown the presence of a significantly increased *P*-value with less than p< 0.05 in the term of ferritin level in Chronic myeloid leukemia group as compared to the control group.The results of serum hepcidin levels that are shown in table (41) funded a significantly increased *P*-value less than p< 0.05 in the levels of serum hepcidin in Chronic myeloid leukemia group as compared to the control group.

The findings of transferrin levels that are shown in the same table indicate a significant increase (*P*-value < 0.05) in the levels of serum transferrin in Chronic myeloid leukemia individuals' group compared with control group. Table (1) also shows the mean of Total iron binding capacity in Chronic myeloid leukemia and control groups. Where TIBC appeared to be a significant decrease in *P*-value < 0.05 in Chronic myeloid leukemia group compared to the control group.

Table (1): Shows the serum iron profile in Chronic myeloid leukemia as control groups

Parameters	Mean ± SD		P-value
	Control (35)	Patient (55)	
Iron	110.33 ± 15.77	36.15 ± 9.16	< 0.001
Ferritin	216.16 ± 22.42	612.14 ± 16.17	< 0.001
Hepcidin	33.16 ± 4.13	66.19 ± 7.17	< 0.001
Transferrin	255.15 ± 16.22	312.17 ± 17.19	< 0.001
TIBC	420.14 ± 16.33	255.14 ± 21.12	< 0.001

Table (2): Shows interleukin 17 levels in Chronic myeloid leukemia as control groups

parameters	Control	Patients	P value
interleukin 17 levels	89.214±4.25	247.24±12.34	< 0.001

Our study's iron profile levels show that the blood iron level dropped significantly in people who were newly identified with chronic lymphoblastic leukemia compared to the healthy control group.

In 2016, Chang et al. compared the levels of some elements, including iron, in the blood of recently identified chronic leukemia patients with those of healthy people. These results are similar to those they found. The results of another study by Kumar et al. (2019), which looked at changes in the blood iron levels of leukemia patients before treatment, were similar. They found that iron was thought to be a risk factor for getting cancer in human population studies.

Several earlier studies found that lower serum iron levels in CML patients could be because they have iron deficiency anemia or get CML or chronic infections (Rohrbacher *et al.,* 2009). They could also be because they are using more iron because cancer cells, like leukemia cells, divide quickly and need a lot of iron to keep their vital functions going. These cells also have a lot of transferrin receptor 1 (TfR1), the protein that brings iron into the cell, making it easier for them to absorb iron from the blood. This overconsumption causes the blood to lose iron (Sanchez-Paz *et al.,* 2024).

In addition, inflammatory cytokines cause hepcidin output to rise, which is what we saw in our study. This happens in conditions with chronic inflammation, like leukemia. Heptacidin is a very important hormone that controls how the body absorbs and iron. High hepcidin levels stop the body from absorbing iron from the gut and keep it in cells, mostly macrophages, spleen cells, and liver cells. This lowers blood iron levels even though the body already has enough iron stores (Sanchez-Paz *et al.,* 2024).

It is well known that inflammations are thought to contribute to the formation and spread of tumors by either directly or indirectly influencing cytokines, chemokines, and growth factors in tumor cells or their surroundings. The signal transduction pathway (STP) in healthy hematopoietic cells is regulated by the activation of cell surface receptors by chemokines, cytokines, and growth factors (Leane *et al.,* 2024).

Conclusions

The study results indicate a close correlation between iron status and interleukin 17 (IL-17) levels in patients with chronic myelogenous leukemia (CML). Iron metabolism and inflammatory pathways mediated by IL-17 may be indicative of the disease and its health status in CML. These two markers can be used as biomarkers for further study and treatment.

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