Introduction

Childhood cancer is rare, accounting for less than 1 % of all cancer in industrialized countries; it is of great scientific interest for a number of reasons. Several types of cancer are virtually unique to childhood, whereas the carcinomas most frequently seen in adults, those of lung, female breast, stomach, large bowel, and prostate, are extremely rare among children. Some of the most striking progress in cancer treatment has been made in paediatric oncology ***(Voute et al., 2005)***.

Leukemia refers to cancers of the white blood cells, which also referred to as leukocytes when a child has leukemia, large number of immature white blood cells is produced in the bone marrow. The abnormal white blood cells crowd the bone marrow and the blood stream, but they can not perform their proper role of protecting the body against disease because they are defective ***(Kamminsky et al., 2006).***

The leukemia is the most common malignant neoplasm in childhood, accounting for about 41% of all malignancies that occur in children younger than 15 years of age. In 2000 approximately 3.600 child were diagnosed with leuckemia in the United Sate for an annual incidence of 4.1 of new cases 100.000 children younger than 15 years of age acute lymphoblastic leukemia (ALL) account for 77 of cases of childhood leukemia ***(World Health Organization[WHO], 2006).***

Acute lymphoblastic leukemia (ALL) accounts for 30 % of all childhood malignancies. It encompasses a heterogeneous group of biologically and clinically related entities, each with their own characteristic epidemiology, biology, and sensitivity to anticancer agents. Whereas ALL was fatal in the vast majority of patients only 30 years ago, cure is now realistic in 75 % of patients. 1 , 2 This impressive success has been obtained by integrating improved understanding of the biology (including cytogenetics and molecular biology) with risk-groupadapted therapy, pharmacology, and supportive care, and not least randomized clinical trials and close international collaboration.3 This approach has served as a general model for the successful treatment of other childhood cancers ***(Voute et al., 2005)***.

High risk conditions such as child experienced cancer and other chronic life threatened illness could contribute to stressors. Researchers have found that different groups of patients experience different types of stressors ***(Fulgr and Ayear, 2006)***.

An assessment of what is stressful and an individual response to stressor begins by asking the individual to describe stressful events or situation encountered presently or in the part. How specific stressors are perceived by individual should be explored. There aspects of the health history are usually established by interviewing. Many children find it difficult to discuss stress and coping. Whether the child responds to direct questioning during interview may depend on what spring

mechanism is being used to handle stressor as well as stage of the stressor reaction ***(Broome, 2008).***

Lack of information and understanding together with in appropriate or contra-indicatory information become a major source of stress and distress for many people especially children in hospital. Thus a major contribution to stress reduction can be made through the full and regular provision of information ***(Redd, 2007)***.

Coping is defined as what one does about a problem in order to bring about relief, reward, and equilibrium. Coping is a distress and stressor relieving process, may lead to are of two outcomes problem resolution or tension reduction. The appraisal of the stressor, especially the process of appraisal where by the child determines their degree of control over a situation influence a child coping style. Coping strategies are two kinds either problem solving strategies which can be used to make adverse circumstances less stressful, and emotion reducing strategies which alternate the response to stress ***(Gelder et al., 2006).***

Coping style are seen in an individual consistent of particular strategies for managing stressors. An individuals coping style is dependent on a number interacting factors, including problem solving skills, social support, health and energy, beliefs, material resources, temperament developmental level and filial coping patterns. Successful coping is not indicated by the absence of distress but rather by child and or parent perception that the event, although unpleasant is manageable ***(Aldwin 2007).***

The child's previous experience with a procedure also influences his/her procedural distress. Children's distress levels have been found to increase as their exposure to a medical procedure increases. Furthermore, when an intervention is not provided, the number of children developing treatment side effects (anticipatory increase in heart rate and elevation of temperature) increases as the number of treatments increases. The invasive of a procedure is also a contributory factor to children's distress levels ***(Mcgrath, 2004 and Rait, 2007)***.

Significance of the Study:

National Cancer institute (NCI) (2004) reported cancer constitute 6.4% of child population. Leukemia account over 30%of all cancer diagnosed in children.

Psychological stressor include fear, anxiety and worries related to disease and treatment which include painful procedure, side effect of chemotherapy ,anxiety and depression which consequently result in restriction of normal activities and prevent children making friends, feeling insecurity ,poor social swells the disruption of school work ***(Vance and Eases, 2002).*** Parents of ill child often difficulty in dealing with their emotional state. Parents are unable to help their child cope. Crisis occurs in the presence of stress. A family crisis is the result of an imbalance between demands of the family and the resources of coping.

Aim of the Study

Aim of the study was to assess the stressor and coping style of school age children having ALL and their mothers.

Research questions

1. Are school ages children having ALL will have physical stressor?
2. Are school ages children having ALL will have social stressor?
3. Are school ages children having ALL will have psychological stressor?
4. What are the different coping styles of school age children having ALL to relief stress?

Part I: Overview of ALL

Definition:

Leukemia is a cancer of the white blood cells. ALL blood cells are production in the bone marrow, the spongy substance at the core of some of the bones in the body

(Soanes and Velang, 2013).

Acute lymphoblastic leukemia (ALL) is a type of cancer that affects immature lymphocytes developing in the bone marrow. Under normal conditions these cells grow and mature into specialized white cells called B-cells and T-cells. In ALL, they undergo a malignant (cancerous) change ***(Voute et al., 2005).***

Acute lymphocytic leukemia (ALL) is also called acute lymphoblastic leukemia. The term acute means that the leukemia grows quickly, and if not treated, could be fatal in a few months. Children with chronic leukemia can live years without treatment. Lymphocytic means it develops from early forms of lymphocytes, a type of white blood cell (WBC). This is different from acute myeloid leukemia (AML), which starts in their blood cell types found in the bone marrow ***(American Cancer Society [ACS],2013).***

Acute lymphoblastic leukemia (ALL) is a type of cancer that affects immature lymphocytes developing in the bone

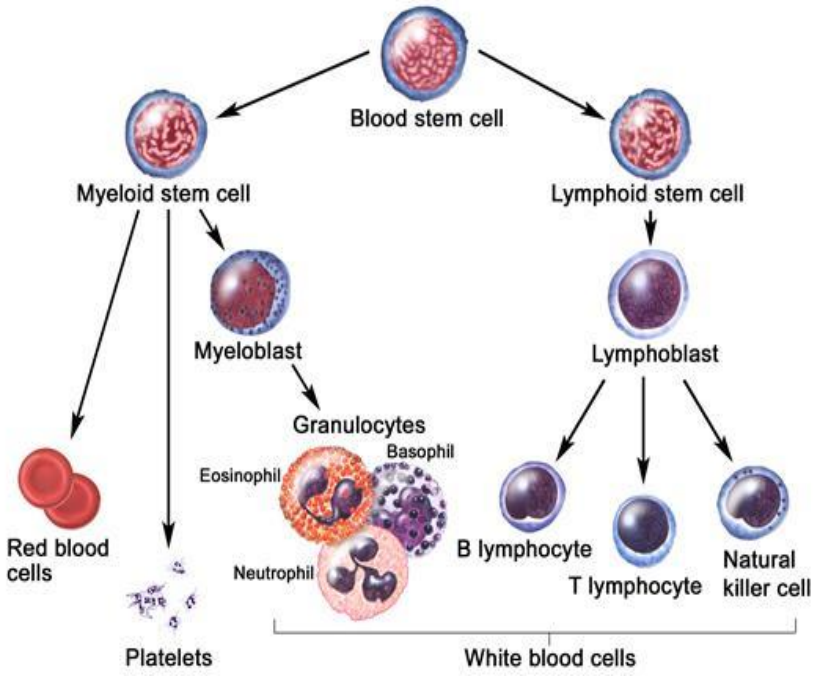
marrow. Under normal conditions these cells grow and mature into specialized white cells called B-cells and T-cells. In ALL, they undergo a malignant (cancerous) change. This means that they multiply in an uncontrolled way, quickly crowding the bone marrow, and interfering with normal blood cell production. Because the bone marrow is unable to make adequate numbers of red cells, normal white cells and platelets, children with ALL become more susceptible to anemia, recurrent infections and to bruising and bleeding easily ***(Jeha, 2010).***

Bone marrow contains. Bone marrow is the soft, spongy, inner part of bones such as the skull, shoulder blades, ribs, pelvis, and bones in the spine. All of the different types of blood cells are made in the bone marrow. Bone marrow is made up of a small number of blood stem cells, blood forming cells, fat cells, and tissues that help the blood cells grow ***(American Cancer Society [ACS], 2013).***

The following figure illustrated Blood stem cells development through a series of changes to make new blood cells. They can develop into 1 of the 3 main types of blood cell;

Red blood cells, White blood cells and Platelets

Figure (1): Blood stem cell development.



Jeha, S. (2010): *Childhood Leukemia and Lymphoma available at:www.leukemia-lymphoma.org/all _id=556138#all.*

• **Red blood cells**:

Red blood cells carry oxygen (O2) and other substances to all tissues of the body. They also carry away carbon dioxide (CO2), a waste product of cell activity.

• **White blood cells:**

White blood cells help the body fight infections. There are quite a few types of WBC. Each has a special role to play in protecting the body against infection. The 3main types of white blood cells are granulocytes, monocytes, and Lymphocytes are

the main cells that make up lymphoid tissue, which is a major part of the immune system. The 3 main types of lymphocytes are called **B** lymphocytes that make antibodies to help fight infection; **T** lymphocytes that help B lymphocytes make the antibodies that help fight infection and (**NKC**) Natural killer cells that attack cancer cells and viruses.

• **Platelets:**

Platelets are disc-shaped cellular fragments that circulate in the blood and play an important role in clot formation. They help to prevent bleeding. If a blood vessel is damaged the platelets gather at the site of injury, stick together and form ***(Soanes and Velang, 2013).***

Classifications of ALL

French American breach criteria (FAB) classifications system defines three subtypes of ALL (L1, L2 and L3) based solely on morphologic features cells look (see figs. 2.2 to 2.4). The l3 subtype is characterized by blast cells of moderate-to-large size with regular unclei and fine –to-slightly coarse chromatin prominent multiple nucleoli, and moderate-to-abundant deeply basophilic cytoplasm with frequent vacuolization ***(Orkin et al., 2009).***

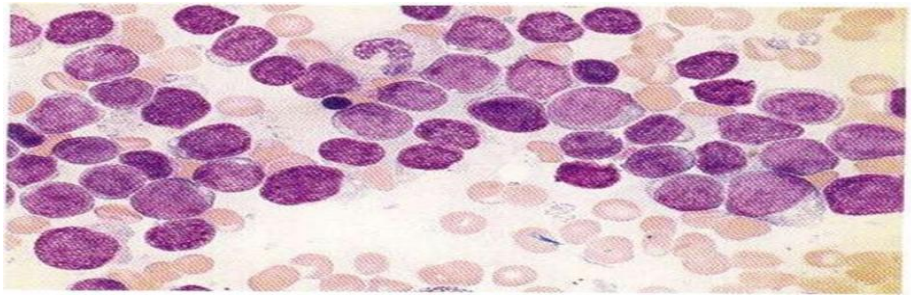
1- ALL-L1: Homogenous cells (Small cell): One population of cells within the case. Small cells predominant, nuclear shape is regular with occasional cleft. Nuclear contents are

rarely visible. Cytoplasm is moderately basophilic. L1 accounts 70% of patients. The L1 type is the acute leukemia that is common in childhood, with 74% of these cases occurring in children 15 years of age or younger***(Pieters and Carroll, 2008).***

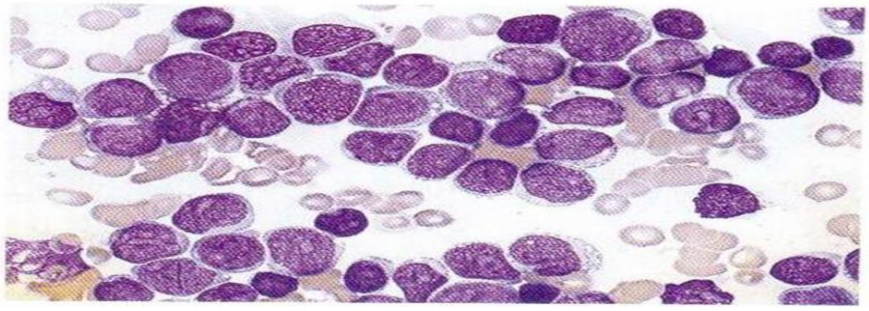
2- ALL-L2: Heterogeneous cells: Large cells with an irregular nuclear shape, cleft in the nucleus are common. One or more large nucleoli are visible. Cytoplasm varies in colour and nuclear membrane irregularities. L2 accounts 27% of ALL patients. The FAB-L2 blast may be confused with the blasts of acute myeloid leukemia. Approximately 66% of these cases of ALL in patients older than 15 years are of type 2 ***(Pieters and Carroll, 2008).***

3- ALL-L3: Burktt's lymphoma type: Cells are large and homogenous in size, nuclear shape is round or oval. One to three prominent nucleoli and sometimes to 5 nuleoli is visible. Cytoplasm is deeply basophilic with vacuoles often prominent. Intense cytoplasmic basophilia is present in every cell, with prominent vacuolation in most. A high mitotic index is characteristic with presence of varying degrees of macrophage activity. Mature B-lymphoid markers are expressed by most cases ***(Pieters and Carroll, 2008).*** The following figure summarized classification of ALL.

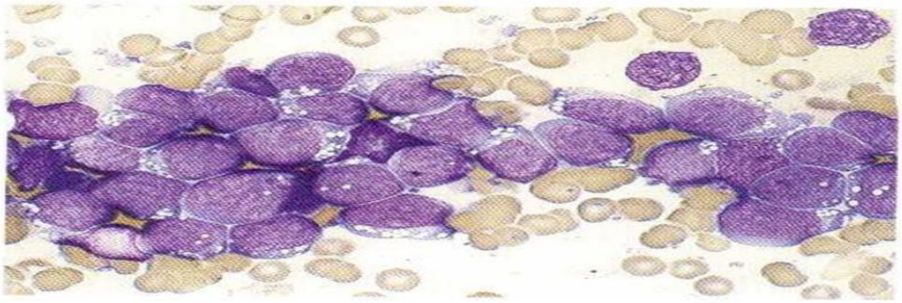
Figure (2): Classifications of ALL.



Color Plate 2.2. ALL with small regular (FABL1) blasts. Small blasts with indistinct nucleoli predominate, with an admixture of a small number of large blasts. This admixture of small and larger blasts is common in ALL. (Wright-Giemsa, × 1000).



Color Plate 2.3. ALL with large (FABL2) blasts with prominent nucleoli and moderate amounts of cytoplasm, with an admixture of smaller blasts. Such cases may be mistaken for AML and emphasize the importance of further studies to corroborate the differential diagnosis. (Wright-Giemsa, × 1000).



Color Plate 2.4. B-ALL (FAB L3) with the t(8;14). Blasts are characterized by intensely basophilic cytoplasm, regular cellular features, prominent nucleoli, and cytoplasmic vacuolation. Vacuoles are not requisite for this diagnosis. (Wright-Giemsa, × 1000).

Stuart, G.W. and Laraia, M.T., (2009): *Principles And Practice of Psychiatric Nursing, 9th Ed., St., Louis, Mo: Mosby.*

B- The World Health Organization (WHO) proposed classification of acute lymphoblastic leukemia based on immunophenotype:

The recent WHO International panel on ALL recommends that the FAB classification be abandoned, since the morphological classification has no clinical or prognostic relevance. It instead advocates the use of the immunophenotypic classification mentioned below ***(Soanes and Velang, 2013).***

There are two different types of Lymphocytes:

T-cells and B-cells.often, leukemia occure at a very early stage in immature lymphocytes, before they have developed into either and T-cells or B-cells.However, if the cells have developed this far before becoming leukaemic ***(David et al., 2009).***

Risk Categories of ALL

Several different features will influence child's ALL risk group at diagnosis (WBC) count, child age, leukemic cells are present in the testes of male child , leukemic cells are inside the cerebrospinal fluid (CSF) which bathes the brain and spinal cord. This means child has a positive centeral nervous system (CNS) status and ALL sub type (precursor B-cell, T-cell) Chromosome changes inside leukemic cell. This happens when a part of a chromosome separates it self and attaches to another unrelated chromosome, producing a new chromosome which expresses genes in different ways. When this happens, it is called a chromosome translocation. In a healthy cell, there are

normally 46 copies of chromosomes. There are two copies of each chromosome ***(Ensor et al., 2013).***

1-ALL Low-risk

Child is considered low-risk if: the age between 1 and 10 years, less than 50, 000 WBC per cubic millimetre (mm3) of blood when she is diagnosed, leukemia cells with chromosome changes that respond well to treatment. These cells either have a translocation of chromosome 12 and 21 or three copies of chromosomes 4, 10 and 17, leukemic cells in the CSF, which means child has a negative CNS status and a good response to the first phase of chemotherapy (induction). It could be the determined this by looking at child's Minimam residual disease MRD status at the end of induction therapy. When children respond well to initial treatment, it is called having a rapid early response RER treatment ***(Tony et al., 2010).***

2- ALL High-risk

Child is considered high risk if she has either one of the following features: Less than age one or older than ten years of age, more than 50, 000 white blood cells/mm3 of blood when she is diagnosed, a large amount of leukemic cells in the spinal fluid, which means child has a positive CNS status and leukemia cells with chromosome changes that are more difficult to treat. In these cells, a part of one chromosome breaks, and fuses to a gene on

another chromosome involved in leukemia, called Myloyed lemphoblastic leukemia MLL. This is called an MLL gene rearrangement ***(Ensor et al., 2013).***

3- Veryhigh-risk ALL

Children with very high-risk ALL may also have certain chromosome changes inside their leukemia cells. These include: Leukemia cells that have parts of chromosome 9 and chromosome 22 fused together. This is called a Philadelphia chromosome. Leukemia cells which have too few chromosomes (hypodiploid)***(Tony et al., 2010).***

4- Standard risk ALL

The child's can be categorizes as standard risk ALL if child does not share any features with the low-risk or high-risk groups. For example, a child who is 4 years old, CNS negative and has a WBC count of less than 50, 000 /mm3 at diagnosis but does not have the low-risk features of leukemia, would be considered standard risk ALL ***(Ensor et al., 2013).***

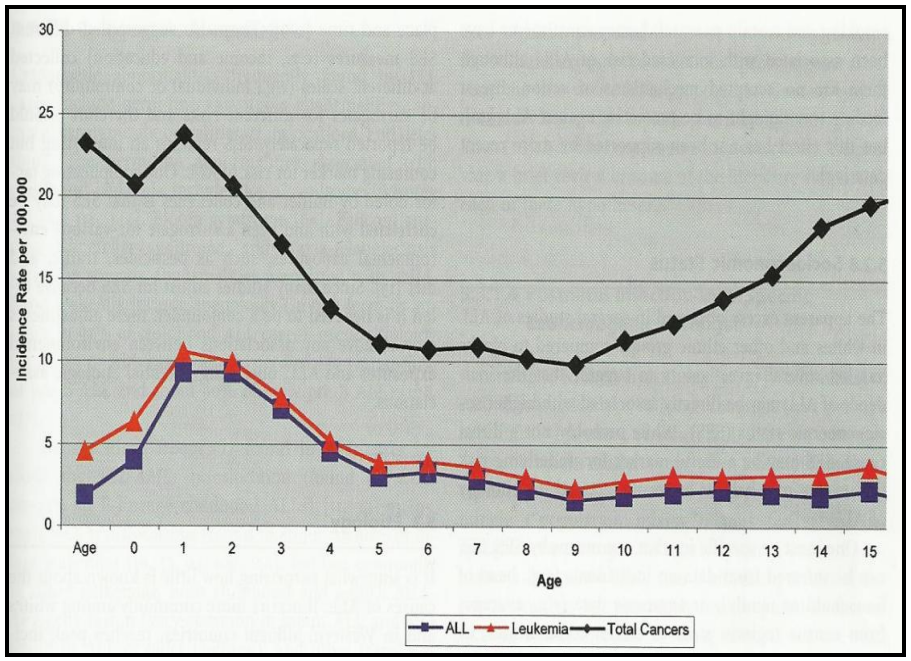
Incidence and mortality

ALL is the most common cancer diagnosed in children and represents approximately 25% of cancer diagnoses among children younger than 15 years. ALL occurs at an annual rate of 35 to 40 cases per 1 million people in the United States. There are approximately 2, 900 children and adolescents younger than

20 years diagnosed with ALL each year in the United States. Over the past 25 years, there has been a gradual increase in the incidence of ALL ***(Pizzo et al., 2006)***

ALL incidence Rate by Age (Figure 3) is observed among children aged 2 to 3 years (>90 cases per 1 million per year), with rates decreasing to fewer than 30 cases per 1 million by age 8 years. The incidence of ALL among children aged 2 to 3 years is approximately fourfold greater than that for infants and is likewise fourfold to fivefold greater than that for children aged 10 years and older ***(Estey et al., 2010).***

Figure (3): ALL Incedince rate by Age



Estey E., Faderl S.and Kantarjian H. (2010): *Hematologic malignancies: acute leukemias, 2ed Ed, springer berlin heidelberg ,Germany,p.p: 82-88.*