Kurdistan Republic Region / Iraq
Ministry of Higher Education
& Scientific Research
University of Sulaimani
College of Medicine

The Effect of Chemotherapy on Children with Cancer and their Family's Quality of Life in Hiwa Hospital

A Thesis Submitted to the Council of College of Medicine - the University of Sulaimani in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Pediatric Hematology – Oncology Nursing

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2019 . Sep **2719 ڕەزبەر** **1441 محرم**

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Supervisor Certification

I certify that this thesis was prepared under my supervision at the Department of Pediatric Nursing, College of the Nursing/ University of Sulaimani in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Pediatric Hematology - Oncology in Nursing.

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We, the examining committee, certify that we have read this thesis entitled *"The Effect of Chemotherapy on Children with Cancer and their Family's Quality of Life in Hiwa Hospital "* and have examined the student (Awayi Ghazy Abdulkareem) in its context and in our opinion it is adequate as a dissertation for the degree of Doctor of Philosophy in pediatric hematology-oncology nursing.

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Dedication

- ***My father and mother***
- ***To my sincere husband zana***
- ***To my dear sons, whom I took their precious times znar and zarin***
- ***To my sister binay***
- ***My Colleagues …***
- ***All children suffering from cancer***
- ***All those who care for the development of my scientific and educational status…***

Acknowledgements

Thanks to Almighty God for giving me patience and strength to complete this study.

I have deeply indebted my supervisor assistant professor Dr Jamal Ahmad Rashid, for his expert guidance and keen interest throughout this study. Unfortunately, before completion of the present dissertation, he left us forever but he still lives in our heart and mind forever.

My deepest appreciation and respect to my supervisor Asisstant Professor Dr Zhian Salah Ramzi, for her continuous guidance, unending support and encouragement besides helping me guiding me in every step.

I would like to express my thanks to Assistant Professor Dr Kosar Mohamed Ali, the Dean of College of the Medicine/University of Sulaimani, for his help and support.

My great thanks to the Hiwa Hospital and Pediatric Teaching Hospitals for hosting this study. The author would like to acknowledge the staff members of both colleges of medicine and college of the nursing library. I express my gratitude to all the participant in this study. Special thanks to assistant lecturer Nazira Salam mina who helped me in statistical analysis.

I am indebted to the family members, friends, and the hospital personnel and their relatives for volunteering in this study, without them, the study could not have been completed.

Abstract

Back ground

Cancer is defined as a disease of the cell in which the normal mechanism of control and growth and proliferation are disturbed. Providence of malignant cancer and mortality are also on the increase now a day. Cancer cells tend to low grow fast so chemotherapy treatment kill fast-growing therefore it affects the entire cells inside the body. Many side effects of this treatment are reported though a little evidence is available on routing clinical care; this situation makes heavy burden on the parents which consequently in countered with their quality of life particularly economically and psychologically as well as social life of both children and their parent.

Methods

To achieve the objectives of the study, quantitative design with case-control study has been conducted, accordingly sample of (300) cancer children and their parents have been selected from –Hiwa hospital as study group and this sample represent 30% of available cancer children in hospital purposively, in addition to (300) non cancer children and their parents have been selected from general teaching hospital as –control group. For proper collection of data questionnaire was constructed according to WHO scale include two parts , description of side effect of chemotherapy on children with cancer health status of second parts quality of life of parents both study and control group. This tool was validated through panel of experts and their reliability was confirmed through coefficient correlation test. To statistical measurement wear used for data analysis descriptive and inferential tests with level of

significancy ≤0.05 to determine the level of quality of life effects- low, moderate, high.

Results

The results of study revealed that side effects of chemotherapy on child health status it was showing that gastrointestinal system and musculoskeletal system were the first system in order while neurological in the second order and other system can be find.

In regard to part of quality of life of parents of cancer children have high and 50% have moderate level of effects compared with quality of life of parents of non-cancer children have high and very high level of effects more over fathers of study group have moderate level compared with fathers of control group have high level of quality of life.

Conclusions

It has revealed that majority of the sample client are from Sulaimani suburban are male and from low sociodemoghraphic economic level, therefore the study recommended to design an organized special checklist to be documented by special nurses in Hiwa hospital to process data concerned with children with cancer, health professionals should trained and in acquainted to care and support this particular group as well as to high light on the most important issues cancer need with cancer disease. The study recommended further studies should be done to identity major problems on large sample as well.

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List of Abbreviations and Acronyms

AD	**Anno domini**
ALCL	**Anaplastic large cell lymphoma**
ALL	**Acute lymphoblastic leukemia**
AML	**Acute myeloid leukemia**
BC	**Before Christ**
BCC	**Basal cell carcinoma**
BSA	**Body surface area**
BCNU	**Carmustine**
CNS	**Central nervous system**
CVL	**Central venous catheter**
DLBCL	**Diffuse large cell lymphoma**
DNA	**Deoxyribonucleic acid**
DTIC	**dacarbazine**
EV	**Epstein Barr virus**
HIV	**Human immunodeficiency virus**
HL	**Hodgkin lymphoma**
HPV	**Human poapilloma viruses**
LBL	**Lymphoblastic lymphoma**

NHL	**Non-Hodgkin lymphoma**
QoL	**Quality of life**
RBC	**Red blood cell**
RNA	**Ribonucleic acid**
SCC	**Squamous cell carcinoma**
UV	**Ultraviolet**
WBC	**White blood cell**
WHO	**World health organization**
WWI	**First world war**
WWII	**Second world war**

Chapter One

Introduction

Introduction

1.1 Introduction

World Health Organization (who) defines health as status of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, it means that health is multidimensional and multifactorial. Therefore, a quality of life (QoL) of human beings includes more dimensional status physical, psychosocial, emotional, and spiritual status (Tsuje et al, 2011).

According to the world health organization quality of life is defined as the individual perception of life, value, objectives, standers, and interests in the framework of culture. Quality of life is increasingly being used as a primary outcome measured in studies to evaluate the effectiveness of treatment.

Our concern with cancer is defined as a disease of the cell in which the normal mechanisms of control of growth and proliferation are disturbed. The prevalence of malignant cancers and mortality due to cancer are also on the increase(Babgi, 2010).

Unfortunately Bener et.al,(2007) has mentioned that world health organization estimates that each year about ten millions of people who diagnosed with cancer all around the world, and more than half of the patients eventually die, these figures will be doubled by the years 2020) and it is the second leading cause of death after cardiovascular disease according to the International Agency of Research for Cancer (IARC,2002).

Cancer has many different types that vary in many aspects such as diagnosis and response to treatment. Cancer is treated with different methods such as surgery, radiation and chemotherapy. Chemotherapy is a systemic approach that uses drugs to stop or slow abnormal cell growth, to control or prevent the spread of abnormal cells and also relieve cancer symptoms such as pain, especially for those children in the end-stage (palliation) (Ruddon, 2005).

Unfortunately, chemotherapy drugs affect both normal and abnormal cells, because of effects on the cellular activity during one or more phases of the cell cycle. There are many cancers where children are prone to develop numerous side effects when undergoing chemotherapy treatment; these side effects may have a significant impact on treatment, management, morbidity and mortality (Ayten & Mark, 2010).

Most common chemotherapy side effects include neutropenia, anemia, and thrombocytopenia, nausea, vomiting, fatigue, alopecia, stomatitis, abdominal pain, joint pain muscle spasm, headache, sleepiness, constipation and diarrhoea (Beachard,etal2006).

Most of children experience are unpleasant physical side effects behavioural and emotional problems and the risk of late effects including reduced liner growth, compromised endocrine functions and may damage the cardiac and reproductive systems with adverse effects on adolescents period(Eiser,etal2005). The diagnosed malignancy in children represents from psychosocial view one of the most – if not the most one – serious problems affecting the child, his/her parents but also his/her siblings – all of

these family members are exposed to extremely intensive psychological and emotional stress. Children with cancer frequently experience and report pain and fatigue, which affect all aspects of their life's: physical, social and psychological domains (Bingen and Kupts,2010).

The impact of the disease and side effects of the treatments that happen to the child affected the quality of life of parents because a parent who is taking care of the ill child during his/her condition (Hoven . …et al,2008). This long term of childhood disease may negatively affect the parenting quality of life than both parents without cancer (Klassen …et al,2008).

Recent advances in medicine have a result in improved survival and have changed the implications of physical illness in childhood. Because of cancer and their treatment burden raised day to day life not only due to problems related to the underlying disease condition itself but also due to having to live with such disease (Hauser & Walsh, 2008).

Naturally, maximum care, attention and support are provided primarily to the deceased child, after the diagnosis, parents of sick children as well start to receive support from medical staff, psychologists and other parents. Various supporting groups for parents are established by children's oncology centres, as well as there are various activities and social events organized by foundations and self-help organizations where all parents can share

their feelings, exchange information and have an opportunity to take a break from their problems.

1.2 Importance of the study

Child caregiving practices are in response to growing interest in the elements of care that help children survive and meet their full needs (WHO, 2004). Health education is primarily at preventative level aims to increase knowledge thus enabling informed choice in addressing issues that affect health and well-being (McMillan, 2011). Educational programs may empower childhood cancer survivors towards healthier care which, in turn, may prevent or reduce risks of late effect (Bingen and Kupst, 2010).

International studies stated that in the first few months after the diagnosis, the healthy family member of child cancer patients are prone to have emotional, social and behavioural problems that interfere with having to live their life with such disease.

With improved survival outcomes for children following cancer treatment, it has become increasingly important to capture the health status or effect of the disease on survivors' physical abilities, mental functions and quality of life. Effective treatment modalities have optimized survival outcomes for children diagnosed with pediatric cancer.

Care providers must balance the prevention, management and optimization of the survivor's physical, emotional, and cognitive care needs. In recent years survivorship has become an important focus in pediatric cancer care. Survivorship is defined as the completion of primary and adjuvant treatment, before recurrence and referral to palliative care. For nurses involved in follow up

care, the ongoing symptoms affect a child's wellbeing is a fundamental practice issue.

Indeed there are insufficient studies related to pediatric oncology nurses in Iraq, particularly in the Kurdistan region. Lack of nursing care is one of the problem developed to early deaths among children and adolescent patients. Shortage of support and guidelines for caregivers who give care to improve the QoL of families should be one important issues to supported with adequate knowledge and practices toward complication, which arise before, during and after treatments and to reduce mortality rate of cancer patients and minimize hospitalization as well, the burden of the treatment, and to the load on the families and could be decreased by health care provider's support to prevent any problem facing them.

1.3 Statement of the problem

To what extent the chemotherapy approach could affect the cancer clients' health status and affect the quality of life of their parents?

1.4 Objectives of the study

1.4.1 General objective

To identify the side effect of chemotherapy approach on cancer children's health status and levels of quality of life of their parents.

1.4.2 Specific objectives

1. To find out the sociodemographic attributes of cancer children in term of age, gender, sociodemographic level, geographical location.

2. To find out the effects of chemotherapy treatments on the child's physical health status , gastro intestinal, musculoskeletal , neurological, integumentary, respiratory, cardiovascular and urology.

3. To identify the sociodemographic attributes of the parents of whom children as cancer client of parents wand whom children non cancer client (case & control).

4. To assess the quality of life domains of parents of both groups of parents (case and control group).

5. To identify the domains quality of life of both parents in both groups which come in order of effects.

6. To find out the overall levels of effects on quality of life in both groups (case and control group).

7. To compare the quality of life domains affected between study group parents with control group parents.

Chapter Two

Review of Literature

Chapter Two

Review of Literature

2.1 Cancer

Cancer is the name given to a collection of related diseases. In all types of cancers, some of the body's cells begin to divide without stopping and spread into surrounding tissues.

Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and divide to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place. When cancer develops, however, this orderly process breaks down. As cells become more and more abnormal, old or damaged cells survive when they should die, and new cells form when they are not needed. These extra cells can divide without stopping and may form growths called tumors (Sidaddhare Mukhurjee,2010).

2.2. Causes of cancer

In 1915, Katsusaburo Yamagiwa and Koichi Ichikawa at Tokyo University induced cancer in lab animals for the first time by applying coal tar to rabbit skin. More than 150 years had passed since clinician John Hill of London recognized tobacco as a carcinogen (a substance known or believed to cause cancer in humans). Many more years passed before tobacco was "rediscovered" as the most destructive source of chemical carcinogens known to man. Today we recognize and avoid many specific substances that cause cancer: coal tars and their derivatives (like benzene), some hydrocarbons, aniline (a substance used to make

dyes), asbestos, and many others. Ionizing radiation from a variety of sources, including the sun, is also known to cause cancer. To ensure the public's safety, the government has set safety standards for many substances, including benzene, asbestos, hydrocarbons in the air, arsenic in drinking water, and radiation. (green wald P. & Dunn B K, 2009).

The World Health Organization's in (2014) and the International Agency for Research on Cancer (IARC) has identified more than 100 chemical, physical, and biological carcinogens. Many of these associations were recognized long before scientists understood much about how cancer develops. Today, research is discovering new carcinogens, explaining how they cause cancer and providing insight into ways to prevent cancer. Scientists discovered that sometimes defective genes are inherited, and sometimes these inherited genes are defective at the points where certain chemicals also tend to cause damage. In other words, most of the things that caused cancer (carcinogens) caused genetic damage (mutations) that looked a lot like the mutations that could be inherited and could result in the same types of cancer if more mutations were introduced. (Loeb L A & Harris, 2008)

During the 1970s, scientists discovered 2 particularly important families of genes related to cancer: oncogenes and tumour suppressor genes. Oncogenes these genes cause cells to grow out of control and become cancer cells. (Vander Heiden MG ..et al, 2009)

Other genes have been discovered that are linked to cancers that run in families, such as cancers of the colon, rectum, kidney, ovary, thyroid, pancreas, and skin melanoma. Familial cancer is not nearly as common as spontaneous cancer (cancer that is caused by DNA damage that starts during a person's lifetime). Cancer linked to heredity is less than 15% of

all cancers. Still, it's important to understand these cancers because with continued research in genetics we may be able to identify more people at very high risk. (Wilison S, et al, 2002)

2.3. Risk factors of cancer among children

Risk factors for children's cancers are not well understood. This is because these groups of cancers are relatively rare and there are lots of different types. Some factors can increase risk. While the factors listed below are linked to children's cancers, most children with cancer aren't affected by any of them. And many children who are affected by these risk factors won't go on to develop cancer for example:

Medical conditions Certain conditions can increase a child's risk of developing some types of cancers. For example, children with Down's syndrome are 10 to 20 times more likely to get leukemia than other children. Leukemia is still very rare, even in children with Down's syndrome. Genetics Retinoblastoma is a rare type of eye cancer (A. Tsimicalis,2018).

When a baby is growing in the womb, many parts of the body, such as the kidneys and eyes, develop very early on. Sometimes something goes wrong and some of the cells that should have turned into mature cells to form a part of the body, instead they remain as very immature cells. Usually, these immature cells don't cause any problems and mature by themselves by the time the child is 3 or 4. But if they don't, they may begin to grow out of control and develop into a cancerous tumour. Exposure to infections Epstein Barr virus (EBV) is a common infection in young children. It usually causes no symptoms. But, it can cause glandular fever (infectious mononucleosis) in teenagers and young adults. While glandular fever can be very unpleasant, it usually passes

within a few weeks and it doesn't mean that you go on to develop cancer. Once infected, a person remains a carrier of EBV for life, but the virus normally doesn't cause any symptoms at all (R.L.Woodgate,2003).

In rare cases, infection with EBV can contribute to the development of cancers such as Hodgkin lymphoma and Burkitt's lymphoma. Most people get infected with EBV as a child and stay infected for life without ever experiencing any symptoms. Because of how common it is, there is nothing you can do to prevent you, or your child, coming into contact with EBV at the moment.

Exposure to radiation Radiotherapy is used as a treatment for cancer. It uses a type of radiation called ionising radiation. Children who have radiotherapy for cancer have a slightly greater risk of developing another type of cancer later on, but the risk is small compared to the risk to their health if original cancer had not been treated with radiotherapy. Radon gas is a natural radioactive gas and it is a type of ionising radiation. Radon gas is found in the air at a low level outdoors, but it can sometimes build up to high concentrations indoors. Because it is natural gas, it is difficult or us to control our exposure to it. Overall, studies so far have only suggested that there might be a weak link between indoor levels of radon gas and risk of childhood leukemia. Previous cancer treatments Past treatment with chemotherapy can increase the risk of cancers such as acute leukemia many years later in children and adults(R.L. Sigeal,2005).

2.4. Cancer prevention

Between 30-50% of all cancer cases are preventable. Prevention offers the most cost-effective long-term strategy for the control of cancer. National policies and programs should be implemented to raise awareness, to reduce exposure to cancer risk factors and to ensure that

people are provided with the information and support they need to adopt healthy lifestyles(Dietrich,Wen et..al,2008).

Dietary modification is another important approach to cancer control. There is a link between overweight and obesity to many types of cancer such as oesophagus, colorectum, breast, endometrium and kidney. Diets high in fruits and vegetables may have an independent protective effect against many cancers. Regular physical activity and the maintenance of healthy body weight, along with a healthy diet, considerably reduce cancer risk. Besides, healthy eating habits that prevent the development of diet-associated cancers will also lower the risk of other noncommunicable diseases. WHO global strategy on diet, physical activity and health also, IARC handbooks on weight control and physical activity (LuW …etal, 2010). Pollution of air, water and soil with carcinogenic chemicals contributes to the cancer burden to differing degrees depending on the geographical settings. Outdoor air pollution is classified as carcinogenic, or cancer-causing, for humans. It has been estimated that outdoor air pollution contributed to 3.2 million premature deaths worldwide in 2012 including more than 200,000 lung cancer deaths. Additionally, over 4million people die prematurely from illness attributable to the household air pollution from cooking with solid fuels, 6% of these deaths are from lung cancer. Indoor air pollution from coal fires doubles the risk of lung cancer, particularly among non-smoking women. Exposure to carcinogens also occurs via the contamination of food, such as aflatoxins or dioxins. (Lord CJ … et al, 2012)

Exposure to all types of ionizing radiation, from both natural and man-made sources, increases the risk of various types of malignancy including leukaemia and several solid tumours. Risks increase when the exposure occurs at a young age and also when the exposure amount is

higher. Ultraviolet (UV) radiation, and in particular solar radiation, is carcinogenic to humans, causing all major types of skin cancer, such as basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and melanoma. Avoiding excessive exposure, use of sunscreen and protective clothing are effective preventive measures. UV-emitting tanning devices are now also classified as carcinogenic to humans based on their association with skin and ocular melanoma cancers. Radiation is used in medicine and can help save lives as well as prevent the need for more invasive procedures. However, inappropriate use may cause harm because of unnecessary and unintended radiation doses for patients. Radiologic tests and procedures should be appropriately prescribed and properly performed to reduce unnecessary radiation doses, particularly in children. Residential exposure can also arise from radon, a naturally radioactive gas sometimes present in soil and building materials increase the risk of lung cancers. Radon levels in homes can be reduced by improving the ventilation and sealing floors and walls. (Chi P…etal,2010)

Precautions to minimize exposures during pregnancy, some of the changes in cells that lead to the development of childhood cancer may take place during pregnancy. Radiation exposures, both in utero and during early life, have been found to increase cancer risk. It is also possible that environmental exposures to either parent before the child's conception may influence childhood cancer risk. Research studies have not identified strong and consistent preventable causes of childhood cancer (other than exposure to ionizing radiation). However, since the developing fetus is more sensitive to some exposures than adults, women are advised to take precautions to minimize exposures during pregnancy. Concerning environmental exposures, the Office of Women's Health,

Department of Health and Human Services recommends that during pregnancy, women should avoid exposure to:Lead, Mercury, Arsenic, Pesticides ,Solvents – Such as degreasers and paint strippers and thinners,Cigarette smoke (The National Institute for Occupational Safety and Health, 2012)

In 2013, WHO launched the Global Action Plan for the Prevention and Control of Non communicable Disease 2013-2020 that aims to reduce, by 25%, premature mortality from cancer, cardiovascular diseases, diabetes, and chronic respiratory diseases by 2025, the plan consists of: increase political commitment for cancer prevention and control; coordinate and conduct research on the causes of human cancer and the mechanisms of carcinogenesis; monitor the cancer burden (as part of the work of the Global Initiative on Cancer Registries);identify priority strategies for cancer prevention and control; generate new knowledge and disseminate existing knowledge to facilitate the delivery of evidence-based approaches to cancer control; develop standards and tools to guide the planning and implementation of interventions for prevention, early diagnosis, screening, treatment and palliative and survivorship care; facilitate broad networks of cancer control partners and experts at global, regional and national levels; strengthen health systems at national and local levels to deliver cure and care for cancer patients; provide global leadership as well as technical assistance to support governments and their partners build and sustain high-quality cervical cancer control programs; Provide technical assistance for rapid, effective transfer of best practice interventions to less-developed countries(Sioka and Kyrisis,2009).

2.5. Signs and Symptoms for Pediatric Cancers

Early diagnosis of cancer in children is often difficult because of the similarity of symptoms to more common diseases of childhood. Parents should ensure that children have regular medical checkups and be alert to any unusual signs or persistent symptoms. Some common symptoms of childhood cancer that should alert parents and health care providers include an unusual mass or swelling; unexplained paleness or loss of energy; a sudden tendency to bruise; a persistent, localized pain or limping; a prolonged, unexplained fever or illness; frequent headaches, often with vomiting; sudden eye or vision changes; and excessive, rapid weight loss. (WolfJ.,2004)

2.6. Most Common Types of Cancer Among Pediatric

2.6.1. Leukemia

Leukemia is a cancer of blood-forming cells arising in the bone marrow. Leukemia are cancers of a certain type of white blood cell (lymphocyte) that can arise anywhere lymphocytes can be found, including bone marrow, lymph nodes, the spleen, the intestines, and other areas of the lymphatic system. Leukemia and lymphomas are classified according to the type of cell that is exhibiting uncontrolled growth.

The two most common types of leukemia in children and adolescents are acute lymphocytic leukemia (ALL) and acute myeloid leukemia (AML). Chronic leukemia is very rare in children and adolescents. ALL accounts for about 80% of leukemia cases in children and 56% of leukemia cases in adolescents. Acute myeloid leukemia (AML) is less

common in children than ALL, comprising about 15% of leukemia cases in children and 31% in adolescents(Wexler LH …et al,2010)

2.6.1.1. Acute lymphocytic leukaemia (ALL)

An estimated 2,670 children and 410 adolescents will be diagnosed with ALL in 2014. ALL is the most common cancer in children, accounting for 26% of cancers diagnosed in ages 0-14. Similar to lymphomas, ALL is a cancer of lymphocytes. Most often ALL in children involves B lymphocytes, the type of lymphocyte that makes antibodies to infections, but it can also involve T lymphocytes, which help the body fight disease in other ways. (Henderson TO,…et al,2010)

ALL occurs in children throughout the world, but it is more common in industrialized countries than in developing countries. ALL is more common in boys than in girls and in Hispanic and white children than in African American children. In industrialized countries, there is a sharp peak in ALL incidence rates at ages 2-4, which is not apparent among children in developing countries. The characteristic age peak for ALL in the US is striking for white and Hispanic children, but less so for African American children. (Kroll ME et al,2011)

There is evidence that some cases of ALL arise in utero, including a frequent concordance of ALL in identical twins. Inherited risk factors associated with ALL include trisomy 21 (Down syndrome), which confers a 10- to 20-fold increased risk, certain genetic syndromes (Bloom syndrome, Fanconi anaemia, and Nijmegen breakage syndrome) and congenital immunodeficiency diseases. Although many epidemiologic studies have sought to find the causes of ALL, few environmental agents are definitively linked with this disease. According to the International Agency for Research on Cancer, there is limited evidence that parental

smoking and maternal exposure to paint increase the risk for childhood leukaemia (particularly ALL). Higher birth weight has also been associated with higher ALL risk. (Roman E et al,2013)

Improved treatment for ALL in childhood has increased the 5-year survival rate from 57% in 1975-1979 to 90% in 2003-2009. Treatment is generally in three phases and consists of 4-6 weeks of induction chemotherapy (chemotherapy given to induce remission) administered in the hospital, followed by several months of consolidation chemotherapy and 2-3 years of maintenance chemotherapy. The central nervous system (CNS) is a common site for relapse, so children receive specific treatment to prevent this (CNS prophylaxis). Bone marrow transplantation is recommended for some children whose leukemia has high- risk characteristics at diagnosis and for children who relapse after remission. It may also be used if leukemia does not go into remission after a successive course of induction chemotherapy. Successful treatment of ALL requires multidisciplinary teams to provide supportive care and careful monitoring for infection and adequate nutrition. (Riberio R et al,2008)

2.6.1.2. Acute myeloid leukaemia(AML)

AML arises from blood-forming cells, most often those that would turn into white blood cells. The incidence of AML is highest in the first two years of life. Incidence rates for AML are slightly higher in Hispanic children compared to other racial/ethnic groups. Children with AML and high white blood cell counts may develop symptoms due to impaired transit of cancer cells (blasts) through small blood vessels. Many AML patients are prone to excessive bleeding and other blood clotting disorders. Death occurs during the first 2 weeks after diagnosis in 2-4%

of children with AML. Treatment for AML consists of induction chemotherapy, CNS prophylaxis, and post-remission therapy. Stem cell transplant has been investigated in clinical trials and has been shown to improve survival rates for some children with AML. Treatment toxicity and long-term effects for AML are similar to those for ALL; however, AML less often requires to treatment or prophylaxis of the CNS, so side effects related to the radiation of the brain are not as common. The 5-year survival rate for AML for children diagnosed in 2003-2009 was 64%. Survival rates for AML have improved in recent decades, but remain lower than for ALL. (Henderson TO et al,2010)

2.6.2. Hodgkin lymphoma

Hodgkin lymphoma is a cancer of lymphocytes that often starts in the lymph nodes in the chest, neck, or abdomen. There are two major types of HL: classic, which is the most common and is characterized by the presence of multinucleated giant cells called Reed-Sternberg cells, and nodular lymphocyte predominant, which is characterized by so-called "popcorn cells." This type is rare and tends to be slower growing than the classic form (Christina A. Meyers,2008).

Survival rates for HL increased from 87% in 1975-1979 to 97% in 2003-2009. HL is highly sensitive to radiation, and cure can be achieved in some patients by radiation therapy alone, although this is seldom the preferred treatment in children and adolescents. The high dose of radiation used to treat HL in past decades was found to be damaging to organs such as the lungs and heart, so current therapies usually combine lower doses of chemotherapy and radiation to achieve a high cure rate with less toxicity. Long-term and late effects of treatment may include pulmonary and cardiac diseases, thyroid abnormalities, infertility, and

second cancers. Girls age 10 and older and young women treated with radiation to the chest for HL have an exceptionally high relative and absolute risk of developing breast cancer. (The American Cancer Society 2011)

2.6.3. Non-Hodgkin lymphoma

Non-Hodgkin's lymphoma is cancer that originates in the lymphatic system, the disease-fighting network spread throughout your body. In Non-Hodgkin's lymphoma, tumours develop from lymphocytes — a type of white blood cell. Non-Hodgkin lymphomas (NHL) are most often classified by how the cancer cells look under the microscope. Key features include the size and shape of the cells and how they are arranged (their pattern of growth). Size is described as large or small. The shape is described as cleaved (showing folds or indentations) or non-cleaved. The growth pattern may be either diffuse (cancer cells are scattered) or follicular (cells are arranged in clusters).

Not every lymphoma is described using all 3 features. Special lab tests are often needed to accurately classify lymphomas. The most common types of NHL in children are different from those in adults. Nearly all NHL in children is 1 of 3 main types:

- Lymphoblastic lymphoma
- Burkitt lymphoma (small non-cleaved cell lymphoma)
- Large cell lymphoma

All 3 types are a high grade (meaning they grow quickly) and diffuse, but it's important to find out which type a child has because they are treated differently. There are many other types of NHL. (American cancer society, 2017)

2.6.4. Brain and central nervous system tumours (CNS tumours)

An estimated 2,240 children and 540 adolescents will be diagnosed with malignant CNS tumours in 2014. CNS tumours are the second most common cancer in children, accounting for 21% of cases, and the third most common cancer type in adolescents, accounting for 10% of cases. CNS tumours are classified by the cells and tissues in which they originate and their location and grade, ranging from I (low) to IV (high). Symptoms of benign tumours and side effects of treatment can be quite severe. (Mirabello L. et al,2011)

Astrocytoma, the most common type of CNS a tumour, accounts for 35% of CNS tumours in ages 0-19. These tumours arise from brain cells called astrocytes. Astrocytomas range from low grade to high grade. Pilocytic astrocytoma, the most common type of astrocytoma in children, is a low-grade tumour - that typically arises in the cerebellum. Fibrillary astrocytoma, another common type of astrocytoma in children, is usually found in the mid-brain, has less well-defined borders and can spread throughout both sides of the brain. (Nickerson HJ et al,2000)

Medulloblastoma most commonly diagnosed in children younger than 10 years. It is a highly invasive embryonal tumour that arises in the cerebellum and has a tendency to spread throughout the central nervous system early in its course. (Dimaras et al,2010)

Ependymoma is a tumour that begins in the ependymal lining of the ventricular system (fluid-filled cavities in the brain) or the central canal of the spinal cord. Ependymomas range from low to high grade.The

symptoms of brain tumours are varied, as is the time course over which symptoms develop and increase in severity. Signs and symptoms of brain cancer depend on the tumour location, the developmental stage and communication ability of the child or young person, and whether intracranial pressure is raised. (Searles Nielsen S. ETAL,2011)

Trends in CNS tumours have been of interest because of a sharp increase in overall incidence in the mid-1980s, with significant increases in incidence rates for pilocytic astrocytoma, primitive neuroectodermal tumour (PNET)/medulloblastoma, and mixed glioma. Many experts believe that this short-term increase in incidence resulted from the introduction of MRI for evaluating children with neurologic conditions and increased use of computer image-guided biopsies to document tumours that could not otherwise be biopsied. Furthermore, the rate of increase in pilocytic astrocytoma was similar to the rate of decrease for astrocytomas NOS (not otherwise specified), suggesting an improvement in classification. After the increase in the mid-1980s, the incidence rate of CNS tumours stabilized. (Mckean – Cowdin R et al, 2013)

The cause of brain tumours in childhood is unclear.47 Children with certain genetic syndromes (e.g., Turcot syndrome, Li-Fraumeni syndrome, neurofibromatosis type 1, and neurofibromatosis type 2) have increased the risk of brain and CNS tumours. High-dose therapeutic radiation is a recognized cause of brain tumours, and children who receive cranial irradiation for ALL or other cancers have an excess risk of brain and CNS tumours. Several studies have also found associations between consumption of cured meats during pregnancy and childhood brain tumours. (Gorlick et al,2010)

Treatment of brain and other CNS tumours depends on the cancer type, grade, location, size, and other prognostic factors. Whenever possible, surgery is performed to remove as much of a tumour as possible while avoiding damage to healthy tissue. Optimal therapy, which may include chemotherapy and/or radiation, requires coordinated efforts of pediatric cancer specialists in fields such as neurosurgery, neuropathology, radiation oncology, and pediatric oncology. Late effects can include impaired growth and neurologic development following radiation therapy, especially in younger children. For this reason, children under age 3 usually receive chemotherapy first with delayed and/or reduced radiation. Radiation is not always needed for low-grade tumours. Survival rates vary depending on tumour type, location, and grade. Trends in survival rates over time are available for malignant brain tumours only. While there has been progressing in survival for CNS tumours overall, there has been little progress for some subtypes, such as DIPG (diffuse intrinsic pontine glioma), for which the median survival time after diagnosis remains less than one year. (Dang Tan T et al,2007)

2.6.5. Neuroblastoma

. It is the third most common childhood cancer and represents 7% of the total cases in this age group. Neuroblastoma develops from certain types of very primitive nerve cells in the embryo and is the most common cancer diagnosed during the first year of life; it is very uncommon after age 10. The incidence of neuroblastoma is slightly higher in boys than girls and substantially higher in whites than children of other races/ethnicities. A family history of neuroblastoma is present in 1% to 2% of cases. Children who have siblings with neuroblastoma are nearly 10 times more likely to be diagnosed with the disease than children without a family history. (Mac Lean J et al,2010)

Neuroblastoma can spread through the lymph system and blood, and over half of children have the regional or distant-stage disease at diagnosis. A rare form of neuroblastoma (stage 4S) occurs in infants with a specific pattern of metastatic disease and often regresses with little or no treatment. Depending on the stage and other prognostic factors, children with neuroblastoma are most commonly treated with surgery and/or chemotherapy and radiation therapy; patients with high-risk disease may receive high-dose chemotherapy followed by stem cell transplant. Children treated for high-risk disease also have the greatest risk of treatment-related complications, including severe hearing loss, infertility, cardiac toxicity, and second cancers related to the use of high-dose chemotherapy. (Cogliano VJ et al, 2011)

2.6.6. Wilms Tumor

Wilms a tumour also called nephroblastoma, Wilms a tumour is an embryonal tumour of the kidney that usually occurs in children under age 5. The vast majority (92%) of kidney tumours in this age group are Wilms a tumour. The incidence rate of Wilms a tumour is slightly higher in girls than boys. Wilms a tumour is bilateral (occurring in both kidneys) in about 5-10% of cases. About 10% of cases are associated with a birth defect such as urogenital tract abnormalities. Epidemiologic studies have not identified strong or consistent environmental risk factors for Wilms a tumour. The majority of children with Wilms a tumour are diagnosed with an asymptomatic abdominal mass that is incidentally noted while bathing or dressing the child. Wilms a tumour may spread locally or through the bloodstream; distant metastases are uncommon at diagnosis. Treatment involves surgery and may include radiation and/or chemotherapy. In addition to the stage, histology and age at diagnosis are important prognostic factors. (Brodeur GM et al,2010)

2.6.7. Retinoblastoma

Retinoblastoma is cancer that starts in the retina, the very back part of the eye. Retinoblastoma usually occurs in children under age 5 and accounts for 6% of cancers in this age group. The incidence of retinoblastoma is similar in boys and girls, does not vary substantially by race and ethnicity. Symptoms of retinoblastoma may include "white pupil," in which the pupil of the eye appears white instead of red when light shines into it, eye pain or redness, and vision problems. Most cases of retinoblastoma are due to a mutation in the RB1 gene. Approximately one-third of retinoblastomas are inherited, meaning that the RB1 mutation is in all of the body's cells (i.e., a germline mutation). Genetic counselling should be an integral part of the therapy for the family of a patient with retinoblastoma. Patients who carry a germline RB1 mutation have an increased risk of second cancers, especially if they receive radiation therapy. (Dimaras H et al,2012)

The type of treatment required for retinoblastoma depends largely on the extent of the disease within the eye and whether the disease has spread beyond the eye. Treatment options consider both cure and preservation of sight. Small tumours may sometimes be treated with cryotherapy (freezing), laser therapy, or thermotherapy (heat laser). Patients with more advanced disease, but that only involves one eye without spread to nearby tissues, are often treated with surgery to remove the eye (enucleation), which may be the only treatment needed. Children with bilateral (both eyes are affected) disease, and some children with unilateral disease, may be treated with chemotherapy to shrink tumours to a size where local treatment is effective. (Kleinerman RA et al, 2012)

2.6.8. Osteosarcoma

Osteosarcoma is the most common type of bone cancer in children and adolescents. The incidence of osteosarcoma increases with age throughout childhood and adolescence; it is very rare among children under age 5. The incidence of osteosarcoma is slightly higher in boys than girls and also higher in African American and Hispanic children than in white and Asian American/Pacific Islander children. Osteosarcoma arises from primitive bone-forming stem cells and usually develops in areas where the bone is growing rapidly, such as near the ends of the long bones around the knee. Osteosarcoma commonly appears as sporadic pain in the affected bone that may worsen at night or with activity, with progression to local swelling. Prior radiation treatment for another tumour increases the risk of osteosarcoma. Radiation-associated osteosarcomas usually occur 7 to 15 years after treatment of a primary tumour (Bozic I et al,2013)

2.6.9. Ewing sarcoma

Ewing sarcoma is the second most common malignant bone tumour in children and adolescents. It is more common among older children and adolescents than young children. Notably, incidence rates of Ewing sarcoma in whites are nearly 7.5 times higher than in African Americans, and moderately higher than in Hispanics and Asian American/Pacific Islanders. Similar differences in incidence are observed globally. Ewing sarcoma is a highly aggressive cancer, and it is characterized by a mutation in the EWSR1 gene.

Ewing sarcomas arise about equally in bones of the extremities and those in other parts of the body, and may also arise in soft tissues. The first symptom is usually pain at the tumour site, sometimes along with a

mass or swelling. Metastases are present in about 25% of patients at diagnosis; the most common metastatic sites are the lungs, bone, and bone marrow. Treatment for Ewing sarcoma typically involves induction chemotherapy followed by local therapy (surgery and/or radiation) and adjuvant chemotherapy. There is continuing uncertainty about whether surgery or radiation therapy is preferred for local control, and sometimes radiation therapy is used both before and after surgery (Esiashvili N et al,2008)

2.7. Treatment of cancer

The "modalities" used to treat cancer are surgery, chemotherapy, radiation therapy, and immunotherapy, usually in some combination. Treatment plans vary from patient to patient based on the type and stage of cancer. All the treatment of cancer they have their side effect that affect on the child's health(Chbaner,2006).

2.8. Chemotherapy

Chemotherapy is the use of any drug to treat any disease. But to most people, the word chemotherapy means drugs used for cancer treatment. It's often shortened to "chemo." Surgery and radiation therapy remove, kill, or damage cancer cells in a certain area, but chemo can work throughout the whole body. This means chemo can kill cancer cells that have spread (metastasized) to parts of the body far away from the original (primary) a tumour(Bozic I et al,2013).

2.8.1. Stages of chemotherapy

2.8.1.1. Induction stage

The first month of therapy consists of induction. At the end of the therapy which over 95% of child exhibits remission on BM aspiration morphology (Maloney et al, 2009). In these stages, the bulk of a tumour destroyed by combination chemotherapy. The patient goes through a period of severe BM hypolyasia, requiring intensive support and in patients care from specially trained medical and nursing staff (Boon et al,2006). The intensity of treatment is determined by specific prognostic fractures at diagnosis (Maloeny et al, 2009). Before starting treatment of the disease, anaemia is corrected with blood transfusion the risk of bleeding is minimized by transfusion, of platelets and infection is treated.

Additional hydration and (allpurinol) are given to protect renal function against the effects of rapid cell lysis. Remission implies eradication of the leukemic blasts and restoration of normal marrow function. Four weeks of combination chemotherapy is given and current induction schedules achieve remission rates of 90 %(Lissauer and Clayden, 2007). Remission induction regimens may provide 14-28 weeks of multi-agent therapy, with the drugs and schedules used varying depending on the risk of the patient (Tubergen and Bleyer, 2004)

2.8.1.2 Consolidation stage

Consolidation is the second phase of treatment, during this phase using chemotherapy along with continued systemic therapy and sometimes cranial radiation therapy are given to kill lymphoblasts "hiding" in the meanings. Several months of intensive chemotherapy

follow consolidation. This intensification has led to improved survival in pediatric (Malony et al, 2009). The intensification or consolidation phase is designed further reduce the total body cancer cells (Hoffman et al, 2008). If remission has been achieved by induction therapy, the residual disease is attacked by therapy during the consolidation phase. This consist of several courses of chemotherapy, again resulting in periods of marrow hypolysia(Tominson and Kline, 2005).

Intensive chemotherapy given to consolidation and remission improved care rates but at the expense of increased toxicity (Lissauer and Clyden, 2007). There are many different approaches to consolidation, but it is typically high dose, a multidrug treatment that is undertaken for a few months.

2.8.1.3 Maintenance stage

Maintenance treatments with chemotherapeutic drugs prevent disease recurrence once remission has been achieved. Maintenance therapy usually involves lower drug doses and may continue for up to three years(Hoffbrand et al, 2006).

2.8.2. Goals of chemotherapy

There are three main goals for chemotherapy (chemo) in cancer treatment: Cure, Control and Palliation

2.8.2.1. Cure: chemo is used to cure cancer, meaning that the cancer is destroyed – it goes away and doesn't come back. Most health care team doesn't use the word "cure" except as a possibility or intention. So, when giving treatment that has a chance of curing a person's cancer, they may describe it as treatment with curative intent. There are no guarantees, and though cure may be the goal, it doesn't always work out that way. It often

takes many years to know if a person's cancer is cured (Usmani G N,2001).

2.8.2.2 Control: If a cure is not possible, the goal may be to control the disease. Chemo is used to shrink tumours and/or stop cancer from growing and spreading. This can help the person with cancer feel better and live longer. In many cases, cancer doesn't completely go away but is controlled and managed as a chronic disease, much like heart disease or diabetes. In other cases, cancer may even seem to have gone away for a while, but it's expected to come back. Then chemo can be given again(Ribeiro RC et al,2005).

2.8.2.3. Palliation: Chemo can also be used to ease symptoms caused by cancer. This is called palliative chemotherapy or palliation. When the cancer is at an advanced stage, meaning it's not under control and has spread from where it started to other parts of the body, the goal may be to improve the quality of life or help the person feel better. For instance, chemo may be used to help shrink a tumour that's causing pain or pressure. It's important to know that any treatment that's used to reduce symptoms or improve comfort is called palliative care. For example, anti-nausea treatments or pain medicines are palliative and can be used at all stages of treatment. It can be confusing when chemo is used as a palliative treatment because it's most often used to try to cure or control cancer. But when it's used with the goal of comfort, chemo becomes palliative care(Epstein RM and Street RL Jr, 2007).

2.8.2.4. Adjuvant chemotherapy: After surgery to remove cancer, there may still be some cancer cells left behind that cannot be seen. Adjuvant chemotherapy is when drugs are used to kill those unseen cancer cells. Adjuvant treatment can also be given after using radiation to

kill cancer -- such as adjuvant hormone therapy after radiation for prostate cancer (Yeo, and park 2003).

2.8.2.5. Neoadjuvant chemotherapy: Chemotherapy can be given before the main cancer treatment (such as surgery or radiation).Giving chemotherapy first can shrink a large tumour, making it easier to remove with surgery. Shrinking the tumour may also allow it to be treated more easily with radiation. Neoadjuvant chemotherapy can also kill small deposits of cancer cells that cannot be seen on scans or x-rays (Yeo, Park 2003).

2.8.3. Planning chemotherapy treatments

The health care team decides what drug or combination of drugs the patient will get. They choose the doses, how the drugs will be given, and how often and how long a patient will get treatment. All of these decisions will depend on the type of cancer, where it is, how big it is, and how it affects normal body functions and overall health. Cancer can be treated with a single chemo drug, but often several drugs are used in a certain order or in certain combinations (called combination chemotherapy). Different drugs that work in different ways can work together to kill more cancer cells. This can also help lower the chance that cancer may become resistant to any one chemo drug (Pearson SD and Raeke LH, 2000).

Sometimes chemo is the only treatment that the patient needs. More often, chemo is used with surgery or radiation therapy or both. Chemo may be used to shrink a tumour before surgery or radiation therapy. Chemo used in this way is called neoadjuvant therapy; it may be used after surgery or radiation therapy to help kill any remaining cancer cells.

Chemo used in this way is called adjuvant therapy, and it may be used with other treatments if your cancer comes back (Griffith R,2000).

2.8.4. Determining which chemotherapy drugs to use

In some cases, the best choice of doses and schedules for each chemo drug is clear, and most doctors would recommend the same treatment. In other cases, less may be known about the single best way to treat people with certain types and stages of cancer. In these cases, different doctors might choose different drug combinations with different schedules. Factors to consider when choosing which drugs to use include:

- The type of cancer
- The stage of cancer (how far it has spread)
- The patient's age
- The patient's overall health
- Other serious health problems (such as heart, liver, or kidney diseases)
- Types of cancer treatments given in the past (Al Amri,2009).

2.8.5. Determining chemotherapy doses

Most chemotherapy (chemo) drugs are strong medicines that have a fairly narrow range for dose safety and effectiveness. Taking too little of a drug will not treat cancer well and taking too much may cause life-threatening side effects. For this reason, doctors must calculate chemo doses very precisely. Depending on the drug(s) to be given, there are different ways to determine chemo doses. Most chemo drugs are measured in milligrams (mg)(Julie,Elizabeth and Louis,2007).

The overall dose may be based on a person's body weight in kilograms (1 kilogram is 2.2 pounds). For instance, if the standard dose of

a drug is 10 milligrams per kilogram (10 mg/kg), a person weighing 110 pounds (50 kilograms) would get 500 mg (10 mg/kg x 50 kg). Some chemo doses are determined based on body surface area (BSA), which are calculated using height and weight. BSA is expressed in meters squared (m2) (Malony K…etal, 2009).

Because children's bodies process drugs differently, dosages for children and adults differ, even after BSA is taken into account. Children may have different levels of sensitivity to the drugs, too. For the same reasons, dosages of some drugs may also be adjusted for people who:

- Are elderly
- Have the poor nutritional status
- Are obese
- Have already taken or are currently taking other medicines
- Have already had or are currently getting radiation therapy
- Have low blood cell counts
- Have liver or kidney diseases(Mann J.& Truswell A. S.,2002)

2.8.6. Determining a chemotherapy schedule (cycle)

Chemotherapy is commonly given at regular intervals called cycles. A cycle may be a dose of one or more drugs followed by several days or weeks without treatment. This gives normal cells time to recover from drug side effects. Sometimes, doses may be given a certain number of days in a row, or every other day for several days, followed by a period of rest. Some drugs work best when given continuously over a set number of days.

Each drug is given on a schedule that makes the most of its anti-cancer actions and minimizes side effects. If more than one drug is used, the

treatment plan will say how often and exactly when each drug should be given. The number of cycles given may be decided before treatment starts, based on the type and stage of cancer. In some cases, the number is flexible and will take into account how the treatment affects cancer and the person's overall health (Sung L. …etal, 2011)

In most cases, the most effective doses and schedules of drugs to treat specific cancers have been found by testing them in clinical trials. It's important, when possible, to get the full course of chemo, the full dose, and keep the cycles on schedule. This gives a person the best chance of getting the maximum benefit from treatment. There may be times, though, when serious side effects require adjusting the chemo plan (dose and/or schedule) to allow time to recover. Sometimes, might be given supportive medicines to help the body recover more quickly. Again, the key is to give enough chemo to kill the cancer cells without causing other serious problems (O'Conner-Von S., 2006)

2.8.7. How Chemotherapy Drugs Work

More than 100 chemotherapy or chemo drugs are used to treat cancer – either alone or in combination with other drugs or treatments. These drugs are very different in their chemical composition, how they are taken, their usefulness in treating specific forms of cancer, and their side effects. Chemotherapy works with the cell cycle; Chemotherapy drugs target cells at different phases of the process of forming new cells called the cell cycle. The plan of how often doses of each drug should be given based on the timing of the cell phases(Sung L. …etal, 2011).

Cancer cells tend to form new cells more quickly than normal cells and this makes them a better target for chemotherapy drugs. However, chemo drugs can't tell the difference between healthy cells and cancer

cells. This means normal cells are damaged along with the cancer cells, and this causes side effects. Each time chemo is given, it means trying to find a balance between killing the cancer cells (to cure or control the disease) and sparing the normal cells (to lessen side effects).

The cell cycle has 5 phases which are labeled in figure (1) using letters and numbers. Since cell reproduction happens over and over, the cell cycle is shown below as a circle. All the steps lead back to the resting phase (GO), which is the starting point.

After a cell reproduces, the 2 new cells are identical. Each of the 2 cells made from the first cell can go through this cell cycle again when new cells are needed.

- GO phase (resting stage): The cell has not yet to divide. Cells spend much of their lives in this phase. Depending on the type of cell, GO can last from a few hours to a few years. When the cell gets a signal to reproduce, it moves into the Gl phase.
- Gl phase: During this phase, the cell starts making more proteins and growing larger, so the new cells will be of normal size. This phase lasts about 18 to 30 hours.
- S phase: In the S phase, the chromosomes containing the genetic code (DNA) are copied so that both of the new cells formed will have matching strands of DNA. S phase lasts about 18 to 20 hours.
- G2 phase: In the G2 phase, the cell checks the DNA and gets ready to start splitting into 2 cells. This phase lasts from 2 to 10 hours.
- M phase (mitosis): In this phase, which lasts only 30 to 60 minutes, the cell splits into 2 new cells.

This cell cycle is important because of many chemotherapy drugs only on cells that are actively reproducing (not on cells in the resting phase, GO). Some drugs specifically attack cells in a particular phase of the cell cycle (the M or S phases, for example) (Yarbro, and Goodman 2005).

Understanding how these drugs work helps oncologists predict which drugs are likely to work well together. The cancer care team can also plan how often doses of each drug should be given based on the timing of the cell phases (Weiss, 2005).

When chemotherapy drugs attack reproducing cells, they cannot tell the difference between reproducing cells of normal tissues (those that are replacing worn-out normal cells) and cancer cells. The damage to normal cells can cause side effects. Each time chemotherapy is given, it involves trying to find a balance between destroying the cancer cells (to cure or control the disease) and sparing the normal cells (to lessen unwanted side effects) (Jim, Donald, and Roy, 2002).

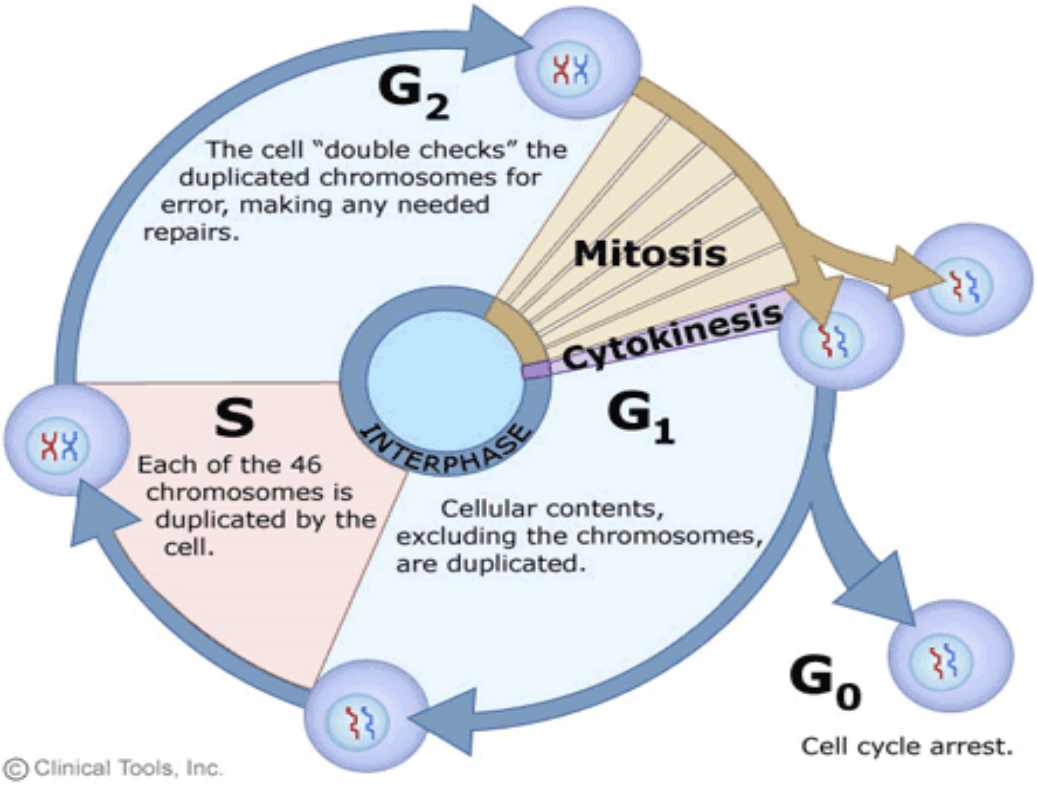

Figure (1) cell cycle

2.8.8. Types of chemotherapy drugs

Chemotherapy drugs can be divided into several groups based on factors such as how they work, their chemical structure, and their relationship with another drug. Some chemotherapy drugs are grouped because they were derived from the same plant. Because some drugs act in more than one way, they may belong to more than one group. Knowing how the drug works are important in predicting effects. This helps oncologists decide which drugs are likely to well together. If more than one drug will be used, this information also(helps them plan exactly when each of the drugs should be given (in which order and how often) (Balis, and Holcenberg, 2002)

2.8.8.1. Alkylating agents

Alkylating agents directly damage DNA to prevent the cancer cell from reproducing. As a class of drills, these agents are not phase-specific; in other words, they work in all phases of the cell cycle. Alkylating agents are used to treating many different cancers, including acute and chronic leukaemia, lymphoma, Hodgkin disease, multiple myeloma, sarcoma, as well as cancers of the lung, breast, and ovary. Because these drugs damage DNA, they can cause long-term damage to the bone marrow. In a few rare cases, this can eventually lead to acute leukaemia. The risk of leukaemia from alkylating agents is "dose-dependent," meaning that the risk is small with lower doses, but goes up as the total amount of the drug used gets higher. The risk of leukaemia after getting alkylating agents is the highest 5 to 10 years after treatment (Tortorice, 2000).

2.8.8.2. Antimetabolites

Antimetabolites are a class of drugs that interfere with DNA and Ribonucleic Acid (RNA) growth by substituting for the normal building blocks of RNA and DNA. These agents damage cells during the S phase. They are commonly used to treat leukaemias, tumours of the breast, ovary, and the intestinal tract, as well as other cancers (Relling, and Dervieux, 2001).

2.8.8.3. Anti-tumour antibiotics

Anthracyclines are anti-tumour antibiotics that interfere with enzymes involved in DNA replication. These agents work in all phases of the cell cycle. Thus, they are widely used for a variety of cancers. A major consideration when giving these drugs is that they can permanently damage the heart if given in high doses. For this reason, lifetime dose limits are often placed on these drugs(Dancey, and Eisenhower, 1996).

2.8.8.4. Topoisomerase inhibitors

These drugs interfere with enzymes called topoisomerases, which help separate the strands of DNA so they can be copied. They are used to treat certain leukaemias, as well as lung, ovarian, gastrointestinal, and other cancers (Beatric, and Brenda, 2000).

2.8.8.5. Mitotic inhibitors

Mitotic inhibitors are often planted alkaloids and other compounds derived from natural products. They can stop mitosis or inhibit enzymes from making proteins needed for cell reproduction. These drugs work during the M phase of the cell cycle but can damage cells in all phases. They are used to treat many different types of cancer including breast, lung, myelomas, lymphomas, and leukaemias. These drugs are known for their potential to cause peripheral nerve damage, which can be a dose-limiting side effect (Amy, and Karch, 2008).

2.8.8.6. Corticosteroids

Steroids are natural hormones and hormone-like drugs that are in treating some types of cancer (lymphoma, leukaemias, and multiple myeloma), as well as other illnesses. When these drugs are used to kill

cancer cells or slow their growth they are considered chemotherapy drugs. Corticosteroids are also commonly used as anti-emetics to help prevent nausea and vomiting caused by chemotherapy. They are used before chemotherapy to help prevent severe allergic reactions (hypersensitivity reactions). When a corticosteroid is used to prevent vomiting or allergic reactions, it is not considered chemotherapy (Amy, and Karch, 2008).

2.8.8.7. Miscellaneous chemotherapy drugs

Some chemotherapy drugs act in slightly different ways and do not fit well into any of the other categories (Amy, and Karch,2008).

2.8.9. Side effects of chemotherapy on the body systems

Although chemotherapy is given to kill cancer cells, it can also damage normal cells. The normal cells most likely to be damaged are those that divide rapidly such as:

2.8.9.1. Gastrointestinal system:

2.8.9.1.1. Stomatitis:

Refers to the inflammation and sores within the mouth that may result from chemotherapy. Similar changes in the throat are called pharyngitis and in the oesophagus (McGuire, et al 1999).

Some chemotherapy drugs can cause sores to develop in the mouth or throat. These drugs affect the rapidly dividing cells that line these areas, making them unable to adequately replace normal cell loss (Beck, 1999).

A microsite is used to refer to inflammation of the mucous membrane layer lining the entire digestive (gastrointestinal) tract from the mouth to the rectum, and the vagina (Sucurr and Judson, 2005).

The first signs of mouth sores occur when the lining of the mouth looks pale and dry. Later, the mouth, gums, and throat may feel sore and become red and inflamed. The tongue may look coated and swollen, leading to trouble swallowing, eating, or talking. Stomatitis, pharyngitis, and esophagitis can lead to bleeding, painful ulcers, and infection (Sonis, et al, 2001).

Mouth, throat, and oesophagus sores are temporary. They usually develop 5 to 14 days after receiving chemotherapy. Stomatitis gradually reverses itself within 2 to 3 weeks and will heal completely once chemotherapy is finished(Keefe, 1998).

Researcher Haughney record that oral and gastrointestinal (Gl) mucositis can affect up to 100% of patients undergoing high-dose chemotherapy and hematopoietic stem cell transplantation, 80% Of patients with malignancies of the head and neck receiving radiotherapy, and a wide range of patients receiving chemotherapy. Alimentary tract mucositis increases mortality and morbidity and contributes to rising health care costs. Consequently, the Multinational Association of Supportive Care in Cancer and the International Society for Oral Oncology assembled an expert panel to evaluate the literature and to create evidence-based guidelines for preventing, evaluating, and treating mucositis (Haughney, 2004)

2.8.9.1.2. Nausea:

It is a vague, unpleasant sensation of sickness or queasiness that may or may not be followed by vomiting. It can be accompanied by symptoms like sweating, light-headedness, dizziness, increased salivation, and weakness. It can lead to retching, vomiting, or both (Suzanne, et al, 2010).

2.8.9.1.3. Vomiting:

Is a process controlled by the vomiting centre that causes the contents of the stomach to be forced out through the mouth. Vomiting can happen right after chemotherapy, or later. If it happens within minutes to hours after chemotherapy, it is called acute vomiting. If it develops or continues for 24 hours or more after chemotherapy, it is called delayed vomiting or delayed emesis. This type sometimes lasts for days (Paolini, 2001).

Anticipatory vomiting can happen when the patient has had experience with nausea and vomiting in the past. This condition response can be stimulated by sights, sounds, or odours. As a result, develop nausea and vomiting when placed in the same situation (for example, before receiving the next chemotherapy treatment). Some types of treatment may help this after it has started, but prevention is best. Although it is not possible to predict the onset, severity, or duration of nausea and vomiting for any one person, certain chemotherapy drugs are more likely to cause nausea and vomiting (Pan, et al, 1999).

Other factors that may affect the amount and severity of nausea and vomiting include:

- Brain metastasis
- Electrolyte imbalances
- Other drugs that are being used (for instance, opioids)
- Prior experiences with motion sickness
- Previous bad experience with nausea and vomiting Fatigue
- Anxiety during treatment
- Heavy alcohol intake (currently or in the past) (Tyler, and Lipma, 2000).

2.8.9.1.4. Loss of Appetite (anorexia) and weight changes

Most chemotherapy medicines cause some degree of anorexia, a decrease in or complete loss of appetite. Loss of appetite, as well as weight loss, may also result directly from the effects of cancer on the body's metabolism (Minami, et al, 2003).

Anorexia may be mild. If it is severe, it may lead to cachexia, a form of malnutrition with muscle loss. Proper nutrition is important during cancer treatment. It helps strengthen the body to fight the disease and infection and also cope with cancer treatments and their side effects. Decreased appetite is generally temporary and improves when chemotherapy is finished. It may take a few weeks after chemotherapy is over for appetite to recover. Some types of chemotherapy may cause a more severe loss of appetite than other types (Higa, et al, 2006).

Weight loss can be a result of appetite loss, vomiting, diarrhoea, and drug side effects. But sometimes people gain weight during cancer treatment. This can be caused by chemotherapy regimens Containing steroids, inactivity, electrolyte imbalances, and retention.

The weight will be monitored during cancer treatment. A dietitian and/or nutritionist may be consulted to help learn ways to try to maintain appropriate body weight (Wood, et al, 2006).

Studies discovered that malnutrition is common among cancer patients this study aimed to determine the overall prevalence of malnutrition among patients undergoing chemotherapy and to determine the predictors of malnutrition among cancer patients (Montoya, et al, 2010)

2.8.9.1.5. Constipation

Constipation is the passage (usually with discomfort) of infrequent hard, dry stool. Also bloating, increased gas, cramping, or pain.

Constipation affects about half of people with cancer and about 3 out of 4 of those with advanced cancer. It can lead to nausea and a decreased appetite (Blanchard, a Hesketh, 2008).

2.8.1.6. Diarrhoea

Diarrhoea is the passage of an increased volume of loose or watery stools several times a day with or without discomfort. Along with diarrhoea, may have gas, cramping, and bloating. Diarrhoea occurs in about 3 out of 4 people who get chemotherapy because it damages the rapidly dividing cells in the digestive (gastrointestinal) tract (Barr, 2008).

Diarrhoea is a common side effect of irinotecan (CPT-Il or Camptosar) and needs to be treated right away to prevent serious dehydration. If a patient getting irinotecan, the patient must follow the doctor's instructions to take medicines to stop diarrhoea right away (Hohenburger and Gretschel, 2003).

2.8.92. Respiratory system:

2.8.9.2.1. Lung damage

It is possible for some chemotherapy drugs, such as bleomycin and carmustine, to permanently damage the lungs. The chance of this is higher if you smoke or get radiation to the chest along with chemotherapy. Age also seems to be an important factor in the development of lung damage. For example, people over 70 years old have about 3 times the risk of developing lung problems from the drug bleomycin (Snyder, and Hertz, 1998).

Lung damage may cause symptoms such as shortness of breath, a non-productive (dry) a cough, and possibly fever. If the chemotherapy drug is stopped early enough in the process, the lung tissue can recover. Because early lung changes may not show up on a chest x-ray, may assess the lungs through pulmonary function tests and arterial blood gas tests. Lung damage cannot be reversed after fibrosis (scarring) has developed (Gupta, et al, 2002).

2.8.9.2.2. Lung infections

Lung infections can be severe consequences of chemotherapy-induced immune defects. Etiological causes of infection include bacteria (most commonly Pseudomonas aeruginosa, Stenotrophomonas maltophilia, and Nocardia species), viruses (eg, respiratory syncytial virus, parainfluenza virus, influenza virus A and B, and cytomegalovirus), and fungi (eg, Aspergillus, Fusarium, and Mucorales species, and Pneumocystis jirovecii). Most infections are caused by bacteria (especially Gram-negative), but viruses are being increasingly identified. Diagnosis is

difficult and frequently time-consuming. Treatment can be ineffective for many patients, particularly those with fungal infection. The greatest hope for the future more targeted anticancer drugs that have fewer side effects on the immune system (Sandro, Francesca, Zelalem, 2008).

2.8.9.2.3. Pulmonary fibrosis

Pulmonary fibrosis (PF) may develop following successful chemotherapy for malignancy, even if such therapy is not combined with radiotherapy. Bleomycin, which is known to induce acute pneumonitis and lung fibrosis, is especially associated with chemotherapy-induced PF, and bleomycin-induced pulmonary fibrosis can occur more than five years after such therapy. Additionally, supplemental oxygen therapy can trigger the onset of pneumonitis and lethal PF in patients who have previously received bleomycin therapy. Careful assessment of lung function via spiroergometry and arterial blood gas analysis during exercise are required if the administration of supplemental oxygen is considered. Two case reports reveal the potentially lethal risk of oxygen for patients who have been treated with bleomycin: (1) a patient with successfully resected and treated basal tongue carcinoma and (2) a patient in remission after being treated for non-Hodgkin lymphoma. Single and double lung transplantation is the only therapeutic option for patients with severe, oxygen-induced PF and should be included as an indication for lung transplantation. Early recognition of pulmonary diffusion abnormalities and establishing a risk profile, as well as consequent monitoring of pulmonary function, may help to avoid or at least reduce the risk of PF induced by oxygen therapy when administered to patients who have previously been given bleomycin (Klein and Wilds, 2005).

2.8.9.3. Urinary system

Chemotherapy drugs are excreted many breakdown products of through the kidneys. These drug by-products can damage the kidneys, ureters, and bladder. If the patients have a history of kidney problems, the patient may be at a higher risk for kidney damage (Yarbro, Frogge, and Goodman, 2005).

2.8.9.4. Nervous System

Some chemotherapy drugs can cause direct or indirect changes in the central nervous system (brain and spinal cord), the cranial nerves, or peripheral nerves. The cranial nerves are connected directly to the brain and are important for movement and touch sensation (feeling) of the head, face, and neck. Cranial nerves are also important for vision hearing, taste, and smell. Peripheral nerves lead to and from the rest of the body and are important in movement, touch sensation, and regulating activities of some internal organs (Winocur, et al, 2006).

2.8.9.5. Integumentary System

Some chemotherapy drugs affect the rapidly growing cells of hair follicles. The hair may become brittle and break off at the surface of the scalp, or it may simply fallout from the hair follicle. While it is certainly not a life-threatening event, it does have a social and psychological impact on many people (Marrs,2006).

2.9. Quality of Life: General Aspects of Quality of Life

Since the 1970s, Quality of Life (QOL) has been widely studied to improve outcomes by raising the standards for treating and managing many chronic disabilities and medical conditions. Quality of Life (QOL) is a critical measure of treatment outcome for people with mental and physical health concerns. However, little research has been conducted toward evaluating outcomes in cancer by utilizing real-world measures, such as employability, self-sufficiency, and social support to gauge treatment success, despite longitudinal research that indicates poor outcomes for people with cancer. Utilizing QOL indicators as the standard for developing treatments and evaluating outcomes in cancer is advantageous (Burgess and Gutstein, 2007).

When a child gets cancer, all family members are individually affected by it. Quality of life is a term that burst into popularity in the 1990s because it seemed to capture the life goals and interests of people in so many walks of life. As a result, academics and professionals in our field took the term "quality of life" and undertook strong efforts to develop its meaning, its measurement, and its application. Many families saw the quality of life as a family challenge and adopted enhancing the family quality of life as a personal goal (Baum, 2008).

Quality of Life (QOL) has been defined by the World Health Organization as individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns, It is a broad concept incorporating the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of the environment (Mugno, et al, 2012).

A study done by Lee et al, (2003) was found that the quality of life for children with cancer may be compromised; and that caring burden on their families can be substantial. Families with children diagnosed with autism reported more profound quality of life effects that families of children with Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder (Lee et al, 2003),

The world health organization quality of life (WHOQOL) instruments, by focusing on individuals' views of their wellbeing, provide a new perspective on the disease. The WHOQOL instruments can form a part of the evaluation of treatments. The WI-IOQOL instruments provide new insights into the nature of the disease by assessing how disease impairs the subjective wellbeing of a person across a whole range of areas the core WHOQOL instruments can assess the quality of life in a variety of situations and population

groups. In clinical practice the WHOQOL instruments may be used with other forms of assessment, giving valuable information that can indicate areas in which a person is most affected and help the practitioner in making the best choices inpatient care. Besides, they may be used to measure the change in the quality of life throughout treatment (WHO, 1997).

2.10. Quality of Life Domains:

2.10.1. The general quality of life:

Quality of life is becoming an important component of the overall assessment in health care settings. Most instruments used for assessing QoL were constructed in the developed countries of North America and Europe. To measure the general quality of life and to evaluate the health status (Saxena et al, 1998).

2.10.2. Physical Domain:

The physical dimension of health is probably the easiest to understand. The state of physical health implies the notion of "perfect functioning" of the body. It conceptualizes health biologically as a state in which every cell and every organ is functioning at optimum capacity and in perfect harmony with the rest of the body (ALgorany, 2010).

Parents of children with cancer are an especially vulnerable population subgroup requiring productive interdepartmental cooperation among relevant Ministries to improve their quality of life and health status, thus creating equal possibilities for their children. The emotional and physical burden of parents as primary careers can be alleviated by providing parents with psychosocial support, specialist care and adequate health and social policy measures (Benjak, 2010).

This facet examines the person's view of his/her ability to get from one place to another, to move around the home, move around the workplace, or to and from transportation services. The focus is on the person's general ability to go wherever he/she wants to go without the help of

others regardless of the means used to do so. The assumption is made that wherever a person is dependent to a significant extent for his/her mobility on another person this is likely to affect the quality of life adversely. Besides, questions address people with mobility difficulties regardless of whether changes in their mobility were sudden or more gradual although it is acknowledged that this is likely to affect the impact on the quality of life significantly(Haydar,..et al,2011).

A person's impairment does not necessarily affect his/her mobility. So, for example, someone using a wheelchair or walking frame may have satisfactory mobility in an adequately adapted home or workplace. Nor does this facet include transportation services (e.g. car, bus) as this is covered in a separate facet (Transport). This facet examines a person's dependence on medication or alternative medicines (such as acupuncture and herbal remedies) for supporting his/her physical and psychological well-being. Medications may in some cases affect a person's quality of life in a negative way (e.g. side-effects of chemotherapy) whilst in other cases, it may enhance the person's quality of life (e.g. cancer patients using painkillers)(Hodgson,..et al,2007).

This facet includes medical interventions that are not pharmacological but on which the person is still dependent, for example, a pacemaker, artificial limb or colostomy bag. The questions do not include detailed enquiry into the type of medication. This facet examines a person's use of his or her energy for work. "Work" is defined as any major activity in which the person is engaged. Major activities might include paid work, unpaid work, voluntary community work, full-time study, care of children and household duties. Because such questions refer to these possible types of major activities, the facet focuses on a person's ability to perform work, regardless of the type of work. The questions do not include how

people feel about the nature of the work that they do, nor do they include the quality of their work environment(Benjak,2010).

2.10.3. Psychological Domain:

The domain of psychological well-being' is associated with negative feelings of mood, sadness, anxiety, and dissatisfaction with oneself. Both mothers and fathers of a child with cancer had highly significantly impaired QOL in this domain (Malhotra et al, 2012).

The emotional and physical burden of parents as primary careers can be alleviated by providing parents with psychosocial support, specialist care and adequate health and social policy measures (Benjak, 2010).

History of chronic disease and religion were related to the QOL in mothers of children with cancer. The parents of children with cancer face higher levels of stress than parents of children with other diseases. The stress is higher among mothers than fathers and mothers reported more anxiety or depression (Yamada et al, 2012).

Nurses and health care workers must create opportunities for children and their parents to communicate about mental health worries to each other and health care professionals. Interventions are urgently needed to assist children to cope with the stress in their lives (Frisch, 2006).

The lower level of the coping mechanism of the family is related to a higher level of stress and tension. Parental coping does not differ with the age of the child with cancer. However, the coping strategies of the parents change over time. Ageing of parents is associated with less coping through reliance on service providers, family support, social withdrawal, and individualism. They usually cope with their religious beliefs and

some other emotional focused strategies. Acquiring social support is a coping strategy which is frequently used by the families and should be encouraged. Coping style can moderate parental stress and decreases the rate of negative outcomes such as depression, social isolation, and spousal relationship problems. The parents of children with cancer should be aware of whether or not they are using healthy coping mechanisms. They need social network support to be able to adjust themselves for their long and difficult journey of caring for the children. Avoidance should be reduced and the use of positive coping strategies should be increased (Ghanizadeh, et al, 2009).

Parent-child relationship; higher quality of mother-child relationships such as maternal warmth and praise decreases internalizing and proceeds externalizing problems. It also diminishes impairments in social reciprocity and repetitive behaviours of the children. The training of the parents of children with cancer improves their positive behavioural transactions with their children, increases satisfaction with their parenting, increases social interactions with their children, and decreases parenting stress and aggression. Mothers who accepted the diagnosis of cancer and resolved their emotion have higher cognitive engagement and supportive engagement in play interactions with the children. In other words, their verbal and nonverbal communications with the children are enhanced and stabilize greater reciprocity (Ghanizadeh et al,2009).

This facet examines the person's personal beliefs and how these affect the quality of life. This might be by helping the person cope with difficulties in his/her life, giving structure to experience, ascribing meaning to spiritual and personal questions, and more generally providing the person with a sense of well-being. This facet addresses people with differing religious beliefs (e.g. Buddhists, Christians, Hindus, Muslims), as well as

people with personal and spiritual beliefs that do not fit within a particular religious orientation. For many people religion, personal beliefs and spirituality are a source of comfort, well-being, security, meaning, sense of belonging, purpose and strength. However, some people feel that religion has a negative influence on their life. Questions are framed to allow this aspect of the facet to emerge.

In recent years, growing research on spiritual health has led the World Health Assembly to consider incorporating spiritual well-being into the WHO definition of health. Spiritual and religious beliefs provide resources for coping with illness (e.g. Pargament, 1997), and can change after diagnosis. However, much research on spiritual health has focused on processes, and outcomes, like the quality of life (QoL), have been less well explored or assessed. Where they exist, existential components of QoL assessments have drawn little attention beyond specific life-threatening illnesses, particularly cancer, (e.g. Functional Assessment of Cancer Therapy.

A study done in Taiwan by Shu, 2009 was found that the religion was negatively correlated with the psychological and environmental domains (Shu, 2009).

2.10.4. Social relationship domain:

The chronic illness frequently affects the quality of the client's social relationships and roles, at the same time clients social support affects their quality of life. Likewise, an individual's socio-cultural backgrounds and relationships influence their response to illness and the nation's quality of life (ALgorany, 2010).

Personal relationships of parents are affected because of the presence of a child with a chronic condition requiring long term care and future concerns. Many times both parents consider themselves responsible for the child's condition and this guilt of causing problems to the child and one's partner impacts the personal relationships. Since, relatives and friends themselves might not be aware of the child's condition and many times, especially in Indian context some of the diseases as something taboo and to be ashamed of, rather than providing support, they often avoid contact with family having a child with the chronic disease. On the other hand, parents of child having disability, also tend to avoid social situations so that their relatives and friends do not get to know of their child's condition and to avoid the embarrassment they may feel because of child's dependency behavioral change and when the side effects and complication appear on the child(Malhotra et al,2012).

A study done in Romania by Roxana found that family quality of life than those of children with cancer, a situation reflected in their initiative to access these services. Families with cancer children benefit more from religious/cultural community support. In general, areas with the lowest results in terms of satisfaction with the family quality of life domains were obtained for financial status, support from others (social) and career. As for opportunities, they also recorded the lowest values for the fields of financial status and support from others (social). The most important predictors for the overall assessment of the family quality of life are family, support from others, career and financial status domains. The significant predictors for the overall satisfaction regarding the family quality of life are family, career and support from services domains (Roxana, 2012).

2.10.5. Environmental domain:

Environmental health is defined by the World Health Organization as those aspects of human health and disease that are determined by factors in the environment. It also refers to the theory and practice of assessing and controlling factors in the environment that can potentially affect health (Scurr and Judson,2005)

Environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments (Relling Dervieux,2001).

Chapter three

Subjects and Methods

Chapter Three

Methodology

This chapter presents the whole study methods and materials and means applied through the process of the study - design, setting and size of sampling methods of data collection and tools and final analytical statistics.

3.1. Design of the study:

Quantitative design an analytical case-control approaches was conducted identify the quality of life domains of their parents from the period of 21of September 2017 to 22 of April 2018. A quantitative descriptive study of purposive sampling conducted to find out the impact of chemotherapy on a child's physical health during the period from 20th September 2017 to the 18th July 2018 in Hiwa Hospital in Sulaimani governorate, Iraq.

3.2. Administrative arrangements:

Before data collection was done, official approval was gained from the health-related authority responsible from Hiwa Hospital to carry out the study (AppendixA, B).

3.3. Ethical consideration:

Informal oral consent was gained from the child and their parents and parent who does not have a child with cancer control. After explaining the purpose and objectives of the study and ensuring the confidentiality of the information.

3.4. The setting of the study:

To obtain the optimum result, the study was conducted in two main settings as follows Hiwa hospital was the first setting where presents as a department of internal medicine since (1993-1994) where later was established Hiwa hospital in (2007) in Qrga / sulaimani city / Kurdistan region of Iraq.

This setting consists of two major parts first for adult's client and the second one for pediatric clients where medical cares as well as medical haematological and oncological are provided.

Pediatric Teaching hospital was the second setting were established in 1970s as a pediatric teaching hospital provides the health care for ill children where their ages less than 13 old and includes emergency and medical units.

3.5. The sampling of the study

To achieve the objectives of the study nonprobability purposive sampling was used of (300) cancer clients who are under chemotherapy were represent (30%) from total Hiwa hospital children with cancer. Accordingly 300 parents of those children were selected to identify their quality of life as study group.

300 children from pediatric teaching hospital who have disese but non cancer clients and their parents were selected as a control group for same purpose.

3.6. Criteria of sample selection:

For optimum findings criteria were approved for selection for the target population of the study:

Criteria of inclusion :(child) cancer clients

1- Child diagnosed as cancer with different types.

2- Ages more than 6 years old.

3- Both genders (male & female)

4- Child undergoing chemotherapy approaches (consolidation)

5- Child from all Iraq governorates who are attended and registered in Hiwa hospital

Criteria of exclusion

1- Any client for less than 6 years or more than 18 years.

2- Any client in ICU in Hiwa hospital or has bad medical condition or statutes.

3- Any client with a disability

4- Any client with chronic disease

Second sample's criteria: (parents as a case) parents of children with cancer

Criteria of inclusion:

1- Both parents

2- Parents of cancer clients undergoing chemotherapy approach.

Criteria of exclusion:

1- Parents who have clients with cognitive impairment

2- Parents whom their children do not participate in the study

Third sample's criteria (parents control group) parents of non-cancer clients

Criteria of inclusion

1- Parents of clients with other medical condition except for cancer or undergoing chemotherapy

2- Parents who accept to participate in the study

3- Parents admitted to a pediatric teaching hospital with their children

Criteria of exclusion

1- Any parents have a child with cognitive impairments

2- Any parents have a child with cancer and undergoing chemotherapy.

3.7. Methods of data collection

The data was collected by the researcher through the following techniques:

A- Interviewing technique:

1. A direct interview was used with the child for more than 6 years after gaining verbal informal consent from each child and their parents.

2. Directed interviewing were used to all who accepted to participate in the study including both samples parents of cases (study group) and parents of control (control group).

B- Questionnaire format: was the tool of data collection and was administered by the researcher

3.8. Tools of data collection:

Through the extensive revision of relevant literature of international and national studies as well as WHO articles questionnaire was constructed consequently for the study presented as follows:

Part one: (socio-demographic attributes of cancer clients ..... items)

This part includes all socio-demographic data of the cancer clients under chemotherapy such as age, gender, order, race, school class, residency, number of siblings and age of diagnosis.... etc.

Part two: (effect of chemotherapy approach .... items)

It consists of related data that considered with the side effect of chemotherapy on the child's physical health dimension

Part three: (sociodemographic attributes .... items)

This part includes all socio-demographic data of the parent of children as cancer clients who are undergoing chemotherapy includes the level of education, occupations, marital status, economic status, etc. for both mothers and fathers.

In addition to other relevant data such as:

- The family history of cancers and other chronic diseases
- Children's school performance
- The family history of chemotherapy
- Consanguinity between parents

Part four: quality of life's dimension, to measure the parent's quality of life, a standardized questionnaire of the world health organization for assessment of the quality of life (WHOQOL-BREF-1996) more precisely it's Slovak version was used with examining the quality of life by five domains:

1. General domain: this is the last domain to examine the general health of the person by asking them how to rate their quality of life and how satisfied in their health.

2. Physical domain: maps the extent to which pain affects the individual's life all over the energy sleep and rest also in this domain assess the level of independence for mobility, depending on the medication, activity of daily living and work capacity.

3. Psychological domain investigates the extent to which people are satisfied with their life if they perceived it. It also focuses on the frequency of the occurrence of negative emotional states as despair, depression, anxiety, also in this fed investigate to what extent life been meaningful.

4. Social domain: reflects the satisfaction with personal relationships, sex life as well as the support that people receive from their friends and the local community.

5. Environmental domain: is fed with questions investigating the level of quality of life about environmental factors-feeling of safety and quality of the environment of people, accessibility of financial and information resources or health services.

All these facets of quality of life domains were used for both parents (mothers and fathers) of the study sample as well as for parents of the control group by the researcher.

All these facets of quality of life domains were used for both parents (mothers and fathers) of the study sample as well as for parents of the control group by the researcher. (Appendix C)

3.9. Pilot study:

Before the original study, a pilot study was conducted by the researcher on (10 children) as cancer clients who were selected from Hiwa hospital as well as (10 parents) whom their children are undergoing chemotherapy randomly from the period of 11 of June 2017 to 20 of June 2017 then excluded from the study.

The objectives of this pilot study are to:

1- identifications of barriers encountered

2-estimation of time required for data collection

3- determinate of the reliability of the tool

4- find out whether the tool is understandable and clear for the target population

The results of the pilot study found through correlation coefficient test for each domain was the following:

The *side effect of chemotherapy was (r=0.97)

*quality of life of parent was (r=0.94)

It was significant at P value <_ 0.01

This means that the questionnaire as a tool of the study was adequately reliable; the time needed to be was (30-40) minutes to full out the questionnaire format.

3.10. The validity of the study instruments:

The content validity of the early instrument was determined initially through panels of experts from different specialities to investigate the clarity; relevancy and adequacy of the questionnaire to achieve the present objectives of the study panel of (17) experts.

The expert's responses were positive towards the study instruments, some changes & modification were applied concerning the expert's suggestion and recommendation.

Finally, the questionnaire was considered valid to viable for data collection(Appendix D).

3.11. Reliability

Reliability of the tool of the study was determined through the compilation of Pearson product-moment correlation through correlation coefficient of the study refers to its consistency of particular methods of measuring or observing the same phenomena (Nies Wiadomy, 2008)

And it was the value of followings:

Part of the side effect of chemotherapy (r=0.97)

While the part of the parent's quality of life the value was (r=0.97)

The following formula was used to estimate the value of reliability:

$$r = \frac{n\sum XY - \left(\sum X\right)\left(\sum Y\right)}{\sqrt{\left[n\sum X^{11} - \left(\sum X\right)^{11}\right]\left[n\sum Y^{11} - \left(\sum Y\right)^{11}\right]}}$$

r = the correlation coefficient for variable X and y

n = number of sample

X = an individual score for variable x (dependent)

Y = an individual dual score for variable y (independent)

$\sum$ = the summation of.

XY= summation of test and retest (Blaire & Taylore, 2008)

3.12. Rating scale and scores

For obtaining the valuable findings, all data were analyzed by SPSS version 23 and the results were presented in relative frequency tables, the level of significance was set at ≤ 0.05.

The tool of the study (questionnaire format) was scaled and scored separately according to the international literature according to each part concerned:

Part one (side effects of chemotherapy):

This part of study was scaled and scored according to the items listed as follows:

Always 3

Never 2

Sometimes 1

Therefore the effects were distributed on levels of effects as follows

Low effect (1-1.66),

Moderate effect (1.67-2.33)

High effect (2.34-3.0).

Part two (quality of life of parents):

The items of this part of the questionnaire were scaled for 5 levels of scales according to WHO brief copy of quality of life and were used for both groups of parents (study & control groups) & as followings:

Scale	Score
1- Not at all.	1
2- A little amount	2
3- A moderate amount	3
4- Very much	4
5- An extreme amount	5

1. Very satisfied 1
2. Dissatisfied 2
3. Neither satisfied nor dissatisfied 3
4. Satisfied 4
5. Very satisfied 5

1. Very poor 1
2. Poor 2
3. Neither poor nor good 3
4. Good 4
5. Very good 5

(WHO, 1996)

According to the severity of problem the data classified as 3 levels and measured consequently as follows:

Low severity (0-1.49)

Moderate (1.50-2.84)

High (2.85-3)

3.13. Sample size estimation

The researcher would like to mention in this chapter that initially for selecting the sample of the target population of children cancer clients has followed the statistical Yamane formula as follows:

Sample size* $n = \frac{N}{1 + N(e)^2}$

* Where n = Sample size

N = Population size

e = Level of precision or Sampling of Error = 0.05

Sample size = (1050)/ 1+ (1050) * $(0.05)^2$ = 290 cases

Notes: 1050 is the Population size in Hiwa Teaching Hospital in Sulaimani Governorate, for getting more representative sample size and power of the study the researcher selected 300 cases as a study sample.

3.14. Statistical analysis:

Data and all parts of the study were analyzed through the application of statistical procedures as follows:

3.14.1 Descriptive statistics:

a- Frequency

b- Percentage = $\frac{\sum f}{n} X100$

3.14.2 Inferential Statistical Methods:

In addition to both types of statistics, the researcher has measured the severity of the problems of cancer clients health as follows:

$$M.S = \sum_{i=1}^{r} fi$$

Parametric T test to find out the level of the significancy

3.15. Limitation of the study:

It's worthwhile to mention that researcher faced during data collection methods many difficulties and barriers to go on

1. This topic is hot topic the communication with this sort of patients' needs strength and high level of stamina to control the researcher reactions during interview were many of them cry and complained and a matter of facts the researcher cry every day of interview after returning home.
2. Efforts and exhausting time are needed for interviewing with this large numbers of parents that reached (1,500) in the both group.
3. The setting of study was only hematological oncology hospital receive daily huge numbers from all Iraqi governorates with limited facility, overcrowding attendance and spaces for interview.

4. Lack of any eligible tool and formal scale in our country or Kurdistan region to have valid measurement and followed by research procedures.
5. Shortage of studies in Iraq as well as in Kurdistan region concerned with effectiveness of chemotherapy and its burden on their families particularly for children which was crucial time for the researcher.
6. Shortage of time and limited by concerned agencies where the researcher has no opportunity to be late for conductivity.
7. Its painful to say that the researcher lost her supervisor in mid-way of the study by actually with cancer and passed away in the mid-way of the study when was emotional and hard time for researcher to go on.

Chapter four

Results

Chapter Four

Results

In this chapter show that the presented results of the data analysis related to the objectives of the study:

Part one child with cancer

Table 1: Sociodemographic attributes of 300 children with cancers in Hiwa Hospital

Items	Children's socio-demographic characteristics	No.	%
Age group (years)	7–10	161	53.7
	11–14	121	40.3
	15–18	18	6.0
Gender	Male	160	53.3
	Female	140	46.7
Ethnicity	Kurdish	277	92.3
	Arabic	23	7.7
Residency	Urban	110	36.7
	Suburban	184	61.3
	Rural	6	2
	Total	**300**	**100**

The results of analyzing the collected demographic data of the patients are presented in Table 1. As demonstrated in this table, the age of the majority of the child cancer patients in the sample was 7–10 years (53.7%), followed by the age group 11–14 years (40.3%), while the 15–18 year age group was the least represented (6.0%). Males represented 53.3% of the sample, the female was (46.7%), and the male-to-female ratio was 1.41:1. The majority of the sample consisted of Kurdish individuals (92.3%), while a limited number of them (7.7%) were Arabs. Moreover, most of the patients were from suburban areas (61.3%),

followed by 36.7% living in cities, and 2% in villages. The cohort also consisted of children who were number second in birth order and those with 1–4 siblings.

Table 2: Clinical characteristics of 300 children with cancers in Hiwa Hospital

Items	**Clinical conditions of children**	**No.**	**%**
Types of cancer	ALL	128	42.7
	Neuroblastoma	37	12.3
	Ewing sarcoma	26	8.7
	Osteosarcoma	23	7.7
	Rhabdomyosarcoma	20	6.7
	Medulloblastoma	17	5.7
	AML	10	3.3
	Nasopharyngeal carcinoma	10	3.3
	Astrocytoma	8	2.7
	Non-Hodgkin lymphoma	7	2.3
	Ependymoma	6	2
	Wilms' tumor	5	1.7
	Hodgkin's lymphoma	3	1
Birth order	1st	75	25
	2nd	109	36.3
	3rd	81	27
	4th	21	7
	5th	8	2.7
	6th	2	0.7
	7th	4	1.3
Number of siblings	1–4	252	84
	5–8	48	16
Age at diagnosis/years	1–9	163	54.3
	10–18	137	45.7
Children's condition affecting school attendance	Yes	300	100
	Total	**300**	**100**

The results of analyzing the data collected on the patients' clinical characteristics are indicated in Table 2 which shows the distribution of children according to the types of cancer, indicating that the majority of the patients (41.7%) have acute lymphoblastic leukemia (ALL), followed by neuroblastoma (12.3%), and in the declining order of prevalence by Ewing sarcoma (8.7%), osteosarcoma (7.7%), Rhabdomyosarcoma (6.7%), Medulloblastoma (5.7%), AML (3.3%), Nasopharyngeal carcinoma (3.3%), Astrocytoma (2.7%), Non-Hodgkin lymphoma Ependymoma (2.3%) and Wilms' tumor (1%). Second in birth order was reported to be 36.3% of the participants, followed by third in order (27%) and firstborn (25%). Most of the children (84%) had 1-4 siblings, and 16% had 5 to 8 brothers or sisters. The majority of the patients were diagnosed before 10 years of age (63%), while the remaining were diagnosed later. All the child cancer patients in the sample had experienced problems during schooling, and their condition had affected the school attendance.

Table 3: Side effects of chemotherapy on the physical health of children with cancers

No.	Side Effect of Chemotherapy on the child physical health	Always		Sometimes		Never		Mean of score	Severity
		F	%	F	%	F	%		
A.	**Gastrointestinal tract**								
1	Abdominal pain	54	18	61	20.3	185	61.7	1.56	Low effect
2	Taste change	105	35	123	41	72	24	2.11	Moderate effect
3	Loss of appetites	124	41.3	119	39.7	57	19	2.22	Moderate effect
4	Nausea	116	38.7	101	33.7	83	27.7	2.11	Moderate effect
5	Vomiting	43	14.3	89	29.7	168	56	1.58	Low effect
6	Sore mouth or ulcer	42	14	62	20.7	196	65.3	1.48	Low effect
7	Diarrhoea	6	2	23	7.7	271	90.3	1.11	Low effect
8	Bloating	25	8.3	29	9.7	246	82	1.26	Low effect
9	Constipation	21	7	21	7	258	86	1.21	Low effect
B.	**Neurological system**								

1	Headache	61	20.3	90	30	149	49.7	1.7	Low effect
2	Drowsiness	15	5	113	37.7	172	57.3	1.47	Low effect
3	Sleep disturbance	43	14.3	100	33.3	157	52.3	1.62	Moderate effect
4	Numbness	58	19.3	49	16.3	193	64.3	1.55	Low effect
5	Convulsion	21	7	47	15.7	232	77.3	1.29	Low effect
C	**Integumentary**								
1	Itching	0	0	74	24.7	226	75.3	1.24	Low effect
2	Sweating	12	4	50	16.7	238	79.3	1.24	Low effect
3	Skin dryness	8	2.7	44	14.7	248	82.7	1.2	Low effect
4	Skin ulceration	7	2.3	19	6.3	274	91.3	1.11	Low effect
5	Skin discolouration	21	7	21	7	258	86	1.21	Low effect
D.	**Musculoskeletal**								
1	Muscle spasm	116	38.7	68	22.7	116	38.7	1.97	Moderate effect
2	Muscle pain	150	50	80	26.7	70	23.3	2.26	Moderate effect
3	Joint pain	143	47.7	86	28.7	71	23.7	2.24	Moderate effect
4	Back pain	112	37.3	92	30.7	96	32	2.05	Moderate effect
E.	**Respiratory system**								
1	Cough	34	11.3	64	21.3	202	67.3	1.44	Low effect
2	Dyspnea	6	2	14	4.7	280	93.3	1.08	Low effect
3	Cyanosis	1	0.3	7	2.3	292	97.3	1.03	Low effect
F.	**Cardiovascular system**								
1	Palpitation	1	0.3	19	6.3	280	93.3	1.07	Low effect
2	Tachycardia	1	0.3	5	1.7	294	98	1.02	Low effect
3	Bradycardia	2	0.7	6	2	292	97.3	1.03	Low effect
4	Fever	34	11.3	82	27.3	184	61.3	1.5	Low effect
5	Chill	10	3.3	31	10.3	259	86.3	1.17	Low effect
G.	**Urological system**								
1	Difficulty in urination	6	2	1	0.3	293	97.7	1.04	Low effect
2	Dysuria	3	1	9	3	288	96	1.05	Low effect
3	Edema	1	0.3	1	0.3	298	99.3	1.01	Low effect

The results of analyzing the side effects of chemotherapy are presented in Table 3. As shown in this table, chemotherapy protocol can be associated with the different side effects on the physical health of children in terms of effects on different body systems.

According to Table 3, the highest score for the effects of chemotherapy on the musculoskeletal system was based on the moderate effect scores (2.26–1.97). Among these symptoms, the highest score (2.26) was reported for muscle pain, followed by that for joint pain (2.24), back pain (2.05), and muscle pain (1.97).

Moreover, the next highest scores for the children's complaints of side effects from chemotherapy were for the gastrointestinal tract. The most prevalent complaint was loss of appetite (81%), recording a moderate score of (2.2), followed by nausea and change in taste, both recording a moderate effect of severity (2.11). The remaining symptoms, such as vomiting, abdominal pain, sore mouth, diarrhoea, bloating, and constipation recorded scores for low severity (1.58, 1.56, 1.48, 1.11, 1.26, and 1.21, respectively).

Also, the neurological complaints exerted effects on children receiving chemotherapy; approximately, half of them complained of sleep disturbance, which recorded a moderate effect of severity (1.26). Subsequently, numbness in the extremities was scored at 1.55, followed by drowsiness (1.47). About 20% of the children complained of convulsions scored at 1.29 with a low severity effect. Finally, the headache recorded a low effect score (1.7), and about half of the children complained of headaches (50.3%).

Among the side effects representing other systems, the cough was most prevalent, recording a low effect score of (1.44), followed by dyspnea (1.08) and cyanosis (1.03).

Next, the integumentary system included itching and sweating in terms of low effect severity of the side effects (1.24), followed by skin dryness and skin discolouration (1.2), and finally skin ulceration (1.11).

In terms of the effects of chemotherapy on the cardiovascular system, an increase in the child’s body temperature had a low effect scored at 1.5 and chill at 1.17. The feeling of palpitation was scored at 1.07, while tachycardia and bradycardia recorded low severity effects at 1.02 and 1.03, respectively.

Finally, regarding the urological system, difficulty in urination received a low effect score of 1.04, followed by dysuria (1.05) and edema (1.01).

Part two: parents of a child with cancer (study sample) and parents of child without cancer

Table 4. Socio-demographic characteristics of mothers of children with cancers

Item	**[No (%)]**	
	Case	**Control**
Age (year)		
19-30	55 (18.3)	164 (54.7)
31-42	208 (69.3)	116 (38.7)
43-54	37 (12.3)	20 (6.7)
Education		
Illiterate	57 (19)	55 (18.3)
Able to read and write	66 (22)	47 (15.7)
Primary school	135 (45)	50 (16.7)
Secondary school	23 (7.7)	78 (26)
Institute graduate	6 (2)	45 (15)
College graduate	13 (4.3)	25 (8.3)
Occupation		

Government employee Non-government employee Housewife	32 (10.7) 21 (7) 247 (82.3)	66 (22) 33 (11) 201 (67)
Marital status		
Married	300 (100)	300 (100)
Consanguinity of parents		
Yes No	188 (62.7) 112 (37.3)	75 (25) 225 (75)
Family economic status		
Sufficient Insufficient Barely sufficient	47 (15..7) 203 (67.7) 50 (16.7)	249 (83) 46 (15.3) 5 (1.7)
Total	300 (100)	300 (100)

Table 4 describes the sociodemographic characteristics of mothers of both case and control groups. The age of the sample group in the cohort was between 31 and 42 years (69.3%), while in the control group, about 54.7% were aged between 19 and 30 years. Moreover, the age group 43-54 years constituted 12.3% of the sample group and 6.7% of the control group. Next, the education level of the mothers ranged from illiterate to college graduate, the majority was primary school graduates (45.0%), the lowest percentage of the study sample constituted of institute graduates

(2%), 26% graduated from secondary school, and only 8.3% graduated from college among the control group.

In both the case and control groups, 82.3% and 67% of the mothers were housewives, respectively, and all the participants were married. Based on the consanguinity between parents, about 62.7% of the cases were relatives, whereas 75% of the control group was not related. Approximately, 67% in the case group scored the socioeconomic status as insufficient, while 83% in the control group scored the same as sufficient.

Table 5: mother's clinical data in both cases and control groups

Mother's Clinical Data	Group							
	Case				Control			
	yes		no		yes		no	
	No.	%	No.	%	No.	%	No.	%
do you have any chronic disease	52	17.3	248	82.7	12	4	288	96
family history of cancer	139	46.3	161	53.7	12	4	288	96
family history of chemotherapy	130	43.3	170	56.7	14	4.7	286	95.3
personal history smoking	3	1	297	99	20	6.7	280	93.3
personal history hookah	0	0	300	100	33	11	267	89
personal history alcohol consumption	1	0.3	299	99.7	57	19	243	81
does your child condition effects on his/her school performance	300	100	0	0	40	13.3	260	86.7

This table indicates that majority of the participant case and control group they don't have chronic disease while a family history of cancer among case group it was (53.7%) but in the control group only (4%) of them they have a previous history with cancers. According to chemotherapy (56.7%) of the mothers of the children with cancers they don't have a history of chemotherapy while (95.3%) of the control group they didn't have a history with chemotherapy. The entire mother in cases group they didn't have any history of hookah and alcohol consumption. According to the control group (90.0%) of them, they don't have a history of smoking while (82.3%) of them don't have a history of hookah and all of them they don't consume alcohol.

Table 6. Socio-demographic characteristics of fathers of children with cancer

Father's Socio-demographic Characteristics		**Group**			
		Case		**Control**	
		F	**%**	**F**	**%**
age of father	20-32	31	10.3	98	32.7
	33-45	197	65.7	175	58.3
	46-58	72	24	27	9
	Total	**300**	**100**	**300**	**100**
education father	illiterate	29	9.7	30	10
	able to read and write	14	4.7	48	16
	primary school	108	36	67	22.3
	secondary school	123	41	70	23.3
	institute graduate	20	6.7	46	15.3
	college graduate	6	2	39	13
	Total	**300**	**100**	**300**	**100**
occupation of father	governmental employee	110	36.7	90	30
	non-governmental employee	162	54	195	65
	jobless	27	9	13	4.3
	Retire	1	0.3	2	0.7
	Total	**300**	**100**	**300**	**100**

Table 6 describes the father's sociodemographic characteristics in both groups. The majority of the participants in the case and control groups were aged between 33 and 45 years (65.7% and 58.3%, respectively). The educational qualification in case and control groups was a secondary school for most of the fathers, and the majority of the participants were non-governmental employees in both groups.

Table 7: father's clinical data in both cases and control groups

Father's Clinical Data	Group							
	Case				Control			
	yes		no		yes		No	
	F	%	F	%	F	%	F	%
do you have any chronic disease	42	14	258	86	36	12	264	88
personal history of smoking	103	34.3	197	65.7	121	40.3	179	59.7
personal history hookah	51	17	249	83	140	46.7	160	53.3
personal history of alcohol consumption	2	0.7	298	99.3	119	39.7	181	60.3

Table 7 reveals that only (14%) of the fathers of children with cancer they have a history of chronic disease. And the majority of the case group they didn't have a history of smoking, hookah and alcohol consumption respectively was present (65.7%, 83% and 99.3%). In another hand (88%) of the control group, they don't have a history with chronic disease. Regarding the smoking, hookah and alcohol consumption this table shows that the highest percentage of the sample they don't have a history with them.

Table 8. The general quality of life domain (Domain 1) for mothers of children with cancers

Item	Frequency [No. (%)]	
	Case	**Control**
How would you rate your quality of life?		
Very poor	40 (13.3)	1 (0.3)
Poor	80 (26.7)	10 (3.3)
Neither poor nor good	74 (24.7)	75 (25)
Good	83 (27.7)	119 (39.7)
Very good	23 (7.7)	95 (31.7)
Mean score ± SD	2.89 ± 1.17	3.99 ± 0.85
How satisfied are you with your health?		
Very dissatisfied	21 (7)	0 (0)
Dissatisfied	46 (15.3)	13 (4.3)
Neither satisfied nor dissatisfied	92 (30.7)	38 (12.7)
Satisfied	112 (37.3)	152 (50.7)
Very satisfied	29 (9.7)	97 (32.3)
Mean score ± SD	3.27 ± 1.05	4.11 ± 0.78

Table 8 describes the distribution of the general quality of life domains in the mothers of the case and control samples. 27.7% and 39.7% of participants rated good for their quality of life, while 37.3% and 50.7% were satisfied with their general health in both groups, respectively. The mean score and SD of general health, i.e., how they rated their quality of

life and how satisfied were they with their health was 2.89 ± 1.17 and 3.99 ± 0.85, 3.27 ± 1.05 and 4.11 ± 0.78, in the case and control groups, respectively.

Table 9. Physical quality of life domain (Domain 2) of mothers of children with cancers

Item	**Frequency [No. (%)]**	
	Case	**Control**
Sensory function: To what extent do you feel that physical pain prevents you from doing what you need to do?		
Not at all	4 (1.3)	6 (2)
A little amount	30 (10)	20 (6.7)
A moderate amount	84 (28)	21 (7)
Very much	139 (46.3)	91 (30.3)
Extremely amount	42 (14.3)	162 (540
Mean score ± SD	3.63 ± 0.89	4.27 ± 0.99
Energy and fatigue: Do you have enough energy for everyday life?		
Not at all	0 (0)	0 (0)
A little amount	46 (15.3)	0 (0)
A moderate amount	75 (25)	28 (9.3)
Mostly	95 (31.7)	129 (43)
Completely	84 (28)	143 (47.7)
Mean score ± SD	3.72 ± 1.03	4.38 ± 0.65

Sleep and rest: How satisfied are you with sleep?		
Very dissatisfied	25 (8.3)	4 (1.3)
Dissatisfied	119 (39.7)	36 (12)
Neither satisfied nor dissatisfied	89 (29.7)	96 (32)
Satisfied	54 (18)	89 (29.7)
Very satisfied	13 (4.3)	75 (25)
Mean score ± SD	2.70 ± 0.99	3.65 ± 1.02
Mobility: How well are you able to move around?		
Very poor	9 (3)	11 (3.7)
Poor	18 (6)	2 (0.7)
Neither poor nor good	67 (22.3)	12 (4)
Good	150 (50)	97 (32.3)
Very good	56 (18.7)	178 (59.3)
Mean score ± SD	3.75 ± 0.92	4.43 ± 0.89
The activity of daily living: How satisfied are you with the ability to perform your daily living activities?		
Very satisfied	14 (4.7)	11 (3.7)
Dissatisfied	17 (5.7)	2 (0.7)
Neither satisfied nor dissatisfied	83 (27.7)	34 (11.3)
Satisfied	29 (43)	125 (41.7)
Very satisfied	57 (19)	128 (42.7)
Mean score ± SD	3.66 ± 1.00	4.15 ± 0.93
Dependence on medical substances and aids: How much medical treatments do you need to function in daily life?		

Not at all	124 (41.3)	197 (65.7)
A little amount	38 (12.7)	42 (14)
A moderate amount	28 (9.3)	21 (7)
Mostly	60 (20)	13 (4.3)
Completely	50 (16.7)	27 (9)
Mean score ± SD	2.58 ± 1.57	1.86 ± 1.34
Work capacity: How satisfied are you with your capacity for work?		
Very satisfied	14 (4.7)	3 (1)
Dissatisfied	23 (7.7)	2 (0.7)
Neither satisfied nor dissatisfied	107 (35.7)	45 (150
Satisfied	115 (38.3)	97 (32.3)
Very satisfied	41 (13.7)	153 (51)
Mean score ± SD	3.48 ± 0.97	4.31 ± 0.82

Table 9 describes the distribution of the physical quality of life of the mothers concerning the domains in case and control samples, which were rated as the effect of physical pain on the sensory, function (46.3% and 30.3%, respectively. Also, the mean score and SD of this facet were 3.63 ± 0.89 and 4.27 ± 0.99, respectively. The majority of the mothers who had a child with cancer undergoing chemotherapy were rated for sufficient energy for daily life (31.7% with the mean score and SD of 3.72 ± 1.03). On the other hand, the control group exhibited sufficient energy for everyday activities (4.38 ± 0.65). The highest percentage of

the case group (39.7% with the mean score and SD 2.70 ± 0.99) was rated as dissatisfied concerning sleep and rest, whereas only 32% of the control group was rated neither satisfied nor dissatisfied (3.65 ± 1.02). Simultaneously, we found that only half of the mothers who had a child undergoing chemotherapy rated good for the ability to get around (3.75 ± 0.92), and 59.3% of the control group rated very good (4.43 ± 0.89). Most of the participants among case and control groups did not depend on medication for daily life functioning 41.3% and 65.7% with a mean score and SD of 2.58 ± 1.57 and 1.77 ± 1.28, respectively).

Regarding performing their daily living activities, 43% of the case group (3.66 ± 1.00) and 42.7% of the control group rated very satisfie (4.19 ± 0.92). Additionally, we found that 38.3% of the mothers in the case group and half the mothers in the control group were very satisfied with their capacity to work (4.31 ± 0.82).

Table 10. Psychological quality of life domain (Domain3) of mothers of children with cancers

Item	Frequency [No. (%)]	
	Case	Control
Positive feeling- how much do you enjoy life?		
Not at all	7 (2.3)	0 (0)
A little amount	66 (22)	0 (0)
A moderate amount	112 (37.3)	6 (2)
Very much	101 (33.7)	127(42.3)
Extremely amount	14 (14.3)	167 (55.7)
Mean score ± SD	3.16 ± 0.90	4.53 ± 0.53
Thinking, learning, memory and concentration- how well are you able to concentrate?		
Not at all	7(2.3)	0 (0)
A little amount	9 (3)	1 (0.3)
A moderate amount	60 (20)	60 (20)
Very much	135(45)	111 (37)
Extremely amount	89 (29.7)	128 (42.7)
Mean score ± SD	3.96 ± 0.91	4.22 ± 0.77
Bodily image and appearance- are you able to accept your bodily appearance?		
No at all	25 (8.3)	4 (1.3)
A little amount	119 (39.7)	36 (12)
A moderate amount	89 (29.7)	96 (32)

Mostly	54 (18)	89 (29.7)
Completely	13 (4.3)	75 (25)
Mean score ± SD	3.80 ± 1.06	4.11 ± 0.74
Self-esteem–how satisfied are you with yourself?		
Very dissatisfied	7 (2.3)	3 (1)
Dissatisfied	39 (13)	2 (0.7)
Neither satisfied nor dissatisfied	59 (19.7)	57(19)
Satisfied	161 (53.7)	158 (52.7)
Very satisfied	34 (11.3)	80 (26.7)
Mean score ± SD	3.58 ± 0.93	4.03 ± 0.75
How often do you have a negative feeling such as blue mode, despair and depression?		
Never	62 (20.7)	110 (36.7)
Seldom	70 (23.3)	76 (25.3)
Quite often	66 (22)	77 (25.7)
Very often	66 (22)	30 (10)
Always	36 (12)	7 (2.3)
Mean score ± SD	3.18 ± 1.31	2.16 ± 1.10
Spirituality, religion and personal beliefs- to what extent do you feel your life to be meaningful?		
Not at all	25 (8.3)	1 (0.3)
A little amount	72 (24)	10 (3.3)
A moderate amount	75 (25)	26 (8.7)
Very much	99 (33)	141 (47)

An extremely amount	29 (9.7)	122 (40.7)
Mean score ± SD	3.11 ± 1.13	4.24 ± 0.77

Table 10 explains the psychological quality of life of the mothers in case and control samples. We found that among the case groups, the highest percentage had a positive feeling (37.3%, 3.16 ± 0.90) that was rated as moderate concerning enjoyment in life, while control group rated extreme (55.7%, 4.53 ± 0.53). According to how they concentrate, 45% (3.96 ± 0.91) of the mothers in the case group were rated as very much for able to concentrate, and 42% of the mothers who did not have a child with cancer (4.22 ± 0.77) rated as extreme ability to concentrate. The majority of the samples (34.7%, 3.80 ± 1.06) was mostly accepting of the body appears as compared to the control group (44.7%, 4.11 ± 0.74). More than half of the samples among case and control groups were mostly satisfied with their self (3.58 ± 0.93 and 4.03 ± 0.75, respectively).

Additionally, 23.3% of the case group rated seldom for having a negative feeling (3.18 ± 1.31), while maximal proportion among the control group never had a negative feeling (36.7%, 2.16 ± 1.10). On the other hand, the majority of the mothers in both groups rated as their life being meaningful (3.11 ± 1.13 and 4.24 ± 0.77, respectively).

Table 11. The social quality of life domain (Domain4) of mothers of children with cancers

Item	Frequency [No. (%)]	
	Case	**Control**
Personal relationship- how satisfied are you with your relationships?		
Very dissatisfied	16 (5.3)	0 (0)
Dissatisfied	32 (10.7)	18 (6)
Neither satisfied nor dissatisfied	79 (26.3)	52 (17.3)
Satisfied	140 (46.3)	145(48.3)
Very satisfied	33 (11)	85 (28.3)
Mean score ± SD	3.47 ± 1.00	3.99 ± 0.83
Sexual activities-how satisfied are you with your feeling toward the opposite sex?		
Very dissatisfied	60(20)	47 (15.7)
Dissatisfied	103 (34.3)	61 (20.3)
Neither satisfied nor dissatisfied	75 (25)	78 (26)
Satisfied	60 (20)	75 (25)
Very satisfied	2 (0.7)	39(13)
Mean score ± SD	2.47 ± 1.04	2.99 ± 1.26
Social support- how satisfied is with the support you get from your friends?		
Very dissatisfied	18 (6)	4 (1.3)
Dissatisfied	62 (20.7)	27 (9)
Neither satisfied nor dissatisfied	77 (25.7)	90 (30)

Satisfied Very satisfied	117 (39) 26 (8.7)	122 (40.7) 57 (19)
Mean score ± SD	3.23 ± 1.06	3.67 ± 0.92

Table 11 indicates the distribution of the social relationship of the mother with the quality of life domains in the case and control samples. The majority of the individuals in the case and control groups were satisfied with the personal relationship (3.47 ± 1.00 and 3.99 ± 0.83, respectively). Also, the support from the friends was satisfactory for both groups (3.23 ± 1.06 and 3.67 ± 0.92, respectively). Among the case group, 34.3% (2.47 ± 1.04) were dissatisfied with the opposite sex, whereas 26% (2.99 ± 1.26) of the control group were neither satisfied nor dissatisfied with the opposite sex.

Table 12. Environmental quality of life domain (Domain5) of mothers of children with cancers

Mother's Quality of life items		Group			
		Case		Control	
		No.	%	No.	%
Domain 4					
Freedom, physical safety, and security- How safe do you feel in your daily life?	not at all A little amount moderately mostly completely	10 9 39 198 44	3.3 3 13 66 14.7	1 3 19 97 180	0.3 1 6.3 32.3 60
Mean ±SD	**Case 3.85±0.82 Control 4.50±0.69**				
Physical environment lo(pollution, noise, traffic and climate-How healthy is your physical environment?	not at all A little amount moderately mostly completely	10 9 35 200 46	3.3 3 11.7 66.7 15.3	0 1 28 121 150	0 0.3 9.3 40.3 50
Mean ±SD	**Case 3.87±0.82 Control 4.40±0.66**				
Financial resources- Have you enough money to meet your needs?	not at all A little amount moderately mostly completely	35 165 73 23 4	11.7 55 24.3 7.7 1.3	22 6 98 125 49	7.3 2 32.7 41.7 16.3
Mean ±SD	**Case 2.32±0.82 Control 3.57±1.02**				

Opportunities for acquiring new information and skills-How available to you are the information that you need in your day-to-day life?	not at all A little amount moderately mostly completely	10 21 44 167 58	3.3 7 14.7 55.7 19.3	1 2 22 12 8 14 7	0.3 0.7 7.3 42.7 49
Mean ±SD	**Case 3.80±0.92 Control 4.39±0.68**				
Participation in and opportunities for recreation/ leisure activities-To what extent do you have opportunities for leisure activities?	not at all A little amount moderately mostly completely	43 110 85 54 8	14.3 36.7 28.3 18 2.7	4 37 10 1 11 1 47	1.3 12.3 33.7 37 15.7
Mean ±SD	**Case 2.58±1.02 Control 3.53±0.94**				
Home environment-How satisfied are you with the condition of your living place?	very dissatisfied dissatisfied neither satisfied nor dissatisfied satisfied very satisfied	11 14 66 177 32	3.7 4.7 22 59 10.7	0 3 16 12 1 16 0	0 1 5.3 40.3 53.3
Mean ±SD	**Case 3.68±0.86**			**Control 4.46±0.64**	
Health and social care, accessibility and quality-How satisfied are you with access to health services?	very dissatisfied dissatisfied neither satisfied nor dissatisfied satisfied very satisfied	4 6 17 132 141	1.3 2 5.7 44 47	1 12 56 10 3 12 8	0.3 4 18.7 34.3 42.7
Mean ±SD	**Case 4.33±0.78 Control 4.15±0.88**				
Transport-How satisfied are you with your transport?	very dissatisfied dissatisfied neither satisfied nor dissatisfied satisfied very satisfied	103 112 63 14 8	34.3 37.3 21 4.7	3 11 80 13 4 72	1 3.7 26.7 44.7 24

			2.7		
Mean ±SD	**Case 2.04±0.99**		**Control**		
	3.87±0.85				

Table 12 presents the distribution of the environmental quality of life domains of the mothers in the case and control samples. We revealed that the majority of the mothers who have a child with cancer (66%, 3.82 ± 0.82) feel safe in their life, while 60% (4.50 ± 0.69) of the control group felt completely safe in their life. Approximately, 66.7% (3.87 ± 0.82) of the case group lived in a healthy environment, while half of the control group lived in a safe environment (4.40 ± 0.66). Furthermore, 55% (2.32 ± 0.82) of the mothers who have children undergoing chemotherapy had sufficient money for their daily life, while 41% (3.57 ± 1.02) of the mothers in the control group had sufficient money.

Additionally, more than half of the case group rated mostly for obtaining information for everyday life (3.80 ± 0.92), while 49% (with mean and SD 4.39 ± 0.68) of the mothers in the control group obtained complete information needed for their daily life. Only 2.7% of the participants in the case group rated completely and 18% had opportunities for leisure activities, while 36.7% had fewer opportunities for leisure activities. On

the other hand, 37% (with a mean score and SD 3.53 ± 0.94) participants in the control group had opportunities for leisure activities.

Simultaneously, the highest proportion (59%, 3.68 ± 0.86) of the case group were satisfied with their living place, and 53.3% (4.46 ± 0.64) of the mothers in the control group were satisfied with their living place. The highest proportion of participants in the case (47%) and control (42.7%) groups were rated very satisfied with access to health services. About, 37.3% of the mothers in the case group were dissatisfied with transport, while 44.7% in the control group were satisfied.

Table 13. The general quality of life domain (Domain 1) for fathers of children with cancers

Item	Frequency [No. (%)]	
	Case	**Control**
How would you rate your quality of life?		
Very poor	0 (0)	1 (0.3)
Poor	92 (30.7)	9 (3)
Neither poor nor good	81 (27)	95 (31.7)
Good	59 (19.7)	127 (42.3)
Very good	68 (22.7)	68 (22.7)
Mean score ± SD	3.34 ± 1.13	3.84 ± 0.81
How satisfied are you with your health?		
Very dissatisfied	0 (0)	0 (0)
Dissatisfied	57 (19)	2 (0.7)
Neither satisfied nor dissatisfied	106 (35.3)	89 (29.7)
Satisfied	106 (25.3)	133 (44.3)
Very satisfied	61 (20.3)	76 (25.3)
Mean score ± SD	3.47 ± 1.01	3.94 ± 0.75

Table 13 reveals the distribution of the general quality of life domains of the fathers in the case and control groups. We demonstrated that 30.7% (3.34 ± 1.13) of the fathers in the case group had a poor quality of life, while 42.3% (3.84 ± 0.81) of the fathers in the control group had a good

quality of life. The maximum of participants in the case group rated neither satisfied nor dissatisfied with their health, while 44.3% of the control group was satisfied with their health.

Table 14. Physical quality of life domain (Domain 2) of fathers of children with cancers

Item	Frequency [No. (%)]	
	Case	Control
Sensory function: To what extent do you feel that physical pain prevents you from doing what you want to do?		
Not at all	4 (1.3)	4 (1.3)
A little amount	34 (11.3)	13 (4.3)
A moderate amount	57 (19)	27 (9)
Very much	130 (43.3)	78 (26)
Extremely amount	75 (25)	178 (59.3)
Mean score ± SD	3.79 ± 0.98	4.37 ± 0.91
Energy and fatigue: Do you have enough energy for everyday life?		
Not at all	3 (1)	2 (0.7)
A little amount	38 (12.7)	1 (0.3)
A moderate amount	59 (19.7)	34 (11.3)
Mostly	83 (27.7)	129 (43)
Completely	117 (39)	134 (44.7)
Mean score ± SD	3.91 ± 1.08	4.30 ± 0.73
Sleep and rest: How satisfied is you with sleep?		

Very dissatisfied	21 (7)	4 (1.3)
Dissatisfied	49 (16.3)	42 (14)
Neither satisfied nor dissatisfied	96 (32)	92 (30.7)
Satisfied	54 (18)	93 (31)
Very satisfied	80 (26.7)	69 (23)
Mean score ± SD	3.41 ± 1.23	3.60 ± 1.03
Mobility: How well are you able to move around?		
Very poor	2 (0.7)	1 (0.3)
Poor	8 (2.7)	7 (2.3)
Neither poor nor good	63 (21)	4 (1.3)
Good	162 (54)	92 (30.7)
Very good	65 (21.7)	196 (65.3)
Mean score ± SD	3.93 ± 0.76	4.58 ± 0.67
The activity of daily living: How satisfied are you with the ability to perform your daily living activities?		
Very satisfied	2 (0.7)	3 (1)
Dissatisfied	5 (1.7)	6 (2)
Neither satisfied nor dissatisfied	71 (23.7)	22 (7.3)
Satisfied	140 (46.7)	131 (43.7)
Very satisfied	82 (27.3)	138 (46)
Mean score ± SD	3.98 ± 1.48	1.72 ± 1.09
Dependence on medical substances and aids: How much medical treatment do you need to function in daily life?		
Not at all	50(16.7)	172(57.3)

A little amount	60 (20)	83(27.7)
A moderate amount	28 (9.3)	13 (4.3)
Mostly	38 (12.7)	19 (6.3)
Completely	124 (41.3)	13 (4.3)
Mean score ± SD	2.41 ± 1.48	1.27 ± 1.09
Work capacity: How satisfied are you with your capacity for work?		
Very satisfied	0 (0)	2 (0.7)
Dissatisfied	0 (8.3)	1 (0.3)
Neither satisfied nor dissatisfied	81 (27)	38 (12.7)
Satisfied	97 (32.3)	130 (43.3)
Very satisfied	97 (32.3)	129 (43)
Mean score ± SD	3.88 ± 0.95	4.27 ± 0.7

Table 14 reveals the distribution of the physical quality of life domains of the fathers in the case and control groups. 43.3% of the fathers had a child with cancer rated extreme pain that prevented them from doing daily activities, while 59.3% of the fathers in the control group rated extreme pain. Most of the fathers in both groups had full energy for activities of everyday life.

Additionally, 32% of the fathers in the case group rated neither satisfied nor dissatisfied for sleep and rest, while 31% of the fathers in the control group were satisfied with the same point. Consecutively, 54% (3.93 ± 0.76) of the participants in the case group rated good to getting around

and 65.3% (4.58 ± 0.67) of the control group rated very well. On the other hand, 41.3% of the case group completely depended on the medication in their daily life, while more than half of the control group did not depend on the medication (SD1.72 ± 1.09). Taken together, the majority of the fathers in both groups performed daily life activities satisfactorily, and the majority of the samples rated satisfied and very satisfied with the capacity to perform their work.

Table 15. Psychological quality of life domain (Domain3) of fathers of children with cancers

Item	[No. (%)]	
	Case	Control
Positive feeling- how much do you enjoy life?		
Not at all	1 (0.3)	0 (0)
A little amount	31(10.3)	1 (0.3)
A moderate amount	103 (34.3)	10 (3.3)
Very much	93 (31)	102(34)
Extremely amount	72(24)	187 (62.3)
Mean score ± SD	3.68 ± 0.96	4.58 ± 0.57
Thinking, learning, memory and concentration- how well are you able to concentrate?		

Not at all	0 (0)	0 (0)
A little amount	3 (1)	3 (1)
A moderate amount	66 (22)	30 (10)
Very much	115(38.3)	139 (46.3)
Extremely amount	116 (38.7)	128 (42.7)
Mean score ± SD	4.14 ± 0.79	4.47 ± 3.00
Bodily image and appearance- are you able to accept your bodily appearance?		
No at all	0 (0)	1 (0.3)
A little amount	12 (4)	0 (0)
A moderate amount	90 (30)	36 (12)
Mostly	118 (39.3)	151 (50.3)
Completely	80 (26.7)	112 (37.3)
Mean score ± SD	3.88 ± 0.84	4.37 ± 0.2.39
Self-esteem –how satisfied are you with yourself?		
Very dissatisfied	2 (0.7)	4 (1.3)
Dissatisfied	28 (9.3)	2 (0.7)
Neither satisfied nor dissatisfied	100 (33.3)	57(19)
Satisfied	94 (31.3)	158 (52.7)
Very satisfied	76 (25.3)	80 (26.7)
Mean score ± SD	3.71 ± 0.97	4.17 ± 0.82
How often do you have a negative feeling such as blue mode, despair and depression?		

Never	46 (15.3)	87 (29)
Seldom	32 (10.7)	118 (39.3)
Quite often	74 (24.7)	50 (16.7)
Very often	91 (30.3)	34 (11.3)
Always	57 (19)	11(3.7)
Mean score ± SD	3.27 ± 1.31	2.21 ± 1.09
Spirituality, religion and personal beliefs- to what extent do you feel your life to be meaningful?		
Not at all	7 (2.3)	0 (0)
A little amount	86 (28.7)	2 (0.7)
A moderate amount	60 (20)	36 (12)
Very much	43 (14.3)	184 (61.3)
An extremely amount	104 (34.7)	78 (26)
Mean score ± SD	3.50 ± 1.28	4.12 ± 0.62

Table 15 indicates the distribution of the psychological quality of life domains of the fathers in the case and control groups. Thus, we found that 34% (3.68 ± 0.96) of the fathers in the case group enjoyed life in moderate amount, while 62.3% (4.58 ± 0.57) of the participants in the control group enjoyed life extremely. About 38% of the samples in the case group displayed an extreme ability to think, learn, and consternate, while 46.3% (4.47 ± 3.00) of the fathers in the case group had high ability to think, learn, and concentrate. The majority of the participants in both

groups accepted their bodily appearance (3.88 ± 0.84 and 4.37 ± 2.39, respectively). On the other hand, 33.3% (3.71 ± 0.97) of the fathers had a child undergoing chemotherapy and rated neither satisfied nor dissatisfied for their self-esteem, whereas 43.3% of the fathers in the control group were satisfied with their self-esteem. Relatively, 30.3% of the samples in the case group often had negative feelings and 39.3% (2.21 ± 1.09) of the control group rated seldom for the same. Finally, we showed that the fathers who had a child with cancer rated their life was extremely meaningful (3.50 ± 1.28), while 61.3% (4.12 ± 0.62) rated that life was very meaningful.

Table 16. The social quality of life domain (Domain4) of fathers of children with cancers

Item	[No. (%)]	
	Case	Control
Personal relationship- how satisfied are you with your relationships?		
Very dissatisfied	1 (0.3)	0 (0)
Dissatisfied	67 (22.3)	12 (4)
Neither satisfied nor dissatisfied	54 (18)	109 (36.3)
Satisfied	124 (41.3)	141(47)
Very satisfied	54 (18)	38 (12.7)
Mean score ± SD	3.54 ± 1.03	3.68 ± 0.74
Sexual activities- how satisfied are you with your feeling toward the opposite sex?		
Very dissatisfied	4(1.3)	1 (0.3)
Dissatisfied	89 (29.7)	15 (5)
Neither satisfied nor dissatisfied	37 (12.3)	126 (42)
Satisfied	85 (28.3)	131 (43.7)
Very satisfied	85 (28.3)	27(9)
Mean score ± SD	3.52 ± 1.22	3.56 ± 0.74
Social support- how satisfied is with the support you get from your friends?		
Very dissatisfied	19 (6.3)	44 (14.7)
Dissatisfied	84 (28)	58 (19.3)
Neither satisfied nor dissatisfied	63 (21)	125 (41.7)

Satisfied Very satisfied	108 (36) 26 (8.7)	33 (11) 40 (13.3)
Mean score ± SD	3.12 ± 1.30	2.89 ± 1.18

Table 16 presented the distribution of the fathers concerning the social relationship quality of life domain in the case and control groups. The majority of the fathers in the case and control groups were satisfied with their relationship (3.54 ± 1.03 and 3.68 ± 0.74, respectively). About 30% (3.52 ± 1.22) of the fathers in the case group were dissatisfied with support from their friends, while 43.7% of the fathers in the control group were satisfied. Most of the subjects in the case group were satisfied with the opposite sex, while 41.7% of the control group were neither satisfied nor dissatisfied with the opposite sex.

Table 17. Environmental quality of life domain (Domain5) of fathers of children with cancers

Father's Quality of life items		**Group**			
		Case		**Control**	
		No.	**%**	**No.**	**%**
Domain 4					
Freedom, physical safety, and security- How safe do you feel in your daily life?	not at all A little amount moderately mostly completely	8 4 42 128 118	2.7 1.3 14.7 42.7 39.3	0 5 14 10 4	0 1.7 4.7 34.7 59

Mean ±SD	**Case 4.14±0.89** **4.51±0.66**		**Control**		
Physical environment (pollution, noise, traffic and climate-How healthy is your physical environment?	not at all A little amount moderately mostly completely	9 16 40 113 122	3 5. 3 13 .3 37 .7 40 .7	1 2 31 12 6 14 0	0.3 0.7 10.3 42 46.7
Mean ±SD	**Case 4.07±1.01** **4.34±0.71**		**Control**		
Financial resources- Have you enough money to meet your needs?	not at all A little amount moderately mostly completely	32 168 78 18 4	10 .7 56 26 6 1. 3	18 4 91 12 9 58	6 1.3 30.3 43 19.3
Mean ±SD	**Case 2.31±0.79** **3.68±0.99**		**Control**		
Opportunities for acquiring new information and skills-How available to you is the information that you need in your day-to-day life?	not at all A little amount moderately mostly completely	11 37 32 105 115	3. 7 12 .3 10 .7 35 38 .3	2 4 10 12 9 15 5	0.7 1.3 3.3 43 51.7
Mean ±SD	**Case 3.92±1.14** **4.43±0.68**		**Control**		
Participation in and opportunities for recreation/ leisure activities-To what extent do you have opportunities for leisure activities?	not at all A little amount moderately mostly completely	40 66 74 72 48	13 .3 22 24 .7 24 16	1 15 11 3 13 5 36	0.3 5 37.7 45 12
Mean ±SD	**Case 3.07±1.27** **3.63±0.77**		**Control**		

Home environment-How satisfied are you with the condition of your living place?	very dissatisfied dissatisfied neither satisfied nor dissatisfied satisfied very satisfied	11 11 51 161 66	3. 7 3. 7 17 53 .7 22	0 1 19 11 1 16 9	0 0.3 6.3 37 56.3
Mean ±SD	**Case 3.86±0.92** **Control 4.49±0.63**				
Health and social care, accessibility and quality-How satisfied are you with access to health services?	very dissatisfied dissatisfied neither satisfied nor dissatisfied satisfied very satisfied	5 11 28 112 144	1. 7 3. 7 9. 3 37 .3 48	1 4 31 14 2 12 2	0.3 1.3 10.3 47.3 40.7
Mean ±SD	**Case 4.26±0.92** **Control 4.26±0.72**				
Transport-How satisfied are you with your transport?	very dissatisfied dissatisfied neither satisfied nor dissatisfied satisfied very satisfied	40 172 45 24 19	13 .3 57 .3 15 8 6. 3	1 3 67 14 8 81	0.3 1 22.3 49.3 27
Mean ±SD	**Case 2.36±1.02** **Control 4.01±0.75**				

Table 17 exhibited the distribution of the environment quality of life on the fathers concerning frequency in the case and control groups. We found that the majority of the samples in the case group expressed the feeling of safety in their lives, while 59% (4.51 ± 0.66) of the fathers in

the control group felt completely safe. A majority of the participants in both groups were living in a completely healthy environment (4.07 ± 1.01 and 4.34 ± 0.71, respectively). Additionally, more than half of the samples in the case group had only sufficient money to meet their daily need (2.31 ± 0.79), while in the control group, 43% (3.68 ± 0.99) of the fathers had sufficient money to meet their daily needs. The highest percentage of both groups rated complete availability for obtaining information in everyday life. About 24.7% of the fathers who have a child undergoing chemotherapy, moderate numbers had opportunities for leisure activity, while in the control group, 45% (3.63 ± 0.77) had time and opportunities to leisure activity. More than half of the case and control groups rated satisfied (53.7%) and very satisfied (56.3%) with their living place.

Regarding satisfaction with access to health services, about 48% (4.26 ± 0.92) of the participants in the case group were very satisfied, and 47.3% (4.26 ± 0.72) of the fathers who did not have a child with cancer were satisfied with the health services. Concerning satisfaction with the transport, 57.3% of the fathers in the case group were dissatisfied with the transport while 49.3% (with the mean score and SD4.01 ± 0.75) of the samples in the control group were satisfied.

Table 18. Comparison between mother's quality of life domains in case and control groups

Mother's quality of life domains	Case M ± SD	Control M ± SD	P-Value of
General domain	6.17 ± 2.09	8.10 ± 1.54	< 0.001
Domain 1/Physical	23.5 ± 3.97	27.0 ± 3.51	< 0.001
Domain 2/Psychological	20.8 ± 3.84	23.3 ± 2.81	< 0.001
Domain 3/Social	9.18 ± 2.65	10.6 ± 2.75	0.047
Domain 4/Environment	26.4 ± 3.92	32.8 ± 4.88	< 0.001
Overall quality of life	87.2 ± 12.4	102.4 ± 11.3	< 0.001

Table 18 demonstrates a comparison between the mother's quality of life in case and control groups. The comparison between the mean score of general and four domains of the quality of life among the mothers in the case and control groups revealed that the mean score of the general, physical, psychological, social, and environmental domain was significantly higher among the control group (P<0.001) than among the case group; however, the difference was statistically non-significant (P=0.047). However, the mean score of the overall quality of life was significantly higher among the case group (87.2 ± 12.4) as compared to the control group (102.4 ± 11.3) (P<0.001)

Table 19. Comparison between father's quality of life domains in case and control groups

Father's quality of life domains	Case	Control	P-Value of
	M ± SD	M ± SD	
General domain	6.81 ± 2.09	7.78 ± 1.50	< 0.001
Domain1/Physical	25.3 ± 3.96	27.1 ± 3.58	< 0.001
Domain 2/Psychological	22.2 ± 4.08	23.9 ± 4.56	< 0.001
Domain3/Social	10.1 ± 2.86	10.1 ± 2.32	0.766
Domain4/Environment	28.0 ± 5.03	33.3 ± 4.28	< 0.001
Overall quality of life	92.5 ± 15.0	102.4 ± 12.2	< 0.001

Table 19 presents a comparison between the father's quality of life in case and control groups. The comparison between the mean score of general and four domains of the quality of life among fathers in the case and control groups revealed that the mean score of the general domain, physical, psychological, social, and environmental was significantly higher among control groups (P<0.001). Hence, although the mean score was higher among controls as compared to the cases, albeit non-significantly (P=0.766). However, the overall quality of life among cases (92.5 ± 15.0) was significantly higher as compared to the controls (102.4 ± 12.2) (P<0.001).

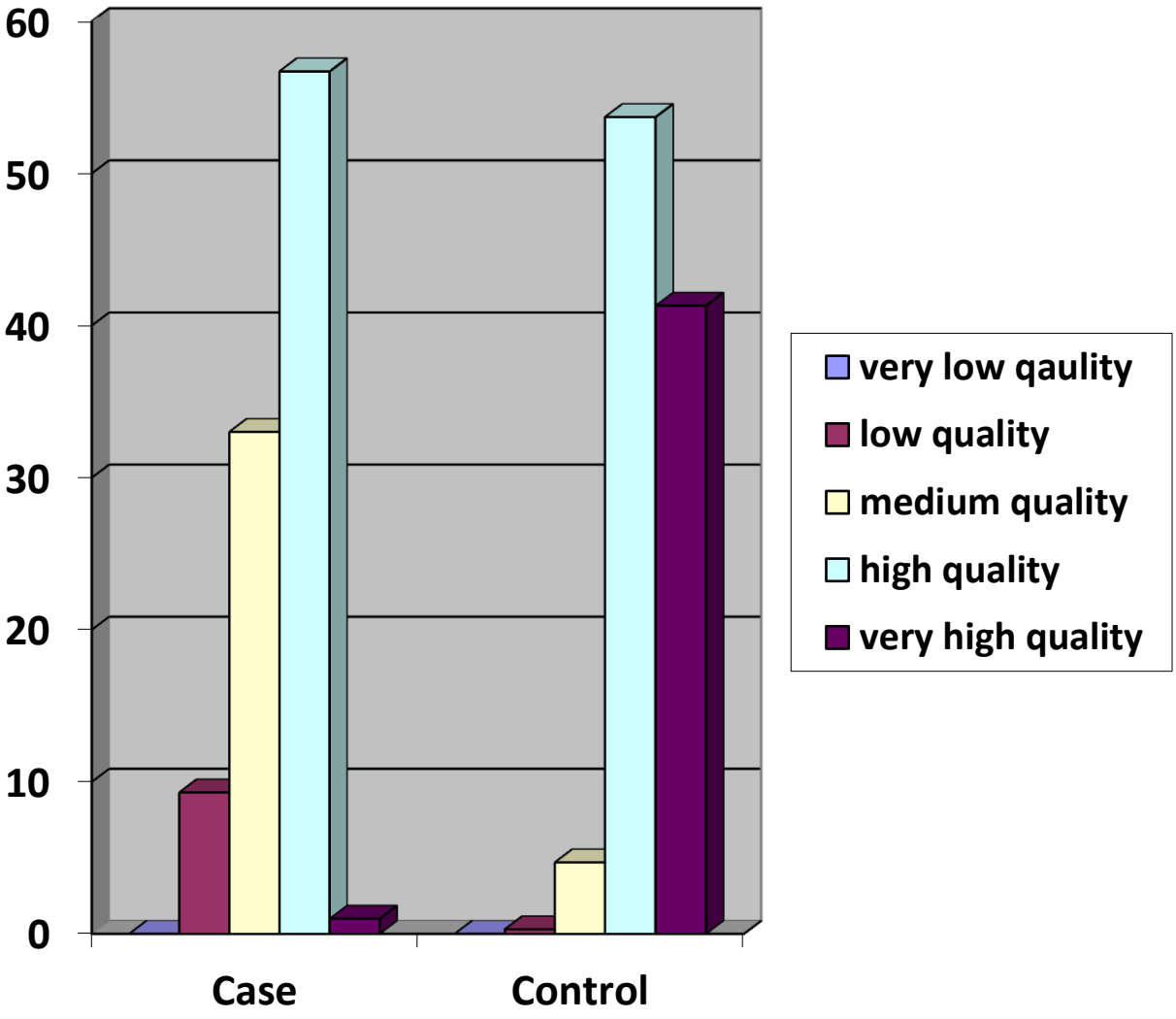

Figure No. 2 overall mother's quality of life of both groups(case and control) with in level of effects

This figure indicates that highest percentage of the sample who have a child with cancer they have a high quality of life and near of half of the sample have the medium quality of life, while the majority of the mother in control group their quality of life between high to very high.

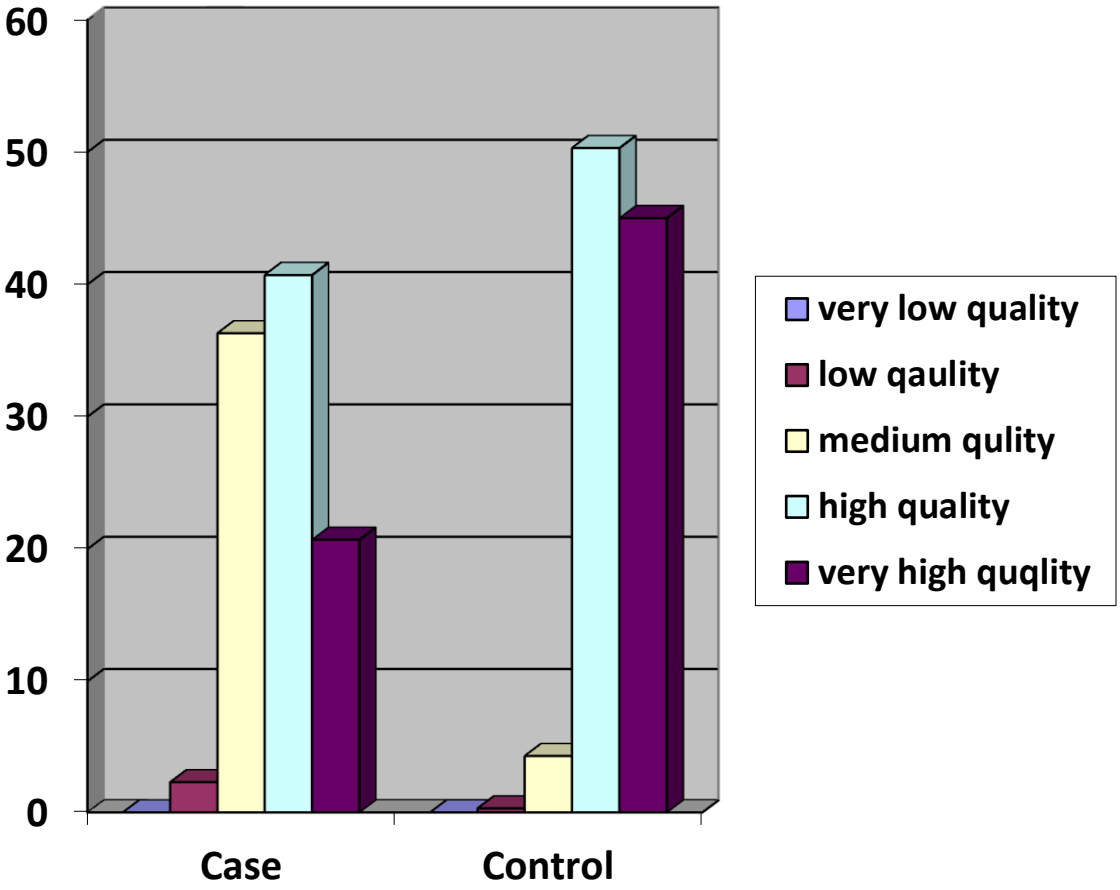

Figure No. 3 overall father's quality of life of both groups (case and control) with in level of effet

This figure reveals that the highest percentage among fathers who have a child undergoing chemotherapy they have high to medium quality of life while fathers in the control group they have high to the very high quality of life.

Chapter Five

Discussion

Chapter Five

Discussion

In this chapter the findings will be interpreted discuses and communicated logically with international studies finding, in addition to the researcher will highlight what actually observed in relation to her specific research question and objectives of the study as follows:

Part one child with cancer

The present study revealed that childhood cancers are more prevalent among male child than female which represent (53.7%) while the female are (46.7%), this finding was in agreement with reports published by the American Cancer Society declaration. Similarly, Dorak at (2012) pointed out that more prevalent among females, while males are more prone to most types of cancer (M.T. Dorak et..al,2012).

According to the results of the present study, ALL was the most prevalent type of cancer observed among the studied child patients with cancer. This finding is in good agreement with the reports published by the Institute of Medicine, National Research Council and National Cancer Policy Board in the USA at (2003) which postulated that ALL is the most prevalent type of cancer. Siegel in (2017) also reported that acute lymphoblastic leukaemia (ALL) is the most prevalent type of cancer (D.A, Siegel, et..al,2017).

The study are revealed that cancer disease affect the lives of children , particularly their school attendance unfortunately, those children are under chemotherapy treatment where children passed in crucial period physically, socially and psychologically which is too hard to keep them attend the school regularly and properly.

This finding come along with previous international studies for examples Parsons at (2012) revealed that the nature of the disease affected education and work of more than 72% of adolescents and young adults (H.M. Parson et..al,2012). This finding is also similar with the one reported by Tsimicalis at (2018) who reported that children with cancer are most affected by cancer in terms of their school attendance(A .Tsimicalis et..al,2018). Most children and families consider hospitalization as an anxiogenic situation that can have its own effects and manifestations in the future, depending on the patient's familial relationship and his/her family members; the level of emotional, cognitive and physical development; the patient's adaptive capacity; the medical procedures; the severity of the disease; and the frequency and length of the hospitalization. Children and teenagers usually have a dual attitude toward the hospital, such that they feel that hospital causes suffering, while it is a place for receiving treatment. Therefore, for them, the hospital is a place to receive medical examinations and treatment, helping them save their lives and regain their wellbeing and health.

Unfortunately, the present study demonstrated that the children with cancer experience persistent side effects and unpleasant signs and symptoms particularly during chemotherapy treatment, Table (3) shown that the gastrointestinal and musculoskeletal system came in the first order with in side effects where children have level of moderate effects. While neurological system was the second in order where children suffer from sleeping disturbance ,while the other body system like respiratory , cardiovascular, and urological have got a low level of effects. This finding dose not came along with pervious published reported by (Chui,2008).

Actually this is the first study describe the experiences of children with cancer related to side effects of chemotherapy treatment. Therefore, the health professional can play role effectively to manage effectively with the families who have child with cancer and increase awareness to what will happen during the cycle of chemotherapy approach.

Unfortunately about 2/3 of the sample experience about nausea, taste shift, and loss of appetite. This is worth to mention that impossible for children to go on with their schools moreover, mothers will not ready to send them . International studies conducted by Schnell in (2003) and Farrell (2013) discovered similar results (F.M. Schnell,2003 and C.Farrell et..al,2013). Our finding come along with Sullivan in (2018) concluded that children with cancer have various symptoms such as diarrhea, abdominal cramps, weight loss, change in the way food tastes, lack appetite, nausea, and dry mouth. As mentioned above, chemotherapy can lead to big changes in the everyday lives and activities of the children and teenagers; however, it is the responsibility of their families to attempt to keep their children's lives on the normal routine prior to the final diagnosis and help them stop feeling dependent, powerless or incapacitated because the symptoms of chemotherapy usually cause the children to feel and even believe that the cancer is "more real" in their lives (R.L.Woodgate et..al,2003), resulting in enormous changes in their family routines including restrictions and losses(G Pentheroudakis et..al,2006).

Part two: parents of a child with cancer and without cancer

It is worthwhile to mention that the results in table (4) revealed that majority of mothers represent (69.3%) their age range 31-42 years in study group while in control group mothers represent (54.7%). Their age range between 19-30 years.in addition to their levels of education majority of mothers were graduated from primary school that represent (54%) and only (2%) were institute graduates among the study group as well as in the control group , majority represent (49%) are under the line of primary school, this finding give indicator that mothers should be well acquainted and be aware of this problem because they are the more dominant and effective agent at home more than the fathers. High percentage of both groups are house wife this give the indicator that financial level of families are not an optimum level to provide economically their needs.

It is delightful that this study is first one in Sulaimani governorate to study the quality of parents whom children are cancer clients and under chemotherapy treatment as well and study how the domains of their life have been effected compared to control group where the parents have children sick but non cancer disease. Day by day number of parents are increasing with cancer clients thus this gives indicator to the concerned health agencies to start planning such health care to prevent disability and complication and less their burden on families. As matter of fact, parent do not realize the influences of child's condition on whole family situation as well as their lives, this is a big challenge when they observe that their children's health status are deteriorated gradually without assistance, though they need to adapt to new life situation and realize this

imposing burden on them and all family's member should participate in responsibilities of sort of care to those disadvantages children.

Accordingly each domain was studied in five scale of measurements for both parents (study) where their children are cancer clients and (control) group where their children are sick but non cancer client. In term of general, physical, psychological, social and environmental. The results of this study showed that parents with cancer clients have different result compared with control group parents but sense to live with children having cancer have satisfied both mothers and fathers, while physical domain of quality of life among cancer clients are significantly poor and different than control group where parents have non cancer clients. It is delightfully expressed that results shown significant differences between levels of effect of quality of life parents with cancer clients compared with parents with non-cancer clients. Actually we can state that parents perceive the life as a meaningful and joy full to what extent compared to the control group. This very good feeling in the same time they positively will play role of adjusting with their children to prevent more problems and impairment.

According to (Lisa,2014), coping with burdensome situations appears as a significant indicator of the quality of life. She distinguishes between two terms – adaptation and coping. According to her, adaptation means coming to terms with the ordinary and increased burden (within limits of our tolerance of burden, we apply methods of solving burdensome situations to which we have predispositions and experience). Coping represents a higher level of adaptation that is necessary for dealing with limit and extreme burden (we find ourselves at the limit of our tolerance of burden, it's a matter of solving sudden, unusual burdensome situations which often overreach our resources; we need to find, examine, test and

adopt necessary coping methods first). Nakane (2006) understands coping with life burdens as a dynamic process in which it comes to transactions (mutual interactions between a person and a given situation). On one hand, there is a given person (or a family) with certain resources, possibilities, values, beliefs. On the other hand, there is a disability imposing certain requirements on a person (or a family) and influences them variously.

The results of this study are agreed with a study done by (Andrea,2015), she showed that there was the only big difference of quality of life of a family with a child with a disability and without disability in the environmental domain. As mentioned earlier, in Saudi Arabia, chronic illness is the most diagnosed type of illness among Saudi children annually (Al-Qurashi et al., 2009; Ng, Zaghloul, Ali, Harrison & Popkin, 2011). In this current study, 92% of mothers of chronically ill children were aged between 22 and 42 years. The majority of the mothers participating in this study had the responsibility of caring for their children, because of the nature of the female role in Saudi Arabia (Ali, Mahmood, Moel, Hudson& Leathers, 2008; Baghdadi, 2011; Elamin & Omair, 2010; Memish, Zumla, AlHakeem, Al-Rabeeah & Stephens, 2013). Women are generally viewed as the primary caregivers for their sick children (Baghdadi, 2011; Elamin & Omair, 2010; Flynn, 2011). The level of support which mothers received, whether it was emotional or social, from a variety of individuals: their spouses, children, extended

family members, nurses, neighbours, friends and even support groups has also been stated. Sixty percent of the Saudi mothers stated that they received respite help from family and or friends, 25% reported receiving help from multiple sources (including not only family and friends, but also government associations and the hospital), and finally, 18% of the participants indicated that they were not receiving help.

A commonly recurring observation among the parents in this study was that the lack of support from the people around them led to lower levels of coping. Saudi parents most commonly relied on their own family and friends for support, although some of the respondents reported receiving no form of support whatsoever.

Previous research has often found parents to be socially isolated when they have a child with a chronic illness, and this adds significantly to their stress and anxiety (Brown et al., 2008; Chiou & Hsieh, 2008; Kratz, Uding, Trahms, Villareale & Kieckhefer, 2009). Also, Arab women have learned to hide their feelings and pretend that they are healthy, especially when they have any disease that might affect their social life. According to studies done previously, the way of Arab parents thinking was very common because these women who were also mothers were expected to be strong for their families.

The women's described roles were that of the primary caregiver (Ali et al., 2008; Baghdadi, 2011; Elamin & Omair, 2010; Memish et al., 2013). Any weakness, whether perceived or actual, must be hidden for the sake of the family. These parents learn to cope with their problems, projecting an image of selfless fortitude by being at the service of their family (Ali et al., 2008; Baghdadi, 2011; Elamin & Omair, 2010; Memish et al., 2013).

At the end of this findings the researcher would like to mention that parents in our culture particularly the mothers who their she has child with cancer or non-cancer, she feels that her priority to keep their children continue his life physical, mentally, psychologically through many barriers or difficulties exist that is why the Figure (1) shown that quality of life slightly significant different from parents have non-cancer clients. The second point which is more important we face shortage of professional people as well as program for follow up the children after chemotherapy treatment and no place for these clients to control and document their health status in our hospital that lead the parent to be accountable for all over view quality of life of their children comparing with worldwide countries who have special programs for checking, follow up and establish many programs sharing with parents of cancer clients as part of health responsibility.

Chapter Six

Conclusions and Recommendations

Chapter Six

Conclusions and Recommendations

Conclusions

1. Majority of the children were male, from low socioeconomic level and from a suburban area.
2. Majority of the study groups have ALL type of cancer.
3. Parents of cancer clients are house wife young less than 30 years of age and majority of them do not exceed primary school graduates.
4. Gastrointestinal and musculoskeletal system came in first order of side effects resulting from chemotherapy approaches and neurological system was the second order of side effects.
5. Low socioeconomic level and limited finance with lack of awareness are more prominent attributes of the study group as well as control group.
6. Shortage of programs and lack of professional health providers are this hospital face for overcrowding of cases from different governorate of Iraq since Hiwa hospital is only oncology hospital in Sulaimani.
7. Regarding the domains of quality of life the physical domain come in first order of effect compared with control group.
8. It has shown that study group parents with cancer clients need support, social and health services to focus and provide follow up for their children and emotional support as well compared with control group where parents have non clients.
9. Lack of educational program and services specified for this group cancer children as established in other countries particularly for this fast increasing for cancers cases in Iraq.

10. The sample of study nearly one thousand and 500 hundred parents of both grouped and studied with different levels of effect but culturally our mothers pretend to know and understand the health condition of their children but actually they are in highly need for support, help and care.
11. It has shown that high level of effect among mothers are more than among the fathers, this indicate the degree of accountability of mothers in our culture particularly at home and their relationships with their children than the father.

Recommendations

Recommendation based on the derived conclusion, the study recommended the following

1. Opening special section inside Hiwa hospital or outside but belong to this hospital run by professional nurses well trained to make follow up and support all children with cancer
2. Design and organize special sheet or checklist under umbrella of ministry of health and manager of Hiwa hospital specific for cancer clients filled by qualified graduate nurse worked in hospital and she is accountable for all data documented.
3. We highly need special attention and program be legislated with different strategies copy with this divesting issues and involve

all families concerned to highlight more important precautions and management.

4. Health care professional are well distributed in health care agencies to be significant carriers for all who needs care, support and referral.
5. Governorate and all health care agencies should pay attention to financial support in a way that help each family has cancer clients.
6. Encourage voluntary organizations and services to promote support.
7. Increase the capacity of hiwa hospital with reinforcement with assisted facilities for continuous monitoring and evaluation.

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Addendum

Publications

1. The following articles abstracted from the thesis content have been published Awayi G A, Zhian S R, Jamal A.R(CHEMOTHERAPY RELATED SIDE EFFCTS AMONG CHILDREN IN HIWA HOSPITAL),2019 published in Kurdistan journal for applied research Volume 4 Issue 1: June 2019 and is available online:

DOI: **10.24017/science.2019.ICHMS.19**
Paper
Link: http://kjar.spu.edu.iq/index.php/kjar/article/view/345

2. Awayi G A, Zhian S R, Jamal A.R (Pediatric Hodgkin lymphoma in Sulaimaniya Province of Iraqi Kurdistan),2019 published in
   Indian Journal of Public Health Research and Development
   It will be published in Volume 11,No.2, February 2020 Issue
   JournalLink:
   http://www.indianjournals.com/ijor.aspx?target=ijor:ijphrd&type=home
3. Awayi G A, Zhian S R, Jamal A.R(quality of life of parents having cancer and non-cancer children: A Comparative Study), published in Medico-Legal Update journal DOI 10.5958/j.0974-1283, http://www.medicolegalupdate.org, Volume 20,No.1 January –July 2020 issue.

Appendix A

Kurdistan Regional Government /Iraq
Ministry of higher Education & Scientific Research
University of Sulaimani
School of Medicine

No:
Date :

بۆ / بەڕێوەبەری نەخۆشخانەی هیوا

بابەت / هاوکاری

دوای ڕێزو سڵاو ...
داواکارین لەبەڕێزتان کە ڕەزامەندی بفەرموون بە هاوکاریکردنی بەڕێز : ئاوایی غازی عبدالکریم ،
کە خوێندکاری خوێندنی باڵای دکتۆرایە بۆیە ئەنجامدانی توێژینەوەکەی بەو ناونیشانەی خوارەوە
لەگەڵ ڕێزدا

The effect of chemotherapy on children with cancer and their family's quality of life in Hiwa hospital in Sulaimani city

پرۆفیسۆری یاریدەدەر
دکتۆر کۆسار محمد علی مراد
ڕاگری فاکەڵتی زانستە پزیشکییەکان بەوەکالەت
سەرۆکی سکوڵی پزیشکی

وێنەیەک بۆ:
- بەشی خوێندنی باڵای سکوڵ
- دۆسیەی دەرچوو

Appendix B

اقليم كوردستان – العراق
مجلس الوزراء
وزارة الصحة
المديرية العامة لصحة السليمانية
- الامور الفنيه -

Kurdistan Regional Government
Council of Ministers
Ministry of Health

هەرێمی کوردستان – عێراق
ئەنجومەنی وەزیران
وەزارەتی تەندروستی
بەڕێوەبەرایەتی گشتی تەندروستی سلێمانی
- کاروباری هونەری -

NO:
Date:

ژمارە: ١١٦٢٨
بەروار: / ١٠/ ٢٠١٧
بەروار: / ڕەزبەر / ٢٧١٧ کوردی

(پێشمەرگە پاڵەوانی ئاشتی بە لە سایەی پێشمەرگە دا ئارامە کوردستان)

بۆ / نەخۆشخانەکانی منداڵان + هیوا

ب// هاوکاری

ئاماژە بە نووسراوی کۆلێژی پزیشکی / زانکۆی سلێمانی ژمارە (١٥٠٨/٢٣/٧)لە (٢٠١٧/٩/١٩) هاوکاری خوێنکاری باڵای (دکتۆرا) (ئاوایی غازی عبدالکریم)بکەن لە کاتی سەردانی بۆنەخۆشخانەکانتان بۆ ئەنجام دانی توێژینەوەکەی ، بەمەرجێ کەل وپەلی نەخۆشخانە بەکار نەهێنێت ....

د. میسران محمد عباس
بەڕێوەبەری گشتی
/٢٠١٧/١٠

وێنەیەک بۆ
- کاروباری هونەری/ کامل / لە گەڵ بەراییەکان
- دۆسیە ی تایبە ت

ئزیرە //

کاروباری هونەری / کامل

Appendix C

Faculty of Medical Science ***No.***

School of Medicine
Pediatric oncology
Phd research

(**The Effect of Chemotherapy among Cancer Clients upon the Parents Quality of Life in Hiwa and pediatric teaching Hospital in Sulaimani Governorate***-*case control study****)***

Supervised by Ass. Professor Dr Jamal Ahmad Rashid
Consultant Pediatrician

PhD student name Awayi Ghazy Abdulkareem
MSc in pediatric nursing
Mobile: 07701548558
Email :awayi.abdulkareem@univsul.edu.iq
:

File No.

(*The Effect of Chemotherapy among Cancer Clients upon the Parents Quality of Life in Hiwa and pediatric teaching Hospital in Sulaimani Governorate*)

First Section/ Case Group

Part One: Child's Socio demographic characteristics

1. **Age:**
2. **Gender:** male female
3. **Child's ethnicity:**
4. **Level of education**:

School Class

5. **Family residency**:
   Urban
   Suburba
   Rural
   Addres
6. **Child's order:**
7. **Number of sibling:**

8. Type of cancer

9. Age at diagnc

Part: Two Side Effect of Chemotherapy on the child physical health

No.	items	Always	Sometimes	N r
1.	Abdominal pain			
2.	Taste change			
3.	Loss of appetites			
4.	Nausea			
5.	Vomiting			
6.	Sore mouth or ulcer			
7.	Diarrhea			
8.	Bloating			
9.	constipation			
10.	Head ache			
11.	Drowsiness			
12.	Sleep disturbance			
13.	Numbness			
14.	Convulsion			
15.	Itching			
16.	Sweating			
17.	Skin dryness			
18.	Skin ulceration			
19.	Skin Discoloration			
20.	muscle spasm			
21.	Muscle pain			
22.	Joint pain			
23.	Back pain			
24.	Cough			
25.	Dyspnea			
26.	Cyanosis			
27.	Palpitation			
28.	Tachycardia			
29.	Bradycardia			
30.	Fever			
31.	Chill			
32.	Difficulty in urination			
34.	Dysurea			
35.	Edema			

Part Three /parents sosiodemographic charactrstics

A. Mother **B. father**

1. **Age:** **1.Age**
2. **Educational level** **2. Educational level**

2.1-Illiterate 2.1- Illiterate

2.2-able to Read and 2.2-able to Read and v

2.3-Primary school 2.3-Primary school

2.4-Secondary school 2.4-Secondary school

3.5-graduate from Inst 3.5-graduate from Inst

2.6graduate from colle 2.6graduate from colle

2.7 post graduate 2.7 post graduate

3-Occupation

3.1-Governmental employee 3.1-Governmental emplo

3.2-Non-governmental emp 3.2-Non-governmental er

3.3-house wife 3.3-jobless

3.4 retire 3.4-retire

4-Marital status

4.1-Widowed

4.2-Separated

4.3-Divorced

5. Consanguinity between parents:

N

6. Economic status of family

6.1- sufficient

6.2- insufficient

6.3- barley sufficient

7. Do you have any chronic disease? **7. Do you have any chronic disease?**

Yes No Yes No

If yes, specify If yes, speci

8. Family history of cancer

Yes

9. Family history with chemotherapy

Yes

2nd domain	Facets	No.	Question	Response option				

10. Personal history

10.1- Smoking

Before your child condition

After the child condition

10.2- Hookah

Before your child cond

After your child condit

10.3-alcohol consumption

Before your child cond

After your child condit

10. Personal history

10.1- Smoking

Before your child condi

After the child condition

10.2- Hookah

Before your child conditi

After your child condition

10.3-alcohol consumption

Before your child condit

After your child condition

11. Does your child's condition effects on his / her school performance

Part four/ parent's quality of life

1. Mother's quality of life

1st domain	Facets	No.	Question	Response option				
General	General health		How would you rate your quality of life?	Very poor	Poor	Neither poor nor good	Good	Very good
				1	2	3	4	5
			How satisfied are you with your health?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5

Physical	Sensory function		To what extend do you feel that (physical) pain prevents you from doing what you need to do?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5
	Energy and fatigue		Do you have enough energy for everyday life?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Sleep and rest		How satisfied are you with sleep?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Mobility		How well are you able to get around?	Very poor	Poor	Neither poor nor good	Good	Very good
				1	2	3	4	5
	Activity of daily living		How satisfied are you with ability to perform your daily living activities?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Dependence on medical substance and medical aids		How much do you need any medical treatments to function in your daily life?	Not at all	A little amount	A Moderately amount	mostly	completely
				1	2	3	4	5
	Work capacity		How satisfied with are you with your capacity for work?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5

3rd domain	Facets	No.	Question	Response option				
Psychological	Positive feelings	0	How much do you enjoy life?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5
	Thinking, learning, memory and concentration	1	How well are you able to concentrate?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5
	Bodily image and appearance	2	Are you able to accept your bodily appearance?	Not at all	A little amount	moderately	mostly	completely
				1	2	3	4	5
	Self esteem	3	How satisfied are you with yourself?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Negative feeling	4	How often do you have negative feelings such as blue mode, despair and anxiety, depression?	Never	seldom	Quit often	Very often	Always
				1	2	3	4	5
	Spirituality/ religion / personal beliefs	5	To what extent do you feel your life to be meaningful?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5

4th domain	Facets	No.	Question	Response option				
Social relationship	Personal relationship	6	How satisfied are you with your personal relationship?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied

						satisfied		
				1	2	3	4	
	Social support	7	How satisfied are with the support you get from your friends?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	
	Sexual activity	8	How satisfied are you with your feeling toward opposite sex?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	

5th domain	Facets	No.	Question	Response option				
Environment	Freedom, physical safety, and security	9	How safe do you feel in your daily life?	Not at all	A little amount	A Moderate amount	mostly	completely
				1	2	3	4	5
	Physical environment(pollution, noise, traffic and climate	0	How healthy is your physical environment?	Not at all	A little amount	A Moderate amount	mostly	completely
				1	2	3	4	5
	Financial resources	1	Have you enough money to meet your needs?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Opportunities for acquiring new information and skills	2	How available to you is the information that you need in your day-to-day life?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Participation in and opportunities for recreation / leisure activities	3	To what extent do you have opportunities for leisure activities?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Home environment	4	How satisfied are you with the condition of your living place?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Health and social care, accessibility and quality	5	How satisfied are you with access to health services?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Transport	6	How satisfied are you with your transport?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5

2.Father's quality of life

1st domain	Facets	No.	Question	Response option				
General	General health		How would you rate your quality of life?	Very poor	Poor	Neither poor nor good	Good	Very good
				1	2	3	4	5
			How satisfied are you with your health?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5

2nd domain	Facets	No.	Question	Response option				
Physical	Sensory function		To what extend do you feel that (physical) pain prevents you from doing what you need to do?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5
	Energy and fatigue		Do you have enough energy for everyday life?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Sleep and rest		How satisfied are you with sleep?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Mobility		How well are you able to get around?	Very poor	Poor	Neither poor nor good	Good	Very good
				1	2	3	4	5
	Activity of daily living		How satisfied are you with ability to perform your daily living activities?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Dependence on medical substance and medical aids		How much do you need any medical treatments to function in your daily life?	Not at all	A little amount	A Moderately amount	mostly	completely
				1	2	3	4	5
	Work capacity		How satisfied with are you with your capacity for work?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5

3rd domain	Facets	No.	Question	Response option				
Psychological	Positive feelings	0	How much do you enjoy life?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5
	Thinking, learning, memory and concentration	1	How well are you able to concentrate?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5
	Bodily image and appearance	2	Are you able to accept your bodily appearance?	Not at all	A little amount	moderately	mostly	completely
				1	2	3	4	5
	Self esteem	3	How satisfied are you with yourself?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Negative feeling	4	How often do you have negative feelings such as blue mode, despair and anxiety, depression?	Never	seldom	Quit often	Very often	Always
				1	2	3	4	5
	Spirituality/ religion / personal beliefs	5	To what extent do you feel your life to be meaningful?	Not at all	A little amount	A moderate amount	Very much	An extremely amount
				1	2	3	4	5

4th domain	Facets	No.	Question	Response option				
Social relationship	Personal relationship	6	How satisfied are you with your personal relationship?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	
	Social support	7	How satisfied are with the support you get from your friends?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	
	Sexual activity	8	How satisfied are you with your feeling toward opposite sex?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	

5th domain	Facets	No.	Question	Response option				
Environment	Freedom, physical safety, and security	9	How safe do you feel in your daily life?	Not at all	A little amount	A Moderate amount	mostly	completely
				1	2	3	4	5
	Physical environment(pollution, noise, traffic and climate	0	How healthy is your physical environment?	Not at all	A little amount	A Moderate amount	mostly	completely
				1	2	3	4	5
	Financial resources	1	Have you enough money to meet your needs?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Opportunities for acquiring new information and skills	2	How available to you is the information that you need in your day-to-day life?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Participation in and opportunities for recreation / leisure activities	3	To what extent do you have opportunities for leisure activities?	Not at all	A little amount	Moderately	mostly	completely
				1	2	3	4	5
	Home environment	4	How satisfied are you with the condition of your living place?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Health and social care, accessibility and quality	5	How satisfied are you with access to health services?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5
	Transport	6	How satisfied are you with your transport?	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied satisfied	Satisfied	Very Satisfied
				1	2	3	4	5

Appendix D

No.	Name	Scientific name	Work place
1	Wajiha Ali Esmaeel	Professor	Retired
2	Salwa shakir al kwrawy	Professor	Retired
3	Anwer sheikha	professor	Hiwa hospital
4	Badiaah M N Salih	professor	Retired
5	Shukr saleem	Assistant professor	Hwaler medical university/college of nursing
6	Norhan Zeki Shakir	Assistant professor	Hwaler medical university/college of nursing
7	Hamdia Mirkhan Ahmad	Assistant professor	Hwaler medical university/college of nursing
8	Salih Ahmad Abdulla	Assistant professor	Hwaler medical university/college of nursing
9	Samir Y. lafi	professor	Raparin university/college of nursing
10	Sana Hassan Abdulsahib	Assistant professor	Raparin university/ college of nursing
11	Pary M. Aziz	Assistant professor	Sulaimani polytechnic university
12	Bushra Mohammed Ali	Assistant professor	University of Sulaimani/college of medicine
13	Fattah H hawrami	Lecturer	University of Sulaimani/college of medicine
14	Shaho Ezzadin	Lecturer	University of Sulaimani/college of medicine
15	Basil kadim Abdulla	Consultant in pediatric hematology - oncology	Hiwa hospital
16	Ibrahim Khasraw Jaff	lecturer	University of Sulaimani college of medicine

17	Suhair safwat mohammed	Assistant profesor	College of basic science English department/ Sulaimani university

پوختە

خانە شێرپە نجەییەکان زۆر بە خێرایی زیادە دەکەن ، وە تەنها هۆکار بۆ لە بردنی ئەم خانانە دەرمانی کیمیاویە کە کارگەری هەیە لەسەری ، هەر چەندە چارەسەری کیمیاوی کاریگەری دەکاتە سەر خانە ئاساییەکانیش لە کاتێکدا چارەسەری کیمیاوی کاریگەری کاتە سەر خانە ئاساییەکان ئەوا چەند کاریگەرییەکی لاوەکی دروست دەبێت لەسەر جەستەی منالّی توش بوو بە شێرپە نجە.

ئەم لێکۆڵینەوەیە ئاما نجی لێکۆڵینەوەیە لە کاریگەری چارەسەری کیمیایی لەسەر منالّی تووش بوو بە شێرپە نجە .

هەندێك جار تەنها یەك دەرمان و هەندێك جار چەندەها دەرمان بەکاردێت بۆ مەبەستی چارەسەرکردن.

دراسەیەکی وەصفی لەسەر (300) منداڵی سەروو (6) ساڵی توشبوو بە شێرپە نجە ئە نجام دراوە بۆ دۆزینەوە ئاستی کاریگەری لاوەکی چارەسەری کیمیایی لەسەریان ، ئە نجامەکان ئەوە دەردەخەن کە زۆربەی زۆری کاریگەری لاوەکی چارەسەری کیمیایی لەسەر کۆ ئەندامی هەرس و کۆئەندامی ماسولکە و ئێسکەکان بەجێ دەهێڵێت .

لە کاتێکدا شێرپە نجە دووەم هۆکاری مردنە لە ناو منداڵاندا بەمەش کاریگەری زۆری دەبێت لەسەر باوانیان .

هەروەها ئەم لێکۆڵینەوەیە ئاما نجێکی تریشی هەیە کە تا چەند نەخۆشی منداڵەکە کاریگەری هەبووە بۆ سەر چۆنیەتی ژیانی باوانیان .

بۆ ئەم مەبەستە (300) باوانی منداڵی توشبوو بە شێرپە نجە وەرگیراوە لە نەخۆشخانەی (هیوا) لە هەمان کاتدا (300) باوانی تر وەرگیراوە کە منداڵەکانیان توش نەبووە بە شێرپە نجە لە نەخۆشخانەی (منداڵانی فێرکاری) وە بەراوردیان پێ کراوە بە بەکارهێنانی پێوەری (WHO-QoLQ)ی ڕێکخراوی تەندروستی جیهانی بۆ هەڵسەنگاندنی جۆریەتی ژیان.

گەورەترین جیاوازی کە بەشێوەیەکی گشتی لە نێوان باوانەکاندا دەرکەوت ئەوە بوو کە باوانی منداڵی تووشبوو بە شێرپە نجە جۆریەتی ژیانیان خرا پترە لەو باوانەی کە منداڵیان تووشبوو بە شێرپە نجە نین.

لە ئە نجامدا بۆمان دەردەکەوێت کە باشترین ڕێگا بۆ پارێزگاری کردن لە تەندروستی منداڵ چاودێری کردنیەتی لە کاتی وەرگرتنی چارەسەری کیمیایی وە پاڵپشتییەکی تەواوی باوانەکانیان بکرێت و لەگەڵ پشتگیری کردنیان .

حکومەتی هەرێمی کوردستان
وەزارەتی خوێندنی باڵا و توێژینەوەی زانستی
زانکۆی سلێمانی
کۆلێژی پزیشکی

کاریگەری چارەسەری کیمیایی لەسەر ئەو منداڵانەی تووشبوی نەخۆشی شێرپە نجەن ، چۆنێتی ژیانی باوانیان لە نەخۆشخانەی هیوا لە شاری سلێمانی

لێکۆڵینەوە یەکە ، پێشکەش بە ئە نجوومەنی کۆلێجی پزیشکی زانکۆی سلێمانی کراوە ، بۆ تەواوکردنی بەشێك لە پێویستیەکانی پلەی دکتۆرا لە زانستی پەرستاری نەخۆشییەکانی هیماتۆلۆجی و ئۆنکۆلۆجی

لە لایەن
ئاوایی غازی عبدالکریم
ماستەر لە پەرستاری هیماتۆلۆجی

بەسەرپەرشتی
پ.ی.د. جمال أحمد رشید
و
پ.ی.د. ژیان صلاح رمزی

محرم 1441 ڕەزبەر 2719 2019 . Sep

حكومة اقيم كوردستان
وزارة التعليم العالي و البحث العلمي
جامعة السليمانية
كلية طب

تأثير العلاج كيميائي على الأطفال مصابين بمرض الصرطان ، و النوعية الحياة الوالدين في مستشفى هيوا بمحافظة السليمانية

اطروحة مقدمة الى مجلس كلية الطب ـ جامعة السليمانية، كجزء من متطلبات نيل شهادة الدكتورا في تمريض هيماتولوجي و ئونكولوجي

من قبل
ئاواي غازي عبدالكريم
ماجستير في تمريض هيماتولوجي

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محرم 1441 | ڕەزبەر 2719 | 2019 . Sep