

**NUTRITIONAL STATUS OF CHILDREN  
HAVING ACUTE LYMPHOBLASTIC  
LEUKEMIA AND UNDERGOING  
CHEMOTHERAPY**

*Thesis*

*Submitted for Partial Fulfillment for Requirements of  
Master Degree in Pediatric Nursing*

*By*

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2014**

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*✍️ Safa Ramadan Mohammed*

*To My*

*Husband*



*Husband Mother*

**WHOM I AM OVERWHELMINGLY INDEBTED  
TO, THANK YOU AND GOD BLESS YOU**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



صِدْقَ اللَّهِ الْعَظِيمِ،

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**List of Abbreviations**

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<i>Abb.</i>	<i>Meaning</i>
<b>ALL</b> .....	Acute Lymphoid Leukemia
<b>AML</b> .....	Acute Myelogenous Leukemia
<b>BMT</b> .....	Bone Marrow Transplantation
<b>BP</b> .....	Blood Pressure
<b>CLL</b> .....	Chronic Lymphocytic Leukemia
<b>CML</b> .....	Chronic Myelogenous Leukemia
<b>CNS</b> .....	Central Nervous System
<b>CVS</b> .....	Cardio Vascular System
<b>DNA</b> .....	Deoxyribonucleic acid
<b>G-CSF</b> .....	Granulocyte Colony- Stimulating Factor
<b>GIT</b> .....	Gastro Intestinal Tract
<b>GUS</b> .....	Genitourinary System
<b>HR</b> .....	Heart Rate
<b>LP</b> .....	Lumber puncture
<b>NCI</b> .....	National Cancer Institute
<b>PEM</b> .....	Protien Energy Malnutrition
<b>Ph</b> .....	Philadelphia
<b>RBCs</b> .....	Red Blood Cells
<b>US</b> .....	Urinary System
<b>WBCs</b> .....	White Blood Cells

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## **ABSTRACT**

The **aim** of the study was to assess the nutritional status of children with acute lymphoblastic leukemia (ALL) who were undergoing chemotherapy. **Design** a descriptive study was used. **Settings** at Ain Shams University Hospitals and Children's Cancer Hospital 57357. **Subject** the sample involved of 83 children with ALL who were undergoing chemotherapy at the previously mentioned settings. **Tools** of data collection involved a pre-designed questionnaire, nutritional assessment, clinical assessment which included anthropometric measurements and physical assessment. **Results** the results show that the mean age of children was  $13.8 \pm 2$  and more than half of them were female. Moreover there was a highly statistical significant differences between regarding temperature of children between before chemotherapy and during induction. The majority of the studied children had normal weight before chemotherapy compared with after induction and there was a highly statistical significant difference regarding nausea and vomiting between before chemotherapy and during induction. **Conclusion** from the findings of the current study it can be concluded that the physical measurements, vital signs and physical status of the majority of studied children were affected by chemotherapy. **Recommendations** this study recommended that both nurses and mothers need education on nutrition requirements for children with cancer during chemotherapy treatment.

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**Key word:** ALL, Chemotherapy and Nutrition.

## **INTRODUCTION**

**L**eukemia is a malignancy that arises from clonal proliferation of abnormal hematopoietic cells leading to disruption of normal marrow function and various manifestations of leukemia. Leukemia is the most common cancer in children. There are two main subtypes, acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML). A small proportion may have chronic myeloid leukemia (CML) **(Ghai et al., 2010)**.

Leukemia accounts for approximately 35 percent of all childhood cancers. Approximately one in 1000 children will be diagnosed with leukemia by the age of 19. It is more common in children under the age of ten **(Nathan et al., 2003)**.

ALL is a malignant transformation of a clone of cells from lymphoid cells. The majority of causes are of B- cell origin, but it can also arise from T- cell precursors. Lymphoid precursors proliferate and replace the normal cells of the bone marrow and blasts spill into the peripheral circulation **(Chalmers and Straub., 2006)**.

Pediatric nutrition support goals in oncology are to prevent or reverse nutritional deficits, promote normal growth and development, minimize morbidity and mortality and maximize quality of life **(Queen et al., 2006)**.

Nurses need knowledge of child development to be able to recognize maladaptation or regression and put preventative or remedial strategies into place. It is also important that the nurses accept the different coping patterns of parents and adapt the care which provides a response to the child's needs(**Valentine and Lowes., 2007**).

Nurses need an in-depth knowledge of the theories of grief, loss, adaptation and change.(**Hatfield., 2003**). Nurses must be able to understand and apply the underlying theoretical principles in the context of care provided to children with ALL and their families. Moreover nurses must also maintain an awareness of grief experienced by children and their family and how this affects their ability to adapt and adjust to the diagnosis (**Fuster et al., 2007**).

### **Significance of the Study**

Malnutrition is a major cause of morbidity and mortality in children with leukemia. It results from either the nutritional effects of cancer itself or from the toxicity of chemotherapy (**Wilkes, Ingwersen and Barton-Burke, 2001**).

Cancer is a major cause of morbidity and mortality throughout the world. It is the second most frequent cause of death in Europe. Children with cancer will develop a large number of physical symptoms. Malnutrition and weight loss are common and are due to a variety of mechanisms involving the disease, the host response to the disease and the chemotherapy(**Karla et al.,2005**).

Pediatric nutrition support goals in oncology are to prevent or reverse nutritional deficits, promote normal growth and development, minimize morbidity and mortality and maximize quality of life (**Queen et al, 2006**).

### **Aim of the Study**

This study aims to assess nutritional status of children having ALL and undergoing chemotherapy.

### **Research Question**

1. What is the effect of chemotherapy on the nutritional status of children with leukemia?
2. What is the effect of chemotherapy on the anthropometric measurement?
3. What is the effect of chemotherapy on the physical status?

## **Review of Literature**

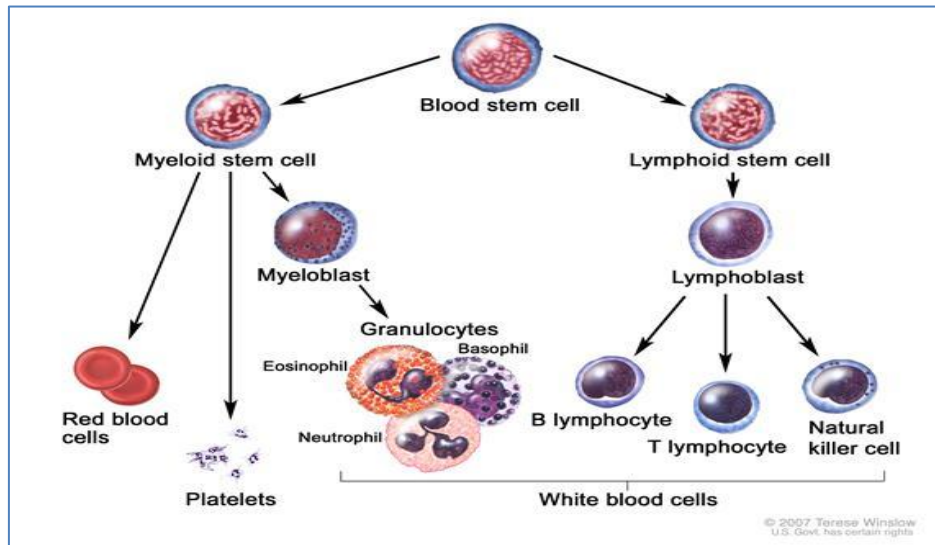
### **Overview of Blood Cells Formation**

**T**n a healthy child, the bone marrow makes blood stem cells which are immature cells that become mature blood cells over time. A blood stem cell should become a myeloid stem cell and a lymphoid stem cell (**Smits et al., 2012**).

A myeloid stem cell becomes one of three types of mature blood cells: red blood cells (RBCs), that carry oxygen and other substances to all body tissues, platelets that form blood clots to stop bleeding and white blood cells (WBCs) that fight infection and disease (**Horton and Steuber., 2010**).

A lymphoid stem cell becomes a lymphoblast cell and then one of three types of white blood cells called lymphocytes: B lymphocytes that make antibodies to help fight infection, T lymphocytes that help B lymphocytes make the antibodies that help fight infection and natural killer cells that attack cancer cells and viruses (**Horton and Steuber., 2010**). See Figure 1.

Fig. (1): Blood Cell Development.



Verstovsek, S.; Golemovic, M.; Kantarjian, H.; Manshour, T.; Estrov, Z. and Manley, P., (2012): Activation and of Invitro Proliferation of Positive Acute Lymphoblastic Leukemia Cells, *Cancer.* ; 104(6):1230-1236.

There are two types of lymphocytes: T-cells and B-cells. Often leukemia occurs at a very early stage in the immature lymphocytes before they have developed into either T-cells or B-cells. However, if the cells have developed this far before becoming leukemic, the type of leukemia may be known as T-cell or B-cell leukemia (Pinkerton et al., 2007).

These immature dividing cells fill up the bone marrow and stop it from making healthy blood cells. As leukemia cells are not mature, it cannot work properly. This leads to an