The Republic of Iraq

Ministry of Higher Education and Scientific Research

University of Babylon

College of Nursing

Care Burden and Coping Strategies Practiced by Mothers for their Children with Leukemia in Al-Basrah Province

A Dissertation submitted by

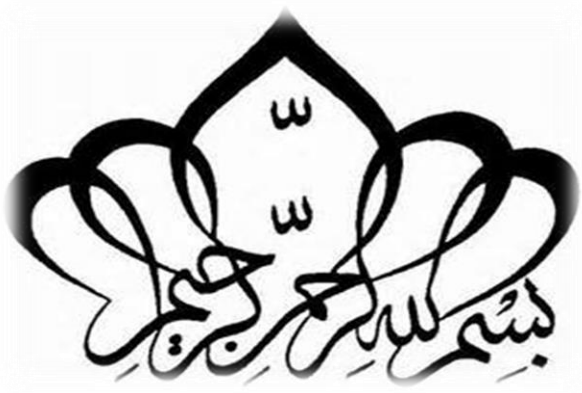
Zahraa Kahdum Abbas Al-Essawi

To the Council of College of Nursing, University of Babylon in partial fulfillment the requirement for the Degree of Doctorate of Philosophy in Nursing Sciences

Supervised By

Prof. Dr. Nuhad M. K. Al-Doori (ph.D)

2022 A.D. ***1444 A.H.***



﴿ وَنُنَزِّلُ مِنَ الْقُرْآنِ مَا هُوَ شِفَاءٌ وَرَحْمَةٌ

لِلْمُؤْمِنِينَ وَلَا يَزِيدُ الظَّالِمِينَ إِلَّا خَسَارًا ﴾

(الآية 82-من سورة الإسراء)

Dedication

To my mother & my father who support, help, and encourage me to achieve the research project, without their love, help and support this project could not have been made possible.

To lovely husband and son, my eternal gratitude.

To my brothers & my sister for supporting me with all love and respect

To my dear colleagues with all appreciation, and respect especially Marwaa Mohammed

I also dedicate this work to all the children who have died or sustained serious disability due to Leukemia.

Supervisor Certification

We *certify that this dissertation, which is entitled* ***"Care Burden and Coping Strategies Practiced by Mothers for their Children with Leukemia in Al-Basrah Province",*** was *prepared under my supervision at the College of Nursing, University of Babylon in partial fulfillment of the requirements for the Degree of Philosophy Doctorate in Nursing.*

Signature

Prof. Dr. Nuhad M. K. Al-Doori

Supervisor
College of Nursing/ University of Babylon
Date: / / 2022

Signature

Assist. Prof. Dr. Wafaa. Ahmed

The head of the Department of Maternal and Neonate Health Nursing

College of Nursing/ University of Babylon
Date: / / 2022

Certification

We, the examining committee, certify that we have read this dissertation entitled ***(Care Burden and Coping Strategies Practiced by Mothers for their Children with Leukemia in Al-Basrah Province)*** which is submitted by the student (**Zahraa Kadhum Abbas)** from the Department of Pediatric Health Nursing, and we have examined the student in its contents, and what is related to it and we decide that it is adequate for awarding the **(Doctorate of Philosophy in Nursing)** with specialty of Pediatric Health Nursing.

Member
Prof. Dr. Afifa Radha Aziz
College of Nursing/ University of Baghdad
Date / / 2022

Member
Prof. Dr. Shatha Saadi Mohammed
College of Nursing/ University of Babylon
Date / / 2022

Member
Prof. Dr. Abd Al.Mahdi Abd Al. Radha
College of Nursing/ University of Babylon
Date / / 2022

Member
Assist. Prof. Dr. Ahmed Abd Allah
College of Nursing/ University of Thi-Qar
Date / / 2022

Chairman
Prof. Dr. Amean A. Yasir
Date / / 2022
Approved by the council of the College of Nursing

Dean

Prof. Dr. Amean A.Yasir

College of Nursing/ University of Babylon

Date / / 2022

Acknowledgments

"In the name of Allah, the most beneficent, the most merciful"

- **F**irst praise is to "Allah" who gave me strength and health to work and to finish this work.
- **I** would like to express my thanks to the **Ministry** of **Health**, and **Ministry** of **Higher Education and Scientific Research** for offering me the opportunity to achieve my study.
- **M**y sincere thanks to **Prof. Dr. Amean A.Yasir, PhD. Dean** of College of Nursing/ Babylon University.
- **I** would like to express the greatest thanks, appreciation and gratefulness to my supervisor **Prof. Dr. Nuhad. M. K. Al-Doori**, **phD**.for her valuable advice, guidance, continuous help and supervision throughout the preparation of this work.
- **I** would like to offer special thanks **to Prof. Dr. Hussain Al-Ibrahimi** (may God have mercy on him), who, although no longer with us, continues to inspire by his example and dedication to the students he served over the course of his career.
- **S**pecial thanks to **Dr. Wafaa. Ahmed, PhD.,** the head of the Department of pediatric Health Nursing in Nursing College.
- **M**y deepest and sincere thanks to the **experts** for their suggestions and for evaluating the study instrument.
- **S**pecial thanks to the **hospital administration** Al-Basrah Specialist Children's Hospital.
- **M**oreover, I would like to thank the participants of this study who helped me in making this thesis possible to be accomplished. Without whom this effort work would never have come to fruition.

Finally, I pray to Allah (the great and Almighty) to bless them all.

Zahraa

2022

Abstract

A cross-sectional descriptive design is carried throughout the present study to assess the care burden and coping strategies practiced by mothers for their children with Leukemia in Al-Basrah Province through the period from 1st November/2020 to 1st March/2022.

A Non-Probability (convenient) sample of 105 mothers who have children under eighteen years are selected from oncology & hematology clinic and leukemia ward at Al.Basrah children specialist hospital.

The data are collected through the use of Zarit Burden Interview and Ways of Coping questionnaires were used for gathering the data. The questionnaire was consist of three parts: part one: the demographic characteristics which consist of three sections, part: mother's burden in caring of child with leukemia, which consist of (22), items, part three: mother's coping strategies of children with leukemia which consist of (66) items.

Reliability of the instrument is determined through a pilot study and validity is achieved through a panel of (16) expert. Internal consistency reliability is granted through the application of Cronbach alpha correlation coefficient, which resulted that 0.732 for care burden and 0.636 for coping strategies.

Data are obtained through utilization of the study instrument and through face-to-face interview techniques as means of data collection. Data collection was initiated from 9 July 2021 to 20 October 2021; interviews were achieved with mothers who were attended Al. Basrah Specialist center for Leukemia in Al-Basrah Province.

Data were analyzed through using the Statistical Package of Social Sciences (SPSS, version 24) performed through the use of descriptive and inferential statistical data analysis approach.

Results of data analysis depict that mothers burden related to caring of child with leukemia is demonstrated at a mean (2.56) and according to the study criteria, the mothers expressed sever care burden. the mostly of mother's coping strategies of children with leukemia expressed moderate coping and were a statistically significant relationship between mother's coping strategies and occupation, marital status and child age at p-value <0.05. Whereas, no statistically significant relationship between severity of care burdens and demographic characteristics. Furthermore, the current study shows that there is a non-significant correlation (weak negative correlation) between overall mother's coping strategies of children with leukemia and care burden.

The study concludes that intentional mothers overall responses were sever at care burden, moderate at coping strategies of children with leukemia at Al.Basrah Specialist Children's Hospital.

The study recommends that appropriate programs should be designed and implemented to support mothers. Use of effective coping skills to reduce the level of mother's burden and improve coping pattern must be considered as apriority for mothers support.

Table of Contents

Contents

Acknowledgments.....I

Abstract.....II

Table of Contents.....IV

Table of Contents.....VIII

List of Abbreviations.....X

Chapter One.....1

Introduction.....1

1.1 Introduction: 1

1.2 Important of the study 11

1.3 Statement of the Problem.....15

1.4 Objectives of the Study 16

1.5 Research Hypotheses:.....16

1.6 Definition of Terms.....17

1.6.1Burden.....17

1.6.2 Coping 17

1.6.3 Strategies.....17

1.6.4 Leukemia 18

1.6.5 Child.....18

Chapter Two.....19

Review of literature.....19

2.1 Historical background of leukemia 19

2.2. Theoretical Framework: 23

2.2.1 The Four Adaptive Modes.....25

2.2.2 Major concepts of Roy's adaptation model (RAM) 26

2.3 General conception of hematologic system.....29

2.3.1 White blood cells (WBCs): 30

2.4 General Conception of Leukemia.....32

2.5 Pathologic and Related Clinical Manifestations 33

1.5.1 Bone Marrow Dysfunction 35

2.5.2 Disturbance of Involved Organs.....36

2.6 Classification of Leukemia.....37

2.6.1 Acute Lymphoblastic leukemia....37
2.6.1.1 Epidemiology of Acute Lymphoblastic leukemia....39
2.6.1.2 Etiology of Acute Lymphoblastic leukemia....41
2.6.1.3 Risk factors....41
2.6.1.4 Staging and Classification....42
2.6.2 Acute Myelogenous Leukemia....47
2.7 Chronic Myeloid Leukemia (CML)....52
2.8 Juvenile Myelomonocytic Leukemia....53
2.9 Clinical Signs and Symptoms....54
2.10 Leukemia diagnostics....56
2.11 Epidemiology of Leukemia....57
2.12 Risk Factors for Childhood Leukemia....59
2.13 Therapeutic Management....61
2.14 Family Caregivers....64
2.15 Care Burden....65
2.16 Coping Strategies....69
2.16.1 Coping strategies for parents....70
2.17 Nursing Roles....73
2.18 Nursing Care Management....75
2.19 Nursing Diagnosis and Related Intervention....76
2.20 Previous Studies....78
Chapter Three....81
Methodology....81
3.1 Design of the study....81
3.2 Administrative arrangements....81
3.3 Ethical Consideration....82
3.4 Setting of the study....82
3.5 Validity of the Instrument:....82
3.6 Pilot study....83
3.7 Reliability of the study instrument....84
3.8 Sample of the study....85
3.8.1 Inclusive criteria....86
3.8.2 Exclusive Criteria....86
3.9 The study instrument....86

3.10 Method of data collection 89
3.11 Methods of data analysis.....90
Chapter Four Results of the Study.....95
Chapter Five.....136
Discussion of the Result.....136
References.....159
APPENDIX A Adminstrative Arrangment
APPENDIX B List of Experts
APPENDIX C Questionnaire Formate
APPENDIX D Linguistic Expert

Table of Figures

Figure 2. 1 The Roy adaptation model (Andrews, 1991) 26

Figure 2. 2 Application of the Roy Adaptation Model for mother of child with leukemia (design by researcher). 28

Figure 2. 3 Hematopoiesis in humans (Jin et al., 2017) 30

Figure 2. 4 Principal sites of tissue involvement in leukemia. CNS, Central nervous system; RBC, red blood cells; WBC, white blood cells (Hockenberry and Wilson, 2015). 35

Figure 4. 1 Overall assessment level of mother's burden in caring of child with leukemia. 102

Figure 4. 2 Overall assessment level of mother's Coping Strategies of children with leukemia 118

Figure 4. 3 Association between Overall mother's Coping Strategies of children with leukemia and psychological burden. 119

Table of Contents

Table 2. 1 FAB ALL classification (Tomlinson and Kline, 2010).....43
Table 2. 2 Acute lymphoblastic leukemia outcome predictions linked to ploidy status (Tomlinson and Kline, 2010) 44
Table 2. 3 Acute myeloid leukemia is classified as French-American-British (FAB) (Tomlinson and Kline, 2010) 50
Table 2. 4 Acute myeloid leukemia is classified by the World Health Organization. (Tomlinson and Kline, 2010) 51

Table 3. 1 Distribution of the Study Sample according to their hospitals.....82
Table 3. 2 Reliability Coefficients of the study instrument. 85
Table 3. 3 Distribution of the Study Sample according to their Setting.....86

Table 4. 1 Distribution of mother's demographic data (N =105).....95
Table 4. 2 Distribution of Child's Demographical data (N=105): 97
Table 4. 3 Distribution of mother's burden in caring of child with leukemia (N=105). 99
Table 4. 4 Overall assessment level of mother's burden in caring of child with leukemia (N=105). 102
Table 4. 5 mother's Coping Strategies of children with leukemia: 102
Table 4. 6 Overall assessment level of mother's Coping Strategies of children with leukemia. (N=105).117
Table 4. 7 Association between Overall mother's Coping Strategies of children with leukemia and their care burden. 118
Table 4. 8 Relationship between mother's care burden and their Demographic Characteristics 119
Table 4. 9 Relationship between mother's care burden and child Demographic Characteristics 122
Table 4. 10 Relationship between mother's care burden and child Demographic Characteristics 124
Table 4. 11 : Relationship between coping strategies and mother's demographic data.....127
Table 4. 12 Relationship between mother's coping strategies and child demographic Data.....131
Table 4. 13 Relationship between mother's coping strategies and medical history of child with leukemia. 133

Table 4.10. 1 Statistical Relationship between mother's care burden and the medical diagnosis of child124

Table 4.10. 2 Statistical Relationship between mother's care burden and the duration of disease.....125
Table 4.10. 3 Statistical Relationship between mother's care burden and Limitations due to disease process for child 125
Table 4.10. 4: Statistical Relationship between mother's care burden and Current disease status.....126
Table 4.10. 5: Statistical Relationship between mother's care burden and current disease treatment.....126

Table 4.11. 1 : Statistical Relationship between mother's coping strategies and Age of mother 127
Table 4.11. 2: Statistical Relationship between mother's coping strategies and Levels of their education 127
Table 4.11. 3 Statistical Relationship between mother's coping strategies and their occupations. 128
Table 4.11. 4 Statistical Relationship between mother's coping strategies and their marital status. 128
Table 4.11. 5 Statistical Relationship between mother's coping strategies and economic status 129
Table 4.11. 6 Statistical Relationship between mother's coping strategies and Residence 129
Table 4.11. 7 Statistical Relationship between mother's coping strategies and Type of family.....130
Table 4.11. 8 Statistical Relationship between mother's coping strategies and Number of children 130

Table 4.12. 1 Statistical Relationship between mother's coping strategies and child age 131
Table 4.12. 2 Statistical Relationship between mother's coping strategies and gender.....131
Table 4.12. 3 Statistical Relationship between mother's coping strategies and Child order in the family 132
Table 4.12. 4 Statistical Relationship between mother's coping strategies and other children with Leukemia in the family 132

Table 4.13. 1 Statistical Relationship between mother's coping strategies and the medical diagnosis of child.....133
Table 4.13. 2 Statistical Relationship between mother's coping strategies and Duration of disease 133
Table 4.13. 3 Statistical Relationship between mother's coping strategies and Limitations due to disease process for child 134
Table 4.13. 4 Statistical Relationship between mother's coping strategies and Current disease status..134
Table 4.13. 5 Statistical Relationship between mother's coping strategies and Current disease treatment 135

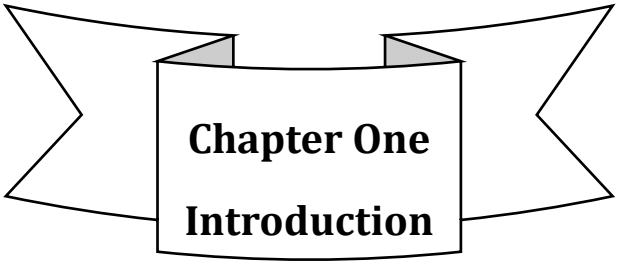
List of Abbreviations

Abbreviations	Definitions
ANC	Absolute Neutrophil Count
ADL	Activities of Daily Living
ALL	Acute Lymphocytic Leukemia
AML	Acute Myelogenous Leukemia
et al.,	And others
AD	Anno Domini
Ass.	Assessment
BC	Before Christ
CB	Caregiver Burden
CDC	Centers for Disease Control and Prevention
CNS	Central Nervous System
SCF	Cerebrospinal Fluid
CL	Childhood Leukemia
CNY	Chinese yuan renminbi
$\chi 2$	Chi-Square
CML	Chronic Myeloid Leukemia
CD	cluster-of-differentiation
c	Column
CBC	Complete Blood Count
CT	Computerized Tomography
df	Degree of Freedom
DNA	DeoxyriboNucleic Acid
$	Dollar Sign
≤	Equal or less than

≥	Equal or more than
E-PRTR	European Pollutant Release and Transfer Register
FAB	French-American-British
F	Frequency
ICP	increased intracranial pressure
IPPC	Integrated Pollution Prevention and Control
IPPC	International Plant Protection Convention
JMML	Juvenile Myelomonocytic Leukemia
LMICs	low- and middle-income countries
MRI	Magnetic resonance imaging
M.S	Mean score
MDS	Myelodysplastic syndromes
INCA	National Cancer Institute
NO.	Number
n	Number of sample
OS	overall survival
P.P.	Pages
%	Percentage
P	Probability level
RBCs	Red blood cells
r	Row
RAM	Roy Adaptation Model
S	Score
S.	Significant
SS	Social support
SD	Stander deviation

SPSS	Statistical Package of Social Sciences
∑	Summation
SEER	Surveillance, Epidemiology, and End Results (SEER) Program
TDN	True de Novo
UK	United Kingdom
UN	United Nations
US	United States
WBC	White Blood Cells
WHO	World Health Organization
ZBI	Zarit Burden Interview

Chapter One
Introduction



1.1 Introduction:

The blood-forming tissues of the bone marrow, lymph nodes, and spleen are all affected by neoplastic illness. In these blood-forming tissues, normal hematopoiesis takes place. A variety of extracellular protein factors control the growth and differentiation of developing cell pathways, ensuring that mature blood cell types are created in proper quantities that result in certain types of leukemia affected by mutations (Tomlinson and Kline, 2010).

Leukemia is the general name for a group of cancers that affect the bone marrow and lymphatic system. It is a multifaceted illness with varying degrees of heterogeneity. As a result, categorization has become more complicated, sophisticated, and important, as determining the subtype of leukemia has therapeutic and prognostic ramifications (Hockenberry et al., 2017).

Myeloblasts, lymphoblasts, and monoblasts, which are frequently referred to as "blasts," are immature white blood cells that cannot function efficiently in leukemia. An abnormal number of immature white blood cells reduces the amount of space available in the bone marrow for the formation of other healthy blood cells. The blast cells could then penetrate the bloodstream and infiltrate the brain (CNS) (Hockenberry et al., 2017).

Acute Lymphocytic Leukemia (ALL) and acute myelogenous leukemia (AML) are the two most common kinds of childhood leukemia (AML). When a child has ALL, completely formed white blood cells are

unable to form properly, and as a result, the patient is unable to fight off diseases (such as the common cold) effectively, and may succumb to the sickness. White blood cells aid in the fight against infection. In leukemia patients, white blood cells form improperly in leukemia patients, and stem cells transform into lymphoblasts (leukemia cells). This has a negative impact on the body because the number of red blood cells and platelets produced by the bones is reduced. Blood coagulation, infection resistance, and iron retention are all dependent on red blood cells. Heavy bleeding from a small incision or anemia is possible without healthy red blood cells (Bernard et al., 2017).

Childhood leukemia is a kind of childhood cancer that affects children aged 0 to 14. In 2018, it accounted for 29 percent of cancers in children aged 0–14.In children, there are several types of leukemia, the most prevalent of which is acute lymphoblastic leukemia (ALL), followed by acute myeloid leukemia (AML) (Howlader et al., 2018). Survival rates vary depending on the type of leukemia, but with ALL, they can be as high as 90% (Hunger and Mullighan, 2015).

Leukemia is a type of hematological cancer that develops in the bone marrow, the soft interior part of the bone where new blood cells are produced. Normal healthy cells, on the other hand, only proliferate when there is enough room for them. The body will control cell production by sending out signals when it is time to cease. The cells of a child with leukemia do not respond to the signals that instruct them when to cease producing cells and when to stop producing them. When the bone marrow becomes overcrowded, it has difficulty creating other blood cells (Pui et al., 2015).

The signs and symptoms of childhood leukemia can be caused by other diseases or internal disorders. Anemia, weakness, feeling cold, pale

skin, and shortness of breath are among the symptoms of childhood leukemia. Low white blood cell counts, which can cause infections, fevers, and a lack of immunity, cause the most noticeable symptoms. In addition, encourage the child to get more infected and inflamed. The accumulation of leukemia cells along the surface causes joint discomfort and swelling on the outside of the stomach. Gradual inflammation in many places of the body might potentially indicate the presence of cancer. Extreme weariness and weakness are the final symptoms of pediatric leukemia (Metayer et al., 2016; Hutter, 2010).

The majority of leukemia cases have no recognized cause. The causes of different leukemias are likely to be diverse. Leukemia, like other malignancies, is caused by DNA mutations. By activating oncogenes or deactivating tumor suppressor genes, some mutations can cause leukemia by altering the regulation of cell death, differentiation, and proliferation. These mutations can occur naturally or as a result of radiation or carcinogenic chemical exposure. (Radivoyevitch et al., 2016).

In contrast to other pediatric malignancies, a growing body of evidence has indicated the participation of many environmental indoor and outdoor risks in the etiology of pediatric leukemia on a national and international level. Exposures to pesticides, solvents, traffic, and tobacco smoke, for example, have consistently been linked to an increased risk of pediatric leukemia. Supplementing with vitamins and folate during the preconception period or throughout pregnancy has been shown to have a protective impact. (Howlader et al., 2018).

Following observations of the symptoms, a diagnosis is usually made based on repeated complete blood counts and a bone marrow examination. Blood tests may fail to detect leukemia in some cases,

particularly in the early stages of the disease or during remission. In some cases, a lymph node biopsy can be used to detect specific kinds of leukemia (Abdul Hay et al., 2021).

Blood chemistry tests can be done after a diagnosis to detect the extent of liver and kidney damage, as well as the effects of chemotherapy on the patient. Doctors may use an X-ray, MRI, or ultrasound if they are concerned about other leukemia-related impairments. These may reveal leukemia's effects on bones (X-ray), the brain (MRI), or the kidneys, spleen, and liver (liver biopsy) (ultrasound). Though it is unusual, CT scans can be used to assess lymph nodes in the chest (Sutliff et al., 2021).

Many people have not been identified with leukemia despite the use of these methods to determine whether or not they have the disease because many of the symptoms are vague, non-specific, and can refer to other illnesses. As a result, according to the American Cancer Society, at least one-fifth of persons with leukemia have yet to be diagnosed (American Cancer Society, 2010).

Doctors must make a diagnosis based on physical exams and histories, complete blood counts with differential, blood chemical testing, and bone marrow aspiration and biopsy because leukemia can impact both red and white blood cells and platelets. Chemotherapy is the most frequent cancer treatment, and it involves the use of chemicals to prevent cancer cells from multiplying by either slowing their growth or killing them. Intrathecal chemotherapy is a type of chemotherapy that can be used to treat leukemia that has progressed to the brain or spinal cord (Cooper and Brown, 2015).

When parents learn that their children have lymphoma, leukemia, or another type of cancer, they are filled with fear. It's a period of new people and situations, as well as fears and change. It may be comforting to know that

children's cancer survival statistics have improved dramatically over the past several decades. Around the world, doctors, nurses, and scientists are collaborating to improve outcomes for children diagnosed with pediatric cancers—experts are still looking for causes, developing better treatments, and reducing long-term impacts. psychologists, social workers, psychiatrists, and other health experts are also trying to figure out ways to help children and families cope with cancer and its treatment while also maintaining a high quality of life during their treatment (DeGennaro, 2012).

There are two categories of caregivers: formal and informal. Formal carers are professionals who are paid to provide all forms of care (Rohani et al., 2014). Individuals who provide unpaid, continuing support with activities of daily living or instrumental activities of daily living for people with a chronic disease or handicap are known as informal caregivers. Informal, or at-home, caregivers are the backbone of the long-term care system, and they are frequently made up of family, friends, and relatives (Plöthner et al., 2019).

Often, one person is designated as the primary caregiver and is in charge of the majority of the physical care and supervision (Farhadi et al., 2016). Caregiving is a demanding duty, especially for inexperienced primary carers who are caring for someone who has major, long-term health issues (Kumar et al., 2015). Caregiver stress is prevalent, and it is caused by the constant physical and emotional burden of caring for others (Penning and Wu, 2016).

Today, the majority of medical treatment is delivered at home, placing a significant strain on family members, particularly parents; as a result, parental caregiver burden is a top goal in children's oncology research. Parents have a vital role in their child's treatment process, including their

interaction with the medical team and medication administration. Caregivers face a variety of issues, including societal expectations, family relationships, and psychological suffering, such as stress, sadness, and anxiety, all of which can have a detrimental impact on their quality of life (Motlagh et al., 2019).

Cancer is an illness with a high morbidity and mortality rate, making it tough to cope with. It has a physical and emotional impact on both patients and their families. It is one of the most serious health issues since it causes deaths, affects individuals of all ages around the world, makes people dependent on others, and has a negative impact on both patients and their families (Tamayo et al., 2010; Terakye, 2011).

A family's life is turned upside down when a youngster is diagnosed with cancer (Khoury et al., 2013). Parents of a child who has recently been diagnosed with cancer are in a state of distress and turmoil. When a child is diagnosed with cancer, parents frequently feel out of control of their lives and worry excessively about the future (Altay et al., 2014; Adelman et al., 2014). Parents experience feelings of inadequacy and inability as a result of a lack of knowledge and expertise, as well as an inability to offer sufficient care. Furthermore, parents' continual worry for their child, as well as the anticipation of unforeseeable difficulties, develop feelings of insecurity and doubt in them, leading to perplexity regarding caregiving (Nemati et al., 2018).

Parents of children with cancer frequently have to alter their lifestyles, as well as some of their roles and responsibilities in general (Masa'Deh et al., 2012). Furthermore, they are subjected to significant emotional and physiological stress during the care process, which can result in physical and mental health issues. They experience despair, depression, anxiety, and disappointment (Nemati et al., 2018; Yakar and Pinar, 2013;

Abbasnezhad et al., 2015), which can lead to poor health and a lower quality of life. This might place a burden on parents who are already caring for their children (Klassen et al., 2011; Altay et al., 2014).

Moghaddasi et al., (2018) signified that a kid's cancer impacts not only the child, but also his or her family, including close relatives and friends. Because of the nature of this condition, it impacts a variety of family components, including personal, familial, and social interactions and relationships, as well as family functioning, while putting a high level of care duty on the family.

It is commonly recognized that cancer disrupts not only patients' but also family members' everyday routines, and that cancer patients' families are more stressed. Once a cancer diagnosis has been made, family members should deal with the difficulties that arise as a result of the disease and take on the position of caregiver (Silveira et al., 2010). Caring for a loved one with a chronic or serious illness comes with a lot of burden (Terakye, 2011; Türkolu and Klç, 2012). As a result, for parents without medical knowledge, caring for children with acute lymphoblastic leukemia (ALL) is a stressful experience. Parents' care burden may increase as a result of the event (Wang et al., 2017).

Burden is a multifaceted notion with objective and subjective components that can be described. The term "objective burden" refers to specific events and activities associated with caregiving, such as financial difficulties or personal activity constraints. On the other hand, "subjective burden" refers to subjective reactions to the caregiver experience, such as anxiety, pressure, and guilt (Ahmad, 2020).

The caregiver burden is described as a subjective experience that the carer considers to be particularly burdensome. Caregivers' physical and

psychological well-being, as well as their personal and social relationships, are all affected by caregiver burden. In the survey, 60.6 percent of carers claimed they didn't have time to devote to their caregiving tasks, 78.8% said they were exhausted, 84.9 percent said they had communication issues with the patient, and 56.9% said they were having financial troubles (Baran, 2018).

Caregiver burden is defined by Ahmadi et al., (2019) as the physical, social, emotional, or economic challenges that a person who cares for a chronically ill or disabled family member can endure and is characterized by the caregiver's negative reaction.

On the other hand, cancer treatment may be a difficult experience for both parents and their children. The advent of numerous difficulties linked with sickness and treatment drastically alters family life patterns, forcing the family to cope with new conditions and requirements (Shamsi et al., 2016; Ahmadi et al., 2019).

When a family member has cancer, it causes a variety of changes in the family structure. Taking care of a cancer-stricken child is stressful and difficult for everyone involved. This burden causes family members to experience symptoms such as "denial, isolation, loneliness, and fearfulness." Family members may require significant emotional support if they are not prepared to take on all of the tasks that the new position implies. The family must adjust to a new condition that includes frequent hospitalizations, aggressive treatment for the kid, changes in family connections, and difficult routines that may prevent the child and family from doing daily duties (Sharma et al., 2018).

Subsequently, the family members, especially the primary caregivers, tend to face new challenges with the appearance of diagnosis.

They are the beginning and the continuation of education and cooperation in a complex and long-term treatment. Since it comes to children, the primary caregiver is the mother, who was elected as the member of the family, whose moral duty is to stay with the child in the hospital and feels compelled to care for the child, since the child himself elects her as protector amongst the other family members and she assumes that no one is prepared, like her, to care for and protect her child (Dantas et al., 2015).

Healthcare practitioners, on the other hand, frequently focus on the difficulties of patients while overlooking the needs of their families. Parents, on the other hand, face significant difficulty and a terrible experience in caring for their children, and they require assistance and support in this regard (Santo et al., 2011). The quality of patient care will be compromised if care is provided in a challenging and distressing circumstance. As a result, health planners should take into account the difficulties and suffering that parents endure and try to eliminate them through appropriate measures (Nemati et al., 2018).

Coping is defined as a cognitive and behavioral effort to manage demands that are seen to be difficult or exceed an individual's resources. Problem-focused coping and emotion-focused coping are the two styles of coping. The first is concerned with problem solving, whereas the second is concerned with emotional management. Coping with the physical and emotional problems of a cancer diagnosis and treatment can be challenging for all family members, especially caregivers of children. This is especially true for children with cancer, with substantial studies demonstrating the psychosocial effects on patients' parents and siblings (Rodríguez-Pérez et al., 2017).

Support is required to allow informal carers to stay in their roles for as long as feasible without jeopardizing their own physical or mental health. Effective and adaptive coping skills may safeguard caregivers by minimizing their discomfort (Iavarone et al., 2014).

Individuals' cognitive and behavioral efforts to comprehend and overcome issues are referred to as coping strategies. There are three categories of coping techniques: problem-focused, emotion-focused, and avoidant coping (Nabi and Khan, 2017). Individuals who employ the problem-focused coping technique try to describe and precisely assess the problem, as well as the possibilities of changing or dominating it, in order to lessen the negative consequences of mental stress (Farnia et al., 2017).

Problem-solving abilities aid in identifying the source of a problem and devising a viable solution (Modaresifard and Maredpour, 2016). The skill of forgetting about the problem or enlisting emotional support from others is part of the emotion-focused coping approach. While escape coping is a useful short-term technique, it delays psychological adjustment and worsens symptoms of helplessness such as sadness in the long run (Mahmoud Alilou et al., 2016).

Problem-focused coping and emotion-focused coping are two types of stress management approaches. Problem-focused (or solution-focused) coping strategies, in general, try to eliminate stressors or work with stressors themselves. Emotion-focused coping strategies, on the other hand, help you become less emotionally reactive to the challenges you confront. They alter your perception of these occurrences, causing them to have a different impact on you (Amnie, 2018).

Anxiety, fear, sadness, and rage are examples of negative emotional reactions to stress that are addressed by emotion-focused coping.

When a stressor is something you cannot control, this kind of coping may be effective. Many people believe that the best way to deal with stress is to adopt solution-focused coping strategies. We do not need to learn how to change our responses to any stressors if we eliminate the things that appear to cause us stress (Scott and Morin, 2021).

The process of acquiring adequate coping skills can be aided by exposing the caregiver to stressors without overwhelming them, resulting in increased adaption. (Jafari and Hesampoor, 2017).

Leukemic children can impair caregivers' social well-being, particularly by changing family responsibilities, as well as a parent's physical well-being when caring for the patient. Caregivers generally experience higher weariness, sleep disruptions, and decreased cognitive function than non-caregivers, despite the fact that their health state is initially similar to that of the general population (Hamad and Shaker, 2019).

Nursing care should be planned to address the medical and psychological requirements of the child, with parental support as needed. Nurses are in a unique position to detect caregiver stress and psychological burden. They can also recognize the negative effects of cancer, such as poor familial coping and adaption, higher hospitalization, abilities, and family stress levels. Nurses who are familiar with the characteristics of caregivers' coping responses and how different coping strategies affect their adjustment can devise effective therapies (Northouse et al., 2010).

1.2 Important of the study

Cancer is a word that instills terror in people's minds and severely affects their lives, but childhood cancer is still the second leading cause of mortality in children, and it is linked to the fear of death, lack of cure, loss of

life, and disease-related suffering. Every year, 75 to 150 million children worldwide are diagnosed with cancer (Sharma et al., 2018).

Childhood cancer is still the second biggest cause of mortality among children aged 5 to 14 years old (behind accidents). Meanwhile, acute lymphoblastic leukemia is a prevalent illness in children, and cancer identification in youth is a life-changing event for both the child and their families (Khazaei and et al., 2017, Moussavi et al., 2014, Ward et al., 2014).

Malignancy is a serious health problem worldwide in terms of morbidity and mortality, but it is particularly prevalent in underdeveloped countries. In 2015, 8.8 million people died of cancer (about 16 percent of all annual deaths), with 70 percent of these deaths occurring in developing countries (WHO, 2017).

The incidence of pediatric cancer in the majority of the world's population ranges from 50 to 200 per million children per year (Stefan, 2015).

In developed countries, despite improvements in the 5-year survival rate, cancer is the second greatest cause of mortality in children after accidents (Murphy et al., 2013). Childhood malignancies account for fewer than one percent of all cancers diagnosed each year. In 2017, 10.270 children under the age of 15 will be diagnosed with cancer in the United States, according to the CDC (American Cancer Society, 2017).

While, Ritwik (2018) states that in the United States, cancer is the second greatest cause of mortality among children between 5 to 14 years old. According to the American Cancer Society, 10,590 children under the age of 15 years were diagnosed with cancer in the United States in 2018.

Cancer is the third or fourth most prevalent cause of death among children in developing countries, despite great progress in treating the

leading causes of death in children, such as infection and starvation. Childhood cancer is most prevalent in developing countries. According to estimates, 80 percent to 85 percent of pediatric cancer occurrences occur in underdeveloped nations, where 90 percent of the world's children live, and 5-year survival rates might be as low as 10%. Childhood cancer accounts for around 6.7 percent of all malignancies in Iraq (Al-Asadi and Ibrahim, 2018). This could be related to the demographic structure, among other things. In Iraq, children under the age of 15 account for 40% of the entire population (Habib et al., 2016).

Leukemia is the most frequent malignancy in children, accounting for about one-third of all cancers in children. In Malaysia, it is the most frequent malignancy among children aged 0 to 14, accounting for 48 percent of malignancies among boys and 44.5 percent among girls (Zainal and Nor, 2011).

Childhood acute lymphoblastic leukemia (ALL) is transformed from a life-threatening disease to a chronic condition due to advancements in therapy and management. It also leads to a shift in childcare from the hospital to the house, requiring a shift in family roles and the ability to manage their social activities, job commitments, and other elements of their lives. The anxiety of losing the ill kid, as well as the abrupt shift in family life, has a significant influence on the parents' health-related quality of life (Sutan et al., 2017).

According to the National Cancer Institute (INCA), about 7,000 new cases of cancer in children are diagnosed in Brazil each year, with patient survival rates improving due to advances in pharmaceutical research, the use of more precise diagnostic techniques, psychosocial support, early diagnosis, and multidisciplinary care. After violent deaths and infectious

diseases, pediatric cancer is the third greatest cause of infant mortality (National Cancer Institute, 2012).

According to the findings of the National Profile of Family Caregivers in Canada research, 50 percent of caregivers had physical health issues and 48 percent had mental health issues. In addition, 54 percent of family caregivers reported financial issues and 66 percent reported difficulty at work as a result of their caregiver obligations (Sercekus et al., 2014).

Cancer is the third biggest cause of mortality in Iranian children aged 1 to 14 years. In the Iranian population, cancer is responsible for about 4% of fatalities in children under the age of 5 and 13% of deaths in children between 5 to 15 years (Mojen et al., 2017; Lotfi et al., 2012).

Leukemia is the most frequent type of cancer in children under the age of 15 years, accounting for 25% of all cancers in this age range (Mahmoud and Elaziz, 2015). Acute leukemia is the most frequent type of cancer in children. Leukemia accounted for 6.6 percent of the 25,320 new cancer cases diagnosed in Iraq in 2018 (International Agency for Research on Cancer, 2018).

More than 120 instances of leukemia in children were documented at Erbil's Nana-kali Hospital for Blood Diseases and Cancer between 2016 and 2018. For someone who cares for children with cancer, the condition, like other chronic diseases, creates a slew of physical and emotional challenges. During the early phases of their child's diagnosis, caregivers, who are mostly parents, exhibit varied levels of psychological issues (Mahmoud and Elaziz, 2015).

In Basrah, the total number of children with cancer who were newly diagnosed and recorded between 2012 and 2016 was 723. The total incidence rate was 13.74 per 100,000, with an age-standardized incidence

rate (ASIR) of 13.87 per 100,000. Childhood cancer incidence and ASIR peaked in Basrah in 2012 (15.74/100,000 population and 15.87/100,000 population, respectively). Then they dropped to 11.50/100,000 population and 11.59/100,000 population, respectively, in 2013, before progressively rising in the years after that to (14.53/100,000 population and 14.54/100,000 population, respectively) in 2016 (Al-Asadi and Ibrahim, 2018).

Caregivers of cancer children have been shown to have a negative impact on their health and wellbeing, as well as a lower quality of life. A caregiver is responsible for not just caring for a kid with a chronic condition, but also for adjusting the youngster's life (Fitzmaurice, 2018).

Previous research has shown that parents of children undergoing active cancer treatment experience a considerable rise in stress. As the number of kids diagnosed with cancer continues to climb, there has been a push to find factors that may help these families have a better outcome. Families of children with cancer suffer substantial stress as they adhere to demanding treatment regimens, probable medical treatment side effects, daily activity adjustments, role disruptions, and the fear of mortality (Bigalke, 2015).

Nurses should be aware of cancer's potential negative impacts, such as lower familial coping and adaption abilities, as well as increased family stress levels. In order to fulfill his position, the caregiver requires proper measures to assist him in reliving the burden (Hassan and Ibrahim, 2018).

1.3 Statement of the Problem

Care Burden and Coping Strategies Practiced by Mothers for their Children with Leukemia in Al-Basrah Province

Childhood leukemia is one of the world's fastest-growing health problems, with poor physical, social, and psychological repercussions for mothers and a negative impact on the quality of long-term care for leukemic children. As a result, coping methods play an important role in reducing the burden of caregiving.

1.4 Objectives of the Study

The present study aims to:

1. To identify the sociodemographic characteristic that define mothers of children with leukemia.
2. To identify the demographic and disease characteristics progression for children of the sample.
3. To assess coping strategies among mothers of children with leukemia.
4. To assess burden among mothers of children with leukemia.
5. To find the association between severity of the burdens and coping strategies.
6. To find out the association between severity of the burden and demographic characteristics.
7. To find out the association between coping strategies and demographic characteristics of mothers and children.

1.5 Research Hypotheses:

A. "**Null hypothesis:** there is no significant positive or negative association between care burden and coping strategies practiced by mothers of leukemic Children and their sociodemographic characteristics: age, education, employment and socioeconomic status at $p \leq 0.05$".

B. **"Alternative hypothesis:** there is significant positive or negative association between care burden and coping strategies practiced by mothers of leukemic Children and their sociodemographic characteristics: age, education, employment and socioeconomic status at $p \leq 0.05$".

1.6 Definition of Terms

1.6.1Burden

a. Theoretical Definition:

"A duty, responsibility, etc. that causes worry, difficulty or hard work (Oxford, 2021).

b. Operational Definition:

The main burden of the mother is caring for a child with a difficult health problem (leukemia).

1.6.2 Coping

a. Theoretical Definition:

“To do something well in a difficult situation" (Cambridge, 2021).

b. Operational Definition:

Behavioral and cognitive efforts that the mother used to adjust to a new circumstance that includes hospital stays, severe chemotherapy, changes in family roles and relationships, routine changes, and other emotional obstacles.

1.6.3 Strategies

a. Theoretical Definition:

“A plan that is intended to achieve a particular purpose" (Oxford, 2021).

b. Operational Definition:

A plan or method chosen by mother to adapt with her child who has a difficult health problem.

1.6.4 Leukemia

a. Theoretical Definition:

A very serious disease in which the body forms too many white blood cells (Merriam, 2021).

b. Operational Definition:

There is an issue with the creation of blood cells. White blood cells are usually affected.

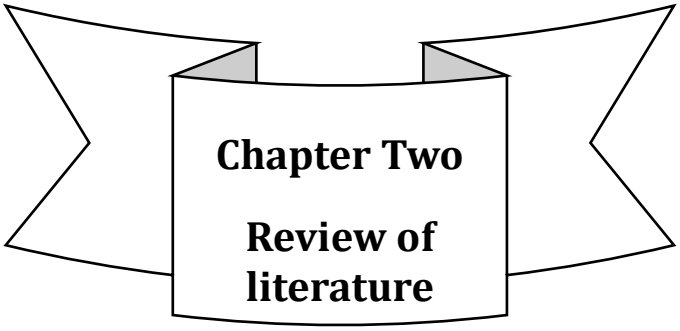
1.6.5 Child

a. Theoretical Definition:

A young person who is not yet an adult (Cambridge, 2021).

b. Operational Definition:

Child in leukemia clinic and ward attending with mother for treatment or follow-up.



This chapter provides a review of the literature and research that are related to the phenomenon that the current study is based on:

2.1 Historical background of leukemia

The earliest mention of cancer was unearthed in Egypt around 1600 BC. Hippocrates, a Greek physician, is credited with coining the term "cancer" from 460 to 370 BC. Hippocrates observed that the blood arteries surrounding a cancerous tumor resembled crab claws. To explain tumors that may or may not proceed to ulceration, he termed the disease karkinos (the Greek word for crab). The ancient Greeks are credited with discovering leukemia around the 4th or 5th century BC, when they noticed this blood disorder. However, before AD 500, there was no evidence of blood cancers in the literature (Tu, 2010).

Leukemia literally translates to "white blood." It was initially discovered in 1845, whenever the blood of victims was inspected and an abundance of "colorless" cells was discovered. (Williams and Hopper, 2015).

The origins of leukemia can be traced back 200 years. Jan Swammerdam (1637 to 1680) viewed blood cells under the microscope for the first time in 1658, after Robert Hooke had published the first important work on advanced biological studies. The pioneer of microbiology, Anton van Leeuwenhoek (1632 to 1723), was the first to characterize human red

blood cells and blood flow in capillaries. In 1674, he published the first detailed report of red blood globules. Joseph Lieutaud (1703-1780) was the first to identify WBCs; he presented his main study on the lymphatic system and described lymphocytes for the first time (Kampen, 2012; Thomas, 2013).

Rudolf Virchow, John Bennett, Alfred Donné, and Velpeau1821 to 1902 are four scientists who are usually referred to as "the ones" who discovered leukemia; it is difficult to say who was the first to do so. However, a review of published papers and books revealed that Peter Cullen (1769–unknown), a Glasgow native and Edinburgh Professor of Medicine, was most likely the first. For splenitis with inexplicable milky blood, he coined the term "splenitis actus," and his work was published in the 1811s (Mehranfar et al., 2017).

In 1833, Maurice Duplay (1736–1820), a chef in a Paris hospital, noticed a severe drop in blood during an autopsy of a female patient. Duplay observed a similarity between his findings and those of Velpeau, who published his findings in 1825. This case report contributed only a little to our understanding of leukemia at the time. In 1829, Collineau (1783–1860) and colleagues published a study about a possible instance of leukemia. He thought the pus, or milky fluid, was a result of the blood being reduced in the interval and the vessel walls being damaged. They identified milky blood in this case, as described by Velpeau and Cullen previously (Patlak, 2002).

In 1827, Alfred-Armand-Louis-Marie Velpeau, chairman of the University of Paris in 1833, presented a case report with signs of fever, abdominal enlargement, urinary stones, weakness, and a changed blood mixture that looked like pus-filled blood. Because of the rise in WBCs, he dubbed the disease "leukemia" for the first time. This disorder, according to

Velpeau, was linked to the circulatory system. Barth (1806–1877) had a similar case in Paris in 1839. After some time, Alexandre Donne discovered that half of the blood cells are made of "white" globules; however, Vidal did not publish this discovery until 1856 (Mehranfar et al., 2017).

The maturation arrest of white blood cells was identified by Alfred Donne and Barth in 1844, approximately six years before Bennett and Virchow published their findings. Bennett (1845) and Virchow (six weeks later) independently provided additional clarification. He not only identified leukemia, but also proposed the theory of festering matter in the blood; in 1842, he found the third element of blood, platelets, and for the first time demonstrated microscopic workshops in medicine. His book "Complementary Microscopy Course" is still accessible. In this work, he wrote a section called "Alterations of White Blood Cells" (Thomas, 2013).

In the 1970s and 1980s, the French-American-British (FAB) categorization of acute leukemias was developed. To differentiate lymphoid neoplasms from myeloid neoplasms, FAB systems relied extensively on morphologic parameters and assessment of regular histologic stain preparations. Whereas these diagnostic criteria are still employed, the World Health Organization (WHO) has developed a more specific classification of hematologic neoplasms (Porwit et al., 2011).

An expert panel of geneticists, hematopathologists, and physicians is convened by the World Health Organization (WHO) on a regular basis to determine a consensus opinion on the classification scheme for hematologic neoplasms. Clinical features, morphology, immunophenotyping, cytogenetics, and molecular genetics are all taken into account in the classification, which was first published in 2001 and updated in 2008 and

2016 in collaboration with the Society for Hematopathology and the European Association for Haematopathology. Mature lymphoid neoplasms, myeloid neoplasms, and acute leukemia are the broad groups used in the classification (Keohane et al., 2019).

Although the present era of leukemia treatment (chemotherapy) just began recently, leukemia was first recognized in the second half of the nineteenth century. From its origins through the beginning of the twentieth century, this brief historical overview covers the first mentions of the disorder as well as important advancements in its development. Although most treatments for leukemia were ineffective until the middle of the twentieth century, it seemed worthwhile to review some relevant examples of the evolution in our understanding of this disease (using chronology as an organizing framework while emphasizing the importance of themes), because our current understanding of leukemia still largely depends on the early records of scientific and medical discovery (Freireich, 2012).

A tiny number of cases of people with unusual or abnormal blood changes were recorded in the early nineteenth century. Four of the instances could indicate chronic leukemia signs. The first case was a detailed report published in the "Edinburgh Medical and Surgical Journal" in October 1845 by John Hughes Bennett. Leukemia was progressively recognized as a unique disease, and the number of published case reports increased. Concurrently, the disease's clinical and pathological descriptions have become more thorough (Thomas, 2013).

In terms of the large number of wars and crises, Iraq is a one-of-a-kind circumstance. Iraq has seen three wars, (Iran-Iraq conflict, 1980-88), Gulf War, 1990-91), and (Iraq War, 2003), as well as financial sanctions

(1990-2003), sectarian war (2006-2007), and American occupation, in the last 31 years (1980-2010). (2003-2010). These various conflicts and crises have harmed people's health, particularly in the case of leukemia, which has increased to 6.35 per 100,000 Iraqis. In 2010, the Nanakuli Hospital for Blood Diseases in Erbil saw around 400 leukemic children(Al-hashimi & Wang, 2013; Saleem et al., 2011).

Despite the fact that Basrah is Iraq's southernmost governorate, home to the country's third largest city and only major port, and its strategic location, childhood leukemia rates in Basrah more than doubled over a 15-year period, outpacing neighboring Kuwait and nearby Oman, as well as the European Union, the United States, and other nations (Hagopian et al., 2010).

2.2. Theoretical Framework:

The Cancer and other life-threatening diseases cause several changes in the function and structure of the family because of their burden on the patient and his or her relatives' (Khanjari et al., 2013). Because families with a child suffering from cancer face experiences such as frequent hospitalization of the child, which often leads to isolation, psychosocial problems, and reduced recreational activities, cancer diagnosis and its therapeutic process can cause stress in both the child and the parents (Shamsi et al., 2016).

According to studies, caregivers of cancer patients, particularly mothers, bear enormous burdens, which can lead to painful experiences such as decreased appetite, excessive weeping, avoidance of social interaction, cheerlessness, reduced social relationships, unwillingness to talk, fatigue, and a reduction in quality of life (Cal et al., 2017).

The use of nursing theory as a research framework is critical for promoting theory-based nursing practice and knowledge growth. The use of a theoretical framework to ground nursing research allows for a deeper understanding of human experiences with health and sickness within the healthcare system. The Roy Adaptation Model (RAM) has been utilized to guide multidisciplinary practice, knowledge production, education, and research for the past 50 years (Jennings, 2017).

Roy's adaption model is one of the most widely used nursing models for dealing with a variety of illnesses and difficulties (Jennings, 2017). The purpose of this paradigm is to boost patients and carers' hope and trust, as well as their physiological and cognitive adaptability to chronic conditions (Alimohammadi et al., 2015; Ursavas et al., 2014). Roy's model-based healthcare programs can help to control maladaptive habits and increase compatibility (Maleki et al., 2016). This model could serve as a reference for nurses caring for patients as well as a template for patient adjustment and compliance programs for a variety of conditions (Hassani et al., 2013).

In the context of nursing care, implementing interventions based on the Roy adaptation model strengthens patients' physiological adaptability while reducing or even eliminating maladaptive behaviors (Sadeghnezhad, 2012). Bakan discovered that using the Roy adaption model to manage chronic conditions has a good effect (Bakan and Akyol, 2008). This adjustment model combines personal and external resources to create the conditions for successful adaptation by assisting the individual in achieving a greater level of balance in dangerous situations (Karatas and Cakar, 2011).

Roy's model of adaptation has been offered by a number of scholars as a useful guide to health education and research, and they feel it can help medical teams intervene successfully in resolving patients' concerns. Evidence also supports its impact on patient psychosocial and physical adaptation, as well as the enhancement and control of adaptive responses to chronic diseases during nursing care and, finally, its relevance in all aspects of nursing. In these research, it is stressed that patient education can have a significant impact on Roy's two essential notions of self-management and self-concept. Patients' self-concept can be transformed into a positive managerial attitude through empowerment through this framework, allowing them to cope with their sickness (Kazak et al., 2011).

The majority of studies on the implementation of Roy's model have found that it improves disease control and patient reactions to chronic conditions like end-stage renal disease, heart failure, and diabetes (Mohammad Pour et al., 2016). Mothers of children with cancer, on the other hand, are the primary caregivers for their children throughout hospitalization and after discharge. However, little research has been undertaken on the effectiveness of this paradigm on caregivers of children with cancer, particularly mothers (Hatami and Hojjati, 2019).

2.2.1 The Four Adaptive Modes

In human adaptive systems, the coping processes cognator-regulator and stabilizer-innovator promote adaptability. The coping processes, on the other hand, are not directly visible. Only the individual's or group's answers or behaviors can be watched, measured, or subjectively recorded. Roy has defined four adaptive modes as categories for assessing behavior arising from individual regulator-cognator coping mechanisms or group stabilizer-innovator coping processes. The physiological-physical,

self-concept-group identification, role function, and interdependence modes are the adaptive modes. The nurse can determine adaptive or inefficient reactions in conditions of health and illness by studying behavior with respect to adaptive modes (George, 2011). Figure (2-2) diagrammatically conceptualizes the human system as an adaptive system that includes the four adaptive modes for assessment.

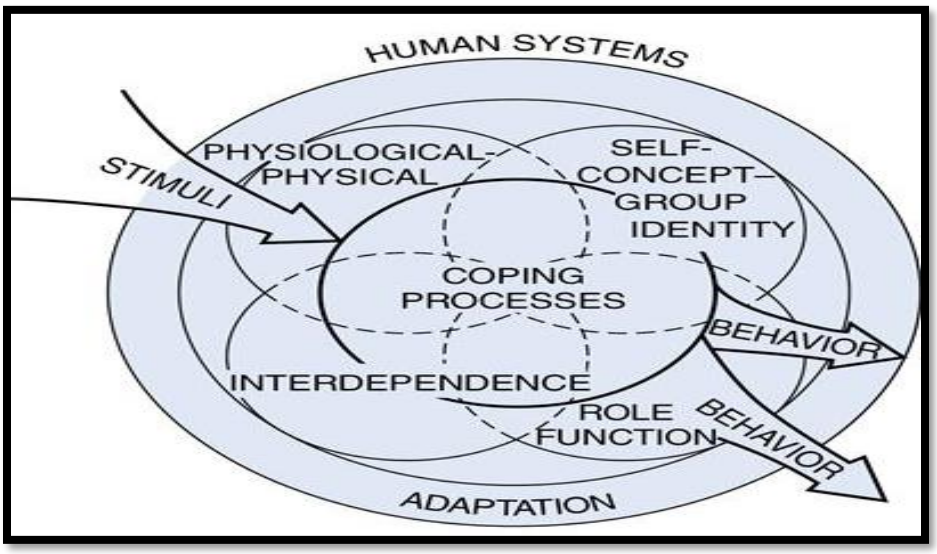


Figure 2. 1 The Roy adaptation model (Andrews, 1991)

2.2.2 Major concepts of Roy's adaptation model (RAM)

The Roy adaption model's underlying assumptions serve as the foundation for and are obvious in the detailed descriptions of the model's primary components. People as adaptive systems (including individuals and communities), nursing's objective, health, and the environment are all key concepts (Smith and Parker, 2015; Ursavaş et al., 2014; George, 2011).

Roy's adaptation model, which offers a global view for analyzing individual adaptation in many domains, guided the research's conceptual framework (i.e., physiologic physical, role function, self-concept identity, and interdependence modes). The approach was first created for people and

then expanded to include groups. Roy defines people as biopsychosocial entities who must adapt to their surroundings. The stimulus that moms of pediatric cancer patients must face once the diagnosis is established is a cancer diagnosis or a change in clinical status. Physiological, self-concept, dependency, and role adaptation are all regarded to be modalities of adaptation ((Yeh, 2001).

The Roy's Adaptation Model and theoretical framework for mother of children with leukemia, as shown in Figure (2-2).

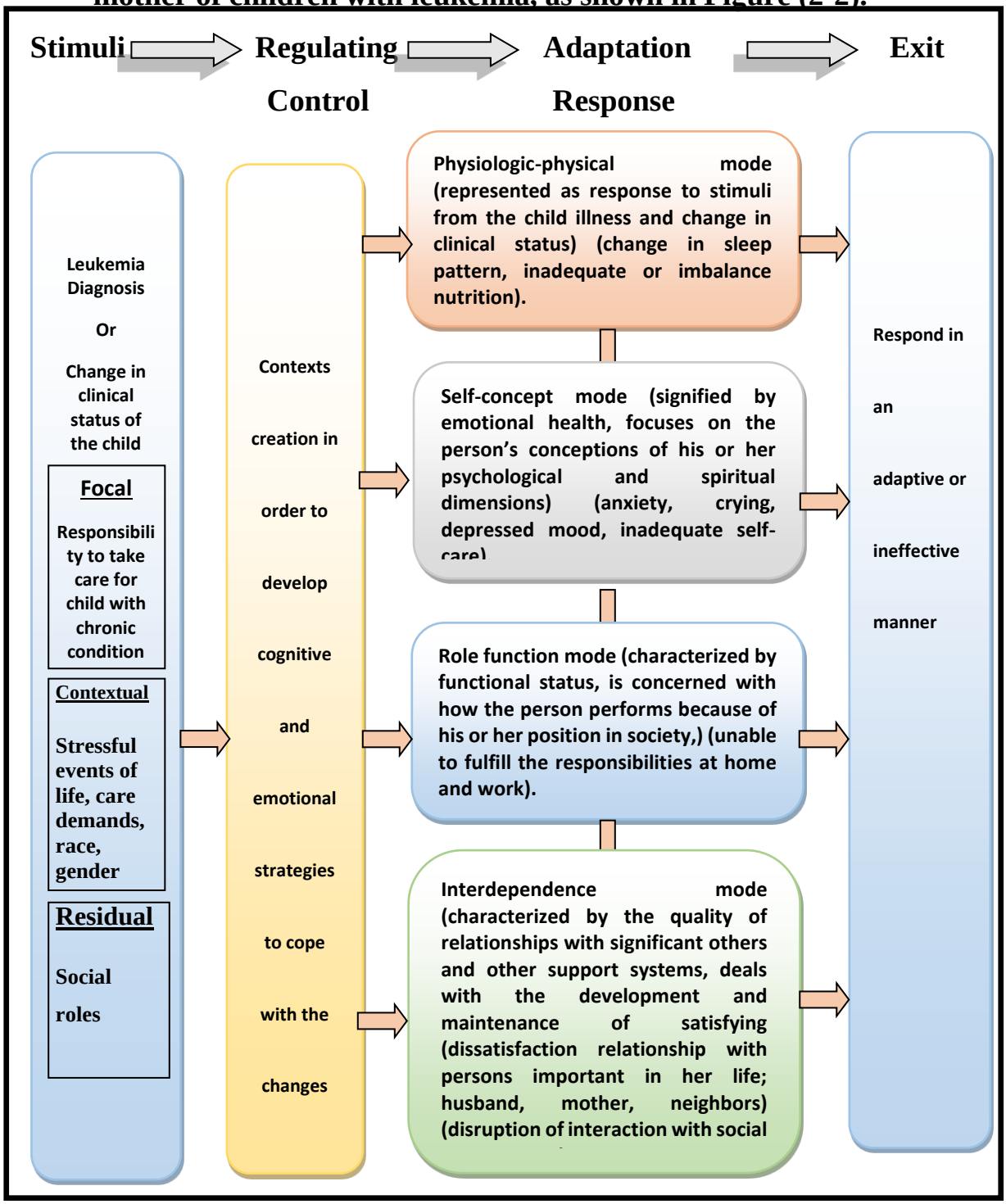


Figure 2. 2 Application of the Roy Adaptation Model for mother of child with leukemia (design by researcher).

2.3 General conception of hematologic system

Blood is made up of two parts: a fluid called plasma and a cellular part called the formed elements of the blood. The volume of the two components is about equal. Plasma is primarily made up of water with a small percentage of solutes. Albumin, electrolytes, and proteins are the main solutes. Clotting factors, globulins, circulating antibodies, and fibrinogen are among the proteins. The cellular constituents mature into mature red blood cells (erythrocytes), white blood cells (leukocytes), and platelets in a sequential order (thrombocytes) (Hockenberry and Wilson, 2015).

The bone marrow is where RBCs, most WBCs, and platelets are made. The produced elements of blood are platelets, WBCs, and RBCs. The soft fatty substance present in bone cavities is called bone marrow. All the blood cells in the bone marrow come from a single sort of unspecialized cell called a stem cell. When a stem cell divides, it produces immature RBCs, WBCs, or platelet-producing cells. The immature cell splits, grows, and eventually matures into a mature platelet, WBC, and RBC (Birbrair and Frenette, 2016).

Multipotent (also known as pluripotent) stem cells divide into lymphoid and myeloid stem cells in the bone marrow to make blood cells. Monocytes, neutrophils, basophils, eosinophils, platelets (thrombocytes) and RBCs are all produced by myeloid stem cells in the bone marrow. T and B lymphocytes are the first lymphoid stem cells to emerge in the bone marrow. Before moving to other lymph organs such as the spleen, lymph nodes, or tonsils, B-lymphocytes continue to grow in the bone marrow. T-lymphocytes continue to develop in the thymus before migrating to other lymphatic tissues; blood cell development is shown in Fig. 2.3 (Peate and Nair, 2017).

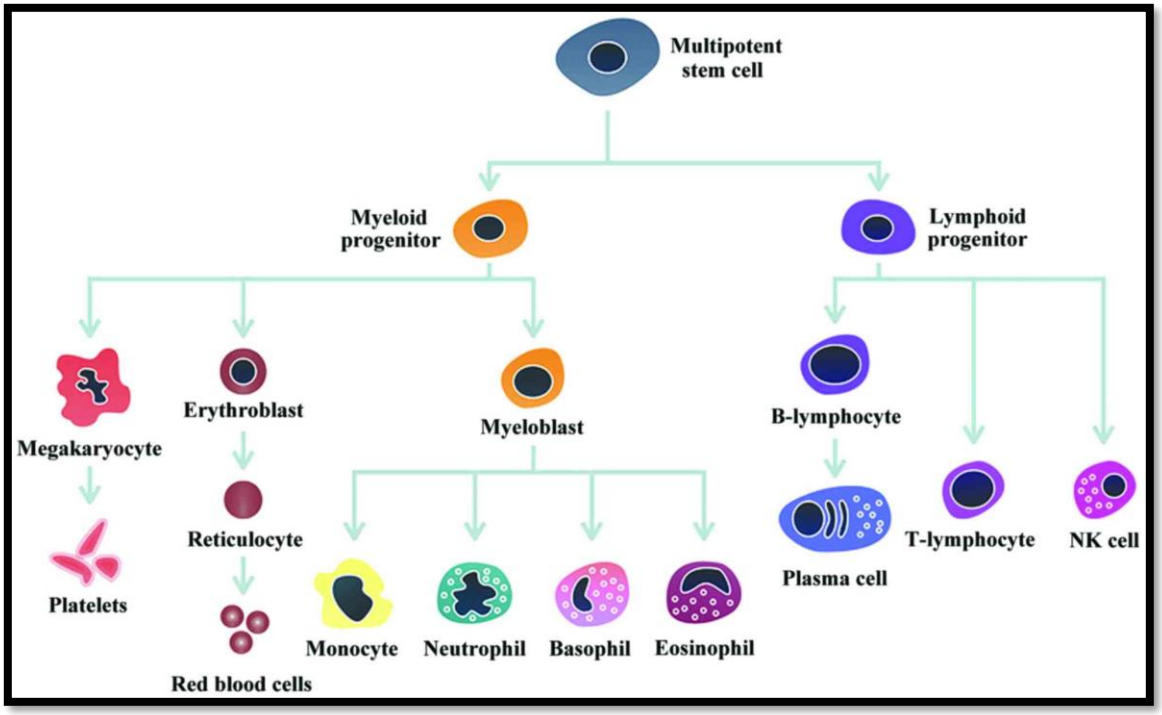


Figure 2. 3 Hematopoiesis in humans (Jin et al., 2017)

2.3.1 White blood cells (WBCs):

White blood cells, commonly called leucocytes, are WBCs that make up about 5000–10,000 WBCs per cubic millimeter of blood. Infections may reach a peak of roughly 25 000 per cubic millimeter of blood. Leukocytosis is an excessively high level of WBCs, while leucopenia is an abnormally low level of WBCs. WBCs, unlike RBCs, have nuclei and can travel through blood channel walls into tissues. Unlike RBCs, WBCs may manufacture an endless source of energy. Because they can synthesize proteins, their lifespan can range from a few days to years (Nair and Peate, 2013).

A total white cell count of (5000-10,000 cells/mm3) of blood is considered normal. In newborns, the WBC count is around (20,000 cells/mm3), which is a high amount induced by the trauma of birth. Granulocytes are the most frequent WBC in newborns. The overall WBC count reduces to around (12,000 cells/mm3) by 14–30 days of life, and lymphocytes become the dominating type.

The WBC count reaches an adult level of 5000 to 10,000 per cubic millimeter by 4 years of age, and granulocytes are once again the dominating kind. In response to a necessity, leukocytes are created. Their lifespan varies between 6 hours and unknown periods (Pillitteri, 2010).

They are divided into two major classes' granulocytes and agranulocytes depends on the absence or presence, respectively, of granules within the cytoplasm of the cells (Nair and Peate, 2013).

2.3.1.1 Granulocytes:

There are three kinds of granulocytes: basophils, eosinophils, and neutrophils. The name of each of these refers to the characteristic, which produced in the bone marrow like erythrocytes. For this reason, these cells are sometimes referred to as myelogenous leukocytes. These cells, in theory, originate from primitive stem cells, which develop into myeloblasts. The differentiation of myeloblasts into various mature WBCs is primarily a result of specialization within the cytoplasm and degeneration of the nucleus. Unlike erythrocytes, however, all WBCs are nucleated). An increasing number of bands in the peripheral circulation (also known as a shift to the left in the complete blood count [CBC]) indicates a bacterial infection when immature granulocytes are produced at a faster pace. The absolute neutrophil count (ANC) is a measurement of the body's ability to fight infection. If the ANC is little than (500/mm3), there is a high risk of infection (Hockenberry and Wilson, 2015; Choi et al., 2017; Al-Dulaimi et al., 2018; Peate and Nair, 2017).

2.3.1.2 Agranulocytes

The agranulocytes include two cell types’ monocytes and lymphocytes. Characteristically these cells do not develop granules, and the nuclei are not lobulated. They originate in various lymphogenous organs, and for this reason,

they are sometimes referred to as lymphogenous leukocytes. However, because stem cells and reticular cells are capable of differentiating into monocytes or lymphocytes, the origin of these cells is frequently designated as the lymphomyeloid complex, which includes bone marrow, lymph nodes, spleen, liver, thymus, subepithelial lymphoid tissue (tonsils, vermiform appendix, and intestinal lymphoid tissues), and connective tissues (mesenchymal cells of the reticuloendothelial system) (Glenn and Armstrong, 2019).

The monocytes follow the same sequence of development from the stem cell as the granulocytes. The monocytes in turn have the ability to exit the vessels and develop into macrophages, large cells that are highly effective phagocytes. Kupffer cells are macrophages located in the liver. Histiocytes are macrophages in the connective tissue. These names are remnants of the old reticular endothelial system designations. Lymphocytopoiesis (lymphocyte formation) takes place anywhere in the lymphomyeloid complex. Lymphocytes develop from blast (stem) cells. The lymphocyte has the potential to develop into other cells, such as T cells or B cells (Daboul, 2019).

2.4 General Conception of Leukemia

Acute Leukemia is the most frequent disease in children, accounting for almost one-third of all cancer diagnoses. It is a neoplastic disease of the spleen, bone marrow, and lymph nodes that affects the blood-forming tissues. In these blood-forming tissues, normal hematopoiesis takes place. Extracellular protein factors control the proliferation and differentiation of developing cell pathways. This ensures that the necessary proportions of mature blood cell types are formed. Leukemia is a clonal disease caused by genetic abnormalities and hematopoiesis transformation of

a single early progenitor myeloid or lymphoid cell (Kliegman and Geme, 2020).

As a result, the type of leukemia that develops is determined by the cell lineage impacted by the mutation. In leukemia, there is an excess of immature WBCs that are unable to function properly. Monoblasts, myeloblasts, and lymphoblasts are examples of immature WBCs known as "blasts." An abnormal number of immature white blood cells reduces the amount of space available in the bone marrow for the formation of other healthy blood cells. The blast cells may then penetrate the bloodstream and the central nervous system (CNS) (Niederhuber et al., 2020).

Leukemia accounts for around 8% of all human malignancies, with acute leukemia accounting for roughly half of these (Jahedi et al., 2014). Acute leukemia, also known as acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML), is a malignant condition caused by clonal proliferation of lymphoid and myeloid progenitors in both children and adult (Einollahi et al., 2013).

2.5 Pathologic and Related Clinical Manifestations

Leukemia is a cancer of the white blood cells that affects people of all ages. In the spleen, bone marrow, and lymph tissue, immature WBCs (blast cells) proliferate at a rapid rate. The cells are aberrant and unable to combat infection efficiently. As a result of the large number of aberrant cells that grow and are released into the peripheral circulation, they tend to concentrate in bodily tissues and organs, especially when circulation is slow. The oral mucosa, anus, sinuses, and lungs are particularly vulnerable to immature WBC infiltration. These sites are frequently inflamed, painful, and infected at the time of diagnosis. Patients are frequently diagnosed only after

they have had an infection that has not responded well to therapy (Lyengar and Shimanovsky, 2021).

The bone marrow continues to create vast numbers of useless cells as the disease progresses; the peripheral circulation is clogged with them, and the bone marrow is densely packed with blast cells. The development of most other normal cells is not possible because so many blood stem cells are required to generate faulty white cells. Because of the lack of RBC production, the patient becomes anemic, and bleeding becomes an issue as platelets get fewer and fewer. Most crucially, despite the high WBC count, there are few normal, mature, and active white cells with which to combat infection. As a result, the patient frequently develops raging infections that are resistant to treatments. If untreated, leukemia leaves patients unable to control their bleeding, unable to fight infection, and trapped in a downward cycle of exhaustion and anorexia. Leukemia is frequently lethal if left untreated. The following section delves deeper into the pathologic process and its clinical manifestations in the body's most vulnerable organs (Fig. 2.4) (Gallegos-Arreola et al., 2013).

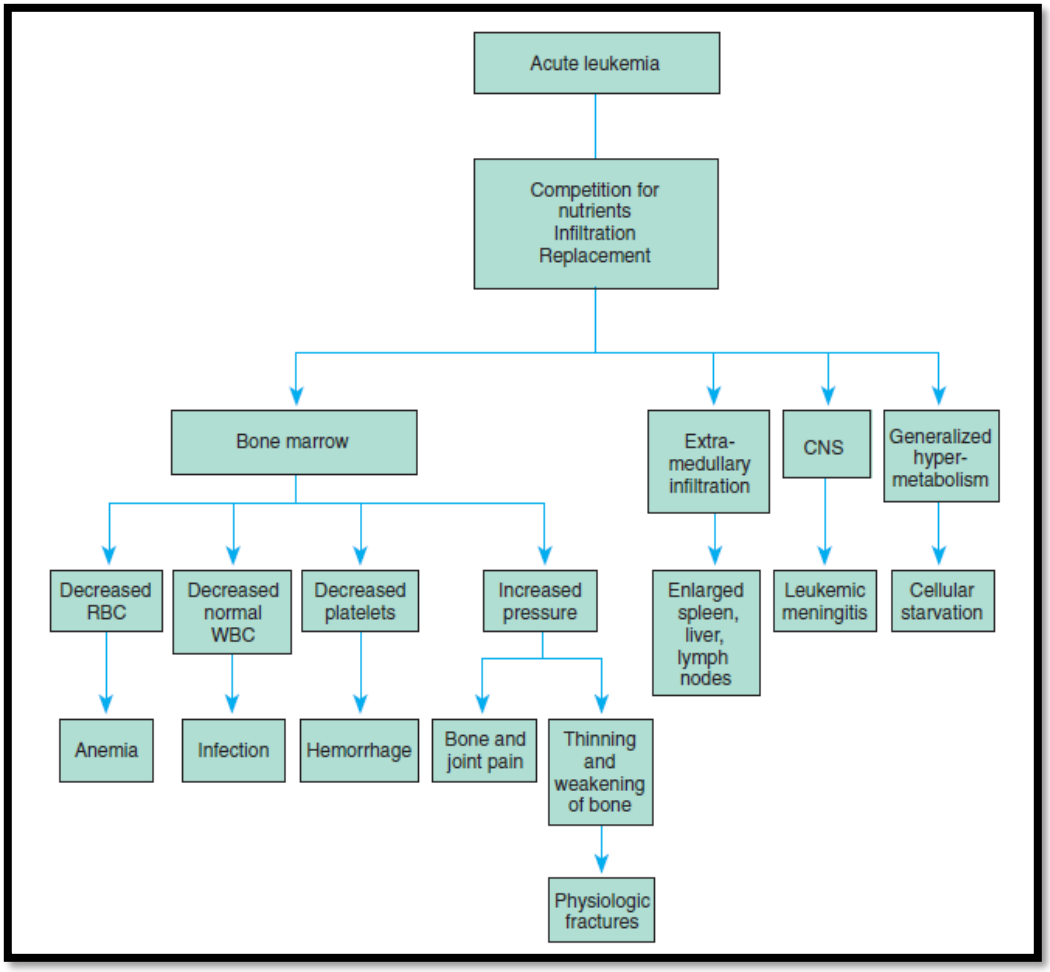


Figure 2. 4 Principal sites of tissue involvement in leukemia. CNS, Central nervous system; RBC, red blood cells; WBC, white blood cells (Hockenberry and Wilson, 2015).

1.5.1 Bone Marrow Dysfunction

Proliferating cells in all kinds of leukemia suppress bone marrow production of blood-forming materials by competing for and depriving normal cells of necessary nutrients for metabolism. Anemia from fewer erythrocytes, bleeding from decreased platelet production, and infection from neutropenia are the three main outcomes. The invasion of leukemic cells into the bone marrow eventually weakens the bone and increases the risk of fracture. Increased pressure causes severe pain as leukemic cells invade the periosteum. Infiltrates of the bone marrow are the most common presenting signs and symptoms of leukemia. Fever,

pallor, weariness, anorexia, bleeding (typically petechiae), and bone and joint pain are some of the symptoms. The body's typical bacterial flora can become aggressive pathogens in the presence of neutropenia. Any skin break has the potential to become infected. Usually, pockets of inflammation induced by natural flora within the digestive tract cause vague abdominal pain (Hutter, 2010).

2.5.2 Disturbance of Involved Organs

One infiltration, hypertrophy, and finally fibrosis are seen in the spleen, liver, and lymph glands. Hepatosplenomegaly is more prevalent than lymphadenopathy in most cases. The CNS is the second most major site of engagement. CNS involvement is found in less than 5% of ALL patients and approximately 20% of AML patients. The use of prophylactic CNS intrathecal treatment has reduced the rate of CNS relapse in these patients considerably (Cooper et al., 2011; Margolin et al., 2011).

Increased intracranial pressure is a common result of leukemic infiltration of the meninges (ICP). The pathophysiology is thought to be due to proliferating cells invading the arachnoid, which subsequently obstruct the flow of cerebrospinal fluid in the subarachnoid space and at the base of the brain. The increased fluid pressure dilates all four ventricles, resulting in the typical signs and symptoms of this condition: vomiting, severe headache, papilledema, lethargy, irritability, eventually coma and lethargy. Irritation of the meninges also causes neck and back discomfort and stiffness (Kaplan, 2019).

The cranial nerves (most commonly cranial nerve VII, or the face nerve) and spinal nerves, particularly the lumbosacral plexus, hypothalamus, and cerebellum, may also be involved. These sites' clinical symptoms are directly related to the area concerned. The patient may have weakness in the

lower limbs, pain spreading down the legs to the feet, and trouble voiding as a result of lumbosacral invasion. Despite the possibility of a brain tumor, the absence of localized signs frequently leads to the discovery of CNS involvement in leukemia. The lungs, kidneys, testes, prostate, gastrointestinal tract, ovaries, gastrointestinal tract are among the other organs that might be infiltrated by leukemic cells (Hockenberry and Wilson, 2015).

2.6 Classification of Leukemia

Acute and chronic leukemias are classed as lymphoid or myeloid, respectively. Acute leukemia symptoms appear suddenly, and the patient is very sick, but chronic leukemia symptoms appear gradually, and patients may be shocked by the diagnosis because they are feeling well. Lymphocytic leukemia affects lymphocytes, whereas myeloid leukemia develops from bone marrow stem cells into platelets, monocytes, granulocytes, and erythrocytes (Williams and Hopper, 2015).

2.6.1 Acute Lymphoblastic leukemia

The Acute lymphocytic leukemia (ALL) is the most prevalent malignancy in children, characterized by aberrant lymphocyte precursor cell development (lymphoblasts). Acute myelogenous (myeloblastic) leukemia (AML) is a type of leukemia that typically affects adults over the age of 60 and has a poor prognosis. A patient with acute leukemia may develop a high fever, aberrant mucous membrane bleeding, petechiae, ecchymoses, and easy bruising following minor trauma. Infection is the most common cause of death (Williams and Hoppe, 2015).

ALL is a type of leukemia that affects lymphocytes, which are immune-system cells that combat infection. When a patient has ALL, the bone marrow produces an excessive number of immature WBCs, which do not mature properly. In addition, these WBCs do not function properly in the battle against infection. WBCs overproduce, causing other blood cells in the bone marrow to become crowded (Hunger and Mullighan, 2015).

American Cancer Society, (2016) stated that ALL is the most common kind of juvenile leukemia, accounting for 75–80% of cases. Acute myeloid leukemia (AML), also known as acute nonlymphoblastic leukemia (ANLL), is a kind of juvenile leukemia that accounts for 20–25 percent of all cases.

Perhaps the most important prognostic factor is the initial WBC count. Children with WBC counts of more than (50,000) have a worse prognosis, and those with counts of more than (100,000) have a very bad outlook. The prognosis is also influenced by the age at diagnosis, with children younger than 2 years and older than 10 years having a dismal prognosis. The outlook is the worst for children under the age of one year. Girls, according to most reports, have a better prognosis than boys. According to current statistics, about 85% of children with ALL live for at least 5 years after diagnosis (U.S. SEER Program, National Cancer Institute, 2009).

With current clinical procedures, children with ALL have an overall survival rate of around 90%. (Jeha et al. 2019, Maloney et al. 2020). Therapy, on the other hand, causes significant short-and long-term morbidity, and high-risk subtypes continue to have a poor prognosis (Schultz et al. 2014).

2.6.1.1 Epidemiology of Acute Lymphoblastic leukemia

Particulate Males are significantly more affected than females (1.2:1), and the disease peaks between the ages of two and six. Females are more likely to be affected in newborns. ALL appears to be most common in Europe and North America, with approximately five occurrences per 100,000 0–14-year-old children. Kuwait and Bombay have the lowest rates, at around 0.9 per 100,000. Due to the lack of actual population-based cancer registration, there may be some ambiguity in some incidence numbers. ALL, on the other hand, is more common in white populations in wealthier industrialized nations. The incidence is lower among black populations in the same countries (Tomlinson and Kline, 2010).

In the United States, ALL accounts for about 78 percent of childhood leukemia. ALL happens at a rate of 30 to 40 per million people each year. In the United States, around 2,400 children and adolescents under the age of 20 are diagnosed with ALL each year. ALL is most common in Hispanic children and is significantly more common in white children than in black kids, with white children having a roughly twofold greater incidence at 2 to 3 years than black kids. Genetic factors are thought to have a significant influence in the development of ALL (National Cancer Institute, 2008).

In a study in the United States, Pang et al., (2002) The rates of leukemia in Asian-Americans and their descendants were compared to Caucasians. This study found that Asian-Americans, regardless of birthplace, have a decreased incidence of leukemia. Stiller et al. found in 1991 that children of Asian and West Indian ethnic descent showed ALL incidence patterns comparable to Caucasians. Other recent studies of ALL incidence in

parts of the United Kingdom have found a higher risk of ALL among South Asian children, but not significantly so, as compared to non-Asian children. These increases, however, could be attributed to socioeconomic status, which has been associated with childhood malignancies (McKinney et al., 2003; Powell et al., 1994).

According to the American Cancer Society, there will be 5,690 new cases of acute lymphocytic leukemia (ALL) in the United States in 2021 (including both kids and adults) and roughly 1,580 fatalities from ALL (900 in males and 680 in females). Children under the age of five are at the greatest risk of developing ALL. The risk then gradually decreases until the mid-20s, before gradually increasing after 50. Adults account for around four out of every ten instances of ALL. ALL is a rare malignancy in the United States, accounted for less than half of one percent of all malignancies. The chance of acquiring ALL in one's lifetime is roughly 1 in 1,000. Males have a little higher risk than females, while whites have a slightly higher risk than African Americans (American Cancer Society, 2021; Appelbaum et al., 2014).

The majority of ALL cases are in youngsters, yet the majority of ALL deaths (about 4 out of 5) are in adults. Kids may perform better than adults due to differences in the nature of childhood and adult ALL, treatment differences (children's bodies can frequently take intensive treatment better than adults'), or a combination of these factors (American Cancer Society, 2021).

Acute lymphocytic leukemia incidence was increasing at a faster rate in Saudi Arabia than in the United States (p 0.001). In Saudi Arabia, the total incidence of ALL increased from 1.58 per 100,000 in 2001 to 2.35 per 100,000 in 2014. The annual growth was 4.58 percent, on average. Males'

incidence climbed from 1.88 to 2.71/100,000, while females' incidence grew from 1.21 to 1.86/100,000(Jastaniah et al., 2020).

Between 1993 and 2007, there were 698 occurrences of childhood leukemia in Iraq, ranging from 15 cases (2.6/100,000 annual rate) in the first year to 56 cases (6.9/100,000 annual rate) in the last year, with a peak of 97 cases in 2006. (12.2 per 100, 000 annual rate). Over a 15-year span, childhood leukemia rates in Basrah more than doubled. The trend test produced a statistically significant result (P =.03). Basrah's childhood leukemia rate was significantly higher than that of Kuwait and Oman, as well as the United States, the European Union, and other nations (Hagopian et al., 2010).

2.6.1.2 Etiology of Acute Lymphoblastic leukemia

Acute lymphocytic leukemia evolves when the genetic material or DNA of a bone marrow cell changes (mutates). The DNA of a cell includes the instructions that tell it what to do. Normally, the cell's DNA directs it to grow at a specific rate and die at a specific time. The mutations in ALL tell the bone marrow cell to keep growing and dividing. Blood cell production becomes uncontrollable when this happens. The bone marrow creates immature lymphoblasts, which grow into leukemic WBCs. These aberrant cells can accumulate and crowd out good cells because they are unable to operate properly (Warner, 2020).

2.6.1.3 Risk factors

A number of factors can raise the risk of acute lymphocytic leukemia: (Hoffman et al., 2018).

- Prior malignancy therapy. Adults and children who have certain forms of chemotherapy and radiation therapy for different kinds of cancer may have an increased risk of developing ALL (Hoffman et al., 2018).
- Radiation exposition. Acute lymphocytic leukemia is more common in those who have been exposed to high doses of radiation, such as survivors of a nuclear reactor disaster (Puckett and Chan, 2022).
- Genetic problems: A higher incidence of ALL is linked to certain genetic abnormalities, such as Down syndrome. Children whose parents have autoimmune disease are at a slightly increased risk of developing leukemia (Mellemkjaer et al., 2000).
- Chemical and pesticide exposure. Exposure to certain chemicals and pesticides has been associated with leukemia but not usually ALL. The suggestion that parenteral vitamin K administration to neonates leads to an increased incidence of ALL has been disproved with further study (Fear et al., 2003).

2.6.1.4 Staging and Classification

2.6.1.4.2 Morphology of Cells

Despite the fact that there are different ways to look at cells, the French-American-British (FAB) methodology is still extensively used. This classification is divided into three categories based on morphology (cytochemistry, structure, and appearance) and cell number (Table 2.1). The FAB system has limitations due to the unequally distributed numbers of patients in each group and the absence of cytoplasmic vacuoles, a

morphological trait that corresponds with response to conventional therapy. Vacuoles are found in 25–30% of individuals and are linked to a lower presenting white cell count as well as the "common" ALL immunophenotype (Ladines-Castro et al., 2016; Bennett et al., 1981).

Table 2. 1 FAB ALL classification (Tomlinson and Kline, 2010)

Classification	Description	Features	patient %
(L1)	"Small cells with scant cytoplasm"	Related with good treatment reaction	(90%)
(L2)	"Large cells with abundant cytoplasm"	Specifies more refractory to therapy if 10–20% L2 cells are present	(9%)
(L3)	"Large cells with prominent nucleoli"	Mature B-cell phenotype; repeatedly presents as lymphoma; poor prognosis	(1%)

2.6.1.4.3 Cytochemistry

The principle of cytochemistry is that an apparently primitive and microscopically bland blast cell will show lineage commitment in its enzymes. The principle importance in ALL is that ALL blasts do not have myeloperoxidase and are therefore Sudan Black negative and distinguishable from most cases of AML. Periodic acid Schiff (PAS) staining may be positive in ALL T- and B-lineage blasts, regularly in a characteristic block pattern and T - lineage leukemia may be positive in a characteristic polar pattern for acid phosphatase (AP) (Bain, 2017).

2.6.1.4.4 Immunophenotyping

The Immunophenotyping is probably the best way to classify ALL. As normal hematopoietic cells mature in the bone marrow, the antigens on their surfaces change. Monoclonal antibodies to many of these cell cluster-of-differentiation (CD) antigen families have been developed thanks

to advances in technology. Each is assigned a classification number that begins with the letter CD. Some CD antigen groups correspond to lymphocyte sublineage (CDs 1–8 indicate various phases of T-cell lineage; CDs 19–22, 24, and 79a indicate B cells), while others correspond to myeloid lineage (CD10 and CD34). The following are some more immunologically determined cell properties that are relevant (Mannelli, 2016):

- Cytoplasmic immunoglobulins found in pre-Bcell ALL
- Surface immunoglobulins found in mature B-ALL
- Terminal deoxynucleotidyl transferase (TdT) found in immature lymphoid cells.

2.6.1.4.5 Cytogenetics

In most cases of childhood ALL, cytogenetic abnormalities can be detected. They are classified based on structural changes or the number of chromosomes (ploidy) and rearrangements found in the karyotype. Ploidy status is a clinically effective tool for determining prognosis (Table 2.2). In terms of structural changes, multicolor spectral karyotyping has allowed for the detection of translocations and marker chromosomes, as well as the delineation of complicated chromosome abnormalities (Harrison and Foroni, 2002).

Table 2. 2 Acute lymphoblastic leukemia outcome predictions linked to ploidy status (Tomlinson and Kline, 2010)

Ploidy level	per malignant cell Chromosomes count	The Percentage of ALL childhood cases	Treatment response prediction
"Hyperdiploidy"	more than fifty	25 - 30%	Favorable
Hypodiploidy	less than fifty	5 -10%	Poor

Near-haploidy	less than thirty	<1%	Very poor

2.6.1.5 Prognosis of Acute Lymphoplastic leukemia

United States, the five -year survival rate for kids with leukemia is 83.6 percent. This means that 83.6 percent of kids with leukemia live for five years or more after being diagnosed. This is a significant improvement over the 36.5 percent 5-year survival rate in 1975. Advances in therapy, particularly for ALL, are largely responsible for the improvement. The type of leukemia a child has influences his or her prognosis. Furthermore, specific characteristics of patients and tumors aid clinicians in predicting prognosis and determining treatment. Prognostic factors are what we call them. In general, prognostic variables in ALL are more important than in AML. The following are prognostic variables in ALL: (Lee and Cho, 2017).

- **Age at the time of diagnosis**: Kids between the ages of 1 and 9 years old with B-cell ALL (a form of ALL) had a higher cure rate than kids under 1 year old or over 10 years old. This does not appear to be an issue in T-cell ALL (another specific type of ALL) (American Cancer Society, 2019).

- **WBC count at the time of diagnosis**: Those with extremely high WBC counts at the time of diagnosis are at a higher risk than kids with lower levels (Horton and Steuber, 2019).

- **Other organs are affected**: When cancer spreads to other organs such as the testicles, spinal cord and brain, the prognosis becomes worse (American Cancer Society, 2019).

- **Changes in the chromosome**: Children with more chromosomes in their leukemia cells are more likely to be treated. Various chromosomal translocations are also linked to various outcomes (Lee and Cho, 2017).

- **Initial response to treatment:** Kids who benefit from treatment rapidly have a better prognosis than those who do not (Möricke et al., 2010).

2.5.1.6 Following up

For two reasons, it is critical to follow these kids and teenagers after they have completed ALL therapy (Kanwar et al., 2012):

1. Blood counts will be performed to verify that signs of relapse can be detected. The frequency of these tests will decrease over time. For the same reason, bone marrow aspiration may be performed once a year initially.

2. Later adverse effects are becoming more of a concern as therapy gets more successful.

The following are some of the long-term impacts of anti-leukemic treatment:

- Anthracyclines (daunorubicin) cause chronic cardiotoxicity, which can lead to permanent heart failure. The severity of cardiac dysfunction is linked to the total anthracycline dose (Liu et al., 2020).

- Radiation damage to the hypothalamic-pituitary axis and gonadal injury. Growth difficulties can lead to short stature and obesity later in life, as well as precocious puberty in girls. It's possible that growth hormone therapy will be required. It's less clear if chemotherapy by itself can stunt growth. Males who have had testicular radiation become sterile, and they will need testosterone

replacement throughout adolescence. Subfertility is a side effect of chemotherapy that can improve over time. Although ovaries are less vulnerable to chemotherapy, estrogen replacement will be required if they are irradiated (Gan and Spoudeas, 2014).

- Glucocorticoids (dexamethasone, prednisolone) cause osteonecrosis and altered bone density that raises fracture susceptibility. This is especially common in teenagers (Ramsey et al., 2015).

- A drop in intelligence of (10–20) indicates some probable intellectual development problems (Zając-Spychała et al., 2018).

- The severe psychosocial consequences of a leukemia diagnosis and therapy Relationship concerns, insurance issues, work issues, and mortgage application issues, as well as emotional issues like despair, confusion, and anger may arise. Several studies have demonstrated the importance of providing excellent psychosocial care throughout the disease process and beyond (Richards et al., 2011).

2.6.2 Acute Myelogenous Leukemia

AML (acute myeloid leukemia) is a malignancy in which the bone marrow produces a large number of abnormal blood cells in children. (AML) is a blood and bone marrow malignancy. Acute myelogenous leukemia is also known as acute myeloblastic leukemia, acute granulocytic leukemia, and acute nonlymphocytic leukemia. Acute cancers usually progress swiftly if they are not treated. Chronic cancers typically progress slowly (National Cancer Institute, 2021).

The bone marrow of healthy children produces blood stem cells (immature cells) that mature into mature blood cells throughout time. A

blood stem cell can differentiate into a lymphoid or myeloid stem cell. Lymphocytic stem cells develop into WBCs. A myeloid stem cell matures into one of three blood cell types: RBCs transport oxygen and other substances to all of the body's tissues. Infection and disease-fighting WBCs. Platelets help to halt bleeding by forming blood clots (National Cancer Institute, 2021).

Myeloid stem cells in AML normally grow into myeloblasts, a type of immature WBC (or myeloid blasts). In AML, the aberrant myeloblasts, or leukemia cells, do not mature into healthy WBCs. Leukemia cells can accumulate in the blood and bone marrow, making it difficult for healthy WBCs, platelets, and RBCs to thrive. Anemia, infections, and simple bleeding are all possible outcomes. Outside of the blood, leukemia cells can travel to other regions of the body, such as the CNS (spinal cord and brain), gums, and skin. Leukemia cells can sometimes develop a solid tumor known as a chloroma or granulocytic sarcoma (Weinblatt, 2020).

Acute myeloid leukemia accounts for 15–20 percent of all instances of pediatric leukemia. Although recent trials have shown that overall survival for children with AML has reached 70%, outcomes are highly sensitive to genetic subtype, and progress has lagged behind that found in ALL (Alexander and Mullighan, 2021).

Acute myeloid leukaemia (AML) diagnosis is based on patient history, physical examination, blood and marrow cytomorphology, multiparameter flow cytometry, and cytogenetic and molecular analyses (Ballová et al., 2019).

2.6.2.1 Epidemiology of Acute Myelogenous Leukemia

Acute myeloid leukemia (AML) is the fifth most frequent cancer in kids, and the prognosis for kids with AML is very dismal. Nevertheless, between 1975 and 2014, the overall incidence of AML in children increased every decade, with the total age-adjusted incidence rising from 5.766 to 6.615 to 7.478 to 7.607 per 1,000,000 people. Furthermore, relative survival rates of AML in children have improved dramatically over the last four decades, rising from 22.40 percent to 39.60 percent to 55.50 percent to 68.30 percent (p 0.0001). Furthermore, over the last four decades, gaps in survival have grown between races and socioeconomic categories (Chen et al., 2019).

In the United States, the incidence of pediatric AML was estimated to be 7.7 cases per million children aged 0-14 in 2005-2009, with some evidence of a rise in frequency over time. The incidence of disease peaks at 18.4 per million in infants under one year of age drops to 4.3 per million in children aged 5 to 9, and then rises to 7.7 per million in children aged 10 to 14. With the exception of a likely elevated rate in Hawaiians and a potentially greater incidence of a specific subtype of AML, acute promyelocytic leukemia (APL), in Hispanic/Latino youngsters, racial/ethnic groupings in the United States show little difference. Asian and Pacific Islanders had the greatest rate of pediatric AML (8.4 per million), followed by African Americans (6.6), Caucasians (7.5), and Hispanics (8.1 per million) according to a report based on data from the Surveillance, Epidemiology, and End Results (SEER) Program (Puumala et al., 2013).

2.6.2.1 Classification and Staging

AML currently lacks a prognostically or therapeutically useful staging system. Sudan black staining of bone marrow smears results in a positive result in AML, and esterase stains differentiate further subtypes.

Immunophenotyping can also help identify the origin cell line. CD11, CD13–15, and CD33 are antigen groups that are associated with the myeloid lineage (Hwang, 2020).

The French-American-British categorization system for AML is used if the myeloid cell line is included and a diagnosis of AML is verified. AML is classified into eight kinds (M0 to M7) depending on the morphology of the sick cells under the microscope (Table 2.3). Each category describes the damaged myeloid lineage and the level of blast cell differentiation. This standardization began in 1976, but as treatment outcomes have improved, this strategy to classify has lost its therapeutic utility. M4 or M5 FAB subtypes are found in around 80% of kids under the age of two. M7 is most common in kids under the age of three, especially those who have Down's syndrome. Myelodysplastic syndrome (MDS) is a preleukemic disease linked to some forms of AML (MDS-related AML or MDR-AML) (Arber et al., 2016).

Table 2. 3 Acute myeloid leukemia is classified as French-American-British (FAB) (Tomlinson and Kline, 2010)

FAB group	morphology of cells
(M0)	**Little differentiation myeloid leukemia**
(M1)	**“Myeloblastic leukemia”**
(M2)	**Undifferentiated-myeloblastic leukemia**
(M3)	**15;17 translocation in promyelocytic leukemia**
(M4)	**Leukemia myelomonocytic**
(M5)	**M5a – non-differentiated; M5b – differentiated monocytic leukemia**
(M6)	**“Erythroblastic leukemia”**
(M7)	**“Megakaryoblastic leukemia”**

Table 2. 4 Acute myeloid leukemia is classified by the World Health Organization. (Tomlinson and Kline, 2010)

Group	Subgroups
Recurrent genetic abnormalities in AML	**Acute myeloid leukemia with t(8;21)**
	Acute myeloid leukemia with abnormal bone marrow eosinophils
	inv(16) or t(16;16)
	AML with t(15;17) and Variants
	Acute myeloid leukemia with MLL abnormalities
Multilineage dysplasia in	**After MDS or MDS/myeloproliferative disease**
Acute myeloid leukemia	
"Multilineage dysplasia"	**Myelodysplastic syndrome without a history**
AML and MDS, therapy-related	**"Alkylating agent-related"**
	"Topoisomerase type II inhibitor-related Other types"
AML unless otherwise stated	**AML slightly distinguished** **AML without maturation** **AML with maturation** **" Acute myelomonocytic leukemia"** **" Acute monoblastic and monocytic leukemia"** **" Acute erythroid leukemia"** **"Acute megakaryoblastic leukemia"** **" Acute basophilic leukemia"** **" Acute panmyelosis with myelofibrosis and Myeloid sarcoma"**

Nearly half of all AML occurrences occur after MDS, and these patients have a poor prognosis. The other major group includes cases that are unrelated to MDS and are referred to as true de novo AML (TDN-AML). As a result of its association with MDS, AML was subclassified. By integrating the AML/MDS relationship, the WHO aimed to improve the FAB categorization. This categorization, as indicated in Table 2.4, has been a source of contention in recent years (Hwang, 2020).

The WHO categorization, on the other hand, includes subtypes of AML with recurring translocations, AML associated with MDS, and

treatment-related AML subsets based on their relationship to the first two groups. As a result, this method may be valuable in assisting therapeutic decisions and assessing biologic investigations in AML. MDS-AML is more prevalent in the elderly, with just 15% of instances occurring in kids. The TDN-AML group, which is caused by a series of cytogenetic translocations and inversions, has a median age that is similar to the population's median age (Head, 2002).

2.6.2.2 Prognosis of Acute Myelogenous Leukemia

Intensification of chemotherapy, improvements in supportive care, wider use of various hematopoietic stem cell transplants, recent advances in risk stratification based on cytogenetics and, more recently, molecular genetics, and early response evaluation by minimal residual disease have all contributed to dramatic improvements in pediatric AML outcomes over the last three decades. The overall survival (OS) rate for pediatric AML patients is around 60-70 percent. In wealthy countries, the chances of curing AML are currently around 60%. Treatment for children with AML in Vietnam is still tough and is only available in a few oncology hospitals. The treatment protocols differed between hospitals. The prognosis was unsatisfactory, with many individuals receiving incomplete care or even abandoned (Kiem Hao et al., 2020).

2.7 Chronic Myeloid Leukemia (CML)

CML, commonly known as chronic myeloid leukemia, is a myeloproliferative condition characterized by increased granulocytic cell proliferation without loss of differentiation potential. As a result, there are more granulocytes and their immature precursors in the peripheral blood cell profile, as well as some blast cells (Besa, 2021).

CML is largely an adult disease, but it is the most frequent of the chronic myeloproliferative disorders in children, accounting for around 10% of all myeloid leukemia in children. Although CML has been observed in infants and toddlers, the majority of patients are aged 6 and up. CML is a clonal panmyelopathy that affects all types of hematopoietic cells. During the chronic phase of this disease, the WBC count can be exceedingly high, but the bone marrow does not indicate increased numbers of leukemic blasts. The Philadelphia chromosome, a translocation between chromosomes 9 and 22 (i.e., t(9;22) that results in fusion of the BCR and ABL1 genes, causes CML (PDQPTE, 2002).

2.8 Juvenile Myelomonocytic Leukemia

A Juvenile myelomonocytic leukemia (JMML), formerly known as juvenile chronic myeloid leukemia (JCML) is a kind of CML (JCML). Less than 1% of kids with leukemia belong to this category. This subtype is classified as chronic myelomonocytic leukemia, but there is some debate over how to classify it (CMML). The majority of the patients are under the age of two, with 95% of them being under the age of four (Stieglitz et al., 2015).

Malaise, fever, or bleeding are common concerns in children, as is localized disease. Pulmonary symptoms (cough, tachypnea, and wheeze) are less prevalent, as are weight loss, stomach distension and discomfort, weight loss, and rarely bone pain. Splenomegaly is a common finding on examination; pallor and hepatomegaly may also be present. There may be skin signs, such as an eczematous rash that is resistant to topical therapy. JMML is frequently associated with xanthoma and café-au-lait spots. These

cutaneous manifestations are also seen in neurofibromatosis, and a link between the two diseases has been demonstrated (Gupta et al., 2021).

In all cases, peripheral blood samples reveal an increasing number of circulating monocytes. Anemia, thrombocytopenia, and immature granulocytes are all common findings. The Philadelphia chromosome is absent in JMML cells, although other chromosomal abnormalities are present. This type of CML is more aggressive and resistant to treatment than CML with the Ph' chromosome. The prognosis is dismal, and these youngsters require a bone marrow transplant as soon as possible, especially if a matched familial donor is available (Stieglitz et al., 2015).

2.9 Clinical Signs and Symptoms

Syphilis Low-grade fever produced by infection, and lethargy, pallor, shortness of breath, weakness, and malaise induced by anemia are all common symptoms of leukemia. These symptoms may occur weeks or months before to the onset of other symptoms. Tachycardia, Fatigue, stomach pain and palpitation all possible symptoms. Crowding of the bone marrow can cause sternal pain and rib tenderness. The patient may have headaches, confusion, and personality changes if the disease has spread to the CNS. The patient may experience high fevers due to infection during the acute period. Thrombocytopenia can cause ecchymosis or petechiae (Williams and Hopper, 2015).

ALL usually manifests as an acute sickness with a rapid onset, although symptoms can also be delayed and subtle. The proliferation of lymphoblastic cells infiltrates the bone marrow and other afflicted tissues, causing symptoms. The symptoms are similar to those of numerous childhood diseases. The following may be described by parents or children:

Irritability, nocturnal sweats, weariness, bone pain (which might manifest as limping) and a loss of appetite are some of the symptoms (Hunger and Mullighan, 2015).

At first, symptoms may vary from day to day, with the youngster feeling fatigued one day and fine the next. The youngster may have had a history of ear infections or other diseases that were resistant to treatment. This is frequently linked to a history of frequent visits to the family physician. lethargy Pallor and pain at the sites of disease infiltration, especially in long bones; bruising; petechiae, or unusual bleeding (include nosebleeds); enlarged spleen or liver, causing the abdomen to protrude; fever, and enlarged lymph nodes are all possible physical symptoms (American Cancer Society, 2016).

At the time of diagnosis, the illness had progressed to the CNS in less than 10% of cases. Poor school performance, headaches, weakness, vomiting, impaired vision, vomiting, seizures, and difficulties keeping balance are all possible side effects (Hutter, 2010; Williams and Hopper, 2015).

The thymus is involved in 60–70 percent of children with the T-cell form of ALL. An anterior mediastinal mass can form when the thymus enlarges due to an accumulation of WBCs, putting pressure on the trachea and causing shortness of breath, coughing, discomfort, and dysphagia. The pressure may also compress the superior vena cava, causing edema in the head and arms in some situations (Williams and Hopper, 2015; Kanwar, 2021).

Hyperleukocytosis is a condition in which acute leukemia presents with extraordinarily high blast cell numbers. This stage of the disease can

result in respiratory failure, severe metabolic abnormalities, and cerebral hemorrhage, all of which are major risks of early death. Leukostasis is the term for the condition that causes these consequences. Overcrowding of leukemic blasts was assumed the cause of leukostasis. Leukostasis, on the other hand, is now known to be caused by adhesive contacts between blasts and the vascular endothelium. The release of cytokines is likely to cause endothelial damage. The blasts' adhesion molecules and their responses to the environment are likely more essential determinants in leukostasis development than the amount of cells. When there is hyperleukocytosis, leukopheresis is commonly done to lower the leukocyte count in the early stages. It's still uncertain whether this is the most effective treatment for leukostasis (Hoffman et al., 2018).

2.10 Leukemia diagnostics

According Initial investigations include CBC, urea and electrolyte counts, and a chest x-ray if ALL is suspected based on the child's narrative and physical examination. The blood count could indicate a diagnosis of leukemia with blast cells present or an elevated WBC count. A bone marrow examination, on the other hand, is a required diagnostic procedure. Bone marrow is frequently extracted from the iliac crest of the iliac bone. Despite improved technologies, ALL is still often diagnosed by a skilled pediatric oncologist and/or pathologist using a high-powered microscope to examine Romanowsky-stained bone marrow smears. A blast cell count of more than 25% in the bone marrow validates a diagnosis of leukemia (Appelbaum et al., 2014).

A sample of the bone marrow aspirate and the chloroma biopsy/trephine are then tested for various characteristics of the leukemic

cells to help determine the kind of leukemia present. Other methods are employed to broaden the scope of the diagnostic. A lumbar puncture is used to evaluate whether the CNS is involved, and a sample of cerebrospinal fluid (CSF) is tested for blast cells. Most of these operations are done under sedation or anesthesia. Because of the potential for anesthetic complications, a chest x-ray is required to aid in the diagnosis of infection or the detection of a mediastinal mass (Vora, 2017).

2.11 Epidemiology of Leukemia

The American Cancer Society's ultimate goal is to lead the fight for a world free of cancer. Cancer now kills one in every seven people on the planet, more than HIV/AIDS, TB, and malaria combined. In 2012, there were an estimated 14.1 million cancer diagnoses and 8.2 million cancer deaths worldwide. More than 60% of cancer deaths happen in low- and middle-income countries (LMICs), many of which lack the medical resources and health systems to support the disease burden. Due to population increase and aging, the worldwide burden of cancer is anticipated to reach 21.6 million new cases and 13.0 million cancer deaths by 2030. Given the adoption of hazardous behaviors and lifestyles related to rapid economic growth (ex. physical inactivity, poor diet, and smoking) as well as changes in reproductive patterns (e.g., fewer children, later age at first childbirth) in LMICs, these projections may increase. Tobacco use contributes significantly to the global burden of cancer, accounting for more than 20% of all cancer deaths (Howlader et al., 2018).

Döhner, (2015) stated that Leukemia is a type of cancer that arises from aberrant cells in the hematological system that are poorly differentiated and aggressive. Leukemia has historically been the second leading cause of

cancer-related death in those under the age of 39 years. (Siegel et al., 2017). According to estimates, the United States will see 61,780 new leukemia cases and 22,840 leukemia-specific fatalities in 2019(Siegel et al., 2019).

Leukemia is the most frequent malignancy in kids and teens, accounting for 25–30% of all cancers in this age group. It is most typically diagnosed in kids between the ages of 1 and 4 years. The average age of diagnosis is six years. Boys are more likely than girls to get childhood leukemia. White and Hispanic children are also more likely to be diagnosed. Childhood leukemia has become more common in recent years. This could be due to improved detection and reporting capabilities rather than an increase in the number of children affected (American Cancer Society, 2018; Barrington-Trimis et al., 2017; Belson et al., 2007).

Nurhidayah et al., (2020) it was found that leukemia was responsible for 3/4 of all malignancies in children in Indonesia. Furthermore, data from throughout the world revealed that leukemia was the most common type of juvenile cancer, with nearly 300,000 cases reported between 2001 and 2010.

Cancer incidence rates in children under the age of 15 years in Turkey range from 11to 15 per100,000 population (Kutluk, 2009). In Taiwan, the overall ASIR was 12.5/100,000 from 1996 to 2010 (Liu et al., 2015).

For the years 1996 to 1998, the average annual incidence rate of cancer in children in Jordan was 11.3 per 100,000 children (Al-Sheyyab et al., 2003). The cancer incidence rate in Saudi Arabia climbed from 8.8 per 100,000 in 1999 to 9.8 per 100,000 in 2008(Al-Mutlaq et al., 2015).

Children's cancer accounts for around 6.7 percent of all malignancies in Iraq. This could be related to the demographic structure, among other things. In Iraq, children under the age of 15 years account for 40 percent of the overall population (Al-Asadi and Ibrahim, 2018.).

In Iraq, During 2000 and 2019, cancers among children aged 0 to 19 years accounted for 8.97 percent of all new cancer diagnoses, with 35411 children diagnosed with cancer, the most prevalent of which was leukemia (10499) (29.65 percent), with 524 children diagnosed with leukemia each year on average. Between 2000 and 2004, leukemia accounted for (2088) 30.94 percent of all cancer cases in children (0–19 years old), significantly dropping (2174) 30.50 percent between 2005 and 2009, growing to (3020) 32.82 percent between 2010 and 2014, and declining to (3217) 25.60 percent between 2015 and 2016 (Al-Hashimi, 2021).

in Basrah, for the years 2012–2016, the total incidence was significant compared to that noted for some Asian countries, such as China, Shanghai, where the crude incidence rate was 12.90 per100,000 and the ASIR was 12.96 per 100,000 population (Bao et al., 2016), and Korea (1993–2011), where the ASIR was 13.49 per 100,000 children (Park et al., 2016).

2.12 Risk Factors for Childhood Leukemia

Primary A number of probable risk variables (ex, infectious, environmental, or genetic) have been investigated in epidemiologic studies of acute leukemias in children in order to determine the disease's genesis. Only one environmental risk factor (ionizing radiation) has been found to be significantly related to either ALL or AML; the rest [e.g., electromagnetic fields (EMFs), cigarette smoking] have been found to be weakly or inconsistently linked to either type of juvenile leukemia (Belson et al., 2007).

The evidence for possible risk factors for childhood leukemia (CL) is unclear. Ionizing radiation exposure, while widely regarded, as a cause of leukemia in children, does not account for all incidences of the disease. CL is multifaceted in its pathogenesis. Leukemic cells with genetic mutations appear primarily before birth. The fusion of the TEL and AML1 genes occurs when chromosomes 12 and 21 are translocated, resulting in aberrant proteins that suppress gene activity and alter the ability of hematopoietic stem cells to self-renew and differentiate. This is the most prevalent structural genetic defect in kids with leukemia (Mori et al., 2002).

Few risk factors for childhood leukemia have been well identified in terms of genesis. Down syndrome and cancer-predisposing disorders such as ataxia telangiectasia have been shown to significantly enhance the risk of leukemias (particularly acute myeloid leukemia and acute lymphoblastic), but they only account for a tiny percentage of cases (5 percent)(Mezei et al., 2014; Ross et al., 2011; Bielorai et al., 2013).

García-Pérez et al., (2015) presented that other risk factors such as radon, ionizing radiation, and infectious agents have also been linked to an increased risk of childhood leukemia. In terms of environmental and parental occupational exposures, several studies have found an increased risk of leukemia in children whose parents worked in jobs involving high levels of carcinogenic agents, pesticides, or social contact, and some meta-analyses have discovered links between childhood leukemias and prenatal parental occupational pesticide exposure. Other chemical exposures, such as benzene and other volatile organic compounds, have been linked to certain kinds of leukemias, while a review of chemical risk factors and childhood leukemia found mixed results.

Some studies have discovered links between juvenile leukemia and air pollution in urban and residential traffic exposure. Despite the fact that industrial plants are known to generate carcinogens such as metals, dioxins, and benzene, there are few studies on exposure to industrial pollution and childhood leukemia. The European Commission passed the Integrated Pollution Prevention and Control (IPPC) directive in 2002 and the European Pollutant Release and Transfer Register (E-PRTR) directive in 2007(Boothe et al., 2014).

By combining IPPC and E-PRTR records, they form a database of geo-located industries in Europe that have a health and environmental impact, which is a valuable resource for checking industrial pollution and, by extension, allowing researchers to investigate the link between residential proximity to polluting installations and health effects like cancer (Heck et al., 2014; Lopez-Cima et al., 2011; Lopez-Cima et al., 2013).

2.13 Therapeutic Management

Leukemia is treated with intravenous and intrathecal chemotherapy drugs. For resistant CNS illness or testicular recurrence, radiation is occasionally utilized. In most cases, leukemia treatment is divided into three phases: (1) induction, which achieves complete remission or clinical disappearance of leukemic cells; (2) intensification, or consolidation, therapy, which reduces the total tumor burden further; and (3) maintenance, which entails additional chemotherapy to keep the disease in remission. Although the drug combinations and irradiation options vary according to the institution, the patient's prognostic or risk factors, and the kind of leukemia being treated, the following general principles for each phase are always followed (Rubnitz, 2017; Hockenberry and Wilson, 2015).

- **Remission Induction**

Induction therapy begins almost immediately once the diagnosis is confirmed and lasts for 4-5 weeks. Corticosteroids (dexamethasone or prednisone), vincristine, and L-asparaginase, with or without an anthracycline, are the most frequently utilized medicines for ALL induction. To maintain continuously high blood levels, oral steroids are given in divided doses every day. Vincristine is administered once a week through IV infusion for a total of four to six doses, while L-asparaginase is given on a variety of schedules. The absence of clinical signs or symptoms of the disease, as well as the presence of less than 5 percent blast cells in the bone marrow, indicate full remission. Doxorubicin or daunomycin, as well as cytosine arabinoside, are the most commonly used induction medicines in AML (Margolin et al., 2011).

- **Consolidation or Intensification, Therapy**

Intensification, also known as consolidation therapy, is used to reduce the number of leukemic cells in the body of a child. L-asparaginase, high-dose methotrexate or intermediate-dose methotrexate with leucovorin rescue, cytarabine, vincristine, steroids, doxorubicin, oral or intramuscular methotrexate, and 6-mercaptopurine are some of the medicines used in intensification therapy. During the first six months of treatment, the intensification phase consists of periodic pulses of these medicines. Intensification therapy drugs vary depending on the type of leukemia and the child's risk factors (Kumar et al., 2014).

- **Maintenance**

Maintenance therapy aims to keep the patient in remission while also reducing the number of leukemic cells. Combined drug regimens have been more successful in maintaining remissions and preventing drug resistance. A daily dose of oral 6-mercaptopurine, weekly doses of methotrexate, and periodic pulses of vincristine and steroids, which are routine in most treatment regimens, are among the medicines used during maintenance therapy. CBC s are collected weekly or monthly during maintenance therapy to assess the marrow's response to the medications. If myelosuppression becomes severe (usually indicated by an ANC less than 1000/mm3), or if toxic side effects occur, therapy is temporarily stopped or the dose decreased (Schmiegelow et al., 2014).

- **Central Nervous System Prophylactic Therapy**

Children with leukemia are at danger of leukemic cells invading the CNS. As a result, every youngster receives CNS prophylactic therapy. Children with ALL used to get cranial-spinal irradiation until the 1980s. Because of the possibility of late consequences from cranial irradiation, such as secondary malignancies, this treatment is now reserved for high-risk patients or those with CNS disease that is resistant to other treatments. Intrathecal methotrexate or triple intrathecal chemotherapy (hydrocortisone, cytarabine, and methotrexate) are used to avoid CNS illness during induction, intensification, and maintenance therapy, depending on the protocol. (Hockenberry and Wilson, 2015).

Duration of therapy has been based on clinical experience comparing survival rates for various time intervals and is concerned with preventing deleterious effects of excessive treatment. Although the ideal period to stop therapy is unknown, it is common practice to continue

treatment for two to three years. Following the cessation of therapy, all kids must undergo monthly medical evaluations to monitor for relapse and long-term therapeutic effects (Hockenberry and Wilson, 2015).

2.14 Family Caregivers

Family caregivers organize and participate in medical consultations, participate in treatment decisions, coordinate care and services, ensure that food and shelter needs are met, help with daily tasks such as dressing, bathing and administering medications, as well as managing financial problems. Because of all of this, the caregiver is a vulnerable individual who requires nursing care and attention. That explains why developing specific interventions to support the well-being of family carers, particularly those who are under stress in their caring role, is so important (Wolff et al., 2016; Diaz and Cruz, 2018).

Because of their duties in caring for children with cancer, parents have encountered a variety of physical issues. Parents regularly complained about extreme exhaustion,a loss of appetite, a lack of time to relax, weight loss, and all of which might be influenced by parental variables such as age, gender, culture, income, education level, and length of child care (Mancini et al., 2011).

A previous study in China found that parents of cancer patients were very stressed, with 54 percent experiencing moderate to severe anxiety and 21% experiencing sadness. Parents of cancer patients reported exhaustion, dread, guilt, worry, melancholy, despair, regret, sleep issues, and a significant level of social isolation (Song et al., 2017).

Additionally, parents reported that their social interactions were strained as a result of their sole attention on patients, neglecting their own needs. They were most likely preoccupied with sustaining patient care, managing pain, assisting patient mobilization, fulfilling the patient's daily needs, calling health workers, and delivering patients to treatment. They also felt terrible about being genetically responsible for the condition, and they were concerned and frightened about their children's future (Nurhidayah et al., 2020).

2.15 Care Burden

Because of the extraordinarily quick course of sickness, acute lymphoblastic leukemia (ALL) appears to directly threaten life among many malignant diseases. Patients rely largely on their families' assistance during this arduous and lengthy treatment time. The intense treatment produces additional worries and obstacles for the caretakers. Caregivers commonly assist patients with activities of daily living (ADL), such as prescription administration, transportation, meal preparation, financial management, health care advocacy, and emotional support (Mantzoukas and Mantzouka, 2010; Bevans and Sternberg, 2012).

In addition, carers must deal with informed consent procedures, hospitalization and multiple clinic visits, significant financial costs, and disruption of family routine. Treatment for these people entails an emotional as well as a physical toll, as well as the possibility of loss. Such caretakers must embrace the complexity of treatment without assurance that the condition will be cured. Despite the fact that family carers provide a valuable service to society, little assistance is provided to them as they strive to fulfill their obligations (Kumari et al., 2018).

Research shows that caregivers of ALL patients, particularly children, have health issues, alcohol abuse, social disengagement, sexual and marital difficulties, and work-related issues. Although there is no evidence of an increase in divorce in these couples, the data show an exacerbation of already existing interpersonal issues and more disharmonies. According to the data, one-fourth to one-fifth of moms of patients with acute leukemia suffer from posttraumatic stress disorder that lasts for two years (Tremolada et al., 2013; Kumari et al., 2018).

Caregiver burden (CB) refers to how much carers believe their role as a caregiver is affecting their psychological, physiological, social, financial, and spiritual well-being. Cancer caregivers spend a large part of their time addressing the needs of the people they are caring for, according to research on cancer caregivers (Arab et al., 2020) .

Rezaei et al., (2020) showed that The term "burden of care" refers to the caregiver's physical, emotional, social, or financial reactions during caregiving as a result of a mismatch between the patient's needs and available health resources. This imbalance is linked to carers' various tasks, physical and mental health, and financial situation, as well as the quality of government health services.

Motlagh et al., (2019) Care necessitates a lot of energy, a desire for recovery, insufficient time for one's own hobbies, and anguish over the fate of the supported person, all of which contribute to caregiver burden.

It also has the following effects: impairment in daily and leisure activities, as well as social interactions, disability and illness, isolation from family and loss of family relationships, loss of hope in social support, insufficient patient care, vulnerability to chronic disorders, and

abandonment. Caregivers must strike a balance between their own and their patients' needs. Due to a lack of sufficient caring skills and limited resources, they are extremely stressed. On the other hand, because they spend so much time with patients, they often overlook their own needs, which may drive them to change their lifestyle (Mohammed et al., 2015; Talebi et al., 2016).

Shaffer et al., (2018) caregivers of cancer patients face a "unique caregiving trajectory" that includes significant responsibilities such as assisting patients with activities of daily living, such as "dressing, toileting, and mobility," as well as overseeing patients' day-to-day errands and chores, assisting patients with transportation to and from health care appointments, and acting as an "emotional bedrock for the patient and his or her extended family."

The immensity of this responsibility for cancer carers, as well as the associated hardship, has been linked to a variety of health problems among caregivers. In this aspect, cancer patients' CB is linked to depression and sentiments like loss, fear, and loneliness, as well as a decrease in help. CB is also linked to major sleep disturbances, which can lead to increased worry and sadness, as well as a lower quality of life for carers (Wang et al., 2016; Shaffer et al., 2018).

Applebaum et al. (2015) it should be noted that caregivers' CB may induce "existential anguish," which includes feelings of hopelessness, demoralization, loss of personal significance, remorse, and impotence, as well as a diminished will to live.

Women have traditionally been expected to offer care, nurturing, and assistance, with the caregiver responsibility resting mostly on mothers in underdeveloped countries. As a result, mothers may be more susceptible to

CB. It is critical to understand the elements that influence the CB in order to develop effective techniques for lowering it. (Santo et al., 2011).

Several factors, according to the literature, influence the degree of CB. One element that can influence CB is social support (SS). Caregivers' perception of self-efficacy in dealing with the patient improves when they feel supported, which helps lower their emotional burden (Burnette et al., 2017; Zhang et al., 2014; Shiba et al., 2016).

For patients with pediatric leukemia, the affordability of treatment is just as important as the quality of treatment. Treatment for AML and ALL might take anywhere from 3 to 5 years. Total therapy costs range from 300,000 to 500,000 Chinese yuan (CNY), with bone marrow transplantation costs exceeding 1 million CNY in China. (Zhan et al., 2022).

Zeidan et al., (2016) the total cost and cost structure of AML therapy in the United Kingdom and the United States were compared. In the UK and the US, rigorous chemotherapy cost £59,426 and $324,502, respectively, whereas allogeneic stem cell transplantation cost £112,545 and $352,682. Patients and their families may face significant financial hardships as a result of a lack of adequate insurance coverage during the lengthy and costly treatment procedure.

The cost of treating blood cancer is very high for the healthcare system. In the first year after diagnosis, the average yearly permitted expense for treating blood cancer is $156.000 per patient. The excessive spending continues after the first year. The amount of money spent varies greatly depending on the type of cancer. The average permitted spending for the three years following diagnosis ranged from $200,000 for chronic leukemia to over $800,000 for acute leukemia. In comparison, the average total cost of

lung cancer in the 36 months following diagnosis was $250,000, while colorectal cancer cost slightly less than $150,000 (Gabriela Dieguez et al., 2018).

2.16 Coping Strategies

Because moms do not have enough time to adjust to the new circumstances in the family, the diagnosis and treatment of children with cancer are emotionally, physically, socially, and financially challenging conditions for them. (Rodriguez et al., 2012).

According to research, parents of children with ALL experienced despair, anxiety, post-traumatic stress, and tension. These symptoms may persist long after the treatment has ended. Instead of categorizing parents as melancholy or anxious, researchers recommend looking into the holistic multidimensional idea of quality of life (Sutan et al., 2017).

Coping refers to a person's efforts to manage the demands of a stressful circumstance through cognitive or behavioral means. Parents manage their children's chronic diseases by devising a variety of tactics to decrease or minimize the number and severity of stressful situations, as well as to aid with chronic illness adaptation (Lai and Oei, 2014; Zanon et al., 2017).

Coping mechanisms at the family level are more beneficial in both ill and concurrently stressed people. The use of adaptive coping methods has a positive correlation with happiness and a negative correlation with stress. Families with children who have chronic illnesses or health difficulties require regular interventions, which might differ depending on parental

personality qualities, education, and gender, as well as the child's condition and age (Padeniya et al., 2020).

(Hockenberry et al., 2017) presented that the coping strategies are actions taken to alleviate the stress brought on by a catastrophe. Approach behaviors, such as asking for information about the diagnosis and status of the child, are coping mechanisms that lead to movement toward adjustment and resolution of the crisis. Avoidance behaviors result in a shift away from adjustment and are indicative of crisis maladaptation (refuse to agree to treatment). The functional stress on the family has a considerable impact on the level of adjustment.

2.16.1 Coping strategies for parents

Some coping strategies for parents and suggestions for managing some of the feelings, emotions, and reactions that parents may experience.

Confusion and Shock. Whenever a parent hears the words "leukemia" or "lymphoma" and learns that his or her child has cancer, it's common for them to block out other facts regarding the child's disease at first (Ramachandran, 2012).

- Many parents take notes or videotape their discussions with their child's care team so they may go over what was said and share it with other family members (Ramachandran, 2012).

Denial. The majority of parents wish to believe that their child's cancer diagnosis was an oversight. Denial about the accuracy of the diagnosis may help parents adjust and shift gears for a brief time. However, parents who remain in denial for an extended period of time may isolate their children and

other family members at a time when communication is critical (Brown and Prinstein, 2011).

- Some parents seek a second opinion or request extra information regarding the credentials of treating physicians or the medical center, as well as the number of patients treated and their outcomes, before their kid begins therapy. This method may be beneficial in many circumstances. However, it is critical to schedule consultations or gather additional information as soon as possible. Healthcare providers are usually eager to assist with this (Hockenberry et al., 2017).

Anxiety and Fear. Concerns about the child's treatment outcome, the health of other children, finances, substantial changes in daily obligations or employment, how family and friends will respond, how the child will cope with treatment, and the ability to handle the situation are common fears and worries for parents.

- Talking about one's concerns and anxieties can be beneficial to some people. Others prefer to learn about the disease and treatment through books or other sources. Professionals on the child's treatment team are trained to assist parents in discussing or gathering information about all elements of their child's illness: economic, physical, and emotional (Estlin et al., 2010).

Anger. Mothers of seriously ill kids have expressed anger at their child's physician or the medical profession as a whole for the difficult treatments; frustration with their health insurance company or healthcare system; anger that their innocent child has to suffer; and even anger at their

child for becoming ill or at God for not protecting their kid from the disease (Sutan et al., 2017).

- Exercise or Physical activity or, journal writing, and finding a private space to express concerns are all effective techniques for parents to cope with and manage stress. Join a parent support group to get advice and recommendations from other parents whose children are undergoing comparable treatment (Sutan et al., 2017).

Blame and Guilt. Many mothers may seek a cause or someone or something to blame for their child's cancer diagnosis in order to cope with the stress of the chevalier's prognosis.

- Recognize any guilt that a parent may be experiencing so that they can receive the comfort, information, and support they require. As difficult as it is to accept, it is possible that parents will never know what caused their child's cancer. Remind yourself and your loved ones that there is no one to blame (Hamad and Shaker, 2019).

Loss and Sadness. Parents may feel bereft from the time the diagnosis is made. Parents may realize that life for their children and families will never be the same. These emotions are very normal. Over time, parents will eventually adapt and establish a new sense of normalcy.

- Seek professional treatment if a parent is overcome by this emotion or is unable to function normally. It is critical to deal through your emotions in order to assist the youngster in

coping with other parts of family life and job (Sutan et al., 2017).

Doubts around spiritual and religious beliefs. A kid's disease may appear unjust. The apparent injustice may cause parents to reconsider their views on life's meaning, purpose, and value, as well as their spiritual beliefs and relationship with God (Ramachandran, 2012).

- Many parents find that talking to a counselor or spiritual advisor about their thoughts is beneficial (Ramachandran, 2012).

2.17 Nursing Roles

When a kid is diagnosed with cancer, it can bring up feelings of uncertainty, the possibility of death, and a loss of hope for the future. These circumstances can cause the family's focus to shift from providing emotional support to caring for a sick child, disrupting the typical routine. Prior to discharge, parents and caregivers need proper information and advice since detecting and acting on basic indicators like fever can mean the difference between life and death for a child with acute lymphoblastic leukemia. Furthermore, before treatment begins, the family requires immediate information (Aburn and Gott, 2014).

Therefore, information must be conveyed in light of the spectrum of emotions that parents are experiencing at this time. It is critical that health workers understand the early stages of grieving and adaptation that a family will go through, as well as the challenges they will have in dealing with a frightening scenario in a strange setting like a hospital (Aburn and Gott, 2011).

Given the sentiments of uncertainty and imminent death that a child and family may experience at the time of diagnosis, it is critical that health professionals are able to manage these worries via support and education. Furthermore, nurses play an important role in eliciting parents' causal explanations so that the content of these worries can be linked to the parents' adjustment and management of their child's cancer experience (Tomlinson and Kline, 2010).

Nurses caring for the kid and family should explain to them the medications the child is taking, how to administer them, and how to employ non-pharmacologic treatments. This gives parents more control over their children's comfort and well-being, alleviating their fears that their child would be in agony or suffer while he or she dies. Furthermore, parents who were actively involved in their child's care reported better bereavement outcomes (for example, family cohesion, adaptive coping, and reduced worry, depression, and stress) (Goodenough et al., 2004).

Nurses can help the family by assisting the parents in identifying ways for siblings to participate in the caring process, such as by bringing supplies or a favorite toy, game, or food item. Parents should be encouraged to set aside time to spend with their children. Assisted parents in locating a trustworthy friend or family member who can sit with the sick child for a brief length of time, allowing them to attend to their own or their other children's needs (Hockenberry et al., 2017).

Referring the patient to the medical team at the first evidence of an unfavorable reaction or complication is another nurse's responsibility. Nurses are typically responsible for offering assistance and education to the patient's parents. According to the authors, the nurse should keep the family informed,

according to the authors, and soothing the parents while staying noncommittal regarding the child's prognosis is critical, especially in the early stages of the condition. To coordinate the patient's inpatient and post-discharge management, nurses should communicate with other members of the child's oncology multidisciplinary team as well as the follow-up team (Kaplan, 2019).

2.18 Nursing Care Management

2.18.1 Get the family ready for diagnostic and therapeutic procedures

The Children must undergo multiple tests from the time of diagnosis through the end of treatment; the most severe are bone marrow aspiration, bone marrow biopsy, and lumbar punctures. Several finger sticks and venipunctures for blood testing and medication infusion are typical. As a result, the youngster requires an explanation of each process as well as what to expect. In addition, effective pharmacologic measures, including conscious and unconscious sedation and no pharmacologic strategies are used to reduce discomfort associated with these painful procedures (Perry et al., 2014).

2.18.2 Provide Continued Emotional Support

Nursing care for a kid with leukemia depends on common issues that families face during treatment. It is not uncommon for a youngster who stops therapy after two or three years to continue to have many adverse effects. As a result, the nurse's job is to provide constant support, advice, clarification, and judgment. Parents must be able to identify signs that require medical treatment. Even if some of the reactions indicated are predictable, parents should still notify their practitioner. Notifying parents in advance of

its likely occurrence allows them to prepare. It also ensures them that these reactions are not due to the reappearance of leukemic cells (Belleza, 2021).

The nurse must also utilize judgment to distinguish between typical reactions and those that signal toxicity. Frequently, it is the office or clinic nurse who screens such calls and, when necessary, offers guidance. Usually, nausea and vomiting are not signs of drug withdrawal. Severe vomiting, on the other hand, may necessitate rapid medical attention to avoid dehydration. Constipation, infection, mucosal ulceration, hemorrhagic cystitis, peripheral neuropathy, and mucosal ulceration are all signs that leukemic cells need to be evaluated (Hockenberry and Wilson, 2015).

The prognosis is a key part of continuing emotional support. Although leukemia is no longer always fatal, it is important to remember that survival numbers are simply averages and only apply to children who have been treated with the most up-to-date methods since their diagnosis. The chances may be higher for low-risk children, but they may be much worse for high-risk youngsters. Some people who survive after stopping treatment will relapse. As a result, at this moment, only the passage of time can certify that the youngster has been "cured" of the sickness. Remission, even if it lasts longer than 5 years, is not the same as cure (Perry et al., 2014).

2.19 Nursing Diagnosis and Related Intervention

2.19.1 "Nursing Diagnosis: Risk for Injury (bleeding, infection) related to pancytopenia"

- **Nursing Intervention**

- Vital signs should be checked every 4 hours or as needed. **Rational** Temperature above normal is an indication of infection.

- Check for edema, redness, and purulent drainage in the patient. **Rational** These infection symptoms should be reported immediately.

- Keep the patient away from potential sources of infection. **Rational** Due to inefficient WBCs, the patient is at danger of infection.

- Look for bloody stools, petechiae, and ecchymosis. **Rational** This is an indication of bleeding and should be reported immediately.

- Keep the patient safe from injuries that could result in bleeding. **Rational** Because of a low platelet count, the patient is in danger of bleeding (Hockenberry et al., 2017; McKinney et al., 2017).

2.19.2 "Nursing Diagnosis: Fatigue related to decreased red cell count and oxygenation and effects of treatments as evidenced by patient statement of lack of energy, inability to participate in desired activities" "(Williams and Hopper, 2015, Puckett et al., 2021)".

➢ **<u>Nursing Intervention</u>**

- Assist the patient in identifying significant activities for him or her (e.g., ADLs, attending a child's wedding, going on a trip). Assist in the creation of goals for the intended activity. **Rationale** If the patient is unable to complete all of his or her wishes, it may be beneficial to concentrate on the most critical tasks.

- Promote a well-balanced diet. As needed, consult a dietician. **Rationale** Poor nutrition contributes to fatigue.

- Allow periods of rest between activities. **Rationale** Any activity (ADL, x-rays, or even conversing) can make you tired.

- Get enough rest. Obtain order for sleeping aid if indicated. **Rationale** Lack of sleep worsens fatigue.

- Assist with ADLs when the patient is unable to do so on his or her own. **Rationale** Excessive weariness may impede the patient from engaging in self-care (Williams and Hopper, 2015, Puckett et al., 2021).

2.20 Previous Studies

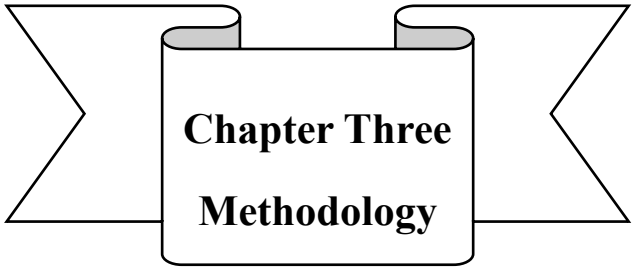
1. A study done by (Sutan et al.) at (2017) on " Coping Strategies among Parents of Children with Acute Lymphoblastic Leukemia " in Malaysia , As a result, half of the parents rated their health-related quality of life as satisfactory. The social relationship area received the greatest scores from parents, while the environmental health domain received the lowest. Religion was found to be the most frequently utilized coping strategy, whereas humor was the least frequently employed. In addition, there was a strong positive association between parent quality of life and problem-focused coping style, as well as a large negative relationship with emotion-focused coping style.
2. Certain study conducted by (Baran) at (2018) on “the Burden of Care and Life Satisfaction of the Turkish Mothers of Children with Cancer”, The average age of the 194 children with ALL who were sent to a chemotherapy polyclinic was 7.263.78 (years), 53.6 percent were male, and 64.4 percent had previously enrolled in school but were unable to continue owing to sickness. The average life satisfaction scale scores and the mothers' economic level were found to differ significantly (P0.005). According to Pearson Product Moment Association analysis, life satisfaction and caregiver load scores (r=-

420, P=0.000) have a statistically significant negative correlation (P0.05).

3. Certain research directed by (Sharma et.al.) at (2018) on "Coping Strategies used by Parents of Children Diagnosed with Cancer" in India, which resulted the average age of the kids was 9.98 years (standard deviation: 1.85). About half of them (54 percent) had completed fifth grade. ALL was diagnosed in half of the children (51%). In this study, 60 parents were selected; nearly half of the parents (48.33%) were educated to or beyond graduation, and approximately 70% earned more than Rupees 19,574 per month. A little more than half of the carers (51.7%) were from joint/extended families. Parents utilized emotion-focused coping techniques more than problem-focused coping strategies, according to the findings of this study.
4. Certain research conducted by (Hamad and Shaker, 2019) about “Coping Strategies among Caregivers of Children with Acute Leukemia at Nanakali Hospital in Erbil City”. The study included 54 caregivers of leukemic children undergoing chemotherapy who were purposefully recruited for the study. More than half of the children, 28 (52%) were female, and the vast majority, 48 (88.9%), had acute lymphoblastic leukemia. Caregivers were 36.53 years old on average, and the majority of primary caregivers (87 percent) were mothers, the majority of whom were illiterate or had only completed secondary school. In terms of overall coping pattern scores among carers, the majority (61.1%) were in the medium range. Maintaining family integration was within the middle range of coping behaviors for 87 percent of carers, whereas social support, self-esteem, and an

understanding of the medical situation had lower percentages of 59.3 percent and 63 percent retrospectively. The study's findings revealed that caregiver education and level of coping have a strong link.

5. Certain study conducted by (Motlagh et al.) at (2019) on " Care Burden in Parents of Children with Leukemia: A Cross-Sectional Study in the West of Iran", A total of 209 parents of children with leukemia were referred to Dr. Mohammad Kermanshahi Hospital in Kermanshah city, in the west of Iran, and the mean care burden score was 56.43+9.32, ranging from 0 to 88. 10.7%, 79.7%, and 9.6% of parents, respectively, had low, moderate, and severe care burden. The lower age of parents (r= -0.255, P 0.001), higher educational level (P=0.028), and better economic status (P=0.001) were all linked to a greater care burden score.



This chapter presents the methods used in the study, which including certain steps assist in accomplishing the objectives of study.

3.1 Design of the study

Cross-sectional description was approved throughout the present study aimed to assess care burden and coping strategies practiced by mothers for their children with leukemia in Al-Basrah province from the period 1st November/2020 to 1st March/2022.

3.2 Administrative arrangements

Prior to the gathering of data, official permissions were acquired for conducting the study as presented in appendix (A).

- College of Nursing approval in the first seminar on the research topic.
- The Research Ethics committee at the University of Babylon, College of Nursing discussed the application of the study and approved to be conducted.
- An official agreement was acquired from Al.Basrah Health Directorate.
- The Research Committee of the Training and Human Development Center agreed on conduction.
- An official agreement was acquired from Al-Basrah Specialist Children's Hospital, which was the setting for the study.

3.3 Ethical Consideration

- Verbal permission from hospital administration.
- Verbal consent from mothers of children with leukemia after explaining the study and its objectives, which is voluntary and confidential.

3.4 Setting of the study

The present study was carried out in Al.Basrah province at Al.Basrah Specialist Children's Hospital as presented in tab. (3-1).

Table 3. 1 Distribution of the Study Sample according to their hospitals

Pediatric Hospital	Department that Selected in the Hospital
Al.Basrah Children Specialist Hospital.	Leukemia ward
	Oncology & hematology Clinic

3.5 Validity of the Instrument:

Validity is the measurement property that concern the degree to which an instrument is measuring what it purports to measure (Polit & Beck, 2018). The content validity of the instrument is established through a panel of (16) experts as shown in (Appendix B) who have more than (10) experience in the specialty to ensure the validity of the instrument and to confirm accuracy, relevancy and adequacy of the questionnaires to prepare to be ready for sample collection.

They are (6) faculty members from the College of Nursing University of Baghdad; (2) specialist in pediatric health nursing and (4) specialist in community health nursing. In addition, (7) faculty members from the College of Nursing University of Babylon; (1) specialist in pediatric health nursing, (1) specialist in adult health nursing, (3) specialist in community health nursing and (1) specialist in psychiatric health nursing. (1) From the College of Nursing University of Dhi Qar specialist in community health nursing, (1) from the College of Nursing University of Karbala specialist in pediatric health nursing and (1) from Al.Basrah children specialist hospital; pediatricians.

The opinions of the experts after reviewing the study instrument which revealed that they agreed on all items, as being clear and adequate for the measurement of the phenomenon underling the study. Minor modifications made on few items with respect to the expert's suggestions.

3.6 Pilot study

The researcher accomplished the pilot study before starting the data collection, a preliminary study is carried out to determine the study instrument's reliability. It was done in Al-Basrah children specialist hospital through the period from (4 to 6 July 2021), on a pilot sample that consist of 20 mothers which were excluded from original sample of the study.

A pilot study was carried out before starting the data gathering for the following purposes:

1. To identify the reliability of the questionnaire.
2. To enhance the validity of the questionnaire.

3. To confirm the precision and content adequacy of the instrument structure throughout the subjects understanding and to determine the required modifications.

4. To estimate the average time needed for data collection for each mother during interview.

5. To identify the barrier that may be encountered during the data collection process.

- **The result of the pilot study**

1. The items of the questionnaire are clear, easy to understand and adequate to assess the phenomenon underlying the study.
2. Minor changes are made relative to few items according to expert's suggestion.
3. The average time required for each interview is nearly (35-45) minute for each mother.
4. The validity and reliability of the instrument are determined.

3.7 Reliability of the study instrument

Reliability is the extent to which scores are free from measurement error. Reliability can also be defined as the extent to which scores for people who have not changed are the same for repeated measurements (Polit & Beck, 2018). Researcher was used internal consistency reliability is estimated by coefficient alpha (Cronbach's Alpha) as shown in table (3.2), coefficient alpha for care burden items indicated (0.732) and for coping strategies items was (0.636) which was statistically acceptable. Internal consistency reliability was employed for the study instrument by calculation

of Cronbach alpha correlation coefficient. The reliability estimate was obtained through the write of all (20) data selected by use of the Statistical Package of Social Sciences (SPSS) version 24.

Table 3. 2 Reliability Coefficients of the study instrument.

Cronbach's Alpha for Care Burden		**Reliability Technique**	**Assessment**
Cronbach's Alpha	No of items	Alpha (Cronbach)	**pass**
0.732	22		
Cronbach's Alpha for Coping Strategies		Alpha (Cronbach)	pass
Cronbach's Alpha	No of items		
0.636	66		

The table above was statistically formed to show the reliability coefficient for the tool of the present study; its result show that there is an acceptable level of Cronbach's Alpha value for the questionnaire therefore the instrument appropriate to apply for the study.

3.8 Sample of the study

Non Probability "convenient" sample of (105) mothers who have children under eighteen years were selected in oncology & hematology clinic and leukemia ward at Al.Basrah children specialist hospital.

The total sample of mothers was not selected as a percentage of total hospital visits due to the lack of accurate statistics on the number of children with leukemia. Total number visits (1375 in 2020) in statistic unite were not accurate related to many cases such as death of children, duplicate names and non- compliance with follow-up and then lead to limiting sampling.

Table 3. 3 Distribution of the Study Sample according to their Setting

Hospital	Places	Mothers	
Al.Basrah children specialist hospital	oncology & hematology clinic and leukemia ward	105	**Total of the Sample**
Total			**105**

NO. = Number

3.8.1 Inclusive criteria

1. Mothers attending the setting for follow up or taking chemotherapy in the clinic and ward.
2. Mothers who had at least one child aged under eighteen year's leukemia.
3. Mothers of children with leukemia regardless their ages.

3.8.2 Exclusive Criteria

1. Exclusion for a child who was not accompanied by his mother.
2. Mothers who are refuse to participate in the study.

3.9 The study instrument

Demographic characteristics, Zarit Burden Interview (ZBI), and Ways of Coping (Revised) questionnaires were used for gathering the data as shown in (Appendix C). The questionnaire was in English language and then translated in to Arabic language with exposure to expert in Arabic language for ease of understanding by the data collector and respondents. For the purpose of this study, the researcher makes simple modifications to the instrument to measure the basic variables of the current study.

Part I: socio-demographic data

This part is consist of three sections, which were presented as follows:

Section (A): Mothers' demographic data

This section include mothers' age, level of education (categorized into 9 categories; not read and write, read only, read and write, primary, intermediate, secondary, institute, college, postgraduate), occupation (categorized into 2 categories; employed and unemployed, marital status (categorized into 4 categories; married, divorced, widowed and separated), economic status, residency, type of family and number of children.

Section (B): Childs' demographic data

It includes child's age divided into (early childhood from 1 month-6years, middle childhood from 6years-12years and late childhood from 12 years- 18years), gender, and child order in the family and other children with leukemia in the family.

Section (C) Medical history of child with leukemia

It includes the medical diagnosis of children, duration of disease since diagnosis, limitations due to disease process for child, current disease status and current disease treatment.

Part II: mother's burden in caring of child with leukemia

The ZBI questionnaire was used for measuring mother burden in caring of child with leukemia. This part consisted of (22) items (Bédard et al., 2001).

The responses for these items are rated and scored on 3-level type Likert scale as; always=3, sometime=2 and never=1, so that the total scores

ranged (22-66) the maximum score explain sever burden while the minimum scores explain little or no burden. The total burden scores of mothers were calculated by adding up the scores for each question in the test, then mothers categorized to their total scores:

Low burden = total scores 22-36.66

Moderate burden = total scores 36.67-51.33

Sever burden= total scores 51.34-66

Part III: mother's Coping Strategies of children with leukemia

This part is measured by ways of coping scale; Folkman and Lazarus developed the scale and it assesses the ways to cope with stressful life situations. The revised scale consist of (66) items questionnaire containing a wide range of thoughts and acts that people use to deal with the internal and/or external demands of specific stressful encounters (Folkman and Lazarus, 1985).

The responses for these items are rated and scored on 3-level type Likert scale as; always=3, sometime=2 and never=1 with higher scores indicating more frequent use of that particular strategy. So that the total scores ranged (66-198), the maximum score explain good coping while the minimum scores explain poor coping. The total coping scores of mothers were calculated by adding up the scores for each question in the test, then mothers categorized to their total scores:

Poor coping = total scores 66-110

Moderate coping= total scores 111-155

Good coping= total scores 156-200.

The items are grouped into eight coping subscales:

1. Confront coping consist of (6) items.
2. Distancing consist of (9) items.
3. Self-controlling consist of (8) items.
4. Seeking social support consist of (7) items.
5. Accepting responsibility consist of (7) items.
6. Escape- Avoidance consist of (11) items.
7. problem-solving coping consist of (9) items.
8. Focusing on the positive consist of (9) items.

3.10 Method of data collection

Data were obtained through face-to-face interview techniques as means of data collection. The period from 9 July 2021 to 20 October 2021, interviews were achieved with mothers who were attended the setting of the study to complete the questionnaire, permission was arranged from the training and development center in the health directorate and an agreement of participation was obtained from the mothers to the interview. The researcher collected these data in oncology & hematology clinic and leukemia ward at morning and evening, through average time required for each respondent has taken nearly 35 - 45 minutes to complete the questionnaire for assessing care burden and coping strategies practiced by mothers for their children with leukemia through the interview.

The data were collected by the following techniques:

1. Primary assessment to find-out a total number of children with leukemia who are visits the Specialist hospital for children in previous year (2020) was 1375 and previous month (May 2021) was 118 child in oncology & hematology clinic and leukemia ward (B).
2. All mothers were interviewed and informed about the study purposes and objectives.
3. After completing the required approvals, data was collection by a questionnaire (Arabic version). The researcher introduced himself to the participants and explained the purpose of the study in order to get verbal agreement, with time consuming approximately in each interview took (35 to 45) minutes.
4. The researcher collect the data from oncology & hematology clinic during the morning shift from the time (9 am) to (12:00pm) two day weekly (Monday and Wednesday) and other week days from leukemia ward (B) in the evening shift from the time (1:30 pm) to (4:00 pm). After the data collection is completed, it is unloaded into the statistical package for the social science program version 24.

3.11 Methods of data analysis

The data of the present study are analyzed through the usage of Statistical Package of Social Sciences (SPSS) version 24-application statistical analysis system. The following statistical data analysis approaches were used in order to analyze and evaluate the results of the study:

3.11.a: Descriptive data analysis:

This approach was made through the determination of:

A. Statistical tables "Frequencies and percent" which are:

$$\% = \frac{Frequency}{Sample\ Size}\ x100$$

B Mean and standard deviation

Mean $\bar{x} = \frac{\sum Xi\ F}{\sum Fi}$

$\bar{x}$= the Mean

Σ= the summation

Xi = each individual raw score

Fi = the number of Frequency

C. Standard Deviation (SD) was calculated through the use of the following formula (Polit &Beck, 2018).

$$SD = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(Xi - \bar{\chi})^2}$$

D. Mean of score (M.S) the average score can be calculated by using the following:

$$M.S = \frac{\sum \mathrm{ri} = 1\mathrm{Fi}\ \mathrm{x}\ \mathrm{Si}}{\sum \mathrm{ri} = 1\mathrm{Fi}}\ x100$$

To calculate cut- off point, it was done by the following formula (Polit &Beck, 2018).

For care burden Questionnaire

∑xi = sum of the "***1x never+ 2x sometime+ 3 x always***" for items.

(1) M.s.=1-1.66 is considered ***Never***.

(2) M.s. = 1.67-2.33 is considered ***Sometime.***

(3) M.s. ≥2.34 is considered ***Always.***

The overall responses according to total mean of score which follow:

Low burden= 22-36.66

Moderate burden= 36.67-51.33

Sever burden= 51.34-66

For coping strategies Questionnaire

∑xi = sum of the "***1x Never + 2x Sometime+ 3 x Always***" for items.

(1) M.s.=1-1.66 is considered ***Never responses***.

(2) M.s. = 1.67-2.33 is considered ***Sometime responses.***

(3) M.s. ≥2.34 is considered ***Always responses.***

The overall responses according to total mean of score, which follow:

Poor coping= 66-110

Moderate coping= 111-155

Good coping= 156-200

E. Graphical presentation by using:

-Pie Chart.

- Bar Chart.

3.11.b. Inferential data analysis:

These were used to accept or reject the statistical hypotheses, which include the following:

1. Reliability Coefficient for the instrument through using Cronbach's

   Alpha test.

   - **Cronbach's alpha**: is a measure of internal consistency reliability concern the extent to which the various components of a multicomponent measure (Polit & Beck, 2018).

   - Formula for the Cronbach's alpha:

$$\alpha = \frac{K}{K-1}\left[1 - \frac{\sum_{i=1}^{K}\sigma_{ii}}{\sum_{i=1}^{K}\sum_{j=1}^{K}\sigma_{ij}}\right]$$

   K is the investigate covariance between the items j and I and is the items number questions. It is important to note that the variance of item I is not the same as the standard deviation".

2. **Chi-Squared Test(x^2)**: is used to test hypotheses about differences in proportion, as in crosstab (Polit & Beck, 2018).

$$\chi^2 = \frac{\sum_{all\,i}(O_i - E_i)^2}{E_i}$$

- chi-squared= " X2 "
- sum =∑

Where O_i is the observed frequency of group i

E_i is the expected frequency.

They χ^2***obs.*** $<$ χ^2 ***crit.*** *= insignificantly*

They χ^2***obs.*** $>$ χ^2 ***crit.*** *= significantly*

As compared with df

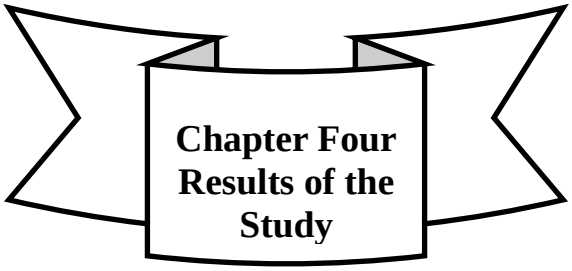
.

-For the abbreviations of the comparison significant (C.S.), the statistical analysis considered level of significant when: -

- NS: Non-significant at P probability-value > 0.05.

- S: Significant at P probability-value < 0.05.

- HS: Highly significant at P probability-value < 0.01.



This chapter presents the results of the data analysis systematically in tables and these corresponded with the objectives of the study as follows:

Table 4. 1 Distribution of mother's demographic data (N =105)

Demographical data	**Ranking And Intervals**	**Frequency**	**Percentage %**
Age of mother/ year	19-26	24	22.9
	27-33	31	29.5
	34-40	**36**	**34.3**
	41-47	14	13.3
	Total	**105**	**100.0**
	Mean ± (SD)	**33.74 ± (7.85)**	
Level of education	Unable to read and write	22	21.0
	Only read	6	5.7
	Read and write	15	14.3
	Primary	**33**	**31.4**
	Intermediate	14	13.3
	Secondary	3	2.9
	Institute	5	4.8
	College	7	6.7
	Total	**105**	**100.0**
Occupation	Unemployed	**103**	**98.1**
	Employed	2	1.9
	Total	**105**	**100.0**
Marital status	Married	**97**	**92.4**

Table (4.1) cont.

	Divorced	5	4.8
	Widowed	2	1.9
	Separated	1	1.0
	Total	**105**	**100.0**
Economic status	Unsatisfied	**54**	**51.4**
	Satisfied to some extent	37	35.2
	Satisfied	14	13.3
	Total	**105**	**100.0**
Residence	Rural	33	31.4
	Urban	**72**	**68.6**
	Total	**105**	**100.0**
Type of family	Nuclear	**67**	**63.8**
	Extended	38	36.2
	Total	**105**	**100.0**
Number of children	1-4	**56**	**53.3**
	5-8	39	37.1
	9-12	10	9.5
	Total	**105**	**100.0**

Table (4-1) Shows that about one-third 36(34.3%) of mother were between (34-40) year and less than one-third 33(31.4%) were primary school. Regarding to occupation, almost of mother 103 (98.1%) were unemployed and vast majority of mother 97 (92.4%) were married. In relation to economic statues, more than half of mother 54 (51.4%) were unsatisfied with their income and more than two-thirds 72 (68.6%) were residence in urban area. Concerning to type of family, less than two-thirds 67 (63.8%) were nuclear and finally more than half 56 (53.3) of mother having.

Table 4. 2 Distribution of Child's Demographical data (N=105):

Demographical data	Ranking And Intervals	Frequency	Percentage%
Child age	Early childhood	**70**	**66.7**
	Middle childhood	25	23.8
	Late childhood	10	9.5
	Total	105	100.0
Child gender	Male	**65**	**61.9**
	Female	40	38.1
	Total	105	100.0
Child order in the family	1st	22	21.0
	2nd	20	19.0
	3rd	26	24.8
	4th and above	**37**	**35.2**
	Total	105	100.0
Other children with Leukemia in the family	Yes	3	2.9
	No	**102**	**97.1**
	Total	105	100.0

Table (4-2) shows the observed frequencies, percent of children demographical characteristics variables that the child age were represented in early childhood as 70(66.7%) and the lowest as in late childhood 10(9.5%), while more than half of them 65 (61.9%) were male, while 40 (38.1%) were female. In relation to their orders among siblings revealed that 37 (35.2%) were 4th and above as highest but the lowest who are 2nd order among them 20 (19.0%), with the majority of family 102 (97.1) did not have another children with Leukemia in the family, and 3 (2.9%) having another children with Leukemia in the family.

Table 4.2. 1 Distribution of medical history of child with leukemia.

Medical history of child with leukemia		Frequency	%
The medical diagnosis of child	Acute Lymphocytic (ALL)	**78**	**74.3**
	Acute Myelogenous (AML)	27	25.7
	Total	105	100.0
Duration of disease	Less than six months	50	47.6
	More than six months	**55**	**52.4**
	Total	105	100.0
Limitations due to disease process for child	Mobility	**30**	**28.6**
	Interacting with friends	13	12.4
	Performance in self-care routines	26	24.8
	Other	36	34.3
	Total	105	100.0
Current disease status	New diagnosis (within last 30 days)	10	9.5
	Remission	**69**	**65.7**
	Initial Relapse	7	6.7
	Subsequent Relapse	2	1.9
	Progressive disease	12	11.4
	Other	5	4.8
	Total	105	100.0
Current disease treatment	None	12	11.4
	Chemotherapy	**92**	**87.6**
	Other	1	1.0
	Total	105	100.0

Table (4.2.1) Shows that about three quarters 78 (74.3%) were diagnosed as Acute Lymphocytic (ALL) and more than half of child 55(52.4%) having a duration of disease for more than six months. Concerning to limitations due to disease process, more than one quarter having limitations with mobility and less than two third 69 (65.7%) were remission. In relation to current disease treatment, the majority of child 92(87.6%) were taking chemotherapy.

Table 4. 3 Distribution of mother's burden in caring of child with leukemia (N=105).

List	Items	*Response*	Freq	M. S	SD	Ass.
1	The child is asking for more help than he needs.	*Never*	21	2.45	±.808	Sever
		Sometime	16			
		Always	68			
		Total	105			
2	Spending time with my child prevents me from paying attention to myself and my family	*Never*	14	2.65	±.707	Sever
		Sometime	9			
		Always	82			
		Total	105			
3	I feel nervous about not being balanced in my responsibilities between the diseased child, family and work	*Never*	8	2.72	±.596	Sever
		Sometime	13			
		Always	84			
		Total	105			
4	Sense embarrassed over the child's behavior	*Never*	38	2.13	±.921	Moderate
		Sometime	15			
		Always	52			
		Total	105			
5	I feel hopeless as I take care of my effected child.	*Never*	57	1.82	±.938	Moderate
		Sometime	10			
		Always	38			
		Total	105			
6	Taking care of my child, will affects our relationships with family members or friends in a negative way	*Never*	32	2.33	±.916	Moderate
		Sometime	6			
		Always	67			
		Total	105			
7	I feel afraid of what the future holds for my child	*Never*	2	**2.90**	±.365	Sever
		Sometime	7			
		Always	96			
		Total	105			

Table (4.3) cont.

8	My child is dependent on me.	*Never*	2	2.52	±.539	Sever
		Sometime	46			
		Always	57			
		Total	105			
9	I feel strained when I'm around my child	*Never*	25	2.35	±.843	Sever
		Sometime	18			
		Always	62			
		Total	105			
10	My health has suffered because of involvement with my affected child	*Never*	6	2.77	±.542	Sever
		Sometime	12			
		Always	87			
		Total	105			
11	I don't have as much privacy as I want because of my child	*Never*	11	2.64	±.667	Sever
		Sometime	16			
		Always	78			
		Total	105			
12	My social life has suffered because I care for my child	*Never*	11	2.62	±.671	Sever
		Sometime	18			
		Always	76			
		Total	105			
13	I feel uncomfortable about having friends over because of my child's care	*Never*	26	2.36	±.856	Sever
		Sometime	15			
		Always	64			
		Total	105			
14	My child seems to expect me to take care of him/her as if I were the only one he/she could depend on	*Never*	3	2.62	±.544	Sever
		Sometime	34			
		Always	68			
		Total	105			
15	I do not have enough money to take care of my child in addition to other expenses	*Never*	8	2.76	±.581	Sever
		Sometime	9			
		Always	88			
		Total	105			
16	I will be unable to take care of my child for much longer	*Never*	51	1.87	±.910	Moderate
		Sometime	17			
		Always	37			
		Total	105			

Table (4.3) cont.

17	lost control of my life, since the disease of child	*Never*	14	2.61	±.714	Sever
		Sometime	13			
		Always	78			
		Total	105			
18	Allow someone else to take care of my child	*Never*	44	1.83	±.802	Moderate
		Sometime	35			
		Always	26			
		Total	105			
19	Sense unsure about what to do for my child	*Never*	22	2.43	±.819	Sever
		Sometime	16			
		Always	67			
		Total	105			
20	I feel should be doing more for my child	*Never*	80	1.38	±.726	Sever
		Sometime	10			
		Always	15			
		Total	105			
21	I can take better care of my affected child	*Never*	81	1.37	±.724	Sever
		Sometime	9			
		Always	15			
		Total	105			
22	In general, I feel overwhelmed for taking care of the child	*Never*	14	2.60	±.715	Sever
		Sometime	14			
		Always	77			
		Total	105			

"(M.s.) Mean of score, (S.d) Standard deviation, Level of Assessment (Poor (M.s.= 1-1.66), Moderate (M.s.=1.67-2.33), Good (M.s. ≥2.34))"

Table 4.3: this table demonstrated that the mothers burden related to caring of child with leukemia was sever at all items of the scale (M.s = 2.34-3) except that for items 4, 5, 6, 7, 9, 16, and 18), the responses were moderate burden (M.s = (2.34-3).

Table 4. 4 Overall assessment level of mother's burden in caring of child with leukemia (N=105).

Intervals	Frequency	Percentage %	Overall M.s.	Assessment
Low burden	2	1.9	2.56	Sever burden
Moderate burden	42	40.0		
Sever burden	61	58.1		
Total	105	100.0		

M: Mean for total score, Cut of points value: low burden = (22-36.66), Moderate burden = (36.67-51.33), sever burden = (51.34-66).

Table 4.4 The analysis of mothers burden related to caring of child with leukemia was demonstrated at a mean (2.56) and according to the study criteria, the mothers expressed sever care burden (n = 61; %=58.1) as shown in (Fig. 4-4).

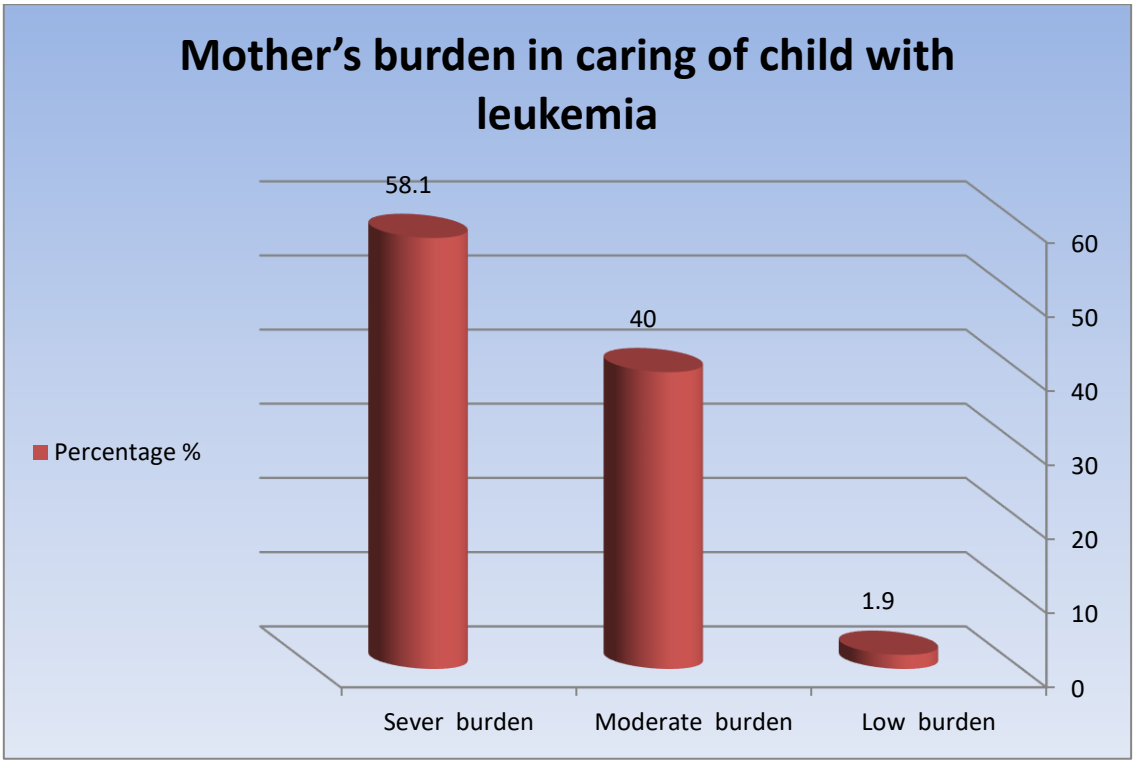


Figure 4. 1 Overall assessment level of mother's burden in caring of child with leukemia.

Table 4. 5 mother's Coping Strategies of children with leukemia:

Table 4.5. 1 Distribution of mother's response regarding confront coping

List	Items	*Response*	Freq	M.S	SD	Ass.
1	Stood my ground and fought for what I wanted.	*Never*	0	**2.97**	**.167**	**Good**
		Sometime	3			
		Always	102			
		Total	105			
2	Tried to get the person responsible to change his or her mind.	*Never*	58	1.75	.896	Moderate
		Sometime	15			
		Always	32			
		Total	105			
3	I expressed anger to the person(s) who caused the problem.	*Never*	86	1.30	.664	Poor
		Sometime	7			
		Always	12			
		Total	105			
4	I let my feelings out somehow.	*Never*	3	2.93	.347	Good
		Sometime	1			
		Always	101			
		Total	105			
5	Took a big chance or did something very risky.	*Never*	93	1.15	.455	Poor
		Sometime	8			
		Always	4			
		Total	105			
6	I did something which I didn't think would work, but at least I was doing something.	*Never*	62	1.71	.906	Moderate
		Sometime	11			
		Always	32			
		Total	105			

"(M.s.) Mean of score, Level of Assessment (Poor (M.s.= 1-1.66), Moderate (M.s.=1.67-2.33), Good (M.s. ≥2.34)"

Table 4.5.1: In the light of statistical cut off point, this table demonstrated that the mothers coping strategies related to confront coping were expressed good level at items number (1 and 4) of the scale (M.s. = M.s. ≥2.34), and items number (2 and 6) indicate that their responses were moderate coping strategies (M.s.=1.67-2.33), while items number (3 and 5) designate that their responses were poor coping strategies (M.s.= 1-1.66).

Table 4.5. 2 Overall assessment of mother's response regarding confront coping

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	2	1.9	1.96	Moderate
Moderate	**82**	**78.1**		
Good	21	20.0		
Total	105	100.0		

Cut of points value(0.66): low burden = (1-1.66), Moderate burden = (1.67-2.33), sever burden = (2.34-3).

Table 4.5.2: The analysis of overall assessment of mother's response related to confront coping was demonstrated at (mean=1.96) and according to the study criteria, the mothers expressed moderate coping (n=82; %=78.1).

Table 4.5. 3 Distribution of mother's response regarding Distancing

List	Items	*Response*	Freq	M.S	SD	Ass.
1	Tried to forget the whole thing.	*Never*	94	1.18	.551	Poor
		Sometime	3			
		Always	8			
		Total	105			
2	Went on as if nothing had happened.	*Never*	99	1.10	.437	Poor
		Sometime	1			
		Always	5			
		Total	105			

Table (4.5.3) cont.

3	I waited to see what would happen before doing anything.	*Never*	97	1.12	.454	Poor
		Sometime	3			
		Always	5			
		Total	105			
4	Went along with fate; sometimes I just have bad luck.	*Never*	92	1.22	.604	Poor
		Sometime	3			
		Always	10			
		Total	105			
5	I felt that time would make a difference – the only thing to do was to wait.	*Never*	95	1.16	.521	Poor
		Sometime	3			
		Always	7			
		Total	105			
6	Accepted it, since nothing could be done.	*Never*	24	**2.52**	**.845**	**Good**
		Sometime	2			
		Always	79			
		Total	105			
7	Made light of the situation; refused to get too serious about it.	*Never*	34	2.15	.886	Moderate
		Sometime	21			
		Always	50			
		Total	105			
8	Did not let it get to me; refused to think too much about it.	*Never*	38	2.04	.876	Moderate
		Sometime	25			
		Always	42			
		Total	105			
9	Turned to work or substitute activity to take my mind off things.	*Never*	40	2.01	.882	Moderate
		Sometime	24			
		Always	41			
		Total	105			

"(M.s.) Mean of score, Level of Assessment (Poor (M.s.= 1-1.66), Moderate (M.s.=1.67-2.33), Good (M.s. ≥2.34)"

Table 4.5.3: In the light of statistical mean of score, this table indicate that the mothers coping related to distancing were expressed poor coping at items of the scale (1, 2, 3, 4, and 5) (M.s. =1-1.66), while items number (7, 8, and 9) the responses were moderate coping (M.s=1.67-2.33) except item number (6) the response was good coping (M.s. ≥2.34).

Table 4.5.3. 1 Overall assessment of mother's response regarding Distancing

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	**57**	**54.3**	1.61	Poor
Moderate	43	41.0		
Good	5	4.8		
Total	105	100.0		

Table 4.5.3.1 The analysis of coping related to distancing was demonstrated at a mean (1.61) and according to the study criteria, more than half 57(54.3%) of mother's response regarding distancing were poor (n = 57; %= 54.3).

Table 4.5. 4 Distribution of mother's response regarding Self-controlling.

List	Items	***Response***	**Freq**	**M.S**	**SD**	**Ass.**
1	I tried to keep my feelings to myself.	*Never*	30	2.12	.829	Moderate
		Sometime	32			
		Always	43			
		Total	105			
2	Avoided being with people in general.	*Never*	29	2.24	.861	Moderate
		Sometime	22			
		Always	54			
		Total	105			
3	Kept others from knowing how bad things were.	*Never*	35	1.96	.796	Moderate
		Sometime	39			
		Always	31			
		Total	105			
4	Tried not to burn my bridges, but leave things open somewhat.	*Never*	25	2.30	.833	Moderate
		Sometime	23			
		Always	57			
		Total	105			
5	I tried not to act too hastily or follow my first hunch.	*Never*	39	2.12	.927	Moderate
		Sometime	14			
		Always	52			
		Total	105			

Table (4.5.4) cont.

6	I tried to keep my feelings from interfering with other things too much.	*Never*	39	2.09	.911	Moderate
		Sometime	18			
		Always	48			
		Total	105			
7	I thought about how a person I admire would handle this situation and used that as a model.	*Never*	8	2.70	.603	Good
		Sometime	15			
		Always	82			
		Total	105			
8	Maintained my pride and kept a stiff upper lip.	*Never*	42	1.81	.761	Moderate
		Sometime	41			
		Always	22			
		Total	105			

"(M.s.) Mean of score, (S.d) Standard deviation, Level of Assessment (Poor (M.s.= 1-1.66), Moderate (M.s.=1.67-2.33), Good (M.s. ≥2.34)"

Table 4.5.4: In the light of statistical cut off point, this table demonstrated that the mothers coping related to self-controlling were expressed moderate coping at all items of the scale (M.s. =1.67-2.33) except, item number (7) the responses was good coping regarding Self-controlling. (M.s.= ≥ 2.34).

Table 4.5.4. 1 Overall assessment of mother's response regarding self-controlling

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	10	9.5	2.16	Moderate
Moderate	**55**	**52.4**		
Good	40	38.1		
Total	105	100.0		

Table 4.5.4.1 The analysis of coping related to Self-controlling was demonstrated at mean (2.16) and according to the study criteria, the mothers expressed moderate coping (n=55; %=52.4).

Table 4.5. 5 Distribution of mother's response regarding seeking social support.

List	Items	*Response*	Freq	M.S	SD	Ass.
1	Talked to someone about how I was feeling.	*Never*	17	2.43	.758	Good
		Sometime	26			
		Always	62			
		Total	105			
2	Accept sympathy and understanding from someone.	*Never*	11	2.61	.672	Good
		Sometime	19			
		Always	75			
		Total	105			
3	Talked to someone who could do something concrete about the problem.	*Never*	20	2.37	.788	Good
		Sometime	26			
		Always	59			
		Total	105			
4	Talked to someone to find out more about the situation.	*Never*	7	2.62	.611	Good
		Sometime	26			
		Always	72			
		Total	105			
5	I asked a relative or friend I respected for advice.	*Never*	10	2.53	.666	Good
		Sometime	29			
		Always	66			
		Total	105			
6	I got professional help.	*Never*	42	1.69	.625	Moderate
		Sometime	54			
		Always	9			
		Total	105			
7	I prayed.	*Never*	5	2.72	.546	Good
		Sometime	19			
		Always	81			
		Total	105			

"(M.s.) Mean of score, (S.d) Standard deviation, Level of Assessment (Poor (M.s.= 1-1.66), Moderate (M.s.=1.67-2.33), Good (M.s. ≥2.34)"

Table 4.5.5: According to the statistically cut off point, this table illustrated that the mothers coping related to seeking social support was expressed good coping at all items of the scale (M.s. = (M.s. ≥2.34) except for the items numbers 6, where the responses was moderate (M.s. = 1.67-2.33).

Table 4.5.5. 1 Overall assessment of mother's response regarding seeking social support

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	4	3.8	2.42	Good
Moderate	32	30.5		
Good	**69**	**65.7**		
Total	105	100		

Table 4.5.5.1: The analysis of coping related to Seeking social support was demonstrated at (mean=2.42) and according to the study criteria, the mothers expressed good coping (n=69; %=65.7).

Table 4.5. 6 Distribution of mother's response regarding Accepting responsibility.

List	Items	*Response*	Freq	M.S	SD	Ass.
1	Criticized or lectured myself.	*Never*	4	2.75	.515	Good
		Sometime	18			
		Always	83			
		Total	105			
2	Realized I brought the problem on myself.	*Never*	75	1.45	.759	Poor
		Sometime	13			
		Always	17			
		Total	105			

Table (4.5.6) cont.

3	I made a promise to myself that things would be different next time.	*Never*	32	2.28	.904	Moderate
		Sometime	12			
		Always	61			
		Total	105			
4	I apologized or did something to make up.	*Never*	6	2.72	.563	Good
		Sometime	17			
		Always	82			
		Total	105			
5	I accepted the next best thing to what I wanted.	*Never*	6	**2.76**	**.546**	**Good**
		Sometime	13			
		Always	86			
		Total	105			
6	I prepared myself for the worst.	*Never*	32	2.16	.867	Moderate
		Sometime	24			
		Always	49			
		Total	105			
7	I reminded myself how much worse things could be.	*Never*	21	2.43	.807	Good
		Sometime	18			
		Always	66			
		Total	105			

"(M.s) Mean of score, (SD) Standard deviation, Level of Assessment (Poor (M. s= 1-1.66), Moderate (M. s=1.67-2.33), Good (M.s ≥2.34)"

Table 4.5.6: Based on statistical cut off point, this table depicts that the mothers coping related to accepting responsibility were expressed good at items number (1, 4, 5 and 7) of the scale (M.s.≥2.34) while, the items number (3 and 6) the responses were moderate coping (M. s=1.67-2.33) in addition, item number (2) the response was poor coping (M. s= 1-1.66).

Table 4.5.6. 1 overall assessment of mother's response regarding Accepting responsibility

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	4	3.8	2.36	Good
Moderate	40	38.1		
Good	**61**	**58.1**		
Total	105	100.0		

Table 4.5.6.1 the analysis of coping strategies related to accepting responsibility was demonstrated at (mean=2.36) and according to the study criteria, the mothers expressed good coping (n=61; %=58.1)

Table 4.5. 7 mother's response regarding Escape- Avoidance.

List	Items	*Response*	Freq	M.S	SD	Ass.
1	Wished that the situation would go away or somehow be over with.	*Never*	3	2.87	.418	Good
		Sometime	8			
		Always	94			
		Total	105			
2	Hoped a miracle would happen.	*Never*	2	2.87	.394	Good
		Sometime	10			
		Always	93			
		Total	105			
3	Had fantasies or wishes about how things might turn out.	*Never*	4	2.80	.488	Good
		Sometime	13			
		Always	88			
		Total	105			
4	Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, etc	*Never*	90	1.19	.502	Poor
		Sometime	10			
		Always	5			
		Total	105			

Table (4.5.7) cont.

5	Refused to believe that it had happened.	*Never*	38	2.07	.891	Moderate
		Sometime	22			
		Always	45			
		Total	105			
6	Got away from it for a while; tried to rest or take a vacation.	*Never*	62	1.50	.652	Poor
		Sometime	34			
		Always	9			
		Total	105			
7	I jogged or exercised.	*Never*	102	1.03	.167	Poor
		Sometime	3			
		Total	105			
8	Slept more than usual.	*Never*	65	1.45	.620	Poor
		Sometime	33			
		Always	7			
		Total	105			
9	Took it out on other people.	*Never*	70	1.41	.631	Poor
		Sometime	27			
		Always	8			
		Total	105			
10	Wished that I could change what had happened or how I felt.	*Never*	21	2.45	.808	Good
		Sometime	16			
		Always	68			
		Total	105			
11	I daydreamed or imagined a better time or place than the one I was in.	*Never*	36	2.08	.874	Moderate
		Sometime	25			
		Always	44			
		Total	105			

"(M.s) Mean of score, (SD) Standard deviation, Level of Assessment (Poor (M. s= 1-1.66), Moderate (M. s=1.67-2.33), Good (M.s ≥2.34)"

Table 4.5.7: In the light of statistical cut off point, this table illustrated that the mothers coping related to escape- avoidance were expressed poor coping at all items number (4, 6, 7, 8, and 9) (M.s =1-1.66) while, items number (11 and 19) the

responses were moderate coping (M. s=1.67-2.33). In addition, the items number (1, 2, 3, 6 and 10) the responses were good coping (M.s.≥2.34).

Table 4.5.7. 1 Overall assessment of mother's response regarding Escape Avoidance.

Intervals	Frequency	%	Overall M.s	Assessment
Poor	14	13.3	1.97	Moderate
Moderate	**84**	**80.0**		
Good	7	6.7		
Total	105	100.0		

Table 4.5.7.1 the analysis of coping related to escape avoidance was demonstrated at (mean=1.97) and according to the study criteria, the mothers expressed moderate coping (n=84; %=80.0 %).

Table 4.5. 8 Distribution of mother's response regarding problem-solving coping.

List	Items	*Response*	Freq	M.S	SD	Ass.
1	Just concentrated on what I had to do next – the next step.	*Never*	2	2.78	.460	Good
		Sometime	19			
		Always	84			
		Total	105			
2	I went over in my mind what I would say or do.	*Never*	7	2.65	.604	Good
		Sometime	23			
		Always	75			
		Total	105			
3	I knew what had to be done, so I doubled my efforts to make things work.	*Never*	2	2.88	.385	Good
		Sometime	9			
		Always	94			
		Total	105			

Table (4.5.8) cont.

4	Came up with a couple of different solutions to the problem.	*Never*	26	2.26	.832	Moderate
		Sometime	26			
		Always	53			
		Total	105			
5	I made a plan of action and followed it.	*Never*	46	1.95	.913	Moderate
		Sometime	18			
		Always	41			
		Total	105			
6	I tried to see things from the other person's point of view.	*Never*	20	2.25	.757	Moderate
		Sometime	39			
		Always	46			
		Total	105			
7	Changed something so things would turn out all right.	*Never*	5	2.67	.566	Good
		Sometime	25			
		Always	75			
		Total	105			
8	I tried to analyze the problem in order to understand it better.	*Never*	35	2.13	.889	Moderate
		Sometime	21			
		Always	49			
		Total	105			
9	Drew on my past experiences; I was in a similar situation before.	*Never*	51	1.78	.843	Moderate
		Sometime	26			
		Always	28			
		Total	105			

"(M.s) Mean of score, (SD) Standard deviation, Level of Assessment (Poor (M. s= 1-1.66), Moderate (M. s=1.67-2.33), Good (M.s ≥2.34)"

Table 4.5.8: In the light of statistical mean of score, this table indicate that the mothers coping related to problem solving coping were expressed good coping at all items of the scale (M.s ≥2.34) except, items number (4, 5, 6, 8, and 9) the responses were moderate coping (M.s=1.67-2.33).

Table 4.5.8. 1 Overall assessment of mother's response regarding problem solving coping

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	3	2.9	2.37	Good
Moderate	33	31.4		
Good	**69**	**65.7**		
Total	105	100.0		

Table 4.5.8.1 the analysis of coping related to problem solving coping was demonstrated at (mean=2.37) and according to the study criteria, the mothers expressed good coping (n=69; %=65.7).

Table 4.5. 9 Mother's response regarding their focusing on the positive.

List	Items	*Response*	Freq	M.S	SD	Ass.
1	I came out of the experience better than when I went in.	Never	6	2.77	.542	Good
		Sometime	12			
		Always	87			
		Total	105			
2	Found new faith.	Never	79	1.42	.769	Poor
		Sometime	8			
		Always	18			
		Total	105			
3	I changed something about myself.	Never	85	1.20	.425	Poor
		Sometime	19			
		Always	1			
		Total	105			
4	I was inspired to do something creative.	Never	83	1.23	.465	Poor
		Sometime	20			
		Always	2			
		Total	105			
5	Changed or grew as a person in a good way.	Never	79	1.30	.574	Poor
		Sometime	20			
		Always	6			
		Total	105			

Table (4.5.9) cont.

6	Rediscovered what is important in life.	Never	81	1.24	.450	Poor
		Sometime	23			
		Always	1			
		Total	105			
7	Looked for the silver lining, so to speak; tried to look on the bright side of things.	Never	46	1.74	.747	Moderate
		Sometime	40			
		Always	19			
		Total	105			
8	Bargained or compromised to get something positive from the situation.	Never	59	1.52	.652	Poor
		Sometime	37			
		Always	9			
		Total	105			
9	I told myself things that helped me to feel better.	Never	23	2.13	.748	Moderate
		Sometime	45			
		Always	37			
		Total	105			

"(M.s) Mean of score, (SD) Standard deviation, Level of Assessment (Poor (M. s= 1-1.66), Moderate (M. s=1.67-2.33), Good (M.s ≥2.34)"

Table 4.5.9: In the light of statistical mean of score, this table indicate that the mothers coping related to their focusing on the positive were expressed poor coping at all items of the scale (M.s. =1-1.66)) while, items number (7 and 9) the responses were moderate coping (M. s=1.67-2.33). In addition, the item number (1) the responses was good coping (M.s.≥2.34).

Table 4.5.9. 1 Overall assessment of mother's response regarding their focusing on the positive

Intervals	Frequency	%	Overall M.s.	Assessment
Poor	**66**	**62.9**	1.61	Poor
Moderate	29	27.6		
Good	10	9.5		
Total	105	100.0		

Table 4.5.9.1 the analysis of coping related to their focusing on the positive was demonstrated at mean=1.61and according to the study criteria, the mothers expressed poor coping (n=66; %=62.9).

Table 4. 6 Overall assessment level of mother's Coping Strategies of children with leukemia. (N=105).

Intervals	Frequency	%	Overall M.s.	Assessment
Poor coping	2	1.9	2.06	Moderate
Moderate coping	**94**	**89.5**		
Good coping	9	8.6		
Total	105	100.0		

M: Mean for total score, Cut of points value: Poor coping = (66-110), moderate coping = (111-155), Good coping = (156-200).

Table 4.6 The analysis of coping related to coping strategies by the overall was demonstrate at (mean=2.06) and according to the total mean of score, the mostly of (89.5%) mother's coping strategies of children with leukemia expressed moderate coping as shown in (Fig. 4-2).

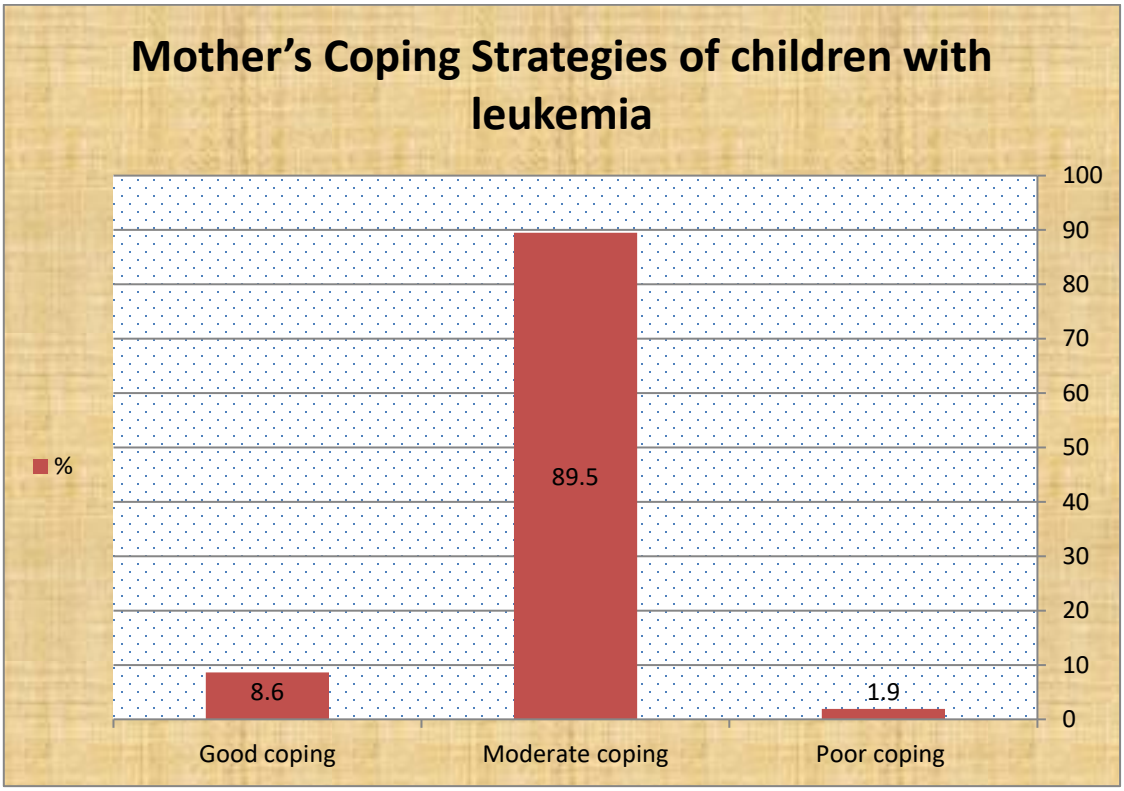


Figure 4. 2 Overall assessment level of mother's Coping Strategies of children with leukemia

Table 4. 7 Association between Overall mother's Coping Strategies of children with leukemia and their care burden.

Coping of mother	burden			Total	Correlation	
	Low burden	Moderate burden	Sever burden		r	Sig
Poor coping	0	0	2	2	-0.109	0.268
Moderate coping	2	37	55	94		
Good coping	0	5	4	9		
Total	2	42	61	105		

r: Pearson Correlation , S: Significant

Table 4.7 shows that there is a non-significant correlation (weak negative correlation) between overall mother's coping strategies of children with leukemia and care burden.

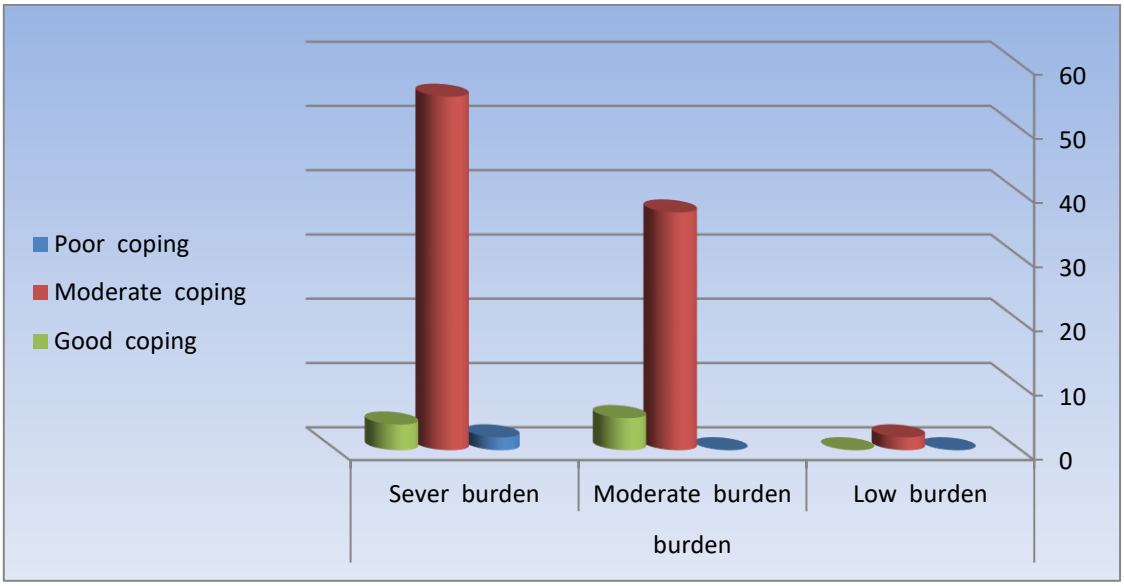


Figure 4. 3 Association between Overall mother's Coping Strategies of children with leukemia and care burden.

This figure show that the majority of sever burden having moderate coping strategies, and the minority of low burden having good coping.

Table 4. 8 Relationship between mother's care burden and their Demographic Characteristics

Table 4.8. 1 Statistical Relationship between mother's care burden and their Ages (n=105)

Age of mother	Mother's care burden			Total	Sig.	
	Low burden	Moderate burden	Sever burden			
19-26	0	11	13	24	$\chi^2 obs.$ = 4.052 d.f = 6 p-value = 0.670	N.S
27-33	0	11	20	31		
34-40	1	14	21	36		
41-47	1	6	7	14		
Total	2	42	61	105		

"$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4.8.1): This table indicate that there was no significant relationship between mother's care burden of children with leukaemia and their age groups at p-value >0.05.

Table 4.8. 2 Statistical Relationship between mother's care burden and their Education Levels (n=105)

Level of education	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Unable to read and write	0	8	14	22	$\chi^2obs.=$ **20.455** **d.f = 14** **p-value = 0. 116**	N.S
Only read	0	3	3	6		
Read and write	0	7	8	15		
Primary	0	15	18	33		
Intermediate	2	2	10	14		
Secondary	0	1	2	3		
Institute	0	1	4	5		
College	0	5	2	7		
Total	2	42	61	105		

"$\chi^2obs.=$ Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-8-2): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and their educational levels at p-value >0.05.

Table 4.8. 3 Statistical Relationship between mother's care burden and their Occupation

Occupation	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Unemployed	2	40	61	103	$\chi^2obs.=$ **3.058** **d.f = 2** **p-value = 0.217**	N.S
Employed	0	2	0	2		
Total	2	42	61	105		

"$\chi^2obs.=$ Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-8-3): This table indicate that there was no significant relationship between mother's care burden of children with leukaemia and their occupation at p-value >0.05.

Table 4.8. 4 Statistical Relationship between mother's care burden and their Economic status

Economic status	Mother's care burden			Total	Sig.	
	Low burden	Moderate burden	Sever burden			
Unsatisfied	0	17	37	54	$\chi^2 obs.$ = **8.011** ***d.f*** **= 4** ***p-value*** **= 0.091**	N.S
Satisfied to some extent	1	17	19	37		
Satisfied	1	8	5	14		
Total	2	42	61	105		

"$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-8-4): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and their economic status at p-value >0.05.

Table 4.8. 5 Statistical Relationship between mother's care burden and their Residence

Residence	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Rural	1	10	22	33	$\chi^2 obs.$ = **2.06** ***d.f*** **= 2** ***p-value*** **= 0.357**	N.S
Urban	1	32	39	72		
Total	2	42	61	105		

"$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-8-5): This table indicate that there was no significant relationship between mother's care burden of children with leukaemia and their residence at p-value >0.05.

Table 4.8. 6 Statistical Relationship between mother's care burden and their Type of families

Type of family	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Nuclear	2	25	40	67	***χ2 obs.*= 1.551**	N.S
Extended	0	17	21	38	***d.f* = 2**	
Total	2	42	61	105	***p-value*= 0.461**	

"$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-8-6): This table indicate that there was no significant relationship between mother's care burden of children with leukaemia and their type of family at p-value >0.05.

Table 4.8. 7 Statistical Relationship between mother's care burden and their Number of children

Number of children	Mother's psychological burden			Total	Sig.	
	Low burden	Moderate burden	Sever burden			
1-4	0	22	34	56	$\chi^2 obs.$ = 4.389	N.S
5-8	2	17	20	39	*d.f* = 4	
9-12	0	3	7	10	*p-value* = 0.356	
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-8-7): This table indicate that there was no significant relationship between mother's care burden of children with leukaemia and their number of children at p-value >0.05.

Table 4. 9 Relationship between mother's care burden and child Demographic Characteristics

Table 4.9. 1 Statistical Relationship between mother's care burden and child age

Child age	Mother's care burden			Total	***Sig.***
	low burden	moderate burden	sever burden		

Table (4.9. 1) cont.

Early childhood	1	26	43	70	***χ2 obs.*= 2.709 *d.f* = 4 *p-value* = 0.608**	N.S
Middle childhood	1	10	14	25		
Late childhood	0	6	4	10		
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-9.1): This table indicate that there was no significant relationship between mother's care burden of children with leukaemia and child age at p-value >0.05.

Table 4.9. 2 Statistical Relationship between mother's care burden and child gender.

Gender	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Male	1	24	40	65	$\chi^2 obs.$ = .872	N.S
Female	1	18	21	40	*d.f* = 2	
Total	2	42	61	105	*p-value*= 0.647	

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-9-2): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and gender at p-value >0.05.

Table 4.9. 3 Statistical Relationship between mother's care burden and Child order among their siblings

Child order among their siblings	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
1st	0	9	13	22	$\chi^2 obs.$ = **5.094**	N.S
2nd	0	6	14	20		
3rd	0	11	15	26	***d.f* = 6**	
4th and above	2	16	19	37	***p-value* = 0.532**	
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-9-3): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and child order among their siblings at p-value >0.05.

Table 4.9. 4 Statistical Relationship between mother's care burden and other children with Leukemia in the family

Other children with Leukemia in the family	**Mother's care burden**			Total	Sig.	
	low burden	moderate burden	sever burden			
Yes	0	2	1	3	***X2*= .934**	**N.S**
No	2	40	60	102	***d.f* = 2**	
Total	2	42	61	105	***p-value* = 0.627**	

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-9-4): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and other children with leukemia in the family at p-value >0.05.

Table 4. 10 Relationship between mother's care burden and child Demographic Characteristics

Table 4.10. 1 Statistical Relationship between mother's care burden and the medical diagnosis of child

The medical diagnosis of child	**Mother's care burden**			Total	Sig.	
	low burden	moderate burden	sever burden			
Acute Lymphocytic (ALL)	1	29	48	78	***X2*= 1.840**	N.S
Acute Myelogenous (AML)	1	13	13	27	***d.f* = 2**	
Total	2	42	61	105	***p-value* = 0.399**	

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-10-1): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and the medical diagnosis of child at p-value >0.05.

Table 4.10. 2 Statistical Relationship between mother's care burden and the duration of disease

Duration of disease	Mother's psychological burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Less than six months	1	22	27	50	***X2*= .662 *d.f* = 2 *p-value* = 0.718**	N.S
More than six months	1	20	34	55		
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-10-2): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and the duration of disease at p-value >0.05.

Table 4.10. 3 Statistical Relationship between mother's care burden and Limitations due to disease process for child

Limitations due to disease process for child	Mother's psychological burden			Total	Sig.	
	low burden	moderate burden	sever burden			
Mobility	1	10	19	30	***X2*= 2.642 *d.f* = 6 *p-value* = 0.852**	N.S
Interacting with friends	0	6	7	13		
Performance in self-care routines	1	10	15	26		
other	0	16	20	36		
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-10-3): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and limitations due to disease process for child at p-value >0.05.

Table 4.10. 4: Statistical Relationship between mother's care burden and Current disease status

Current disease status	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
New diagnosis (within last 30 days)	0	5	5	10	***X2*= 1.796** ***d.f* = 10** ***p-value* = 0.998**	N.S
Remission	2	27	40	69		
Initial Relapse	0	3	4	7		
Subsequent Relapse	0	1	1	2		
Progressive disease	0	4	8	12		
Other	0	2	3	5		
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-10-4): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and current disease status at p-value >0.05.

Table 4.10. 5: Statistical Relationship between mother's care burden and current disease treatment

Current disease treatment	Mother's care burden			Total	Sig.	
	low burden	moderate burden	sever burden			
None	0	3	9	12	**$\chi^2 obs.$ = 2.494** ***d.f* = 4** ***p-value* = 0.646**	N.S
Chemotherapy	2	39	51	92		
Other	0	0	1	1		
Total	2	42	61	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-10-5): This table indicate that there was no significant relationship between mother's care burden of children with leukemia and current disease treatment at p-value >0.05.

Table 4. 11 : Relationship between coping strategies and mother's demographic data

Table 4.11. 1 : Statistical Relationship between mother's coping strategies and Age of mother

Age of mother	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
19-26	0	20	4	24	$\chi^2 obs.$ = **7.086** **d.f = 6** **p-value = 0.313**	N.S
27-33	0	30	1	31		
34-40	2	31	3	36		
41-47	0	13	1	14		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-1): This table show that there was no significant relationship between mother's coping strategies and age of mother at p-value >0.05.

Table 4.11. 2: Statistical Relationship between mother's coping strategies and Levels of their education

Level of education	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Unable to read and write	2	19	1	22	***X2*= 19.933** ***d.f* = 14** ***p-value* = 0.132**	N.S
Only read	0	6	0	6		
Read and write	0	14	1	15		
Primary	0	30	3	33		
Intermediate	0	13	1	14		
Secondary	0	3	0	3		
Institute	0	5	0	5		

Table (4.11. 2) cont.

College	0	4	3	7		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer, Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-2): This table demonstration that there was no significant relationship between mother's coping strategies and level of education at p-value >0.05.

Table 4.11. 3 Statistical Relationship between mother's coping strategies and their occupations.

Occupation	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Unemployed	2	94	7	103	**$\chi 2$ obs.= 21.748 d.f = 2 p-value = 0.000**	H.S
Employed	0	0	2	2		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-3): This table demonstrate that there was high significant relationship between mother's coping strategies and their occupation at p-value <0.05.

Table 4.11. 4 Statistical Relationship between mother's coping strategies and their marital status.

Marital status	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Married	2	89	6	97	***X2*= 17.955 *d.f* = 6 *p-value* = 0.006**	Sig
Divorced	0	2	3	5		
Widowed	0	2	0	2		
Separated	0	1	0	1		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-4): This table demonstrate that there was significant relationship between mother's coping strategies and marital status at p-value <0.05.

Table 4.11. 5 Statistical Relationship between mother's coping strategies and economic status

Economic status	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Unsatisfied	2	45	7	54	$\chi^2 obs.$ =5.246 *d.f* = 4 *p-value* = 0.263	N.S
Satisfied to some extent	0	35	2	37		
Satisfied	0	14	0	14		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-5): This table demonstrate that there was no significant relationship between mother's coping strategies and economic status at p-value >0.05.

Table 4.11. 6 Statistical Relationship between mother's coping strategies and Residence

Residence	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Rural	2	29	2	33	*X2*= 4.732 *d.f* = 2 *p-value* = 0.094	N.S
Urban	0	65	7	72		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-6): This table demonstration that there was no significant relationship between mother's coping strategies and residence status at p-value >0.05.

Table 4.11. 7 Statistical Relationship between mother's coping strategies and Type of family

Type of family	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Nuclear	2	61	4	67	***X2*= 2.644** ***d.f* = 2** ***p-value* = 0.267**	N.S
Extended	0	33	5	38		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-7): This table demonstration that there was no significant relationship between mother's coping strategies and type of family status at p-value >0.05.

Table 4.11. 8 Statistical Relationship between mother's coping strategies and Number of children

Number of children	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
1-4	0	51	5	56	$\chi^2 obs.$ = **4.780** ***d.f* = 4** ***p-value* = 0.311**	N.S
5-8	1	35	3	39		
9-12	1	8	1	10		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-11-8): This table demonstrate that there was no significant relationship between mother's coping strategies and number of children at p-value >0.05.

Table 4. 12 Relationship between mother's coping strategies and child demographic Data

Table 4.12. 1 Statistical Relationship between mother's coping strategies and child age

Child age	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Early childhood	0	63	7	70	$\chi^2 obs.$ = 10.354 *d.f* = 4 *p-value* = 0.035	Sig
Middle childhood	2	23	0	25		
Late childhood	0	8	2	10		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-12-1): This table demonstration that there was significant relationship between mother's coping strategies and child age at p-value <0.05.

Table 4.12. 2 Statistical Relationship between mother's coping strategies and gender

Gender	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Male	2	56	7	65	$\chi^2 obs.$ = **2.409** ***d.f*** **= 2** ***p-value*** **= 0.30**	N.S
Female	0	38	2	40		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-12-2): This table demonstration that there was no significant relationship between mother's coping strategies and gender at p-value >0.05.

Table 4.12. 3 Statistical Relationship between mother's coping strategies and Child order in the family

Child order in the family	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
1st	0	20	2	22	$\chi^2 obs.$ = **1.534** ***d.f* = 6** ***p-value* = 0.957**	N.S
2nd	0	18	2	20		
3rd	1	23	2	26		
4th and above	1	33	3	37		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-12-3): This table demonstration that there was no significant relationship between mother's mother's coping strategies and child order in the family at p-value >0.05.

Table 4.12. 4 Statistical Relationship between mother's coping strategies and other children with Leukemia in the family

Other children with Leukemia in the family	Mother's coping strategies			Total	Sig.	
	poor coping	moderate coping	good coping			
Yes	0	3	0	3	$\chi^2 obs.$ = .361 *d.f* = 2 *p-value* = 0.835	N .S
No	2	91	9	102		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-12-4): This table demonstration that there was no significant relationship between mother's coping strategies and other children with Leukaemia in the family at p-value >0.05.

Table 4. 13 Relationship between mother's coping strategies and medical history of child with leukemia.

Table 4.13. 1 Statistical Relationship between mother's coping strategies and the medical diagnosis of child

The medical diagnosis of child	**Mother's coping strategies**			Total	Sig.	
	poor coping	moderate coping	good coping			
Acute Lymphocytic (ALL)	2	72	4	78	$\chi^2 obs.$ = **5.151** ***d.f*** **= 2** ***p-value*** **= 0.076**	N.S
Acute Myelogenous (AML)	0	22	5	27		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-13-1): This table demonstration that there was no significant relationship between mother's mother's coping strategies and the medical diagnosis of child at p-value >0.05.

Table 4.13. 2 Statistical Relationship between mother's coping strategies and Duration of disease

Duration of disease	**Mother's coping strategies**			Total	Sig.	
	poor coping	moderate coping	good coping			
Less than six months	1	44	5	50	$\chi^2 obs.$ = **.257** ***d.f*** **= 2** ***p-value*** **= 0.88**	N.S
More than six months	1	50	4	55		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-13-2): This table demonstration that there was no significant relationship between mother's coping strategies and duration of disease at p-value >0.05.

Table 4.13. 3 Statistical Relationship between mother's coping strategies and Limitations due to disease process for child

Limitations due to disease process for child	**Mother's coping strategies**			Total	Sig.	
	poor coping	moderate coping	good coping			
Mobility	1	27	2	30	$\chi^2 obs.$ = **4.918** ***d.f*** = **6** ***p-value*** = **0.554**	N.S
Interacting with friends	1	10	2	13		
Performance in self-care routines	0	24	2	26		
other	0	33	3	36		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-13-3): This table demonstration that there was no significant relationship between mother's coping strategies and limitations due to disease process for child at p-value >0.05.

Table 4.13. 4 Statistical Relationship between mother's coping strategies and Current disease status

Current disease status	**Mother's coping strategies**			Total	Sig.	
	poor coping	moderate coping	good coping			
New diagnosis (within last 30 days)	0	9	1	10	$\chi^2 obs.$ = **12.235** ***d.f*** = **10** ***p-value*** = **0.270**	N.S
Remission	1	63	5	69		
Initial Relapse	1	6	0	7		
Subsequent Relapse	0	1	1	2		

Table (4.13. 4) cont.

Progressive disease	0	11	1	12		
Other	0	4	1	5		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

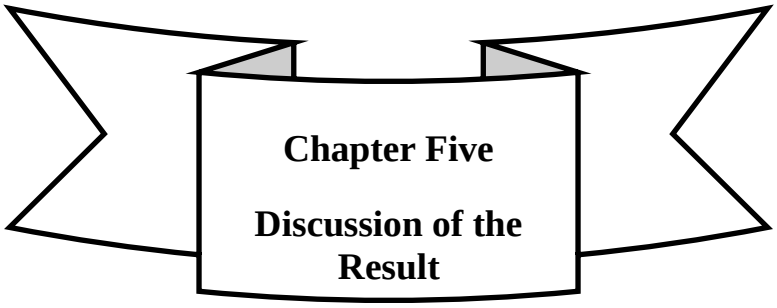
Table (4-13-4): This table demonstration that there was no significant relationship between mother's coping strategies and ccurrent disease status at p-value >0.05.

Table 4.13. 5 Statistical Relationship between mother's coping strategies and Current disease treatment

Current disease treatment	**Mother's coping strategies**			Total	Sig.	
	poor coping	moderate coping	good coping			
None	0	11	1	12	***$\chi^2 obs.$* = .391 *d.f* = 4 *p-value* = 0.983**	N.S
Chemotherapy	2	82	8	92		
Other	0	1	0	1		
Total	2	94	9	105		

$\chi^2 obs.$ = Chi-square observer,Df= Degree of freedom, P-value= Probability value, S= significant, NS= non-significant, S= significant, HS= high significant

Table (4-13-5): This table demonstration that there was no significant relationship between mother's coping strategies and current disease treatment at p-value >0.05.



Throughout this chapter, interpretations and discussion of the findings are presented with supportive evidence, which are available in the different articles.

5.1. Demographic Characteristics of the mothers

Table (4-1) the findings of the study underhand showed that the mean age and standard deviation (SD) for mothers in the study was (33.74 ± (7.85)); one third of the mother were one third reported at age group (34-40) years. This mean that the current study had sample from early middle adulthood who have children with leukemia. The findings of this study disagree with the study done by Sharma et al., (2018) was the mean age of the studied sample was the average age of the parents was 38.76 (SD-3.58) years. also this result is slightly different than Kohlsdorf and Costa Junior, (2011) who mentioned in their study about coping strategies and caregiver´s anxiety in pediatric oncohematology that, the mean age of the studied sample was ((Avg=34.25; SD=9.82) but their age group from (20-60) years. This explains that the large proportion of the sample are between the ages of (34 – 40) years. This variation may be due to different criteria of the studied sample according to their availabilities.

Concerning to educational level, the less than one-third percent of mothers were primary school level. The findings of this study agree with the study done by Hashemi, et al., (2007) about coping strategies used by parents of children with cancer in Shiraz, Southern Iran on (72) parents included in the study, mention that the participants in this study was primary to high school education (69.4%). This

agreement also related to Iraqi society women tradition formed that studied samples were from primary education, this result can be true in Iraqi culture; where most females may only have the opportunity to reach primary education with satisfaction with level.

The most percentage of the study mothers were unemployed, while the lowest percentage were employed. The findings of this study agree with the study done by Hamad and Shaker, (2019) about coping strategies among caregivers of children with acute leukemia at Nanakali hospital in Erbil city shows that the highest proportion of the respondents were unemployed (77.8%). Also, another study with a convenience sample of 80 caregivers conducted by El Malky et al., 2016 at the outpatient clinic at the health insurance institute in Shebin El-Kom district, Menoufia Governorate in Egypt. The finding of this study represent that the majority of participants (75%) was not working.

In respect to the field of study, almost of mother were married. The study done by compas et al., (2015) about Mothers and fathers coping with their children's cancer: Individual and interpersonal processes at two hospitals in the Midwestern and Southern United States aimed to examine individual and interpersonal processes of coping and emotional distress in a sample of mothers and fathers of children with recently diagnosed cancer. The finding of this study revealed that the majority of participants were married.

Regarding to economic status, more than half of mother were unsatisfied with their income. The findings of this study approved with the study done by Mahmoud, Elaziz, (2015) in Egypt, that included a purposive sample of 60 parents, and their children attended day care and outpatient clinic in pediatric hospital of Ain Shams University , which discovered that the majority of them (93.3%) with insufficient monthly income for their needs. Another a study in Italy conducted by

Terracini, (2011) about epidemiology of childhood cancer. The finding of this study reveals that worldwide, every year, the number of children being diagnosed a cancer before reaching age 15 exceeds 200,000. Four fifths of them live in low income countries.

Concerning to residence more than two-thirds were residence in urban area. According to the researcher point of view, can be explained in a way that people prefer to be within the areas where services are widely distributed primarily in urban area and are easily accessible. This result agree with study performed for all 83 children under 14 years old done by Fathi et al., (2015) about epidemiology of childhood cancer in Northwest Iran. The results disclose that 60 (72.3%) of cases were from urban areas. However, the findings of this study disagree with a descriptive study of 80 caregivers done by Hasan et al., (2011) in Nanakali hospital for blood disease in Erbil city. Results of the study show that (66.2%) of them were living from rural areas.

As regards to the type of family, the present study reveal that less than two-thirds ware nuclear. This result supported by a cross-sectional descriptive study conducted by Khalaf and Kassem, (2020) aimed to assess mother's preventive strategies concerning physical complication for children with leukemia shows that 89 (59.3%) living in nuclear family type.

Finally, mothers' demographic findings reveals that number of children more than half of mother having (1-4) children. A study in Egypt with a convenient sample compromised 50 caregivers done by El-Abbassy et al., (2015) disagree with present result shows (48%) of the study sample has equal and more than four children in the family.

5.2. Demographic Characteristics of the children

Table (4-2), the present study discloses that more than two thirds of children as majority were within early childhood, while the minority who are late childhood. This result agree with study in Kano, northern Nigeria done by Ochicha et al., (2012) about Pediatric malignancies. The finding of this study discloses that the malignancies frequently seen in early childhood (0-4 years) accounted for 46.1%. Also, the result agree with study conducted by Al-Mutlaq et al., (2015) aimed to describe the patterns of childhood cancers in Saudi Arabia over a period of ten years (1999-2008). The finding of this study signify that the highest incidence rate in the surveyed years was apparent in the birth to age 4 years group. According to the researcher opinion, based on results of the study underhand which supported by various studies, this mean that more common incidence of leukemia and risky age within the early childhood.

As well as a study in Chinese at Shanghai done by Bao et al., (2016) aimed to understand the incidence trend of malignant tumors in children aged <15 years agree with the present results reported that the incidence was highest in age group <5 years (165.1 per million). The incidences in age groups 5-9 years and 10-14 years were 101.2 per million and 113.9 per million, respectively. In addition to a study done by Kebudi, (2012) about Pediatric oncology in Turkey. The finding of this study discloses that 2000 new pediatric cancer cases are reported each year. One fourth of the population is younger than 15 years of age.

Regarding child gender, the study represent that less than two thirds were male. This result agree with study done by Ma'arefvand and Khatamsaz, (2014) in Iran about coping strategies of the parents of the children with cancer carried out through a survey of 200 participants were chosen among 991 parents of the children with cancer through convenience sampling. Shows that most of the children (127) were male. Also another descriptive retrospective study done by Al-Mutlaq et al.,

(2015) in Saudi Arabia about Patterns of childhood cancer incidence in Saudi Arabia (1999- 2008). The finding of this study represent that the incidence rates of cancers per 100,000 in the years 1999 and 2008 were generally higher among males, (9.4 and 11.5 in males vs. 8.3 and 8.1 in females).

In addition, a study done Habib et al., (2016) about cancer of children in Basrah-Iraq: Person and time characteristics. The results of this study reveals that the incidence rate was higher among male children (12.90 per 100000 males) than for female children 9.43 per 100000 females). Another study in USA, agree with present result conducted by Martin et al., (2012) about family functioning and coping styles in families of children with cancer and HIV disease. The findings of this study revealed that more than half of the sample were male.

Concerning child order in the family, one third were 4th and above. This result is slightly different from Hassan and Ibrahim, (2018) who mentioned in their study about the effect of supportive nursing intervention on burden and coping strategies of caregivers of children with cancer in specialized pediatric hospital at Benha city in Egypt that, the highest percent of children was late rank in the family. Another descriptive study in Baghdad, Iraq done by Shawq et al., (2020) about effects of caring children with leukemia on their mothers psychosocial status with a purposive sample of (60) mothers. The findings disagreement with present results reveals that 50% of children were first order in family. In addition, a study among 178 parent directed by Sherief et al., (2015) in Egypt aimed to assess the self-esteem of pediatric patients on chemotherapy for acute lymphoblastic leukemia (ALL) and psychological status of their parents. The finding of this study disagreement with present study signify that 52.0% were second order in the family.

5.3 Distribution of medical history of child with leukemia

Table (4-2-1) the findings of the study underhand showed that the medical diagnosis of child about three quarters of study, children were diagnosed as Acute

Lymphocytic (ALL). A descriptive study at Nanakali hospital for blood diseases in Erbil city done by Hasan et al., (2013) agree with present result shows 62 (77.5%) of the study sample were diagnosed as (ALL). Additional study with a total of 727 new cases of childhood cancer were recorded, conducted by Missaoui et al., (2011) about Childhood cancer frequency in the center of Tunisia. The finding of this study disagree with the present study, shows that lymphoid leukemia were the most prevalent (73.5%). Also another study with 44 caregivers about coping strategies and caregiver's anxiety in pediatric oncohematology done by Kohlsdorf and Costa Junior, (2011) in Brasil agree with present results reveal that the majority of children were diagnosed with (ALL).

Regarding duration of disease, the present study discovered that more than half of the study children having a duration of disease for more than six months. This result is slightly different from Hassan and Ibrahim, (2018) who mentioned in their study about the effect of supportive nursing intervention on the burden and coping strategies of caregivers of children with cancer that, 35 (58.3%) of the studied sample period of disease was 4 to < 8 years. Another cross-sectional study in Malaysia disagreement with present result directed by Sutan et al., (2017) among (299) parents of kids with “Acute lymphoblastic leukemia”. They found that high percent, 206 (70.3%) of children were diagnosed as early within the first six months of age. according to the researcher opinion, this means that more common incidence in children within one year, whether the first or second half.

Concerning to limitations due to disease process, more than one quarter having limitations with mobility. The finding of this study differ from a study done by Bigalke, (2015) in Mississippi about coping, hardiness, and parental stress in parents of children diagnosed with cancer. Reported that the child’s diagnosis and treatment had limited his or her interactions with friends (73%).

In relation to current disease treatment, the majority of child were taking chemotherapy. The findings of this study agree with the study done by Mahmoud and Elaziz, (2015) in Egypt, the study was included purposive sample of 60 parents in pediatric hospital of Ain Shams University. The finding of this study discovered that 63.3% of them treated by chemotherapy.

5.4 Overall assessment level of mother's burden in caring of child with leukemia

Table (4.4) the present results were shown that the mothers burden related to caring of child with leukemia was demonstrated at a mean (2.56) and according to the study criteria, the mothers expressed sever care burden (n = 61; %=58.1) as shown in **(Fig. 4-1)** according to researcher opinion, this indicate that mothers of children with leukemia experience more care burden due to factors such as low chance of recovery in this group of children, exacerbation of child's status with progress of disease, lack of response to the treatment, and higher child dependence on mothers for daily life activities.

In a similar way, in Texas a study conducted by Palos et al., (2011) on caregiver symptom burden: the risk of caring for an underserved patient with advanced cancer among 85 caregivers , which determined that the caregiving burden of the caregivers was high. Another study in Tabriz, Iran done by Pashaee et al., (2016) aimed to investigate time and effort required for care activities among 150 parents of children with cancer in pediatric educational treatment center. The finding compatible with present result reported a high level of care burden in the caregivers of patients with cancer. As well as, a descriptive and correlational study among 150 sample done by Çıtlık Sarıtaş et al., (2017) about examination of care burden of caregivers of oncology patients and the perceived social support form family. The values agree with present study showed that the care burden was high level.

Also, in Iran a descriptive study directed by Salmani et al., (2014) aimed to determine the burden and related factors in caregiver of patients with leukemia among 60 care givers of the patients. The result agree with present finding indicate that the average of care burden in all samples was high.

Contrarily, a cross-sectional study conducted by Motlagh et al., (2019) was among 209 parents of children with leukemia, in the West of Iran, disagree with present results who stated that 79.7% of parents had moderate care burden. Wang et al., (2017) carried out a study in China about care burden and its predictive factors in parents of newly diagnosed children with acute lymphoblastic leukemia in academic hospitals on 130 parents of children with cancer. The finding of this study disagreement who reported that 43.85% of parents had mild-to-moderate burden. Another descriptive study done by Kardaş Özdemir et al., (2009) aimed to determine the caregiving burden of mothers who care for their children with cancer, carried out with the mothers of 82 pediatric patients. The result reveals that that the Caring Burden Scale scores of mothers who care for their children with cancer were not very high.

As well, the finding of the present result disagreement with a cross-sectional descriptive study with 85 parents done by Ahmadi et al., (2018) in Tehran aimed to explored care burden among parents of children with cancer and its related factors shown that 71.8% of parents had moderate care burden. Also, in line with study, Kahriman and Zaybak (2015) carried out a research in Turkey, about caregiver burden and perceived social support among caregivers of patients with cancer and reported that the care burden score in caregivers of patients with cancer was at mild level.

5.5 Overall assessment level of mother's Coping Strategies of children with leukemia

Table (4.6): The present study revealed that the overall assessment of mother's response related to confront coping was demonstrated at (mean=1.96) and according to the study criteria, the mothers expressed moderate coping (n=82; %=78.1). In India, a study directed by Geetha, (2015) about Knowledge on leukemia, the stress and coping strategies of mothers with leukemic children undergoing treatment in a selected cancer institute. Disagree with present result revealed that the mothers with leukemic children are having better coping strategies on meeting the stress about leukemia.

5.6 Relationship between mother's care burden and their Demographic Characteristics

Table (4-8-1): The findings presented that non-significant relationship between mother's care burden of children with leukemia and their age groups at p-value >0.05. According to the researcher opinion, younger mother tend to experience higher burden than older. That is mean accept the null hypothesis and reject the alternative hypothesis, which rationalized as. In a similar way, in Texas a study conducted by Palos et al., (2011) on caregiver symptom burden: the risk of caring for an underserved patient with advanced cancer among 85 caregivers ,found that there was no significant difference between age groups and caregivers burden. Another study done by Sarıtaş et al., (2014) about caregivers of patients undergoing liver transplantation determination the burden of care. The finding reveals that there was no significant difference between age groups and caregivers burden.

In this regard, in china Wang et al., (2017) conducted a research about care burden and its predictive factors in parents of newly diagnosed children with acute lymphoblastic leukemia in academic hospitals disagreement with present result,

shown that the age was inversely correlated with caregiver burden. Also, another a cross-sectional study of 411 parents of children receiving cancer treatment conducted by Klassen et al., (2011). The findings of this study revealed that the age correlated with caregiver burden.

Also, in turkey a study directed by Baran, (2018) aimed to determining the relationship between the burden of care and life satisfaction of the Turkish mothers of children with cancer. The finding of this disagree with present result reveals that there was a negative correlation between the mean score of caregiver burden and the age of mother and at $P<0.01$. According to the researcher opinion, younger parents may not have enough experience to use supportive resources. It is very logical for women of young ages to express their fear of diseases and health problems, especially chronic ones or those that require frequent admission to the hospital. The most difficult thing is their struggle against diagnosis and treatment of cancers, including leukemia of all kinds.

Table (4-8-2): The results were demonstrated that non-significant relationship between mother's care burden of children with leukemia and their educational level at p-value >0.05. As it is clear from the absence of a relationship between care burdens and educational level of mother's that care burdens is not affected by level of education. This result agree with descriptive research in turkey done by GÜR and ERSİN, (2021) about the investigation of caregiving burden and life quality of caregivers who care for cancer patients. There was no statistically significant difference between the mean scores of the whole burden interview according to education level (p= .788). Another agreement study done by Ahmad, (2020) about Psychological Burden of Caregivers of Children with Cancer at AL-Amal Hospital in Baghdad City , who show that there was no significant association between care burden and level of education at p-value =0.202). Which rationalized,

as most of the mothers who participated in the study were of primary education level and do not work so they spend more time taking care of his/her child.

A cross-sectional study conducted by Motlagh et al., (2019) was among 209 parents of children with leukemia, in the West of Iran, disagree with present results who stated that parents' educational level was significantly associated with the total care burden at (P-value=0.028). In this regard, a study done by Rha et al., (2015) in Korea disagreement with present study about caregiving burden and the quality of life of family caregivers of cancer patients: the relationship and correlates was positively related to caregiver's educational level.

Table (4-8-3) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and their occupation at p-value >0.05. According to the researcher opinion, caregivers that those who work, more especially women, are subjected to the compounded burden of coping with work and child demands. The result agree with study conducted by Şahin and Ergüney, (2015) about determining reactions and anger expressions of family members giving care for receiving chemotherapy. The finding represent that no significant relationship between the employment status and caregivers burden.

Table (4-8-4) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and their marital status at p-value >0.05. In turkey a study conducted by Çinar et al., (2016) about determining the care burden of caregivers taking care of patients with cancer. They found that there was a statistically significant difference between the care burden of caregivers that were included in the study and marital status at (p-value <0.05). The finding disagreement with present study.

Table (4-8-4) the findings are showed that non-significant relationship between mother's care burden of children with leukemia and their economic status

at p-value >0.05. A cross-sectional study among 170 patients and their relatives who were treated in a chemotherapy unit of a hospital directed by Zeliha et al., (2016) in Turkey aimed to determine the burden of care and the factors affecting the caregiving of the relatives of patients who were diagnosed with cancer. It was similarly, stated that showed that non-significant relationship between caregivers burden of and economic status at p-value >0.05.

Contrarily, a cross-sectional study conducted by Motlagh et al., (2019) was among 209 parents of children with leukemia, in the West of Iran, disagree with present results who stated that parents' economic status was significantly associated with the total care burden at (P-value=0.001). In this regard, a study done by Deniz and Inci (2015) on 123 caregivers of cancer patients found higher care burden associated with low income parents. Also, Wang et al., (2016) conducted a research in China on 117 family caregivers of patients with retinoblastoma and showed that lower monthly income was associated with heavy caregiver burden. This result disagreement with present findings. In addition, a study directed by Köse et al., (2019) in turkey aimed to analyze the relationship between care burden of parents who have a child diagnosed with cancer and their anxiety levels. The finding disagree with present result shown that significant relationship between economic status and care burden at p<0.05.

Table (4-8-5) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and their residence at p-value >0.05. this result agree with study done by Maheshwari Preksha and Kaur, (2016) in India on perceived social support and burden among family caregivers of cancer patients among 225 cargivers. The result discloses that no significant relationship between care burden and residence at p-value= 0.345.

Table (4-8-6) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and their type of family at p-value >0.05. In similar way, co-relational, cross sectional study conducted by Maheshwari and Kaur, (2016) on perceived social support and burden among family caregivers of cancer patients in Punjab. The finding agreement with present result reveals that no significant relationship between care burden and type of family at p-value= 0.145.

In turkey, a study done by Yigitalp et al., (2017) about Predictors of caregiver burden in primary caregivers of chronic patients. The finding of this study disagreement with present result reveals that statistically significant relationship between caregiver's burden and their type of family at p-value 0.040.

Table (4-8-7) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and their number of children at p-value >0.05. The result agree with study done by El-Abbassy et al., (2015) 50 caregivers about the effectiveness of Practical Guides on Burden's Coping Strategies among Caregiver of Children Undergoing Hemodialysis in Egypt. Show that there was no significant relation between total score of caregiver's burden and number of children at p-value 0.859.

5.7 Relationship between mother's care burden and child Demographic Characteristics

Table (4-9-1) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and child age at p-value >0.05. In turkey, a study directed by Baran, (2018) aimed to determining the relationship between the burden of care and life satisfaction of the Turkish mothers of children with cancer. The finding of this study disagree with present result reveals

that there was a negative correlation between the mean score of caregiver burden and the age of the child at P<0 .01.

Table (4-9-2) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and gender at p-value >0.05. A cross-sectional study among 209 parents of children with leukemia was conducted by Motlagh et al., 2019. The finding agree with present result reveals that no significant correlation between care burden and child gender at p-value=0.671.

Table (4-9-3 and 4-9-4) those tables show that there was no significant relationship between mother's care burden of children with leukemia and child order and other children with leukemia in the family at p-value >0.05. In the literature review, similar studies could not be found, either in Iraq or worldwide. Therefore, the findings of the current study were discussed here using the findings of studies conducted on the mothers of children with leukemia. According to the researcher's opinion, the mother's care burden is not affected by child order and other children with leukemia in the family due to the majority of participants do not have other children with leukemia.

5.8 Statistical Relationship between mother's care burden and the medical history of the child

Table (4-10-1) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and the medical diagnosis of child at p-value >0.05. In Tehran, Iran a cross-sectional descriptive study among 85 parents of children with cancer done by Ahmadi et al., (2018) about care burden and its related factors in parents of children with cancer disagreement with present result reveal that significant association with between care burden and medical diagnosis (Acute myeloid leukemia).

Table (4-10-2) this table indicate that there was no significant relationship between mother's care burden of children with leukemia and the duration of disease at p-value >0.05. In Iran a cross-sectional descriptive study among 125 parents of children with cancer conducted by Ahmadi et al., (2019) about Predictors of caregiver burden among parents of children with cancer. The finding agree with present result showed that no significant correlation between care burden (total score) and at duration of disease at p-value=0.1.

Table (4-10-3 and 4) these tables specify that there was no significant relationship between mother's care burden of children with leukemia and Limitations due to disease process for child and Current disease status at p-value >0.05. According to the researcher opinion, the mothers accept the complexities and difficulties to guarantee that his child will cure from the disease.

Table (4-10-5) this table show that there was no significant relationship between mother's care burden of children with leukemia and current disease treatment at p-value >0.05. In similar way, a study done by Ahmadi et al., (2019) aimed to determine caregiving burden and relevant influential factors among 125 parents of children with cancer in Iran. The finding agree with present result revealed that no significant correlation between care burden (total score) and type of treatment at p-value=0.7.

5.9 Relationship between coping strategies and mother's demographic data

Table (4-11-1) the results presented that non-significant relationship between mother's coping strategies and age of mother at p-value >0.05. According to the researcher opinion, younger mothers have less life experience tend to fare more poorly on coping with stress as compared to those that are older and have greater life experience. A study among 44 caregivers about coping strategies and caregiver's anxiety in pediatric oncohematology done by Kohlsdorf and Costa Junior, (2011) in

Brasil disagreement with present results reveal that the association between coping strategies and sociodemographic characteristics such as the caregivers' age**.**

Table (4-11-2) the finding of the study demonstration that there was no significant relationship between mother's coping strategies and level of education at p-value >0.05. According to the researcher opinion, those that are more educated also have a greater sense of mastery over their lives, a higher sense of perceived control over stressful events, a greater sense of self-efficacy and a greater ability to establish supportive networks. A study among 86 mothers of children suffering leukemia and lymphoma participated in the present stud conducted by Sabry, et al., (2016) on assessing the coping strategies in a sample of mothers of Egyptian children with leukemia & lymphoma disagreement with present results represent that there was statistically significant relationship between mother's coping strategies and level of education.

Table (4-11-3) the present study reveals that there was high significant relationship between mother's coping strategies and occupation at p-value <0.05. This result agreement with a study done by Geetha, C., (2015) in India aimed to correlate the demographic characteristics with the coping strategies adapted by the mothers with leukemic children. The study reveals that there is significant association between coping strategies adapted by the mothers and occupation.

Table (4-11-4) this table demonstration that there was significant relationship between mother's coping strategies and marital status at p-value <0.05. The finding disagreement with study done in India by Hassan, et al., (2011) about burden and coping strategies in caregivers of schizophrenic patients. The result represent that there was significant relationship between mother's coping strategies and marital status.

Table (4-11-5) this table demonstration that there was no significant relationship between mother's coping strategies and economic status at p-value >0.05. A study done by Klassen et al., (2007) disagreement with present result about developing a literature base to understand the caregiving experience of parents of children with cancer: a systematic review of factors related to parental health and well-being. The finding discloses that no significant association between coping and monthly income.

Table (4-11-6) the finding specify that there was no significant relationship between mother's coping strategies and residence status at p-value >0.05. In Egypt, a study conducted by El Malkyet al., (2016). The effectiveness of the nursing intervention program on feeling of burden and coping among caregivers of children with epilepsy. The finding disagreement with present result reveals that there was highly statistically significant relationship between level of coping and place of residence at p value >0.001.

Table (4-11-7) the result revealed that there was no significant relationship between mother's coping strategies and type of family status at p-value >0.05. This result disagreement with a study done by Geetha, C., (2015) in India aimed to correlate the demographic characteristics with the coping strategies adapted by the mothers with leukemic children. The study reveals that there is significant association between coping strategies adapted by the mothers and type of family.

Table (4-11-8) the table demonstration that there was no significant relationship between mother's coping strategies and number of children at p-value >0.05.The result agree with study done by El-Abbassy et al., (2015) 50 caregivers aimed to evaluate the effect of practical guide on burden's coping strategies among caregiver of children undergoing hemodialysis in Egypt. Show that there was no

significant relation between total score of coping strategies and number of children at p-value 0. 0.242.

5.10 Relationship between mother's coping strategies and child's demographic data

Table (4-12-1) this table demonstration that there was significant relationship between mother's coping strategies and child age at p-value <0.05. A study done by Steele et al., (2004) about patterns of maternal distress among children with cancer and their association with child emotional and somatic distress. The finding disagreement with present result signify that no significant association between coping strategies and age.

Table (4-12-2) this table demonstration that there was no significant relationship between mother's coping strategies and gender at p-value >0.05. In Mississippi, a study conducted by Greening and Stoppelbein, (2007) among 172 participants about pediatric cancer, parental coping style, and risk for depressive, posttraumatic stress, and anxiety symptoms. The finding of this study agree with present result reveals that no significant associations between coping and gender. Another agreement study in Shiraz, Southern Iran conducted by Hashemi et al., (2007) about coping strategies used by parents of children with cancer. Show that there was no significant association between coping strategies and gender.

Table (4-12-3) the findings demonstration that there was non-significant relationship between mother's coping strategies and child order in the family at p-value >0.05. A study among 44 caregivers about coping strategies and caregiver's anxiety in pediatric oncohematology done by Kohlsdorf and Costa Junior, (2011) in Brazil disagreement with present results reveal that the association between coping strategies and sociodemographic characteristics such as the child's position in the family.

Table (4-12-4) this table demonstration that there was no significant relationship between mother's coping strategies and other children with Leukemia in the family at p-value >0.05. In the literature review, similar studies could not be found, either in Iraq or worldwide. According to the researcher's point of view, this result related to the majority of participants in the study does not have other children with leukemia in the family.

5.11 Relationship between mother's coping strategies and medical history of child with leukemia

Table (4-13-1) this table demonstration that there was no significant relationship between mother's coping strategies and the medical diagnosis of child at p-value >0.05. In Brazil, a study conducted by Kohlsdorf and Costa Junior, (2011) among 44 caregivers aimed to investigate associations between sociodemographic data, patient's clinical condition, indicators of anxiety, and coping strategies adopted by caregivers during leukemia diagnosis in order to indicate which factors may influence anxiety and the adopted coping strategies. The finding of this study agree with present result represent that no significant association between coping strategies and type of diagnosis.

Table (4-13-2) the results existing that there was non-significant relationship between mother's coping strategies and duration of disease at p-value >0.05. The finding agreement with study done by Virtue et al., (2014) about Psychological distress and psychiatric diagnoses among primary caregivers of children undergoing hematopoietic stem cell transplant: an examination of prevalence, correlates, and racial/ethnic differences showed there was no significant difference between coping strategies, and duration of diagnosis of the leukemia and lymphoma.

Another study among 86 mothers of children suffering leukemia and lymphoma participated in the present stud conducted by Sabry, et al., (2016) on assessing the coping strategies in a sample of mothers of Egyptian children with leukemia & lymphoma disagreement with present results represent that there was statistically significant relationship between mother's coping strategies and duration of disease at p-value =0.027.

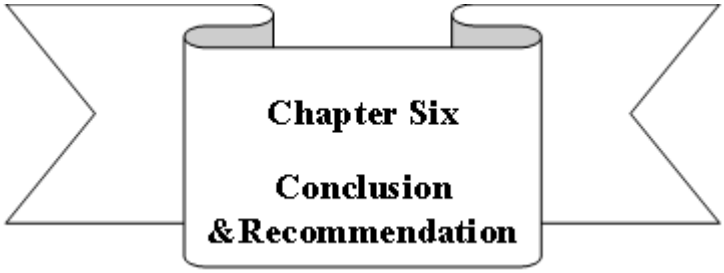
Table (4-13-4 and 5): This table demonstration that there was no significant relationship between mother's coping strategies and current disease status and current disease treatment at p-value >0.05. In the literature review, similar studies could not be found.

5.12 Association between Overall mother's Coping Strategies of children with leukemia and care burden

Table 4.7shows that there is a non-significant correlation (weak negative correlation) between overall mother's coping strategies of children with leukemia and care burden. The finding disagree with a cross-sectional study done by Abbasi et al., (2013) among 133 caregivers about the relationship between caregiver burden with coping strategies in Family caregivers of cancer patients in Iran. Showed that coping strategies significant correlation with caregiver burden.

Another disagreement study in India done by Chadda et al., (2007) about caregiver burden and coping. Showed that positive correlation between coping and the total burden scores.

In Japan, Hanzawa et al., (2008) on burden and coping strategies in mothers of patients with schizophrenia. The finding disagree with present result reveals that significant association between coping strategies and care burden score.



This chapter summarizes the study's key findings and conclusions, as well as study recommendations that can be taken into consideration.

6.1. Conclusions

The following conclusions are drawn from the present study's data analysis, discussion, and critical interpretations of such findings:

1. After assessing the mother's burden related to caring of child with leukemia, the findings indicated that the mothers expressed sever care burden.
2. The overall assessment of mother's coping strategies of children with leukemia at Al.Basrah Specialist Children's Hospital is moderate coping.
3. The current study signify that around two-thirds of child were within early childhood and more than half of them were male. Regarding medical history of child with leukemia, the results indicated that about three quarters of study children were diagnosed as Acute Lymphocytic (ALL) and Chemotherapy is used to treat the majority of children with leukemia.
4. The current study showed that there was a non-significant association (weak negative correlation) among overall mother's coping strategies of kids with leukemia and care burden.
5. A Statistically significant association among mother's coping strategies and occupation, marital status and child age at p-value <0.05. In addition to non-statistical significant relationship between severity of care burdens and demographic characteristics.

6.2. Recommendations:

The findings and conclusions of the study have influenced the following recommendations, which are aimed at:

Ministry of Health:-

1. Addressing the mothers' concern seriously to enhance better coping and develop their life quality and health as well.

2. Encouraging mothers to utilize effective coping skills, through appropriate programs designed and implemented to support caregivers. Use of effective coping skills to reduce the level of mother's burden can improve mother's physical health and psychological well-being.

Health Care Team:-

1. The findings of the present study are crucial in the planning and implementation of educational programs to reduce care burden among parents of children with pediatric leukemia. Thus, health care providers such as doctors, nurses, and psychologists are expected to be more available to respond to their requests and pay more attention to planning educational programs.

2. Caring for mothers of children with leukemia by offering support, which helps to reduce their load and enhance coping patterns, should be a top goal for caregiver support.

3. Health care team should practice their role of counseling services to reduce their stress and improve their overall happiness. Nurses should also be able to connect families with other children who have the same condition.

Future Plan:-

1. Activating the function of the social worker in pediatric hospitals to assist families of children with chronic diseases, particularly moms of children with

leukemia, in reducing stress and anxiety throughout their hospital stay and thus enhance coping with chronic disease.

2. As a future suggestion, finally, the researcher suggest more research with a bigger sample size including all centers in all over the country that specialized in child oncology.

References

المصادرالعربية

القران الكريم (سورة الاسراء الاية 82)

(A)

- Abbasnezhad, M., Rahmani, A., Ghahramanian, A., Roshangar, F., Eivazi, J., Azadi, A. and Berahmany, G., 2015. Cancer care burden among primary family caregivers of iranian hematologic cancer patients. *Asian Pacific Journal of Cancer Prevention, 16*(13), pp.5499-5505.
- Abbasi, A., Shamsizadeh, M., Asayesh, H., Rahmani, H., Hosseini, S. and Talebi, M., 2013. The relationship between caregiver burden with coping strategies in Family caregivers of cancer patients. *Iranian Nursing Scientific Association, 1*(3), pp.62-71.
- Abdul Hay, M.M., Al-Homsi, S., Jun H. Choi, J.H., Grossbard, M.L. and Hymes, K.B., 2021. Diagnosing Chronic Lymphocytic Leukemia in Adults".
- Aburn, G. and Gott, M., 2011. Education given to parents of children newly diagnosed with acute lymphoblastic leukemia: A narrative review. *Journal of Pediatric Oncology Nursing, 28*(5), pp.300-305.
- Aburn, G. and Gott, M., 2014. Education Given to Parents of Children Newly Diagnosed with Acute Lymphoblastic Leukemia: The Parent's Perspective. *Pediatric Nursing, 40*(5).
- Adelman, R.D., Tmanova, L.L., Delgado, D., Dion, S. and Lachs, M.S., 2014. Caregiver burden: a clinical review. *Jama, 311*(10), pp.1052-1060.
- Ahmad, A.S., 2020. Psychological Burden of Caregivers of Children with Cancer at AL-Amal Hospital in Baghdad City. *Medico-legal Update, 20*(4), p.1747.

- Ahmadi, M., Rassouli, M., Gheibizadeh, M., Karami, M. and Poormansouri, S., 2019. Predictors of caregiver burden among parents of children with cancer. *Iranian Journal of Pediatric Hematology & Oncology*, *9*(4).
- Ahmadi, M., Rassouli, M., Karami, M., Abasszadeh, A. and Poormansouri, S., 2018. Care burden and its Related Factors in Parents of Children with Cancer. *Iran Journal of Nursing, 31*(111), pp.40-51.
- Al-Asadi, J.N. and Ibrahim, S.J., 2018. Childhood cancer in Basrah, Iraq during 2012-2016: incidence and mortality. *Asian Pacific journal of cancer prevention: APJCP*, *19*(8), p.2337
- Al-Dulaimi, K., Chandran, V., Banks, J., Tomeo-Reyes, I. and Nguyen, K., 2018, December. Classification of white blood cells using bispectral invariant features of nuclei shape. In 2018 Digital Image Computing: Techniques and Applications (DICTA) (pp. 1-8). IEEE.
- Alexander, T.B. and Mullighan, C.G., 2021. Molecular Biology of Childhood Leukemia. Annual Review of Cancer Biology, 5, pp.95-117.
- Al-Hashimi, M.M., 2021. Incidence of Childhood Leukemia in Iraq, 2000-2019. *Asian Pacific Journal of Cancer Prevention, 22*(11), pp.3663-3670.
- AL-Hashimi, M.Y. and Wang, X., 2013. Trend of Leukemia in Ninawa/Iraq. *Clinical and Experimental Medical Sciences, 1*(8), pp.353-362.
- Alimohammadi, N., Maleki, B., Shahriari, M. and Chitsaz, A., 2015. Effect of a care plan based on Roy adaptation model biological dimension on stroke patients' physiologic adaptation level. *Iranian journal of nursing and midwifery research*, *20*(2), p.275.

- Al-Sheyyab, M., Bateiha, A., El Kayed, S. and Hajjawi, B., 2003. The incidence of childhood cancer in Jordan: a population-based study. Annals of Saudi medicine.
- Al-Mutlaq, H.M., Bawazir, A.A., Jradi, H., Al-Dhalaan, Z.A. and Al-Shehri, A., 2015. Patterns of childhood cancer incidence in Saudi Arabia (1999-2008). *Asian Pacific Journal of Cancer Prevention, 16*(2), pp.431-435.
- Altay, N., Kilicarslan, E., Sarı, Ç. and Kisecik, Z., 2014. Determination of social support needs and expectations of mothers of children with cancer. *Journal of Pediatric Oncology Nursing*, *31*(3), pp.147-153.
- American Cancer Society (2010). "How is Leukemia Diagnosed?". Detailed Guide: Leukemia – Adult Chronic. American Cancer Society. Archived from the original on 5 April 2010. Retrieved 4 May 2010.
- American Cancer Society, 2016. "What is Childhood Leukemia?". Retrieved 2018-12-03.
- American Cancer Society, 2018. "Cancer Facts and Figures" (PDF). Retrieved 2018-12-03.
- American Cancer Society, 2019. Available at: https://www.cancer.org/cancer/leukemia-in-children/detection-diagnosis-staging/prognostic-factors.html.
- American Cancer Society, 2021.Key Statistics for Acute Lymphocytic Leukemia (ALL). Available at: https://www.cancer.org.
- American Cancer Society, 2017. Key statistics for childhood cancers.
- Amini, Z., Fazel, A., Zeraati, A. and Esmaeili, H., 2012. The effect of care plan based on the Roy adaptation model on activities of daily living of hemodialysis patients. *Journal of North Khorasan University of Medical Sciences, 4*(2), pp.145-153.

- Amnie, A.G., 2018. Emerging themes in coping with lifetime stress and implication for stress management education. SAGE open medicine, 6, p.2050312118782545. Available from: http://cancer.org.cancer.
- Andrews, H.A. ed., 1991. The Roy adaptation model: The definitive statement. Appleton & Lange.
- Appelbaum, F.R., Niederhuber, J.E., Armitage, J.O., Doroshow, J.H., Kastan, M.B. and Tepper, J.E., 2014. Chapter 98: Acute leukemias in adults. Abeloff's Clinical Oncology. 5th ed. Philadelphia (PA): Elsevier.
- Applebaum, A.J., Kulikowski, J.R. and Breitbart, W., 2015. Meaning-centered psychotherapy for cancer caregivers (MCP-C): Rationale and overview. *Palliative & supportive care*, *13*(6), pp.1631-1641.
- Arab, M., Bernstein, C., Haghshenas, A. and Ranjbar, H., 2020. Factors associated with caregiver burden for mothers of children undergoing Acute Lymphocytic Leukemia (ALL) treatment. *Palliative & supportive care*, *18*(4), pp.405-412.
- Arber, D.A., Orazi, A., Hasserjian, R., Thiele, J., Borowitz, M.J., Le Beau, M.M., Bloomfield, C.D., Cazzola, M. and Vardiman, J.W., 2016. The 2016 revision to the World Health Organization classification of myeloid neoplasms and acute leukemia. Blood, The *Journal of the American Society of Hematology*, *127*(20), pp.2391-2405.
- Ashtiani, M.Z., Mousavi, P.S. and Panaghi, L., 2017. The comparison of marital conflict and child's perception of parental conflict in children with and without cancer. *J Pediatr Nurs.*, *3*(3), pp.46-54.

(B)

- Bain, B.J., 2017. Leukaemia Diagnosis, 5th edition. John Wiley & Sons Ltd. Available at: https://onlinelibrary.wiley.com › doi.

- Bakan, G. and Akyol, A.D., 2008. Theory-guided interventions for adaptation to heart failure. *Journal of advanced nursing, 61*(6), pp.596-608.
- Ballová, V., Ghielmini, M. and Dimopoulos, M.A., 2019. Leukaemia & Myeloma: Essentials for Clinicians. UK: ESMO Press.
- Bao, P., Wu, C., Gu, K., Gong, Y., Peng, P., Huang, Z., Zhang, M., Zheng, Y. and Zhong, W., 2016. Incidence trend of malignant tumors in children in Shanghai. *Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi, 37*(1), pp.106-110.
- Baran, G. 2018. The Burden of Care and Life Satisfaction of the Turkish Mothers of Children with Cancer. *Journal of Client-Centered Nursing Care, 4*(4), pp. 175-184.
- Barrington-Trimis, J.L., Cockburn, M., Metayer, C., Gauderman, W.J., Wiemels, J. and McKean-Cowdin, R., 2017. Trends in childhood leukemia incidence over two decades from 1992 to 2013. *International journal of cancer, 140*(5), pp.1000-1008.
- Bédard, M., Molloy, D.W., Squire, L., Dubois, S., Lever, J.A. and O'Donnell, M., 2001. The Zarit Burden Interview: a new short version and screening version. *The gerontologist, 41*(5), pp.652-657.
- Belleza, M., 2021. Acute Lymphocytic Leukemia Nursing Care Management. Available at: https://nurseslabs.com/acute-lymphocytic-leukemia/.
- Belson, M., Kingsley, B. and Holmes, A., 2007. Risk factors for acute leukemia in children: a review. *Environmental health perspectives, 115*(1), pp.138-145.
- Bennett, J.M., Catovsky, D., Daniel, M.T., Flandrin, G., Galton, D.A.G., Gralnick, H.R. and Sultan, C., 1981. The morphological classification of

acute lymphoblastic leukaemia: concordance among observers and clinical correlations. *British journal of haematology*, *47*(4), pp.553-561.

- Bernard, S.C., Abdelsamad, E.H., Johnson, P.A., Chapman, D.L. and Parvathaneni, M., 2017. Pediatric leukemia–A review. *Journal of Cancer Clinical trials*, *2*(131).
- Besa, C.E., 2021. Chronic Myelogenous Leukemia (CML). Available at: http://emedicine.medscape.com/article/199425-overview.
- Bevans, M. and Sternberg, E.M., 2012. Caregiving burden, stress, and health effects among family caregivers of adult cancer patients. *Jama*, *307*(4), pp.398-403.
- Bielorai, B., Fisher, T., Waldman, D., Lerenthal, Y., Nissenkorn, A., Tohami, T., Marek, D., Amariglio, N. and Toren, A., 2013. Acute lymphoblastic leukemia in early childhood as the presenting sign of ataxia-telangiectasia variant. *Pediatric hematology and oncology*, *30*(6), pp.574-582.
- Bigalke, K.L., 2015. Coping, hardiness, and parental stress in parents of children diagnosed with cancer.
- Birbrair, A. and Frenette, P.S., 2016. Niche heterogeneity in the bone marrow. *Annals of the new York Academy of Sciences*, *1370*(1), p.82.
- Boothe, V.L., Boehmer, T.K., Wendel, A.M. and Yip, F.Y., 2014. Residential traffic exposure and childhood leukemia: a systematic review and meta-analysis. *American journal of preventive medicine*, *46*(4), pp.413-422.
- Brown, B.B. and Prinstein, M.J., 2011. Encyclopedia of Adolescence.
- Burnette, D., Duci, V. and Dhembo, E., 2017. Psychological distress, social support, and quality of life among cancer caregivers in Albania. *Psycho-oncology*, *26*(6), pp.779-786.

(C)

- Cal, A., Avci, I.A. and Cavusoglu, F., 2017. Experiences of caregivers with spouses receiving chemotherapy for colorectal cancer and their expectations from nursing services. *Asia-Pacific journal of oncology nursing*, *4*(2), p.173.
- Cambridge Dictionary | English Dictionary, Translations, 2021. Available at: https://dictionary.cambridge.org.
- Chadda, R.K., Singh, T.B. and Ganguly, K.K., 2007. Caregiver burden and coping. *Social Psychiatry and Psychiatric Epidemiology*, *42*(11), pp.923-930.
- Chen, X., Pan, J., Wang, S., Hong, S., Hong, S. and He, S., 2019. The epidemiological trend of acute myeloid leukemia in childhood: a population-based analysis. *Journal of Cancer*, *10*(20), p.4824.
- Choi, J.W., Ku, Y., Yoo, B.W., Kim, J.A., Lee, D.S., Chai, Y.J., Kong, H.J. and Kim, H.C., 2017. White blood cell differential count of maturation stages in bone marrow smear using dual-stage convolutional neural networks. *PloS one*, *12*(12), p.e0189259.
- Çinar HG, Arkan B, Avdal EÜ, Aksu E, Vatansever H, et al., 2016. Determining the Care Burden of Caregivers Taking Care of Patients with Cancer. *Ann Nurs Pract 3*(3): 1049.
- Çıtlık Sarıtaş, S., Kavak, F., Aksoy, A. and Sarıtaş, S., 2017. Examination of care burden of caregivers of oncology patients and the perceived social support form family.
- Compas, B.E., Bemis, H., Gerhardt, C.A., Dunn, M.J., Rodriguez, E.M., Desjardins, L., Preacher, K.J., Manring, S. and Vannatta, K., 2015. Mothers and fathers coping with their children's cancer: Individual and interpersonal processes. *Health Psychology*, *34*(8), p.783.

- Cooper, S.L., and Brown, P.A., 2015. Treatment of Pediatric Acute Lymphoblastic Leukemia. *Pediatric Clinics of North America 62*, P. 61-73.
- Cooper, T.M., Hasle, H. and Smith, F.O., 2011. Acute myeloid leukemia, myeloproliferative and myelodysplastic disorders. Principles and practice of pediatric oncology. 6th ed. Philadelphia: Lippincott Willians & Wilkins, pp.566-610.

(D)

- Daboul, M.W. 2019. Characteristics of White Blood Cells (leucocytes): White Blood Cells in Detail.
- Dantas, M. S. A., Pinho, T. A. M., de, Silva, D. A. et al., 2015. Family coping strategies for leukemia diagnosis: Social and Religious Aspects. *J Nurs UFPE on line. 9*(1), P. 137-42.
- DeGennaro, L. J., 2012. Coping with Childhood Leukemia and Lymphoma.
- Deniz, H. and Inci, F., 2015. The burden of care and quality of life of caregivers of leukemia and lymphoma patients following peripheric stem cell transplantation. *Journal of psychosocial oncology*, *33*(3), pp.250-262.
- Devita, V.T., Hellman, T. S., and Rosenberg's, S. A., 2015. Cancer: principles & practice of oncology, 10th edition. USA: Wolters Kluwer Health, P.2.
- Diaz, L.J.R. and Cruz, D.D.A.L.M.D., 2018. Adaptation model in a controlled clinical trial involving family caregivers of chronic patients. Texto & Contexto-Enfermagem, 26.
- Döhner, H., Weisdorf, D.J. and Bloomfield, C.D., 2015. Acute myeloid leukemia. *New England Journal of Medicine*, *373*(12), pp.1136-1152.

(E)

- Einollahi, N., Alizadeh, S., Dashti, N., Nabatchian, F., Zare Bovani, M., Abbasi, S., Mohamadian, M. and Kashani Khatib, Z., 2013. Serum lipid

profile alterations in acute leukemia before and after chemotherapy. *Iran Blood Cancer j, 6*(1), pp.3-9.

- El Malky, M.I., Mohsen, M.M. and Amer, H.M., 2016. The effectiveness of the nursing intervention program on feeling of burden and coping among caregivers of children with epilepsy. *International Journal of Advanced Nursing Studies, 5*(1), p.87.
- El-Abbassy, A.A., Atia, M.M. and Alam, F.H., 2015. The effectiveness of Practical Guides on Burden's Coping Strategies among Caregiver of Children Undergoing Hemodialysis. *International Journal of Nursing, 2*(2), pp.128-143.
- Estlin, J.E., Gilbertson, R.J. and Wynn, R.F., 2010. Pediatric hematology and oncology: scientific principles and clinical practice. Singapore: Wiley-Blackwell.
- Evelyn, W.M. and Melanie, M., 2002. Theoretical Basis for Nursing Philadelphia.

(F)

- Farhadi, A., Foroughan, M., Mohammadi, F., Rassouli, M., Sadegh Moghadam, L., Nazari, S. and Sadeghi, N., 2016. Caregiving appraisal in family caregivers of older adults. *Iranian Journal of Ageing, 11*(1), pp.8-19.
- Farnia, V., Mousavi, S.A., Parsamehr, A., Alikhani, M., Golshani, S., Nooripour, R. and Moradi, M., 2017. The mediating role of emotional intelligence in coping strategies and test anxiety in students of Kermanshah University of Medical Sciences, Kermanshah, Iran in 2013-2014. *Iranian Journal of Psychiatry and Behavioral Sciences, 11*(4).

- Fathi, A., Amani, F. and Bahadoram, M., 2015. Epidemiology of childhood cancer in Northwest Iran. *Asian Pacific Journal of Cancer Prevention, 16*(13), pp.5459-5462.
- Fear, N.T., Roman, E., Ansell, P., Simpson, J., Day, N. and Eden, O.B., 2003. Vitamin K and childhood cancer: a report from the United Kingdom Childhood Cancer Study. *British journal of cancer, 89*(7), pp.1228-1231.
- Fitzmaurice, C., Alsharif, U., El Bcheraoui, C., Khalil, I., Charara, R., Moradi-Lakeh, M., Afshin, A., Collison, M., Chew, A., Krohn, K.J. and Daoud, F., 2018. Burden of cancer in the Eastern Mediterranean Region, 2005-2015: findings from the Global Burden of Disease 2015 Study. *International Journal of Public Health, 63*(1).
- Folkman, S., Lazarus, R. S., 1985. The Ways of Coping.
- Freireich, E.J., 2012. The history of leukemia therapy—a personal journey. *Clinical Lymphoma Myeloma and Leukemia, 12*(6), pp.386-392.

(G)

- Gabriela Dieguez, F., Ferro, C. and Rotter, C.D., 2018. The cost burden of blood cancer care. *blood*.
- Gallegos-Arreola, M., Borjas-Gutiérrez, C., Zúñiga-González, G., Figuera, L.E., Puebla-Pérez, A.M. and García-González, J.R., 2013. Pathophysiology of acute lymphoblastic leukemia. Clinical Epidemiology of Acute Lymphoblastic Leukemia-From the Molecules to the Clinic. InTech: Mexico, pp.43-73.
- Gan, H.W. and Spoudeas, H.A., 2014. Long-term follow-up of survivors of childhood cancer (SIGN Clinical Guideline 132). *Archives of Disease in Childhood-Education and Practice, 99*(4), pp.138-143.
- García-Pérez, J., López-Abente, G., Gómez-Barroso, D., Morales-Piga, A., Romaguera, E.P., Tamayo, I., Fernández-Navarro, P. and Ramis, R., 2015.

Childhood leukemia and residential proximity to industrial and urban sites. *Environmental research, 140*, pp.542-553.

- Geetha, C., 2015. Knowledge on leukemia, the stress and coping strategies of mothers with leukemic children undergoing treatment in a selected cancer institute. *International journal of recent scientific research, 6*(5), pp.4192-6.
- George, J.B., 2011. Pearson New International Edition: Nursing Theories: The Base for
- Glenn, A. and Armstrong, C.E., 2019. Physiology of red and white blood cells. *Anaesthesia & Intensive Care Medicine*, *20* (3), pp.170-174.
- Goodenough, B., Drew, D., Higgins, S. and Trethewie, S., 2004. Bereavement outcomes for parents who lose a child to cancer: are place of death and sex of parent associated with differences in psychological functioning?. *Psycho-Oncology, 13*(11), pp.779-791.
- Greening, L. and Stoppelbein, L., 2007. Brief report: pediatric cancer, parental coping style, and risk for depressive, posttraumatic stress, and anxiety symptoms. *Journal of Pediatric Psychology*, *32*(10), pp.1272-1277.
- Gupta, A.K., Meena, J.P., Chopra, A., Tanwar, P. and Seth, R., 2021. Juvenile myelomonocytic leukemia-A comprehensive review and recent advances in management. *American Journal of Blood Research, 11*(1), p.1.
- GÜR, S.C. and ERSİN, F., 2021. The Investigation of Caregiving Burden and Life Quality of Caregivers Who Care for Cancered Patients. *Harran Üniversitesi Tıp Fakültesi Dergisi, 18*(1), pp.88-94.

(H)

- Habib, O.S., Hassan, J.G., and JM, A.D., 2016. Cancer of children in Basrah-Iraq: Person and time characteristics. *The Medical Journal of Basrah University, 34*(2), pp.77-85.
- Hagopian, A., Lafta, R., Hassan, J., Davis, S., Mirick, D. and Takaro, T., 2010. Trends in childhood leukemia in Basrah, Iraq, 1993–2007. *American journal of public health, 100*(6), pp.1081-1087.
- Hamad, S.A. and Shaker, N.Z., 2019. Coping Strategies among Caregivers of Children with Acute Leukemia at Nanakali Hospital in Erbil City. *Erbil Journal of Nursing and Midwifery, 2*(2), pp.155-162.
- Hann, I., Vora, A., Harrison, G., Harrison, C., Eden, O., Hill, F., Gibson, B., Richards, S. and UK Medical Research Council's Working Party on Childhood Leukaemia, 2001. Determinants of outcome after intensified therapy of childhood lymphoblastic leukaemia: results from Medical Research Council United Kingdom acute lymphoblastic leukaemia XI protocol. *British journal of haematology, 113*(1), pp.103-114.
- Hanzawa, S., Tanaka, G., Inadomi, H., Urata, M. and Ohta, Y., 2008. Burden and coping strategies in mothers of patients with schizophrenia in Japan. *Psychiatry and clinical neurosciences, 62*(3), pp.256-263.
- Harrison, C.J. and Foroni, L., 2002. Cytogenetics and molecular genetics of acute lymphoblastic leukemia. *Reviews in clinical and experimental hematology, 6*(2), pp.91-113.
- Hasan, S.S., Hussein, K.A. and Al-Ani, M.H., 2011. Assessment of home care management for caregiver’s having leukemic adolescent patient in Erbil city. *Nurs. Sci, 12*(3), pp.1-13.
- Hasan, S.S., Hussein, K.A. and Al-Ani, M.H., 2013. Physical problems among leukemic adolescent patients undergoing chemotherapy in Erbil city.

Zanco Journal of Medical Sciences (Zanco J Med Sci), 17(1), pp.273_279-273_279.

- Hashemi, F., Razavi, S., Sharif, F. and Shahriari, M.M., 2007. Coping strategies used by parents of children with cancer in Shiraz, Southern Iran.
- Hassan A.W., Mohamed I.I., Elnaser E.A., and Sayed E.N., 2011. Burden and Coping Strategies in Caregivers of Schizophrenic Patients. *Journal of American Science, 7*(5): 802-811.
- Hassan, G.A. and Ibrahim, H.S., 2018. The effect of supportive nursing intervention on the burden and coping strategies of caregivers of children with cancer. *Journal of Nursing Education and Practice, 8*(7), p.125.
- Hassani, S.N., Tabiee, S., Saadatjoo, S.A. and Kazemi, T., 2013. The effect of an educational program based on Roy adaptation model on the psychological adaptation of patients with heart failure. *Modern Care Journal*, *10*(4).
- Hatami, F. and Hojjati, H., 2019. Effect of Roy's Adaptation Model on the Care Burden of Mothers of Children under Chemotherapy (A Quasi-Experimental Study). *Medical-Surgical Nursing Journal, 8*(1).
- Head, D.R., 2002. Proposed changes in the definitions of acute myeloid leukemia and myelodysplastic syndrome: are they helpful?. *Current opinion in oncology, 14*(1), pp.19-23.
- Heck, J.E., Park, A.S., Qiu, J., Cockburn, M. and Ritz, B., 2014. Risk of leukemia in relation to exposure to ambient air toxics in pregnancy and early childhood. *International journal of hygiene and environmental health, 217*(6), pp.662-668.
- Hockenberry, M.J. and Wilson, D., 2015. Wong's Nursing Care of Infants and Children, 10th edition. Canada: Elsevier. P.1399.
- Hockenberry, M.J., Wilson, D., and Rodgers, C.C., (2017). Wong's Essentials of Pediatric Nursing, 10th edition. USA: Elsevier, P.1616-973.

- Hoffman R, et al., 2018. Clinical manifestations and treatment of childhood acute lymphoblastic leukemia. In: Hematology: Basic Principles and Practice. 7th ed. Elsevier. https://www.clinicalkey.com. Accessed Oct. 2, 2020.
- Horton, T.M., and Steuber, C.P., 2019. Risk group stratification and prognosis for acute lymphoblastic leukemia in children and adolescents. Accessed at www.uptodate.com/contents/risk-group-stratification-and-prognosis-for-acute-lymphoblastic-leukemia-in-children-and-adolescents on December 29, 2018.
- Howlader, N., Noone, A.M., Krapcho, M., Miller, D., Bishop, K. and Kosary, C.L., 2018. American Cancer Society Cancer Facts & Figures 2018. Atlanta: American Cancer Society.
- Hunger, S.P. and Mullighan, C.G., 2015. Acute lymphoblastic leukemia in children. *New England Journal of Medicine*, *373*(16), pp.1541-1552.
- Hutter, J.J., 2010. Childhood leukemia. *Pediatrics in Review*, *31*(6), pp.234-241.
- Hwang, M.S., 2020. Classification of acute myeloid leukemia. National Library of Medicine. 55. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7386892/.

(I)

- Iavarone, A., Ziello, A.R., Pastore, F., Fasanaro, A.M. and Poderico, C., 2014. Caregiver burden and coping strategies in caregivers of patients with Alzheimer's disease. *Neuropsychiatric disease and treatment*, *10*, p.1407.
- Instituto Nacional de Câncer. Particularidades do Câncer Infantil [Internet], 2012. [cited 2013 Aug 22]. Available from: http://www.inca.gov.br/conteudo_view.asp?id=3433.

- International Agency for Research on Cancer. Global Cancer Observatory, 2018; 1-2. Available from: https://gco.iarc.fr/today/data/factsheets/populations/368-iraq-fact-sheets.pdf.

(J)

- Jafari, A. and Hesampour, F., 2017. The comparison of coping strategies and psychological hardiness between parents of children with cancer of positive and negative responding to treatment.
- Jahedi, M., Shamsasenjan, K., Sanaat, Z., Aliparasti, M., Almasi, S., Mohamadian, M., Nejati, B., Kamalifar, A. and Movassaghpour, A.A., 2014. Aberrant phenotype in Iranian patients with acute myeloid leukemia. *Advanced pharmaceutical bulletin*, *4*(1), p.43.
- Jastaniah, W., Essa, M.F., Ballourah, W., Abosoudah, I., Al Daama, S., Algiraigri, A.H., Al Ghemlas, I., Alshahrani, M. and Alsultan, A., 2020. Incidence trends of childhood acute lymphoblastic leukemia in Saudi Arabia: increasing incidence or competing risks?. *Cancer epidemiology*, *67*, p.101764.
- Jeha, S., Pei, D., Choi, J., Cheng, C., Sandlund, J.T., Coustan-Smith, E., Campana, D., Inaba, H., Rubnitz, J.E., Ribeiro, R.C. and Gruber, T.A., 2019. Improved CNS control of childhood acute lymphoblastic leukemia without cranial irradiation: St Jude Total Therapy Study 16. *Journal of Clinical Oncology*, *37*(35), p.3377.
- Jennings, K.M., 2017. The Roy adaptation model: a theoretical framework for nurses providing care to individuals with anorexia nervosa. ANS. *Advances in nursing science*, *40*(4), p.370.

- Jin, M., Xu, S. and An, Q., 2017. Pediatric haematopoiesis and related malignancies. *Oncology letters, 14*(1), pp.10-14.

(K)

- Kahriman, F. and Zaybak, A., 2015. Caregiver burden and perceived social support among caregivers of patients with cancer. *Asian Pacific journal of cancer prevention, 16*(8), pp.3313-3317.
- Kampen, K.R., 2012. The discovery and early understanding of leukemia. *Leukemia research, 36*(1), pp.6-13.
- Kanwar, S.V., 2021. Pediatric Acute Lymphoblastic Leukemia Clinical Presentation. Available at: Presentationhttp://emedicine.medscape.com.
- Kanwar, V. S. et al., 2012. Pediatric acute lymphoblastic leukemia. eMedicine.Medscape.com. WebMD LLC.
- Kaplan, A.J., 2019. Leukemia in Children. Pediatrics in Review, 40(7).
- Kaplan, B. W., 2019. The Nurse's Role in Childhood Leukemia from Disease Recognition to Survivorship Care. Avialale at: https://www.oncologynurseadvisor.com › leukemia.
- Karatas, Z. and Cakar, F.S., 2011. Self-Esteem and Hopelessness, and Resiliency: An Exploratory Study of Adolescents in Turkey. *International Education Studies, 4*(4), pp.84-91.
- Kardaş Özdemir, F., AKGÜN ŞAHİN, Z.Ü.M.R.Ü.T. and KÜÇÜK ALEMDAR, D.İ.L.E.K., 2009. Determining the caregiving burden of mothers with children with cancer. *Journal of New Medicine, 26*(3), pp.153-158.
- Kazak, A.E., Barakat, L.P., Hwang, W.T., Ditaranto, S., Biros, D., Beele, D., Kersun, L., Hocking, M.C. and Reilly, A., 2011. Association of

psychosocial risk screening in pediatric cancer with psychosocial services provided. *Psycho-oncology, 20*(7), pp.715-723.

- Kebudi, R., 2012. Pediatric oncology in Turkey. *Journal of pediatric hematology/oncology, 34*, pp.S12-S14.
- Keohane, E.M., Otto, C.N. and Walenga, J.M., 2019. Rodak's Hematology-E-Book: Clinical Principles and Applications. Elsevier Health Sciences.
- Khalaf, M.H. and Kassem, N.M., 2020. Physical Preventive Strategies Related to Children with Leukemia from Mothers' Perspective in Al. Basrah Province. *Medico Legal Update, 20*(1), pp.901-905.
- Khanjari, S., Oskouie, F., Eshaghian Dorche, A. and Haghani, H., 2013. Quality of life in parent of children with leukemia and its related factors. *Iran Journal of Nursing, 26*(82), pp.1-10.
- Khazaei, S., Khazaei, S., Mansori, K. and Ayubi, E., 2017. Childhood cancer patterns in Iran: Challenges and future directions. *Iranian journal of public health, 46*(8), pp.1145-1146.
- Kholasehzadeh, G., Shiryazdi, S.M., Neamatzadeh, H. and Ahmadi, N., 2014. Depression levels among mothers of children with leukemia. *Iranian journal of pediatric hematology and oncology, 4*(3), p.109.
- Khoury, M.N., Huijer, H.A.S. and Doumit, M.A.A., 2013. Lebanese parents' experiences with a child with cancer. *European Journal of Oncology Nursing, 17*(1), pp.16-21.
- Kiem Hao, T., Van Ha, C., Huu Son, N. and Nhu Hiep, P., 2020. Long-Term outcome of childhood acute myeloid leukemia: a 10-year retrospective cohort study. *Pediatric reports, 12*(1), pp.22-25.
- Klassen, A., Raina, P., Reineking, S., Dix, D., Pritchard, S. and O'Donnell, M., 2007. Developing a literature base to understand the caregiving experience of parents of children with cancer: a systematic review of factors

related to parental health and well-being. *Supportive Care in Cancer, 15*(7), pp.807-818.

- Klassen, A.F., Raina, P., McIntosh, C., Sung, L., Klaassen, R.J., O'Donnell, M., Yanofsky, R. and Dix, D., 2011. Parents of children with cancer: Which factors explain differences in health-related quality of life. *International Journal of Cancer, 129*(5), pp.1190-1198.
- Kliegman, R.M. and Geme, J.S. 2020. Nelson Textbook of Pediatrics, 21st ed. Elsevier. Available at: https://www.clinicalkey.com. Accessed Oct. 16, 2020.
- Kumar, K., Kaur, J., Walia, S., Pathak, T. and Aggarwal, D., 2014. L-asparaginase: an effective agent in the treatment of acute lymphoblastic leukemia. *Leukemia & lymphoma, 55*(2), pp.256-262.
- Kohlsdorf, M. and Costa Junior, Á.L., 2011. Coping strategies and caregiver's anxiety in pediatric oncohematology. Psicologia: Reflexão e Crítica, 24, pp.272-280.
- Köse, S., Türköz Arar, A. and Yıldırım, G., 2019. The Relationship Between the Care Loads and Anxiety Levels of Parents Whose Child Has Cancer. *Journal of Education and Research in Nursing, 16*(4), pp.282-287
- Kumar, R., Kaur, S., Reddemma, K., 2015. Burden and coping strategies in caregivers of stroke survivors. *J Neurol Neurosci, 6*(5), P.5.
- Kumari, R., Kohli, A., Malhotra, P., Grover, S. and Khadwal, A., 2018. Burden of caregiving and its impact in the patients of acute lymphoblastic leukemia. *Industrial psychiatry journal, 27*(2), p.249.
- Kutluk, T., 2009. Epidemiology of childhood cancer and current status in Turkey. *J Pediatr Sci, 5*, pp.1-8.

- Ladines-Castro, W., Barragán-Ibañez, G., Luna-Pérez, M.A., Santoyo-Sánchez, A., Collazo-Jaloma, J., Mendoza-García, E. and Ramos-Penafiel, C.O., 2016. Morphology of leukaemias. *Revista Médica del Hospital General de México, 79*(2), pp.107-113.
- Lai, W.W. and Oei, T.P.S., 2014. Coping in parents and caregivers of children with autism spectrum disorders (ASD): A review. *Review Journal of Autism and Developmental Disorders, 1*(3), pp.207-224.
- Lee, J.W. and Cho, B., 2017. Prognostic factors and treatment of pediatric acute lymphoblastic leukemia. *Korean journal of pediatrics, 60*(5), p.129.
- Lim, H.A., Tan, J.Y., Chua, J., Yoong, R.K., Lim, S.E., Kua, E.H. and Mahendran, R., 2017. Quality of life of family caregivers of cancer patients in Singapore and globally. *Singapore medical journal, 58(*5), p.258.
- Liu, K., Chu, J., Dai, Y., Jiang, A., Yang, L., Xie, Z., Zhang, K., Tu, S., Cai, H., Wu, Z. and Wang, N., 2020. Long-term follow-up of acute lymphoblastic leukemia in young children treated by the SCMC-ALL-2009 protocol. *Leukemia & Lymphoma*, *61*(12), pp.2850-2858.
- Liu, Y.L., Lo, W.C., Chiang, C.J., Yang, Y.W., Lu, M.Y., Hsu, W.M., Ho, W.L., Li, M.J., Miser, J.S., Lin, D.T. and Lai, M.S., 2015. Incidence of cancer in children aged 0–14 years in Taiwan, 1996–2010. *Cancer epidemiology, 39*(1), pp.21-28.
- López-Cima, M.F., García-Pérez, J., Pérez-Gómez, B., Aragonés, N., López-Abente, G., Pascual, T., Tardón, A. and Pollán, M., 2013. Lung cancer risk associated with residential proximity to industrial installations: a spatial analysis. *International Journal of Environmental Science and Technology, 10*(5), pp.891-902.
- López-Cima, M.F., García-Pérez, J., Pérez-Gómez, B., Aragonés, N., López-Abente, G., Tardón, A. and Pollán, M., 2011. Lung cancer risk and

pollution in an industrial region of Northern Spain: a hospital-based case-control study. *International journal of health geographics*, *10*(1), pp.1-13.

- Lotfi, F., Vaziri, S.h., Ghaser, S.h., Mousavi, M., Hashemi, M., 2012. The effectiveness of spiritual intervention on improving the quality of life of mothers of children with cancer. *Medic Ethic J, 4*(11):125-149.
- Lyengar, V., Shimanovsky, A., 2021. Leukemia. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available at: https://www.ncbi.nlm.nih.gov/books/NBK560490/.

(M)

- Ma'arefvand, M. and Khatamsaz, Z., 2014. Coping strategies of the parents of the children with cancer. *Quarterly journal of social work*, *3*(3), pp.3-9.
- Macedo, E.C., Silva, L.R.D., Paiva, M.S. and Ramos, M.N.P., 2015. Burden and quality of life of mothers of children and adolescents with chronic illnesses: an integrative review 1. *Revista latino-americana de enfermagem*, *23*, pp.769-777.
- Maheshwari Preksha, S. and Kaur, M.R., 2016. Perceived social support and burden among family caregivers of cancer patients. *Int J Health Sci Res*, *6*(1), pp.304-314.
- Mahmoud Alilou, M., Khanjani, Z. and Bayat, A., 2016. Comparing the coping strategies and emotion regulation of students with symptoms of anxiety-related emotional disorders and normal group. *Quarterly Journal of Child Mental Health*, *3*(1), pp.41-51.
- Mahmoud, S. and Elaziz, N.A.A., 2015. Effect of Psycho-Educational Training Program for Parent's Having Child with Leukemia on Their Experience and Psychological Wellbeing. Journal of education and practice, 6(12), pp.13-29. Available from: https://eric.ed.gov/?id=EJ1080628

- MALEKI, F., HEMMATI, M.M. and KHALKHALI, H., 2016. Study The Effect Of Performance Roy Adaptation Model On Intensity And Effects Of Fatigue In Multiple Sclerosis Patients.
- Maloney, K.W., Devidas, M., Wang, C., Mattano, L.A., Friedmann, A.M., Buckley, P., Borowitz, M.J., Carroll, A.J., Gastier-Foster, J.M., Heerema, N.A. and Kadan-Lottick, N., 2020. Outcome in children with standard-risk B-cell acute lymphoblastic leukemia: results of Children's Oncology Group Trial AALL0331. *Journal of Clinical Oncology*, *38*(6), p.602.
- Mancini, J., Baumstarck-Barrau, K., Simeoni, M.C., Grob, J.J., Michel, G., Tarpin, C., LOUNDOU, A.D., Lambert, A., Clément, A. and Auquier, P., 2011. Quality of life in a heterogeneous sample of caregivers of cancer patients: an in-depth interview study. *European Journal of Cancer Care*, *20*(4), pp.483-492.
- Mannelli, F., 2016. Immunophenotyping of Acute Leukemias–From Biology to Clinical Application. Flow Cytometry: Select Topics, p.115.
- Mantzoukas, S. and Mantzouka, C., 2010. Anxiety in acute leukemia patients and their family. *Interscientific Health Care*, *2(*1).
- Margolin JF, Rabin KR, Steuber CP, et al: 2011. Acute lymphoblastic leukemia. In Pizzo PA, Poplack DG, editors: Principles and practices of pediatric oncology, ed 6, Philadelphia: Lippincott.
- Martin, S., Calabrese, S.K., Wolters, P.L., Walker, K.A., Warren, K. and Hazra, R., 2012. Family functioning and coping styles in families of children with cancer and HIV disease. *Clinical pediatrics*, *51*(1), pp.58-64.
- Masa'Deh, R., Collier, J. and Hall, C., 2012. Parental stress when caring for a child with cancer in Jordan: a cross-sectional survey. *Health and Quality of Life Outcomes*, *10*(1), pp.1-7.

- McKinney, E.S., James, S.R., Murray, S.S., Nelson, K. and Ashwill, J., 2017. Maternal-child nursing-e-book. Elsevier Health Sciences.
- McKinney, P.A., Feltbower, R.G., Parslow, R.C., Lewis, I.J., Glaser, A.W. and Kinsey, S.E., 2003. Patterns of childhood cancer by ethnic group in Bradford, UK 1974–1997. *European Journal of Cancer, 39*(1), pp.92-97.
- Mehranfar, S., Zeinali, S., Hosseini, R., Mohammadian, M., Akbarzadeh, A. and Feizi, A.H.P., 2017. History of leukemia: diagnosis and treatment from beginning to now. *Galen Medical Journal*, *6*(1), pp.12-22.
- Mellemkjaer, L., Alexander, F. and Olsen, J.H., 2000. Cancer among children of parents with autoimmune diseases. *British journal of cancer, 82*(7), pp.1353-1357.
- Merriam-Webster's Learner's Dictionary, 2021. Available at: https://learnersdictionary.com.
- Metayer, C., Dahl, G., Wiemels, J. and Miller, M., 2016. Childhood leukemia: a preventable disease. Pediatrics, 138(Supplement_1), pp.S45-S55.
- Mezei, G., Sudan, M., Izraeli, S. and Kheifets, L., 2014. Epidemiology of childhood leukemia in the presence and absence of Down syndrome. *Cancer epidemiology, 38*(5), pp.479-489.
- Missaoui, N., Khouzemi, M., Landolsi, H., Jaidene, L., Abdelkrim, S.B., Abdelkader, A.B., Beizig, N., Yaacoubi, M.T. and Hmissa, S., 2011. Childhood cancer frequency in the center of Tunisia. *Asian Pac J Cancer Prev, 12*(2), pp.537-542.
- Modaresifard, F., Maredpour, A., 2016. On the Relationship of Personality Traits and Coping Strategies with Drug Abstinence Self-Efficacy in Addicted Youth. *Research on addiction, 10*(39), P. 213-30.

- Moghaddasi, J., Taleghani, F., Moafi, A., Malekian, A., Keshvari, M. and Ilkhani, M., 2018. Family interactions in childhood leukemia: an exploratory descriptive study. *Supportive Care in Cancer*, *26*(12), pp.4161-4168.
- Mohammadpour, A., Najafi, S., Tavakkolizadeh, J. and Mohammadzadeh, F., 2016. The effect of intervention based on. *Journal of Sabzevar University of Medical Sciences*, *22*(6), pp.999-1007.
- Mohammed, S., Priya, S.S. and George, C., 2015. Caregiver burden in a community mental health program-A cross sectional study. *Kerala Journal of Psychiatry*, *28*(1), pp.26-33.
- Mojen, L.K., Rassouli, M., Eshghi, P., Sari, A.A. and Karimooi, M.H., 2017. Palliative care for children with cancer in the Middle East: A comparative study. *Indian journal of palliative care*, *23*(4), p.379.
- Mori, H., Colman, S.M., Xiao, Z., Ford, A.M., Healy, L.E., Donaldson, C., Hows, J.M., Navarrete, C. and Greaves, M., 2002. Chromosome translocations and covert leukemic clones are generated during normal fetal development. *Proceedings of the National Academy of Sciences*, *99*(12), pp.8242-8247.
- Möricke, A., Zimmermann, M., Reiter, A., Henze, G., Schrauder, A., Gadner, H., Ludwig, W.D., Ritter, J., Harbott, J., Mann, G. and Klingebiel, T., 2010. Long-term results of five consecutive trials in childhood acute lymphoblastic leukemia performed by the ALL-BFM study group from 1981 to 2000. *Leukemia*, *24*(2), pp.265-284.
- Motlagh, M.E., Mirzaei-Alavijeh, M. and Hosseini, S.N., 2019. Care Burden in Parents of Children with Leukemia A Cross-Sectional Study in the West of Iran. *International Journal of Pediatrics*, *7*(6), pp.9541-9548.

- Moussavi, F., Hosseini, S.N., Saket, S. and Derakhshanfar, H., 2014. The First CBC in Diagnosis of childhood acute lymphoblastic leukemia. *International Journal of Medical Investigation*, *3*(1), pp.0-0.
- Murphy, S.L., Xu, J., Kochanek, K.D., Curtin, S.C. and Arias, E., 2013. National vital statistics reports. National vital statistics reports, 61(4).

(N)

- Nabi, A., Khan, I., 2017. Resilience as predictor of mental well-being among cardiovascular disorder. *The International Journal of Indian Psychology*, *4*, P.182–90.
- Nair, M. and Peate, I., 2013. Fundamentals of Applied Pathophysiology: An essential guide for
- National Cancer Institute, 2021. Childhood Acute Myeloid Leukemia/Other Myeloid Malignancies. Available: https://www.cancer.gov › patient › child-aml-treatment-pdq.
- National Cancer Institute. (2008). National Cancer Institute Research on Childhood Cancers, cancer facts 6.40. Retrieved October 21, 2004, from http://cis.nci.nih.gov/fact/6_40.htm.
- Nemati, S., Rassouli, M., Ilkhani, M. and Baghestani, A.R., 2018. Perceptions of family caregivers of cancer patients about the challenges of caregiving: a qualitative study. *Scandinavian journal of caring sciences*, *32*(1), pp.309-316.
- Niederhuber, J.E. et al. 2020. Abeloff's Clinical Oncology, 6th ed. Elsevier. Available at: 2020. https://www.clinicalkey.com. Accessed Oct. 16, 2020.
- Northouse, L.L., Katapodi, M.C., Song, L., Zhang, L. and Mood, D.W., 2010. Interventions with family caregivers of cancer patients: meta-analysis of randomized trials. *CA: a cancer journal for clinicians*, *60*(5), pp.317-339.

- Nurhidayah, I., Hendrawati, S. and Hasriyadhi, D.P., 2020. Quality of life of family caregivers of children with leukemia: A Descriptive Quantitative Study. *Belitung Nursing Journal, 6*(2), pp.52-58.
- National Cancer Institute, 2012. Particularidades do Câncer Infantil [Internet]. [cited 2013 Aug 22]. Available from: http://www.inca.gov.br/conteudo_view.asp?id=3433.

(O)

- Ochicha, O., Gwarzo, A.K. and Gwarzo, D., 2012. Pediatric malignancies in Kano, northern Nigeria. *World Journal of Pediatrics, 8*(3), pp.235-239.
- Oxford Learner's Dictionaries, 2021. Available at: https://www.oxfordlearnersdictionaries.com.

(P)

- Padeniya, R.N., Thushari, G., Nissanka, D.H., Shashika, C., Munasinghe, D.H., Aberathne, D.M., Weerawardena, P.L., Galgamuwa, L.S., Kumarasinghe, N. and Liyanage, L., 2020. Maternal coping strategies in response to child's oncological diseases in Sri Lanka. *Acta Oncologica, 59*(7), pp.866-871.
- Palos, G.R., Mendoza, T.R., Liao, K.P., Anderson, K.O., Garcia-Gonzalez, A., Hahn, K., Nazario, A., Ramondetta, L.M., Valero, V., Lynch, G.R. and Jibaja-Weiss, M.L., 2011. Caregiver symptom burden: the risk of caring for an underserved patient with advanced cancer. *Cancer*, *117*(5), pp.1070-1079.
- Pang, J.W., Cook, L.S., Schwartz, S.M. and Weiss, N.S., 2002. Incidence of leukemia in Asian migrants to the United States and their descendants. *Cancer Causes & Control, 13*(9), pp.791-795.

- Park, H.J., Moon, E.K., Yoon, J.Y., Oh, C.M., Jung, K.W., Park, B.K., Shin, H.Y. and Won, Y.J., 2016. Incidence and survival of childhood cancer in Korea. *Cancer research and treatment: official journal of Korean Cancer Association, 48*(3), p.869.
- Pashaee, S., Khalili, A., Shirvani, H., Valizadeh, L. and Joonbakhsh, F., 2016. Investigation of time and effort required for care activities among parents of children with cancer in pediatric educational treatment center. *Health Sciences, 5*(9S), pp.44-8.
- Patlak, M., 2002. Targeting leukemia: from bench to bedside. *FASEB journal: official publication of the Federation of American Societies for Experimental Biology, 16*(3), p.273.
- PDQPTE, B., 2002. Childhood Acute Myeloid Leukemia/Other Myeloid Malignancies Treatment (PDQ®): Health Professional Version. PDQ Cancer Information Summaries. Bethesda (MD): National Cancer Institute (US).
- Peate, I. and Nair, M., 2017. Fundamentals of Anatomy and Physiology: For Nursing and Healthcare Students, 2nd edition. USA: Willey Blackwell. P.196.
- Penning, M.J. and Wu, Z., 2016. Caregiver stress and mental health: Impact of caregiving relationship and gender. *The gerontologist, 56*(6), pp.1102-1113.
- Perry, S.E., Hockenberry, M.J., Lowdermilk, D.L. and David Wilson, 2014. Maternal Child Nursing Care, Fifth edition. Canada: Elsevier.
- Pillitteri, A., 2010. Maternal and child health nursing: care of the childbearing and childrearing family, 6th edition. Philadelphia: Lippincott Williams & Wilkins, p.1312-1587.

- Plon SE, Malkin D. 2011. Childhood cancer and heredity. In Pizzo PA, Poplack DG, editors: Principles and practices of pediatric oncology, ed 6, Philadelphia: Lippincott.
- Plöthner, M., Schmidt, K., de Jong, L., Zeidler, J. and Damm, K., 2019. Needs and preferences of informal caregivers regarding outpatient care for the elderly: a systematic literature review. *BMC geriatrics*, *19*(1), pp.1-22..
- Polit, D.F., & Beck, C.T., (2018). Essentials of nursing research appraising evidence of nursing practice (ninth edition.). Wolters Kluwer Health. Available at https://lccn.loc.gov/2016043994. Page 259, 355, 348, 349, 350.
- Porwit, A., McCullough, J. and Erber, W.N., 2011. Blood and bone marrow pathology e-book. Elsevier Health Sciences.
- Powell, J.E., Parkes, S.E., Cameron, A.H. and Mann, J.R., 1994. Is the risk of cancer increased in Asians living in the UK?. *Archives of disease in childhood*, *71*(5), pp.398-403.
- Puckett, Y., Chan, O., Doerr, C., 2021. Acute Lymphocytic Leukemia (Nursing). In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan. Available at: https://www.ncbi.nlm.nih.gov/books/NBK568716/.
- Puckett, Y. and Chan, O., 2022. Acute Lymphocytic Leukemia. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459149/.
- Pui, C.H., 2010. Recent research advances in childhood acute lymphoblastic leukemia. *Journal of the Formosan Medical Association*, *109*(11), pp.777-787.
- Pui, C.H., Yang, J.J., Hunger, S.P., Pieters, R., Schrappe, M., Biondi, A., Vora, A., Baruchel, A., Silverman, L.B., Schmiegelow, K. and Escherich,

G., 2015. Childhood acute lymphoblastic leukemia: progress through collaboration. *Journal of Clinical Oncology*, *33*(27), p.2938.

- Puumala, S.E., Ross, J.A., Aplenc, R. and Spector, L.G., 2013. Epidemiology of childhood acute myeloid leukemia. *Pediatric blood & cancer*, *60*(5), pp.728-733.

(R)

- Radivoyevitch, T., Sachs, R.K., Gale, R.P., Molenaar, R.J., Brenner, D.J., Hill, B.T., Kalaycio, M.E., Carraway, H.E., Mukherjee, S., Sekeres, M.A. and Maciejewski, J.P., 2016. Defining AML and MDS second cancer risk dynamics after diagnoses of first cancers treated or not with radiation. *Leukemia*, *30*(2), pp.285-294.
- Ramachandran, V.S., 2012. Encyclopedia of Human Behavior, Second Edition.
- Ramsey, L.B., Janke, L.J., Payton, M.A., Cai, X., Paugh, S.W., Karol, S.E., Kamdem, L.K., Cheng, C., Williams, R.T., Jeha, S. and Pui, C.H., 2015. Antileukemic efficacy of continuous vs discontinuous dexamethasone in murine models of acute lymphoblastic leukemia. *PloS one*, *10*(8), p.e0135134.
- Rezaei, H., Niksima, S.H. and Ghanei Gheshlagh, R., 2020. Burden of Care in Caregivers of Iranian patients with chronic disorders: a systematic review and meta-analysis. *Health and Quality of Life Outcomes*, *18*(1), pp.1-11.
- Rha, S.Y., Park, Y., Song, S.K., Lee, C.E. and Lee, J., 2015. Caregiving burden and the quality of life of family caregivers of cancer patients: the relationship and correlates. *European Journal of Oncology Nursing*, *19*(4), pp.376-382.

- Richards, M., Corner, J. and Maher, J., 2011. The National Cancer Survivorship Initiative: new and emerging evidence on the ongoing needs of cancer survivors. British journal of cancer, 105(1), pp.S1-S4.
- Ritwik, P., 2018. Dental care for patients with childhood cancers. *Ochsner Journal, 18*(4), pp.351-357.
- Rodriguez, E.M., Dunn, M.J., Zuckerman, T., Vannatta, K., Gerhardt, C.A. and Compas, B.E., 2012. Cancer-related sources of stress for children with cancer and their parents. *Journal of pediatric psychology, 37*(2), pp.185-197.
- Rodríguez-Pérez, M., Abreu-Sánchez, A., Rojas-Ocaña, M.J. and del-Pino-Casado, R., 2017. Coping strategies and quality of life in caregivers of dependent elderly relatives. *Health and Quality of life Outcomes, 15*(1), pp.1-8.
- Rohani, H., Eslami, A.A., Jafari-Koshki, T., Raei, M., Abrishamkarzadeh, H., Mirshahi, R. and Ghaderi, A., 2015. The factors affecting the burden of care of informal caregivers of the elderly in Tehran. *Journal of Kermanshah University of Medical Sciences, 18*(12).
- Ross, J.A., Johnson, K.J., Spector, L.G. and Kersey, J.H., 2011. Epidemiology of acute childhood leukemia. Childhood leukemia, pp.3-26.
- Ruccione, K.S., Waskerwitz, M., Buckley, J., Perin, G. and Hammond, G.D., 1994. What caused my child's cancer? Parents' responses to an epidemiology study of childhood cancer. *Journal of Pediatric Oncology Nursing, 11*(2), pp.71-84.

(S)

- Sabry, Y., Zaki, N. and Elbahaey, W., 2016. Assessing the coping strategies in a sample of mothers of Egyptian children with leukemia & lymphoma. *Arab Journal of Psychiatry*, *27*(1), pp.20-30.
- Sadeghnezhad Forutagheh, M., Vanaki, Z. and Memarian, R., 2012. The effect of nursing care plan based on a consistent pattern of physiological adaptation in patients with diabetes type II. *Bimonthly J Shahed Univ*, *18*(92), pp.1-11.
- Şahin, Z.A. and Ergüney, E., 2015. Determining reactions and anger expressions of family members giving care for receiving chemotherapy. *Chemo Open Access*, *4*, pp.1-6.
- Schmiegelow, K., Nielsen, S.N., Frandsen, T.L. and Nersting, J., 2014. Mercaptopurine/methotrexate maintenance therapy of childhood acute lymphoblastic leukemia: clinical facts and fiction. *Journal of pediatric hematology/oncology*, 36(7), p.503
- Saleem, S., Kareema, H., Hussein, A., and Al-ani, H. 2011. Assessment of Home Care Management for caregivers having leukemic Adolescent patient in Erbil city.
- Salmani, N., Ashketorab, T. and Hasanvand, S., 2014. The burden of caregiver and related factors of oncology patients of shahvali hospital. *Adv Nurs Midwife*, *23*(84), pp.11-17.
- Santo, E.A.R.D.E., Gaíva, M.A.M., Espinosa, M.M., Barbosa, D.A. and Belasco, A.G.S., 2011. Taking care of children with cancer: evaluation of the caregivers' burden and quality of life. *Revista Latino-Americana de Enfermagem*, *19*(3), pp.515-522.
- Sarıtaş SÇ, Bayır K, Sarıtaş S, Ucuzal M., 2014. Caregivers of patients undergoing liver transplantation determination the burden of care. *Yıldırım Beyazıt University Journal of Nursing*, *2*(1), p.17-25

- Schultz, K.R., Devidas, M., Bowman, W.P., Aledo, A., Slayton, W.B., Sather, H., Zheng, H.W., Davies, S.M., Gaynon, P.S., Trigg, M. and Rutledge, R., 2014. Philadelphia chromosome-negative very high-risk acute lymphoblastic leukemia in children and adolescents: results from Children's Oncology Group Study AALL0031. *Leukemia*, *28*(4), pp.964-967.
- Scott, E., Morin, A., 2021. What Coping Strategies Are Effective to Manage Stress. Available at: https://www.verywellmind.com.
- Serçekuş, P., Besen, D.B., Günüşen, N.P. and Edeer, A.D., 2014. Experiences of family caregivers of cancer patients receiving chemotherapy.
- Shaffer, K.M., Chow, P.I., Cohn, W.F., Ingersoll, K.S. and Ritterband, L.M., 2018. Informal caregivers' use of internet-based health resources: An analysis of the health information national trends survey. *JMIR aging*, *1*(2), p.e11051.
- Shamsi, A., Azizzadeh Forouzi, M. and Iranmanesh, S., 2016. Psychosocial risks among parents of children with cancer. *Journal of Pediatric Nursing*, *2*(3), pp.44-55.
- Sharma, R., Shyam, R. and Grover, S., 2018. Coping strategies used by parents of children diagnosed with cancer. *Indian journal of social psychiatry*, *34*(3), p.249.
- Shawq, A.H., AL-Mousawi, K.M. and Ajil, Z.W., 2020. Effects of Caring Children with Leukemia on their MothersPsychosocial Status. *Medico Legal Update*, *20*(3), pp.1299-1302.
- Sherief, L.M., Kamal, N.M., Abdalrahman, H.M., Youssef, D.M., Abd Alhady, M.A., Ali, A.S., Abd Elbasset, M.A. and Hashim, H.M., 2015.

Psychological impact of chemotherapy for childhood acute lymphoblastic leukemia on patients and their parents. *Medicine*, *94*(51).

- Shiba, K., Kondo, N. and Kondo, K., 2016. Informal and formal social support and caregiver burden: The AGES caregiver survey. *Journal of epidemiology*, *26*(12), pp.622-628.
- Siegel RL, Miller KD, Jemal A., 2017. Cancer Statistics, 2017. *CA: a cancer journal for clinicians*, *67*(1), pp.7-30.
- Siegel RL, Miller KD, Jemal A., 2019. Cancer statistics, 2019. *CA: a cancer journal for clinicians*, *69*(1), pp.7-3.
- Silveira, M.J., Given, C.W., Given, B., Rosland, A.M. and Piette, J.D., 2010. Patient-caregiver concordance in symptom assessment and improvement in outcomes for patients undergoing cancer chemotherapy. *Chronic Illness*, *6*(1), pp.46-56.
- Smith, M. C. and Parker, M.E., 2015. Nursing Theories & Nursing Practice, fourth edition. Philadelphia: F.A. Davis Company.
- Smith, M.A., Seibel, N.L., Altekruse, S.F., Ries, L.A., Melbert, D.L., O'Leary, M., Smith, F.O. and Reaman, G.H., 2010. Outcomes for children and adolescents with cancer: challenges for the twenty-first century. *Journal of clinical oncology*, *28*(15), p.2625.
- Song, Y., Nam, S., Park, S., Shin, I.S. and Ku, B.J., 2017. The impact of social support on self-care of patients with diabetes: What is the effect of diabetes type? Systematic review and meta-analysis. *The Diabetes Educator*, *43*(4), pp.396-412.
- Steele, R. G., Dreyer, M. L., & Phipps, S., 2004. Patterns of maternal distress among children with cancer and their association with child emotional and somatic distress. *Journal of Pediatric Psychology*, *29*(7), 507-517.

- Stefan, D.C., 2015. Patterns of distribution of childhood cancer in Africa. *Journal of tropical pediatrics, 61*(3), pp.165-173.
- Stieglitz, E., Taylor-Weiner, A.N., Chang, T.Y., et al., 2015. The genomic landscape of juvenile myelomonocytic leukemia. *Nat Genet 47* (11): 1326-33.
- Stiller, C.A., McKinney, P.A., Bunch, K.J., Bailey, C.C. and Lewis, I.J., 1991. Childhood cancer and ethnic group in Britain: a United Kingdom Children's Cancer Study Group (UKCCSG) study. *British journal of cancer, 64*(3), pp.543-548.
- Sutan, R., Al-Saidi, N.A., Latiff, Z.A. and Ibrahim, H.M., 2017. Coping strategies among parents of children with acute lymphoblastic leukemia. *Health, 9*(07), p.987.
- Sutliff, K.F., Cunningham, L., Gersten, T., 2021. Chronic Lymphocytic Leukemia (CLL): Tests After Diagnosis". University of Rochester Medical Center.

(T)

- Talebi, M., Mokhtari Lakeh, N. and Rezasoltani, P., 2016. Caregiver Burden in Caregivers of RenalF Patients under Hemodialysis. *Journal of Holistic Nursing and Midwifery, 26*(2), pp.59-68.
- Tamayo, G.J., Broxson, A., Munsell, M. and Cohen, M.Z., 2010, January. Caring for the caregiver. In Oncology nursing forum, 37 (1).
- Terakye, G. 2011. Interaction with cancer patients' relatives. *Electronic Journal of Dokuz Eylul University School of Nursing*, 4, P. 78-82.
- Terracini, B., 2011, December. Epidemiology of childhood cancer. *In Environmental health* (Vol. 10, No. 1, pp. 1-3). BioMed Central.

- Terwilliger, T. and Abdul-Hay, M.J.B.C.J., 2017. Acute lymphoblastic leukemia: a comprehensive review and 2017 update. *Blood cancer journal, 7*(6), pp.e577-e577.
- Tomlinson, D. and Kline, N.E., 2010. Pediatric Oncology Nursing Advanced Clinical Handbook. Germany: Springer, P. 1073.
- Tremolada, M., Bonichini, S., Aloisio, D., Schiavo, S., Carli, M., Pillon M., 2013.*Psychooncology. Jun; 22*(6):1266-72.
- Tu, S.M., 2010. Origin of cancers: clinical perspectives and implications of a stem-cell theory of cancer (Vol. 154). Springer Science & Business Media.
- Turkoglu, N. and Kilic, D., 2012. Effects of care burdens of caregivers of cancer patients on their quality of life. *Asian Pacific Journal of Cancer Prevention*, *13*(8), pp.4141-4145.

(U)

- U.S. SEER Program, National Cancer Institute. (2009). SEER Cancer Statistics Review 1975–2006. National Cancer Institute. Retrieved May 28, 2009, from http://seer.cancer.gov/csr/1975_2006/ index.html.
- Ursavaş, F.E., Karayurt, Ö. and İşeri, Ö., 2014. Nursing approach based on Roy adaptation model in a patient undergoing breast conserving surgery for breast cancer. *The journal of breast health, 10*(3), p.134.

- Ursavaş, F.E., Karayurt, Ö. and İşeri, Ö., 2014. Nursing approach based on Roy adaptation model in a patient undergoing breast conserving surgery for breast cancer. *The journal of breast health, 10*(3), p.134.

(V)

- Vicdan, A.K. and Karabacak, B.G., 2016. Effect of treatment education based on the Roy Adaptation Model on adjustment of hemodialysis patients. *Clinical Nurse Specialist*, *30*(4), pp.E1-E13.
- Virtue, S.M., Manne, S.L., Mee, L., Bartell, A., Sands, S., Gajda, T.M. and Darabos, K., 2014. Psychological distress and psychiatric diagnoses among primary caregivers of children undergoing hematopoietic stem cell transplant: an examination of prevalence, correlates, and racial/ethnic differences. *General hospital psychiatry*, *36*(6), pp.620-626.
- Vora, A. ed., 2017. Childhood acute lymphoblastic leukemia. Springer International Publishing.

(W)

- Wang, J., Shen, N., Zhang, X., Shen, M., Xie, A., Howell, D. and Yuan, C., 2017. Care burden and its predictive factors in parents of newly diagnosed children with acute lymphoblastic leukemia in academic hospitals in China. *Supportive Care in Cancer*, *25*(12), pp.3703-3713.
- Wang, L.J., Zhong, W.X., Ji, X.D. and Chen, J., 2016. Depression, caregiver burden and social support among caregivers of retinoblastoma patients in China. *International journal of nursing practice*, *22*(5), pp.478-485.
- Ward, E., DeSantis, C., Robbins, A., Kohler, B. and Jemal, A., 2014. Childhood and adolescent cancer statistics, 2014. *CA: a cancer journal for clinicians*, *64*(2), pp.83-103.
- Warner, K.J. 2020. Allscripts EPSi. Mayo Clinic. Available at: https://www.mayoclinic.org › syc-20369077.
- Weinblatt, E. M., 2020. Pediatric Acute Myelocytic Leukemia. Available: http://emedicine.medscape.com/article/987228-overview.

- WHO, (2017). 10 facts about cancer. Available at: http://www.who.int/features/factfiles/cancer/en/.
- Williams, L.S. and Hopper, P.D., 2015. Understanding medical surgical nursing, fifth edition. Philadelphia: F.A. Davis Company, P. 576.
- Wolff, J.L., Feder, J., and Schulz R., 2016. Supporting Family caregivers of older Americans. *N Engl J Med*, *375*(26):2513-15.

(Y)

- Yakar, H.K. and Pinar, R., 2013. Reliability and validity of Turkish version of the caregiver quality of life index cancer scale. *Asian Pacific Journal of Cancer Prevention, 14*(7), pp.4415-4419.
- Yeh, C.H., 2001. Adaptation in children with cancer: Research with Roy's model. *Nursing Science Quarterly*, *14*(2), pp.141-148.
- Yigitalp, G., Surucu, H.A., Gumus, F. and Evinc, E., 2017. Predictors of caregiver burden in primary caregivers of chronic patients. *International Journal of Caring Sciences*, *10*(3), p.1168.

(Z)

- Zainal Ariffin, O. and Nor Saleha, I.T., 2011. National cancer Registry report 2007 Ministry of Health.
- Zając-Spychała, O., Pawlak, M., Karmelita-Katulska, K., Pilarczyk, J., Jończyk-Potoczna, K., Przepióra, A., Derwich, K. and Wachowiak, J., 2018. Anti-leukemic treatment-induced neurotoxicity in long-term survivors of childhood acute lymphoblastic leukemia: impact of reduced central nervous system radiotherapy and intermediate-to high-dose methotrexate. *Leukemia & lymphoma, 59*(10), pp.2342-2351.

- Zanon, R.B., Silva, M.A.D., Mendonça, E.J.D., Bandeira, D.R., Santos, M.A.D., Halpern, R. and Bosa, C.A., 2017. Brazilian study of adaptation and psychometric properties of the Coping Health Inventory for Parents. Psicologia: Reflexão e Crítica, 30.
- Zarina, A., Radhiyah, R., Hamidah, A., Zakaria, S.Z.S. and Jamal, R., 2012. Parenting stress in Childhood Leukaemia. *Medicine & Health, 7*, P. 73-83.
- Zeidan, A.M., Mahmoud, D., Kucmin-Bemelmans, I.T., Alleman, C.J., Hensen, M., Skikne, B. and Smith, B.D., 2016. Economic burden associated with acute myeloid leukemia treatment. *Expert review of hematology, 9*(1), pp.79-89.
- Zeliha, K.O.Ç., Sağlam, Z. and ÇINARLI, T., 2016. Determination of Caring Burden and Factors Affecting Relatives of Patients Caring for Individuals Diagnosed with Cancer. *Samsun Journal of Health Sciences, 1*(1), pp.99-116.
- Zhan, C., Wu, Z., Yang, L., Yu, L., Deng, J., Luk, K., Duan, C. and Zhang, L., 2022. Disparities in economic burden for children with leukemia insured by resident basic medical insurance: evidence from real-world data 2015–2019 in Guangdong, China. *BMC health services research, 22*(1), pp.1-12.
- Zhang, S., Edwards, H., Yates, P., Li, C. and Guo, Q., 2014. Self-efficacy partially mediates between social support and health-related quality of life in family caregivers for dementia patients in Shanghai. *Dementia and geriatric cognitive disorders, 37*(1-2), pp.34-44.

Appendix (A)
Administrative Arrangement

Appendix A

University of Babylon
College of Nursing
Research Ethics Committee
Issue No: 44
Date: 23 /03 /2021

جـامـعة بـابـل
كـلية التمريـض
لجنة اخلاقيات البحث العلمي

Approval Letter

To,
Zahraa Kadhum Abbas

The Research Ethics committee at the University of Babylon, College of Nursing has reviewed and discussed your application to conduct the research study entitled " Care Burden Coping Strategies Practiced by Mothers for their Children with Leukemia in Al-Basrah Province."

The Following documents have been reviewed and approved:

1. Research protocol
2. Research instrument/s
3. Participant informed consent

Committee Decision:
The committee approves the study to be conducted in the presented form. The Research Ethics committee expects to be informed about any changes occurring during the study, any revision in the protocol and participant informed consent.

Prof. Dr. Salma K. Jehad
Chair Committee
College of Nursing
Research Ethical Committee
23 / 3 /2021

Ministry of Higher Education and Scientific Research
وزارة التعليم العالي والبحث العلمي
University of Babylon
College of Nursing
جامعة بابل
كلية التمريض
لجنة الدراسات العليا

Ref. No. : العدد : ٩٤١
Date: / / التاريخ : ٢٠٢١ / ٣ / ٢٣

الى / دائرة صحة البصرة / مركز التدريب والتنمية البشرية
م/ تسهيل مهمة

تحية طيبة :

يطيب لنا حسن التواصل معكم ويرجى تفضلكم بتسهيل مهمة طالبة الدكتوراه (زهراء كاظم عباس حسن) لغرض جمع عينة دراسة الدكتوراه والخاصة بالبحث الموسوم :

عبء الرعاية واستراتيجيات التأقلم التي تمارسها الأمهات لأطفالهن المصابين بسرطان الدم في محافظة البصرة

Care Burden Coping Strategies Practiced by Mothers for their Children with Leukemia in AL- Basrah Province

مع الاحترام ...

أ.م.د. حسام عباس داود
معاون العميد للشؤون العلمية والدراسات العليا
٢٣/ ٣/ ٢٠٢١

صورة عنه الى //
- مكتب السيد العميد للتفضل بالاطلاع مع الاحترام .
- لجنة الدراسات العليا
- الصادرة .

E-mail:nursing@uobabylon.edu.iq
وطني 07711632208
المكتب 009647711632208

جمهورية العراق
وزارة الصحة
دائرة صحة البصرة
مكتب المدير العام
مركز التدريب و التنمية البشرية
شعبة ادارة المعرفة/البحوث

العدد : ٤٢٤
التاريخ : ٢٠٢١/٦/٢٧

الى /م. البصرة التخصصي للاطفال

م/ تسهيل مهمة

عقدت لجنة البحوث في دائرة صحة البصرة اجتماعها في يوم ٢٠٢١/٦/٢٢ وتم دراسة مشروع البحث ذي الرقم (٢٠٢١/٤٠٥) المعنون:

(عبء الرعاية واستراتيجيات التاقلم التي تمارسها الامهات لاطفالهن المصابين بأبيضاض الدم في محافظة البصرة)

والمقدم من الباحثة (زهراء كاظم عباس- ممرض جامعي –معهد الصحة العالي /دائرة صحة بابل) في دائرة صحة البصرة بتاريخ ٢٧ / ٦ /٢٠٢١ وقررت:

"الموافقة على تنفيذ مشروع البحث بصيغته المقدمة ولاعلم من تنفيذه في مؤسسات الدائرة."

لتفضلكم بالاطلاع وتسهيل مهمة الباحث لاجراء بحثة مع التقدير....

المرفقات:
قرار لجنة البحوث المرقم ٢٠٢١/٢٢

الطبيبة الاختصاص
د. رجاء احمد محمود
مديرة مركز التدريب والتنمية البشرية
٢٠٢١/ ٦/

نسخة منه الى:
مركز التدريب والتنمية البشرية لمع للاولاد.

وزارة الصحة
دائرة صحة البصرة
مركز التدريب والتنمية البشرية
لجنة البحوث

رقم القرار ٢٠٢١/٣٥
تاريخ القرار: ٢٠٢١/٦/٢٧

قرار لجنة البحوث

درست لجنة البحوث في دائرة صحة البصرة مشروع البحث ذي الرقم (٢٠٢١/٤٠٥) المعنون:

(عبء الرعاية واستراتيجيات التاقلم التي تمارسها الامهات لاطفالهن المصابين بابيضاض الدم في محافظة البصرة)

والمقدم من الباحثة (زهراء كاظم عباس- ممرض جامعي –معهد الصحة العالي /دائرة صحة بابل) في دائرة صحة البصرة بتاريخ ٢٧ / ٦ / ٢٠٢١ وقررت:

"الموافقة على تنفيذ مشروع البحث بصيغته المقدمة ولامانع من تنفيذه في مؤسسات الدائرة."

المطبق الاختصاص
د. علي كاظم قاسم
مقرر لجنة البحوث / دائرة صحة البصرة
/ ٦ / ٢٠٢١

المرفقات :
لا يوجد

الملاحظات:
- تم تخويل رئيس لجنة البحوث او مقرر اللجنة للتوقيع على هذا القرار استنادا الى النظام الداخلي للجنة البحوث .
- الموافقة تعني ان مشروع البحث قد استوفى المعايير الأخلاقية والعلمية لإجراء بحث والمعتمدة في وزارة الصحة، اما التنفيذ فيعتمد على التزام الباحث بتعليمات المؤسسة الصحية التي سينفذ فيها البحث. وعلى الباحث التواصل مع مسئول البحوث في المؤسسة الصحية التي يجرى بها البحث واطلاعه على مجريات البحث بشكل دوري ولحين انتهاء البحث.

Appendix (B)
List of Experts

Appendix (B)

List of Experts

ت	أسم الخبير	اللقب العلمي	التخصص	مكان العمل	سنوات الخبرة
1	د. أمين عجيل الياسري	أستاذ	تمريض صحة مجتمع	جامعة بابل / كلية التمريض	37
2	د. عبد المهدي عبد الرضا	أستاذ	تمريض صحة الطفل و المراهق	جامعة بابل / كلية التمريض	42
3	د. عفيفة رضا عزيز	أستاذ	تمريض صحة الطفل و المراهق	جامعة بغداد / كلية التمريض	40
4	د. سلمى كاظم جهاد	أستاذ	تمريض صحة مجتمع	جامعة بابل / كلية التمريض	36
5	د. اركان بهلول ناجي	أستاذ	تمريض صحة مجتمع	جامعة بغداد / كلية التمريض	35
6	د. حسين جاسم محمد	أستاذ	تمريض صحة مجتمع	جامعة بابل / كلية التمريض	29
7	د. هالة سعدي عبد الواحد	أستاذ	تمريض صحة مجتمع	جامعة بغداد / كلية التمريض	27
8	د.سحرأدهم علي	أستاذ	تمريض بالغين	جامعة بابل / كلية التمريض	26
9	د. ختام مطشر	أستاذ مساعد	تمريض صحة الطفل و المراهق	جامعة بابل / كلية التمريض	23
10	د. وسام جبار قاسم	أستاذ مساعد	تمريض صحة مجتمع	جامعة بغداد / كلية التمريض	25
11	د. خميس بندر عبيد	أستاذ مساعد	تمريض صحة الطفل و المراهق	جامعة كربلاء / كلية التمريض	21
12	د. علاء محيبس	أستاذ مساعد	تمريض صحة مجتمع	جامعة ذي قار / كلية التمريض	16
13	د. عذراء حسين	أستاذ مساعد	تمريض صحة الطفل و المراهق	جامعة بغداد / كلية التمريض	16

14	د.حيدر حمزة علي	أستاذ مساعد	تمريض الصحة النفسية والعقلية	جامعة بابل / كلية التمريض	12
15	د.حسام محمود	أستشاري	أطفال	مستشفى البصرة التخصصي للأطفال	30
16	د.زيد وحيد	مدرس دكتور	تمريض صحة الطفل و المراهق	جامعة بغداد / كلية التمريض	14

Appendix (C)

Questionnaires Format

Appendix (C)

Questionnaires in Arabic

عزيزتي الأم

تحية طيبة.....

الاستبانة الخاصة بأطروحة الدكتوراة **(عبء الرعاية و استراتيجيات التأقلم التي تمارسها الأمهات لأطفالهن المصابين بسرطان الدم في محافظة البصرة)**

بكل التقدير والامتنان والفخر والاعتزاز أقدر مشاركة شخصكم الكريم في هذه الاستبانة التي ستساعدنا في اخذ الفائدة المرجوة من البحث والذي سيعود فضله إن شاء الله على الأطفال المصابين بأيضاض الدم لذا أرجو الإجابة بشكل دقيق وتوخي صحة المعلومة لأعمام الفائدة بأذن الله . علما بأن المعلومات ستعامل بسرية وتستعمل لأغراض البحث فقط.

ملاحظة: ضع أشارة صح(✓) في المربع المناسب **رقم الاستمارة**

التاريخ: / / 2021

.

طالبة الدكتوراه
زهراء كاظم عباس
تمريض الأطفال
جامعة بابل/ كلية التمريض

الجزء الأول: الخصائص الأجتماعية الديموغرافية

اولا: الخصائصى الديموغرافية للأم

1. العمر (سنة) ☐

2. المستوى التعليمي :

1. ☐ لا تقرأ و لا تكتب
2. ☐ تقرأ فقط
3. ☐ تقرأ و تكتب
4. ☐ أبتدائية
5. ☐ متوسطة
6. ☐ أعدادية
7. ☐ معهد
8. ☐ كلية
9. ☐ دراسات عليا

3. المهنة:

1. ☐ لا تعمل 2. ☐ تعمل

4. الحالة الاجتماعية:

1. متزوجة ☐
2. مطلقة ☐
3. أرملة ☐
4. منفصلة ☐

5. الحالة الأقتصادية:

1. لا يكفي ☐

2. يكفي لحد ما ☐

3. يكفي ☐

6. السكن:

1. ريف ☐

2. حضر ☐

7. نوع الأسرة:

1. منفردة ☐

2. ممتدة ☐

8. عدد الأطفال ☐

ثانيا: المعلومات الديموغرافية للطفل

1. العمر ☐ سنة

2. الجنس:

1. ذكر ☐

2. أنثى ☐

3. تسلسل الطفل بين أشقائه: ☐

4. هل هناك طفل آخر في العائلة مصاب بأبيضاض الدم:

1. نعم ☐

2. لا ☐

ثالثا: التاريخ الطبي للطفل:

1. التشخيص الطبي للطفل:

1.أبيضاض الدم الليمفاوي الحاد ☐
2. أبيضاض الدم النخاعي الحاد ☐

2. فترة المرض منذ التشخيص:

1. أقل من ستة أشهر ☐
2. أكثر من ستة أشهر ☐

3.القيود بسبب المرض للطفل:

1. التنقل ☐
2. التفاعل مع الأصدقاء ☐
3. الأداء في روتين الرعاية الذاتية ☐
4. آخر ☐

4. حالة المرض الحالية:

1. تشخيص جديد (خلال آخر 30يوما) ☐
2. تخفيف ☐
3. الأنتكاس الأول ☐
4. الأنتكاس الاحق ☐
5. المرض المتقدم ☐
6. نهاية الحياة ☐
7. آخر ☐

5. علاج المرض الحالي:

1. بدون علاج ☐
2. العلاج الكيميائي ☐
3. العلاج الأشعاعي ☐

4. الجراحة
5. زرع نحاع العظم /الخلايا الجذعية
6. العلاج التجريبي
7. العناية التلطيفية
8. آخرى

الجزء الثاني: عبء الأمهات في رعاية الأطفال المصابين بسرطان الدم:

ت	العناصر	دائما	أحيانا	أبدا
1	الطفل يطلب مساعدة أكثر مما يحتاج			
2	قضاء الوقت مع طفلي يمنعني من الاهتمام بنفسي و عائلتي			
3	أشعر بالتوتر إزاء عدم التوازن في مسؤولياتي بين الطفل المريض و الاسرة والعمل			
4	إحساس بالحرج من سلوك الطفل			
5	أشعر باليأس لأنني أعتني بطفلي المصاب			
6	رعاية طفلي تؤثرسلبا على علاقاتنا مع أفراد الاسرة أو الأصدقاء بطريقة سلبية			
7	أشعر بالخوف مما يخبئه المستقبل لطفلي			
8	طفلي يعتمد عليّ بشكل كامل			
9	أشعر بالتوتر عندما أكون قرب طفلي			
10	لقد تأثرت صحتي بسبب التزامي مع طفلي المصاب			
11	ليس لدي الكثير من الخصوصية كما أريد بسبب تواجدي المستمرمع طفلي المصاب			
12	لقد أهملت حياتي الأجتماعية لأنني أهتم بطفلي المصاب			
13	أشعر بعدم الارتياح حيال أصدقائي بسبب رعاية طفلي			
14	أن طفلي يتوقع مني أن أعتني به كما لو كنت الشخص الوحيد الذي يمكنه الاعتماد عليه			
15	ليس لدية ما يكفي من المال لرعاية طفلي بالأضافة إلى غيرها من النفقات الأخرى			
16	أخشى من عدم تمكني من رعاية طفلي المصاب لفترة أطول			
17	فقدت السيطرة على حياتي منذ مرض الطفل			
18	اسمح لشخص آخر برعاية طفلي			
19	أشعر بعدم اليقين بشأن ما يجب عليه فعله لطفلي			
20	أشعر أنه يجب أن أفعل المزيد لطفلي			
21	يمكنني رعاية طفلي المصاب بشكل أفضل			
22	بشكل عام ، أشعر بالإرهاق لرعاية طفلي المصاب			

الجزء الثالث: استراتيجيات التكيف لأمهات الأطفال المصابين بسرطان الدم

1	مواجهة التأقلم	دائما	احيانا	ابدا
1	أعتمدت على نفسي وحاربت من أجل ما أريد.			
2	حاولت إقناع الشخص المسؤول بتغيير رأيه			
3	أعبر عن غضبي للشخص (الأشخاص) الذي تسبب في المشكلة.			
4	تركت مشاعري تخرج بطريقة ما.			
5	أخذت فرصة كبيرة أو فعلت شيئا بالغ الخطورة.			
6	فعلت شيئًا لم أكن أعتقد أنه سينجح ، لكنني على الأقل كنت أفعل شيئًا.			
2	**التباعد**	**دائما**	**احيانا**	**ابدا**
7	حاولت أن أنسى كل شيء.			
8	ذهبت كما لو لم يحدث شيء.			
9	أنتظرت لأرى ما سيحدث قبل أن أفعل أي شيء.			
10	ذهبت مع القدر. أحيانًا يكون حظي سيئًا.			
11	شعرت أن الوقت سيحدث فرقًا - الشيء الوحيد الذي يجب أن أفعله هو الانتظار.			
12	قبلت ذلك لأنه لا يمكن فعل أي شيء.			
13	رفضت الحصول على جدية حول تشخيص طفلي المصاب			
14	رفضت التفكير كثيرا حول موضوع طفلي المصاب			
15	أقوم ببعض الأعمال لتشتيت ذهني حول التفكير عن الموضوع.			
3	**ضبط النفس**	**دائما**	**احيانا**	**ابدا**
16	حاولت الاحتفاظ بمشاعري لنفسي.			
17	أتجنب التواجد مع الناس بشكل عام.			
18	أمنع الآخرين من معرفة مدى سوء الأمور.			
19	أحاول ألا أنزعج بل أترك الأمور مفتوحة بعض الشيء.			
20	أحاول ألا أتسرع أو أتبع حدسي الأول.			
21	أحاول منع مشاعري من التدخل في أشياء أخرى أكثر من اللازم.			

22	فكرت في الأستفادة من خبرات الأشخاص الذين لديهم أطفال مصابين بنفس المرض.			
23	أحافظ على كبريائي			
4	**السعي للحصول على الدعم الاجتماعي**	**دائما**	**احيانا**	**ابدا**
24	أتحدث إلى شخص قريب عما كنت أشعر به.			
25	أتقبل التعاطف والتفاهم من شخص ما.			
26	أتحدث إلى شخص يمكنه فعل شيء ملموس بشأن مشكلة طفلي.			
27	أتحدث إلى شخص ما لمعرفة المزيد عن مرض طفلي.			
28	أسأل الأخرين للحصول على المشورة.			
29	حصلت على مساعدة مهنية.			
30	أستخدم الدعاء و الصلاة لغرض الأطمئنان النفسي.			
5	**قبول المسؤولية**	**دائما**	**احيانا**	**ابدا**
31	أعلم نفسي الصبر.			
32	أدركت أنني جلبت المشكلة على نفسي.			
33	لقد قطعت وعدًا لنفسي بأن الأمور ستكون مختلفة في المرة القادمة.			
34	اعتذرأو أفعل شيئًا للتعويض			
35	لقد قبلت الشيء التالي الأفضل لما أردت.			
36	أعددت نفسي للأسوأ.			
37	أذكر نفسي كم يمكن أن تكون الأمور أسوأ.			
6	**الهروب- التجنب**	**دائما**	**احيانا**	**ابدا**
38	أ تمنى أن تزول مشكلة طفلي أو تنتهي بطريقة ما.			
39	أمل ان تحدث معجزة			
40	كان لديه تخيلات أو رغبات حول كيف يمكن أن تسير الأمور.			
41	أحاول أن أشعر بتحسن من خلال الأكل والشرب والتدخين وتعاطي المخدرات أو الأدوية ، إلخ			
42	رفضت تصديق حدوث مرض لطفلي			
43	ابتعد عن رعاية طفلي فترة ؛ أحاول أن أخذ قسط من الراحة أو أخذ إجازة.			
44	أركض أوأمارس الرياضة			
45	أنام أكثر من المعتاد.			
46	أخرج الى أشخاص آخرين.			
47	أتمنى أن أغير ما حدث لطفلي أو ما شعرت به.			

48	أحلم أو أتخيل وقتًا أو مكانًا أفضل من ذلك الذي كنت فيه.			
7	**التأقلم المركز على المشكلة**	**دائما**	**احيانا**	**ابدا**
49	أركز فقط على ما يجب أن أفعله لطفلي بعد ذلك - الخطوة التالية.			
50	أراجع في ذهني ما سأقوله أوأفعله لطفلي			
51	كنت أعرف ما يجب القيام به ، لذلك ضاعفت جهودي لإنجاح الأمور.			
52	أضع حلين مختلفين للمشكلة.			
53	أضع خطة عمل واتبعتها.			
54	أحاول أن أرى الأشياء من وجهة نظر الشخص الآخر.			
55	أغير شيئا من الأشياء حتى تسير الأمور على ما يرام.			
56	أحاول تحليل مشكلة طفلي لفهمها بشكل أفضل.			
57	أعتمد على تجاربي الماضية التي كانت مماثله لوضعي من قبل.			
8	**التركيز على الجانب الأيجابي**	**دائما**	**احيانا**	**ابدا**
58	أخرج من التجربة أفضل مما كنت عليه في بداية المشكلة عندما عرفت بمرض طفلي			
59	العثور على وسيلة جديده من أجل أنقاذ طفلي.			
60	لقد غيرت شيئا عن نفسي.			
61	كان مصدر إلهام أن أفعل شيئا إبداعيا			
62	تغيرت أو كبرت كشخص بطريقة جيدة.			
63	إعادة اكتشاف ما هو مهم في الحياة.			
64	أحاول أن أنظر إلى الجانب المشرق من الأشياء.			
65	أحاول الحصول على شيء إيجابي من هذا الوضع			
66	أخبر نفسي بأشياء ساعدتني على الشعور بتحسن.			

Questionnaires in English

Part one: Socio-Demographic characteristics

A- Mother's demographic characteristics:

1. Age ☐ **years**

2. Level of education

1. Unable to read and write ☐
2. Only read ☐
3. Read and write ☐
4. Primary school certificate ☐
5. Intermediate ☐
6. Secondary ☐
7. Institute ☐
8. College ☐

3. Occupation:

1. Unemployed ☐
2. Employed ☐

4. Marital status:

1. Married ☐
2. Divorced ☐
3. Widowed ☐
4. Separated ☐

5. **Economic status:**

1. Unsatisfied ☐

2. Satisfied to some extent ☐

3. Satisfied ☐

5. **Residence:**

1. Rural ☐

2. Urban ☐

7. Type of family:

1. Nuclear ☐

2. Extended ☐

8. Number of children ☐

B- Child's demographic characteristics:

1. Age ☐ **year**

2. Gender:

1. Male ☐

2. Female ☐

3. Child order among their siblings: ☐

4. Other children with Leukemia in the family:

1. Yes ☐

2. No ☐

C- Medical history of child with leukemia:

1. **The medical diagnosis of children:**
   1. Acute Lymphocytic (ALL) ☐
   2. Acute Myelogenous (AML) ☐
2. **Duration of disease since diagnosis:**
   1. Less than six months ☐
   2. More than six months ☐
3. **Limitations due to disease process for child:**
   1. Mobility ☐
   2. Interacting with friends ☐
   3. Performance in self-care routines ☐
   4. Other ☐
4. **Current Disease Status:**
   1. New diagnosis (within last 30 days) ☐
   2. Remission ☐
   3. Initial Relapse ☐
   4. Subsequent Relapse ☐
   5. Progressive disease ☐
   6. End of Life ☐
   7. Other ☐
5. **Current Disease Treatment**
   1. None ☐
   2. Chemotherapy ☐
   3. Radiation ☐
   4. Surgery ☐
   5. Bone Marrow/Stem Cell Transplant ☐
   6. Experimental Therapy ☐
   7. Palliative Care ☐
   8. Other ☐

Part two: mother's burden in caring of child with leukemia:

NO.	Items	Always	Sometimes	Never
1	The child is asking for more help than he needs.			
2	Spending time with my child prevents me from paying attention to myself and my family			
3	I feel nervous about not being balanced in my responsibilities between the diseased child, family and work			
4	Sense embarrassed over the child's behavior			
5	I feel hopeless as I take care of my effected child.			
6	Taking care of my child, will affects our relationships with family members or friends in a negative way			
7	I feel afraid of what the future holds for my child			
8	My child is dependent on me.			
9	I feel strained when I'm around my child			
10	My health has suffered because of involvement with my affected child			
11	I don't have as much privacy as I want because of my child			

12	My social life has suffered because I care for my child			
13	I feel uncomfortable about having friends over because of my child's care			
14	My child seems to expect me to take care of him/her as if I were the only one he/she could depend on			
15	I do not have enough money to take care of my child in addition to other expenses			
16	I will be unable to take care of my child for much longer			
17	lost control of my life, since the disease of child			
18	Allow someone else to take care of my child			
19	Sense unsure about what to do for my child			
20	I feel should be doing more for my child			
21	I can take better care of my affected child			
22	In general, I feel overwhelmed for taking care of the child			

Part three: mother's Coping Strategies of children with leukemia:

1	Confront coping	Always	Sometime	Never
1.1	Stood my ground and fought for what I wanted.			
1.2	Tried to get the person responsible to change his or her mind.			
1.3	I expressed anger to the person(s) who caused the problem.			
1.4	I let my feelings out somehow.			
1.5	Took a big chance or did something very risky.			
1.6	I did something which I didn't think would work, but at least I was doing something.			
2	**Distancing**	**Always**	**Sometime**	**Never**
2.1	Tried to forget the whole thing.			
2.2	Went on as if nothing had happened.			
2.3	I waited to see what would happen before doing anything.			
2.4	Went along with fate; sometimes I just have bad luck.			
2.5	I felt that time would make a difference – the only thing to do was to wait.			
2.6	Accepted it, since nothing could be done.			
2.7	Made light of the situation; refused to get too serious about it.			

2.8	Didn't let it get to me; refused to think too much about it.			
2.9	Turned to work or substitute activity to take my mind off things.			
3	**Self-controlling**	**Always**	**Sometime**	**Never**
3.1	I tried to keep my feelings to myself.			
3.2	Avoided being with people in general.			
3.3	Kept others from knowing how bad things were.			
3.4	Tried not to burn my bridges, but leave things open somewhat.			
3.5	I tried not to act too hastily or follow my first hunch.			
3.6	I tried to keep my feelings from interfering with other things too much.			
3.7	I thought about how a person I admire would handle this situation and used that as a model.			
3.8	Maintained my pride and kept a stiff upper lip.			
4	**Seeking social support**	**Always**	**Sometime**	**Never**
4.1	Talked to someone about how I was feeling.			
4.2	Accept sympathy and understanding from someone.			

4.3	Talked to someone who could do something concrete about the problem.			
4.4	Talked to someone to find out more about the situation.			
4.5	I asked a relative or friend I respected for advice.			
4.6	I got professional help.			
4.7	I prayed.			
5	**Accepting responsibility**	**Always**	**Sometime**	**Never**
5.1	Criticized or lectured myself.			
5.2	Realized I brought the problem on myself.			
5.3	I made a promise to myself that things would be different next time.			
5.4	I apologized or did something to make up.			
5.5	I accepted the next best thing to what I wanted.			
5.6	I prepared myself for the worst.			
5.7	I reminded myself how much worse things could be.			
6	**Escape- Avoidance**	**Always**	**Sometime**	**Never**
6.1	Wished that the situation would go away or somehow be over with.			
6.2	Hoped a miracle would happen.			

6.3	Had fantasies or wishes about how things might turn out.			
6.4	Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, etc			
6.5	Refused to believe that it had happened.			
6.6	Got away from it for a while; tried to rest or take a vacation.			
6.7	I jogged or exercised.			
6.8	Slept more than usual.			
6.9	Took it out on other people.			
6.10	Wished that I could change what had happened or how I felt.			
6.11	I daydreamed or imagined a better time or place than the one I was in.			
7	**problem-solving coping**	**Always**	**Sometime**	**Never**
7.1	Just concentrated on what I had to do next – the next step.			
7.2	I went over in my mind what I would say or do.			
7.3	I knew what had to be done, so I doubled my efforts to make things work.			
7.4	Came up with a couple of different solutions to the problem.			

7.5	I made a plan of action and followed it.			
7.6	I tried to see things from the other person's point of view.			
7.7	Changed something so things would turn out all right.			
7.8	I tried to analyze the problem in order to understand it better.			
7.9	Drew on my past experiences; I was in a similar situation before.			
8	**Focusing on the positive**	**Always**	**Sometime**	**Never**
8.1	I came out of the experience better than when I went in.			
8.2	Found new faith.			
8.3	I changed something about myself.			
8.4	I was inspired to do something creative.			
8.5	Changed or grew as a person in a good way.			
8.6	Rediscovered what is important in life.			
8.7	Looked for the silver lining, so to speak; tried to look on the bright side of things.			
8.8	Bargained or compromised to get something positive from the situation.			
8.9	I told myself things that helped me to feel better.			

Appendix (D)

Linguistic expert

Appendix D **Linguistic Expert**

Ministry of Higher Education and Scientific Research
وزارة التعليم العالي والبحث العلمي
جمهورية العراق
University of Babylon
College of Education for Human Sciences
جامعة بابل
كلية التربية للعلوم الانسانية

Ref. No :
Date: / /

العدد : ٥/ ١٧٧
التاريخ : ١٢ / ٦ / ٢٠٢٢

جامعة بابل
الدراسات العليا
كلية التربية للعلوم الانسانية

الى/جامعة بابل/ كلية التمريض

مكتب السيد معاون العميد للشؤون العلمية المحترم

م/أعادة رسالة

تحية طيبة :

اشارة الى كتابكم المرقم (١٩٧١) في ٢٠٢٢/٥/٣١، نعيد إليكم رسالة طالبة الدراسات العليا / الدكتوراه (زهراء كاظم عباس) بعد تقويمها لغوياً من قبل (أ.م.د.حسين حميد معيوف) من قسم اللغة الانكليزية في كليتنا، وقد ثبت الملاحظات على متن الرسالة يرجى من الباحثة الالتزام بها.

*** مع الاحترام ***

جامعة بابل
الدراسات العليا
كلية التربية للعلوم الانسانية

أ.م.د. اسامة كاظم عمران
معاون العميد للشؤون العلمية
والدراسات العليا

نسخة منه إلى //
- الدراسات العليا .
- الصادرة

//سارة //

البريد الالكتروني bad_edu_humsci@yahoo.com
امنية 07801010633
www.uobabylon .edu.iq

المستخلص

أجريت دراسة وصفية مقطعية تم من خلالها تقييم عبء الرعاية واستراتيجيات التأقلم التي تمارسها الأمهات لأطفالهن المصابين بسرطان الدم في محافظة البصرة خلال الفترة من 1 تشرين الثاني / 2020 إلى 1 آذار /2022.

أختيرت عينة غير احتمالية (عينة مناسبة) مكونة من (105) أم لديهن أطفال دون سن الثامنة عشر من أستشارية الأورام وأمراض الدم و ردهة سرطان الدم (ب) في مستشفى البصرة التخصصي للأطفال.

جمعت البيانات من خلال استخدام أداة القياس (الأستبانة) (ZBI, and Ways of Coping) ووسيلة المقابلة كطريقة لجمع البيانات. يتألف الأستبيان من ثلاثة أجزاء والتي تتكون من أولا: الخصائص الديموغرافية والذي يتكون من ثلاثة أقسام، ثانيا: عبء الأمهات في رعاية أطفالهن المصاب بسرطان الدم والذي يتكون من (22) فقرة، ثالثا: استراتيجيات التأقلم لأمهات الأطفال المصابين بسرطان الدم والذي يتكون (66) فقرة.

تم تحديد مصداقية الأستبيان من خلال لجنة مكونة من (16) خبيرو أجريت دراسة تجريبية لتحديد موثوقية الأستبيان من خلال تطبيق معامل الأرتباط (Cronbach alpha). والذي نتج عنه (0.732) لعبء الرعاية و (0.636) لاستراتيجيات التأقلم.

تم الحصول على البيانات من خلال استخدام أداة القياس (الأستبانة) ووسيلة المقابلة كطريقة لجمع البيانات. بدأ جمع البيانات في الفترة من 9 تموز الى 20 تشرين الأول 2021. وتم إجراء المقابلات مع الأمهات اللاتي حضرن مستشفى البصرة التخصصي في محافظة البصرة.

وتم تحليل البيانات من خلال استخدام نظام التحليل الإحصائي (SPSS) النسخة (24) والتي أجريت من خلال استخدام نظام تحليل البيانات الإحصائية الوصفية و الأستنتاجية.

توضح نتائج تحليل البيانات أن عبء الأمهات المتعلق برعاية أطفالهن المصابين بأبيضاض الدم تم إثباته بمتوسط (2.56) ووفقًا لمعايير الدراسة ، عبّرت الأمهات عن عبء شديد لرعاية أطفالهن. أظهرت معظم (89.5٪) استراتيجيات الأمهات للتكيف مع الأطفال المصابين بسرطان الدم تأقلمًا متوسطا، وقد ارتبطت استراتيجيات التأقلم ارتباطا وثيقا بالحالة الأجتماعية، المهنة، وعمر الطفل و

كانت علاقة ذات دلالة احصائية بقيمة $p<0.05$. حيث لا توجد علاقة ذات دلالة احصائية بين شدة عبء الرعاية والخصائص الديموغرافية. علاوة على ذلك ، تظهر الدراسة الحالية أن هناك علاقة غير مهمة (ارتباط سلبي ضعيف) بين استراتيجيات التأقلم للأمهات الإجمالية للأطفالهن المصابين بأبيضاض الدم وعبء الرعاية.

الأستنتاجات من هذه الدراسة تشيرإلى أن الاستجابات العامة للأمهات المدروسات كانت شديدة في عبء الرعاية و متوسطة في استراتيجيات التأقلم للأطفال المصابين بأبيضاض الدم في مستشفى البصرة التخصصي للأطفال.

توصي الدراسة بضرورة تنظيم البرامج المناسبة وتنفيذها لدعم الأمهات. يجب اعتبار استخدام مهارات التأقلم الفعالة لتقليل مستوى عبء الأمهات وتحسين أنماط التأقلم كأولوية لدعم أمهات الأطفال المصابين بأبيضاض الدم.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة بابل
كلية التمريض

عبء الرعاية و استراتيجيات التأقلم التي تمارسها الأمهات لأطفالهن المصابين بسرطان الدم في محافظة البصرة

اطروحة مقدمة من قبل

زهراء كاظم عباس العيساوي

الى مجلس كلية التمريض، جامعة بابل كجزء من متطلبات نيل درجة الدكتوراه فلسفة في علوم التمريض

بإشراف

أ.د. نهاد محمد قاسم الدوري

2022 ميلادية **1444هجرية**