



## The Infection of Leukemia in Children with Hormone Variation in Baghdad Patients

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### ABSTRACT

The purpose of the current study was to find out the reasons that lead to a continuous increase in the injury of children (0-14 years) with leukemia. There is no information to support the mother's exposure to prenatal accidents or the extent of their impact on the fetus. Therefore, the study suggested the effect of some environmental factors such as pollution in Baghdad and that they are genetic. The study was conducted on 30 children with acute leukemia divided into two subgroups: 15 male and 15 females; the control group also consisted of 30 children and divided into two subgroups: 15 male and 15 females. The results showed a large number of acute lymphoblastic leukemia B-cells (ALL) in the peripheral blood smear of infected children with leukemia. The level of erythropoietin showed significant variation in the groups that were included in the study where the EPO level in the infected children was  $(82.476 \pm 7.435 \text{ mIU/ml})$ , while the EPO level in the uninfected children was  $(12.321 \pm 1.315 \text{ mIU/ml})$ . The study also shows that there were significant differences in the levels of EPO in children from males with an infection  $(85.672 \pm 1.127 \text{ mIU/ml})$  compared to children of uninfected males  $(12.869 \pm 1.623 \text{ mIU/ml})$ . This also applies to children of infected females  $(72.351 \pm 9.216 \text{ mIU/ml})$  compared to children of uninfected females  $(11.672 \pm 0.632 \text{ mIU/ml})$ .

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### INTRODUCTION

The childhood cancer considers most common causes of malignancy in age under 14 is called leukemia (Ries *et al.*, 1999). There are several kinds of leukemia that initiate in bone marrow and caused in high number of abnormal white

blood cells. The acute lymphoblastic leukemia [ALL] consider first class of childhood infected followed by acute myeloblastic leukemia [AML] and chronic myeloid chronic myeloid leukemia [CML] (U.S. Cancer statistics working Group, 2003). The beginning steps of carcinogenesis of some kinds of Leukemia had been preceding to prove in studies that identified the translocations of hallmark chromosome in the blood spots of new offspring (Wiemels *et al.*, 1999; Wiemels, 2002).

A little fact about matter whether exposure to the different levels of chemicals agent that pregnant mother or children are exposed every day in their life increase risk infected with leukemia (Ghosh *et al.*, 2013; Amigou *et al.*, 2011; Vinceti *et al.*, 2012).

In spite of the fact a little study of children has demonstrated excess risk for leukemia in children and motherhood employment in different machinery production and motherhood vocational

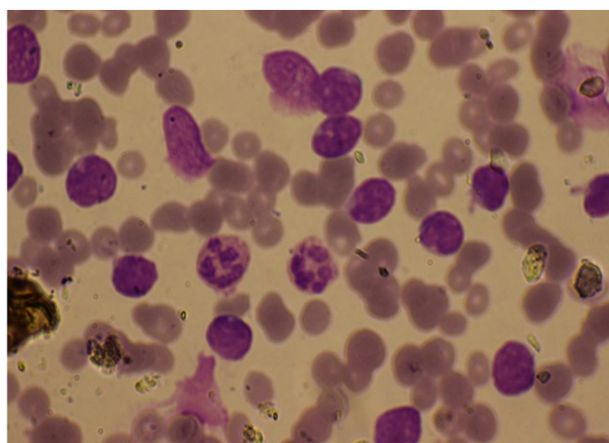
exposure to carbon tetrachloride, lacquers, paint, benzene and wood dust (Reid *et al.*, 2011; Shu *et al.*, 1999). The presence of an interaction between environmental conditions and industrial waste increases the harmful effect on the pregnant mother and the fetus (McKinney *et al.*, 1991; Mag-nani *et al.*, 1990).

The causes of childhood leukemia complex arises from the fact it to make similar to most cancer types and have diverse factorial etiology to associated the interaction among different aspects emerge from the environment also human genetics (Shu *et al.*, 1988; Buffler *et al.*, 2005; Pui, 1995).

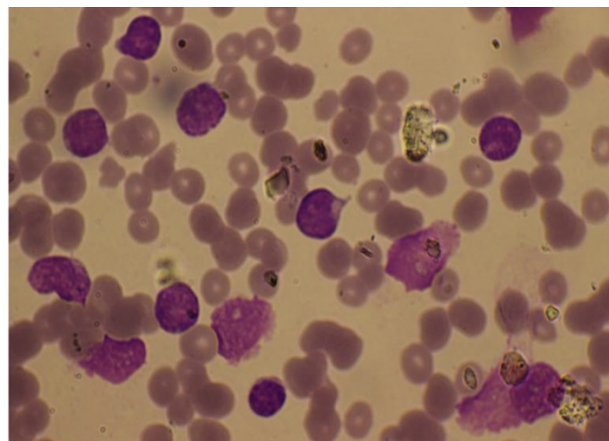
The evidence for increased dangerous of ALL includes race, sex, prenatal exposure to x-ray, age and specific genetic syndromes, whereas the evidence for increased dangerous of AML consist of chemotherapy agents (Rowley, 2000). The flow-ing studies suggested the chromosomal mutation causative that leukemia by disorder the normal path way of myeloid and lymphoid progenitor cells differ-ential (Rowley, 2000; Gaine *et al.*, 2017).

The rate of cancer infection has increased with a clear rise in the incidence of leukemia is the most common cancer in Iraq children especially an acute lymphoblastic leukemia [ALL]. Erythro-poietin hormone(EPO) produced in the kidneys mainly in adults and in small amounts in the fetuses liver (Haroon *et al.*, 2003).

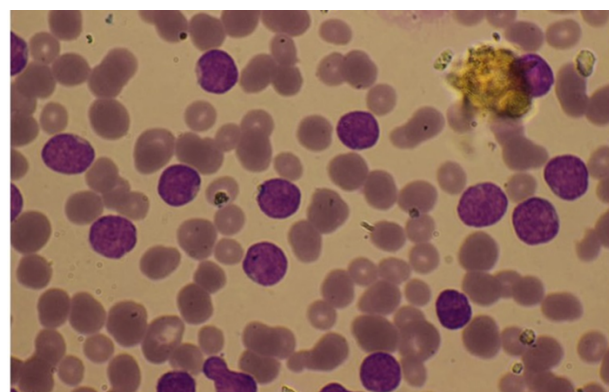
EPO controls the production of erythrocytes from the red Bone marrow which is a major source of it, Decreasing the production of this hormone level or disrupting its action causes stops the production of red blood particles and also cells in the red bone marrow (Percy *et al.*, 2008; Adewoyin and Nwogoh, 2014).



**Figure 1: Acute lymphoblast leukemia T-cells type in peripheral blood (X100)**



**Figure 2: Acute myeloid leukemia (hairy cell leukemia) type in Peripheral blood (X100)**



**Figure 3: Massive acute Monocytic leukemia - cells type in peripheral blood (X100)**

## MATERIALS AND METHODS

Childhood occurrence cancer data for children diagnosed with cancer subjected aged 0-14 years were achieved to collected from central children Hospital the research groups were distributed as follows,

1. Group of children with leukemia include 30 patients subdivided into,

A-Male of infected children include 15 patients

B-Female of infected children include 15 patients

- 2- The control group(non-infected) of children include 30 people subdivided into,

A-Male are children include 15 people.

B-Female are children include 15 people.

Routine analysis of peripheral blood smear usually carried out in medical laboratories using blood film according (Boscolo *et al.*, 2013) to investigate the abnormal types of white cells that cause the disease. Photographing different blood smear prepared with digital camera attached to an optical microscope.

**Table 1: Eop levels in the sera of people with leukemia and healthy people**

Subjects (n)	Eop concentration (mIU/ml) Mean ± S.D.	Min-Max Eop Concentration (mIU/ml)	Range	P-value
Patients (30)	82,476 ± 7.435	50.000 – 88.100	38.100	0.000
Control (30)	12.321 ± 1.315	11.100 – 14.000	2.900	0.000

The mean difference issignificant at 0.05 level

**Table 2: Levels of Eop in male and female sera with leukemia and healthy people of both sexes**

Subject (n)	Gender (n)	Eop concentra- tion (mIU/ml) Mean ± S.D	Min-Max Eop Concentration (mIU/ml)	Range	P-value
Patents (30)	Male (15)	85.672 ± 1.127	84.000 – 88.100	4.100	0.000
	Female (15)	72.351 ± 9.216	50.000 – 85.000	35.000	0.000
Controls (30)	Male (15)	12.869 ± 1.623	12.000 -15.000	3.000	0.000
	Female (15)	11.672 ± 0.632	11.200 – 14.000	2.800	0.000

The mean difference is significant at 0.05 level

**Measurement of Erythropoietin Level**

The level of erythropoietin in serum samples of two groups was measured using the erythropoietin hormone kit manufactured by Abcam-USA.

The method of measuring erythropoietin levels in the sera of two affected research groups was based on a method Sandwich-Enzyme Linked Immune Sorbent Assay (Sandwich-ELISA) (Valent, 2008).

**Statistical Analysis**

Statistical analysis of the results obtained in the current study was performed to compare of the statistical package for the social science (SPSS)program, results were expressed in terms of Means+ Standard Deviation(M+S.D.) using t-test. The statistical comparison process was conducted between the two main study groups. Whereas, an ANOVA test was applied to compare the results of the four subgroups based on the differences in gender, the statistically analyzed results were adopted at probability level less than P%5(P<0.05).

**RESULTS AND DISCUSSION**

The study conducted on peripheral blood for children with leukemia, which included the following,

**Peripheral blood smear**

The study was carried out on the peripheral blood smear of children with leukemia occurred acute

lymphoblast leukemia T- cells type nucleus demonstrated an invagination or cleave and coarsely granular heterochromatin, cytoplasm is more abundant than in cell from normal cell Figure 1. Also showed another type of leukemia is called (hairy cell leukemia) nucleus is oval and inconspicuous nucleolus, A characteristics feature is the long and sometimes branched surface projection Figure 2. There are notes massive acute monocytic leukemia - cells type Figure 3 these results confirm disturbance and disorder in the production of white blood cells due to a defect in the red bone marrow, the results that appear are consistent with the results (Reid et al., 2011; McKinney et al., 1991).

Erythropoietin evaluation: the results of the evaluation of the erythropoietin hormone levels showed an increase in the EPO levels of patients with leukemia compared with healthy people Table 1 indicates the presence of statistically significant difference(P=0.000) in the level of EPO in serum of people with leukemia compared with uninfected people. The highest levels of EOP hormone were reported in males with severe lymphocytic leukemia compared with the male healthy, statistical analysis revealed significant differences when compared between males and females infected with leukemia, the same is true when comparing the results of this hormone in infected females with healthy females as shown in the Table 2.

The above result shows the defect in oxygen level in the circulatory system, as the low level of oxygen in the blood stream stimulates increased production and secretion of erythropoietin, this is consistent with Numerous previous researches have pointed to high levels of EPO as an indicator of cancer in general and leukemia in particular (Deneka, 2016; Seena, 2015). During the stages of cancerous transformation there is a decrease in number of erythrocytes produced due to bone marrow dysfunction causing malignant anemia, this is characterized a decrease in the rate of oxygen supply to the body there for this leads to stimulate the body to increase the amount of oxygen that reaches the cells when increased production of EPO. The present study agreed with several previous studies which indicated that the increase in EPO levels coincided with the incidence of leukemia in people with (Schuz et al., 2000).

## CONCLUSIONS

The Erythropoietin hormone is important and sensitive function in investigating for leukemia. And determining the level of infection. The defect caused by leukemia includes all. Components of the blood and its manufacturing sites, is not limited to lymphocytes only. The effectiveness of the organs in performing some of their vital functions is affected by Lymphocytic leukemia. There has been an increase in the incidence of leukemia among Children in Iraq as a result of pollution in river water and air, with areas in Iraq exposed to Radiation as a result of wars.

## Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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