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The effects of chemotherapy treatment on blood counts

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Abstract
This study was carried to measure changes in hematological parameters among the leukemic children under chemotherapy treatment visiting, National Cancer Institute in Madani City. Blood samples were collected from fifty and analyzed for CBC by full analyzer Sysmex. The analysis showed mean values of CBC as follows HB (11.3g\dl), PCV (31.6L\L), MCV (81.9%), MCH (29.8%pg), MCHC (35.7%), TWBCs (6.800), RBCs (3.8cell\cumm), PLT count (263cell\cumm) and RDW (15.8%) in leukemic children. Children who affected by leukemia, The investigation should that 92%of the group under study were suffering Acute Leukemia (ALL) and 8% were affected by acute Myeloid Leukemia (AML). No Chronic Leukemia was detected within the group(0.0%)

Keywords: leukemic children, chronic leukemia, acute leukemia, CBC, Child hood leukemia**,** childhood cancer

1. Introduction
leukaemias are group of disorders characterized by the accumulation of malignant white cells in the bone marrow and blood, usually begin in the bone marrow and result in high numbers of abnormal white blood cells, (Steven A., Rosenberg, 2014) [1]. These white blood cells are not fully developed and are called blasts or leukemia cells (Fisher, 2013, 2014) The disorder Symptoms may include bleeding and bruising problems, feeling tired, fever, and an increased risk of infections, (Fisher. 2013) [3]. Symptoms occurs due to the lack of normal blood cells, (Fisher, 2013,) [3] Diagnosis normally carried by blood tests or bone marrow biopsy, (Fisher. (2013) [3]. Different kinds of leukemia are believed to have different causes (Hutter, JJ., 2010) [4]. Both inherited and non-inherited factors is believed to be involve, (Hutter, JJ., (2010) [4]. Risk factors include smoking, ionizing radiation, some chemicals such as benzene, prior chemotherapy, and Down Syndrome (Steven A, Rosenberg,2014) [1], People with a family history of leukemia are also at higher risk,(Steven A, Rosenberg 2014) [1]. There are four main types of leukemia, acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL) and chronic myeloid leukemia (CML), as well as, a number of less common types, (Steven A, Rosenberg 2014, World Health Organization. 2014) [5]. Leukemias and lymphomas both belong to a broader group of tumors that affect the blood, bone marrow, and lymphoid system, known as tumors of the hematopoietic and lymphoid tissues, (Vardiman, JW, 2009, Cătoi, *et al*. 2007) [6, 7] the Treatment may involve some combination of chemotherapy, radiation therapy, targeted therapy, and bone marrow transplant, in addition to supportive and palliative care (Steven A, Rosenberg 2014) [1] Certain types of leukemia may be managed with watchful waiting (Steven A, Rosenberg 2014) [1]. The success of treatment depends on the type of leukemia and the age of the patient. Outcomes have improved in the developed world (World Health Organization. 2014) [4]. The average five-year survival rate is 57% in the United States, (Bishop K, *et al*, 2011) [8], In children under 15, the five-year survival rate is greater than 60 to 85%, depending on the type of leukemia,(Fisher, 2014) [3] In children with acute leukemia who are cancer-free after five years, the cancer is unlikely to return.(Fisher, 2014) [3]. In the year 2012 newly developed in 352,000 people, World Health Organization).As the most common type of cancer in children, three quarters of leukemia cases in children was being the acute lymphoblastic type, (Steven A, Rosenberg, 2014) [1] However, about 90% of all leukemias are diagnosed in adults, with (AML) and (CLL) being most common, and occurs more commonly in the developed world, (Steven A, Rosenberg 2014,World Health Organization. 2014) [1]. In the year 2015, The number of leukemic people was between 2-3 million resulting in 353,500 death (Ryan M. Barber, *et al*, 2015, Peter W, *et al*, 2015) [9, 10], Childhood leukemia is usually found to be acute lymphocytic leukemia (ALL) as a type of childhood cancer. The cure rate of childhood leukemia is generally higher than adult leukemia, approaching 90%, although some side effects of treatment last into adulthood. The older aggressive treatments of cranial irradiation and anthracyclines (such as doxorubicin) caused increased risk of solid tumors, heart failure, growth retardation, and cognitive defects (Diller L, 2011) [11]. Acute lymphoblastic leukemia is the most common malignancy in pediatric patients. It is diagnosis is usually easy to establish as malignant lymphoblasts invade bone marrow and peripheral blood. Some acute lymphoblastic leukemia patients may initially he present with pancytopenia and a hypoblastic bone marrow leading to the initial diagnosis of a plastic anemia. In most patients clinical improvement occurs, with normalization of the complete blood count within six months, although recovery can also develop at few weeks after initiating steroid therapy (Rev Bras, 2012). Acute lymphoblastic leukemia was

successfully treated with standard chemotherapy (Rev Bras., 2012), Acute Myeloid Leukemia (AML) is a collection of neoplastic blood disorders, categorized by the proliferation and growth of immature hematopoietic cells in the bone marrow and blood. The high incidence of (AML) was seen in adults, accounting for almost 80% of acute leukemia in adults and only 20% of acute leukaemias in children (Fisher, 2016) [1]. All these (AML) are quite uncommon disease, which only accounts for about 1.2% of cancer deaths in United States, (Jemal A, 2002). It is commonly found as acute leukemia in adults, with its incidence increases with age. In patients with acute myeloid leukemia (AML), the median age is about seventy years (Ossenkoppele G, *et al*, 2015) [14]. The majority of the studies have found great occurrence of (AML) in males compared females ratio of 2.5:1, (Belson M., 2013) [15], males have been accounted for more than (57)% percent of the new cases of leukemia, (Fisher, 2013) [1]. Acute Myeloid Leukemia (AML) is actually a varied selection of wide number of malignant neoplastic diseases, that,may be grouped on the basis of morphological, cytogenetic with molecular and genetics criteria, (Peter *et al* 2015) [10].

2. Methodology

The study was conducted among leukemic children visiting the National Cancer Institute in gazera state. Agree was taken from the families of 50 patient admitted to the center. 2.5mls of venous blood samples were taken from each patient and transferred to K2-EDTA anti-coagulant tube. The collected samples were analyzed for complete blood count (CBC) using full analyzer sysmex. The analysis was performed at National cancer institute laboratories at wad madani city. The obtained results were statistically analyzed using SPSS program.

3. Results and discussion

Table 1: Types percentage leukemia among the study group

Leukemia	percent
Acute Lymphoied Leukemia (ALL)	92%
Acute Myeloid Leukemia (AML)	8%
Chronic lymphoid Leukemia (CLL)	zero%
Chronic Myeloid leukemia (CML)	zero%

In this study leukemia was high in males (78%) than in females (22%). according to Haiqing Ma, Hanhuan Sun, Xiaoping (2014), the patient aged between 0-14 years were affected with acute lymphoblastic leukemia. In this study the ages between 2-7years (60%) were highly affected and 8-15years (40%) were less affected. According to A. Victor Hoff brand, (2011), the incidence of (ALL) is highest at 3 – 7 years with 75% of cases occurring before the age of 6years. Eight percent (8%) of leukaemic children in this study group have family history of leukaemia and (92%) were without history of leukemia. All the children which affected by acute leukaemia, (92%) have Acute lymphoid leukemia and this is a gender difference, where boys were found to be of higher risk. (8%), have Acute myeloid leukemia. Chronic leukemia were not detected in this study, and the Acute lymphoid leukemia was more in children than Acute Myeloid leukemia. Diller L (2011) [11] reported that Childhood leukemia is a type of leukemia, usually acute lymphocytic leukemia (ALL). According to A. Victor Hoff brand (2011) acute lymphoid leukemia was highest in children more than adults.

Table 2: Hematological parameters count among the study group

Hematological parameters	Mean
Hb	11.3g\dl),
RBCs	3.8
PCV	31.6%
MCV	81.9
MCH	29,8pg
MCHC	35.7
RDW	15.8%
WBCs	$6.8*10^3$
Platelets	263
MPV	7.7fl

The mean hemoglobin, mean RBCs, and mean MCH were low than the normal range. The other parameters, MCV, MCHC, RDW, WBCs, Platelet, and MPV means were found to be within the normal range. The obtained results in this study showed mean hemoglobin (11.3g/dl), mean packet cell volume (31.6%), mean cell volume (81.9%), mean cell hemoglobin (29.8pg), mean of mean cell hemoglobin (35.7%), mean WBCs ($6.8*10^3$), and mean of red cell distribution width (15.8%). In a study carried by I. Nwannadi O. Alao, *et al*; (2009) [17] in south-south Nigeria patients with acute leukemia showed very low mean hematocrit. Ericaya Merli dia Schapania, Charles loprinzi (2017) [18], reported that, some cancer treatment, mainly chemotherapy and radiation therapy may cause a decrease in red blood cells and white blood cell count the study also reported that, chemotherapy, and cancer of blood and bone marrow may cause a decrease in white blood cell. Platelet count was reported to be affected by some cancer treatment, when it was found to be decreased in those who treated by chemotherapy or radiation thereby (Ericaya Merlidia Schapira, *et al*, 2017) [19].

Table 3: Differential count among study group

Cell type	Percent
Lymphocyte	32.4%
Neutrophil	30.5%
Monocyte	11,7%

Table (3) showed mean lymphocyte, mean Neutophil and mean Monocyte as 32.4%, 30.5% and 11.7 % respectively. The analytical finding were strong agree with the observations reported by Ericaya Merlidia Schapira, *et al*, 2017) [19] treatments may cause neutropenia, which increase the chances of a bacterial infection to neutrophil.

4. Conclusion and Recommendations

Within the studied group, the percentage of children affected by by acute leukemia was found to be 92% of acute lymphocytic leukemia and 8%of acute myeloid leukemia. The affected boys were 78% against 22% affected girls. 92% of affected children have no family history and 8%have family history. There is significant difference in White blood cells count, Platelet count, neutrophil, monocyte, lymphocyte, and Heamoglobin, Heamatocrit, and not significant difference in Red blood cell, Men cell heamoglobin, Men cell heamoglobin concentration, and Men cell volume.

More researches may be needed to determine leukemia in children by covering all the states of the country. Further

studies may be needed to cover more wide range of sampling and different ages. More national centers for children may need. More investigation cancer we may be required for the effect of cancer treatment on hematological parameters

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