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Effectiveness of an Education Program Upon Mothers Knowledge and Attitudes Toward Iron Deficiency Anemia Among their Elementary School Children

A Dissertation
Submitted to the Council of College of Nursing, University of Babylon as Partial Fulfillment of the Requirements for the Doctorate Degree of Philosophy in Nursing

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الإهداء

❖ الى الغائبة الحاضرة في قلبي ... لا أعرف كيف أخاطبك بلغة الدموع أم بلغة الفراق أم بلغة الغائب ...لأن روحك مازالت تحمل أنيني واشتياقي اليك يأتيني كطيف بأحلامي مبتسمة وكأنك تجمعين شتاتي وشتات حزني وتذهب بعيدا... رحمك الله يا زوجتي ورفيقتي في كل نجاحاتي ....

❖ إلى من كللهم الله بالهيبة والوقار.. إلى من علموني العطاء بدون انتظار... إلى من أحمل أسمهم بكل افتخار.. أرجو من الله أن يمد في عمركم لتروا ثماراً قد حان قطافها بعد طول انتظار وستبقى كلماتكم نجوم أهتدي بها اليوم وفي الغد وإلى الأبد... والدي.. والدتي العزيزين.

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Abstract

Anemia is a pathological condition in which the number of red blood cells is low, the term anemia refers to the state in which the level of hemoglobin in the blood is lower than normal due to a deficiency in one or a group of essential nutrients, this disease is considered one of the common diseases in children in the primary school stage in many countries. This study aimed to identify the effectiveness of the present educational program on the knowledge and attitudes of mothers who have children with anemia through the application of the pre and post-test and to find-out the relationship between mothers' response to the education program with their demographic variables.

A quasi-experimental study design was conducted by using the educational program prepared for this purpose and based on the pre- and post-test for mothers who have children with anemia. For the period of November 1st, 2019 to June 19th, 2021. Non-probability purposive sample consist of (60) mothers of primary school students suffering from anemia. This sample included (30) mothers as a study group, while (30) other mothers were selected as a control group, from primary health care centers in the first health sector.

The results revealed that the level of mothers' knowledge in study group altered significantly ($P< 0.05$), where it's in pre-test before performing educational program sessions the knowledge score was (22.23) then became in post-test one after the application of educational program sessions (34.9) and in post-test two the score became (33.63), while the knowledge of mothers in control group stayed the same without any change

in pre-test and post-test one and post-test two. The attitudes of mothers towards the anemia disease that their children suffer from it were positive in the study

group during the pre-test and the post I and post II-test, while in control group the assessment of mothers' attitudes were negative in pre and post-test.

The study concluded that the higher percentage of study sample in regarding the age in both group was among mothers with age group (28-37 years). As well as, the knowledge and attitudes of the mothers in the study group improved as a result of the application of the educational program and there was a significant relationship between mother's knowledge about anemia and most demographic data, while in the control group, there were not significant changes in the level of knowledge and attitudes about the disease. This indicated that the applied educational program was effective interventional approach to improve knowledge and attitudes of the targeted mothers.

The study recommended the necessity of cooperation between the Ministry of Health, the Ministry of Higher Education and scientific Research and the Ministry of Education to develop plans for anemia prevention and control, especially among the primary school children.

Teaching staff should be trained and educated mainly by community health nurses, in the field of school health services and health promotion through of mothers and their children to achieve the sustainable development goals at the year 2030 through improvement the health level of children.

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List of Abbreviations

Item	Meaning
AIDS	Acquire immunodeficiency syndrome
ANOVA	Analysis of Variance
AD	Anno Domino
CBC	Complete Blood Count
df	Degree of freedom
DNA	Deoxyribonucleic Acid
e.g.	For Example,
ELISA	Enzyme-Linked Immunosorbent Assay
ESR	Erythrocyte Sedimentation Rate
et. al.	Et alia (Others)
Fr	Frequencies
G6PD	glucose-6-phosphate dehydrogenase
HB	Hemoglobin
HCT	Hematocrit
HPS	Health Promoting School
IDA	Iron Deficiency Anemia
IgG	Immunoglobulin G
IgM	Immunoglobulin M
LDH	Lactate Dehydragenase
M	Mean
M.S	Mean of Score
MCV	Mean Corpuscular Volume
MCH	Mean Corpuscular Hemoglobin
MOH	Ministry Of Health
MMN	Multiple micronutrients
N. S	Not Significant
No.	Number
P- value	Probability Value
P.	Page
PCR	Polymerase Chain Reaction
PHCC	Primary Health Care Center
PCC	Pearson Correlation Coefficient
RCT	Randomized Controlled Trial
RBC	Red Blood cells
S.D.	Standard Deviation
SCA	Sickle cell anemia
S or Sig	Significance

SPSS	Statistical Package of Social Sciences
U.S.	United State
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organization
Vol	Volume
WHO	World Health Organization
WIC	Women Infant Care
°C	The Degree Celsius
χ^2	Chi-Square
%	Percentage
>	More than
<	Less than
$\sum$	Sum
$\leq$	Less than or equal
$\geq$	More than or equal

Chapter One

Introduction

Chapter one

Introduction

1.1. Introduction: -

Anemia is a condition in which there is a reduced number of red blood cells or the hemoglobin concentration within the red blood cells is lower than normal. Hemoglobin is needed to carry oxygen and if you have too few or abnormal red blood cells, or not enough hemoglobin, there will be a decreased capacity of the blood to carry oxygen to the body's tissues. This results in symptoms such as fatigue, weakness, dizziness and shortness of breath, among others. The optimal hemoglobin concentration needed to meet physiologic needs varies by age, sex, elevation of residence, smoking habits, and pregnancy status. The most common causes of anemia include nutritional deficiencies, particularly iron deficiency though deficiencies in folate, vitamins B12 and A are also important causes; hemoglobinopathies; and infectious diseases, such as malaria, tuberculosis, HIV and parasitic infections, (WHO,2019).

Addition to the previous definitions, anemia can be defined as a decrease in the number of hemoglobin, the number of red blood cells with the possibility of a change in the shape of red blood cells. There are many types of anemia that are caused by several factors, the most common of which is nutritional, iron deficiency anemia, which affecting more than 25% of the world's population, iron deficiency anemia is the third leading cause of disability worldwide and contributes to childhood morbidity and mortality, (Faysal, et al,2020).

Anemia is considered a priority health problem among school-age children, with a general prevalence and in varying proportions, and according to the environment, social status and various factors of each

country. Malnutrition and intestinal parasitic infection are among the main factors associated with anemia among school-aged children, (Gutema,et al,2014).

Anemia is a condition in which the child's red blood cells (RBC) are few in number, the term "anemia" refers to a condition in which the hemoglobin content in the blood is below normal due to deficiency of one or more essential nutrients, (Assefa,et al, 2014).

In the modern era, anaemia, malnutrition and parasitic infections continue to be the most common public health problems or problems affecting primary school students, especially in underdeveloped countries, (Kadir, et al,2018). Over 1.5 billion citizens or people are affected by parasitic worms. Currently 1 in 9 (820 million) people worldwide suffer from hunger and a lack of important nutrients that the body needs to function effectively, with more than 90% of stunted children worldwide residing in Asia and Africa, with their numbers rising since in 2015, the World Health Organization mentioned these problems on more than one occasion and time, about 40% of the world's population, or more than two billion people, suffering from anemia. It is the main causes of illness among primary and secondary school students who have the highest prevalence of worms, anemia and malnutrition, (Kesete, et al, 2020).

Anemia is diagnosed when the hemoglobin concentration is less than the set values. When the hemoglobin concentration decreases, the ability of the blood to carry oxygen to the tissues is at risk, leading to symptoms such as fatigue, decreased physical work, and shortness of breath, among other things,(WHO, 2017).

It occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children. It affects more than half of the

children, and has serious consequences since severe anemia is associated with an increased risk of death due to circulatory collapse, shock and recurrent infection. Also death may be caused by inherited anemia, such as sickle cell anemia, can be serious and lead to life-threatening complications. Losing a lot of blood quickly results in acute or severe anemia and can be fatal. Anemia is still considered as the common hematological disorders and common health problem among infants and children, (Eftekhar, et al,2015; Amal, et al, 2010).

A large group of the population, especially children, is still neglected and difficult to be educated, as the needs of children of all ages in particular are often ignored, they can be involved by raising awareness and promoting correct health attitudes and practices about anemia, there is a lack of knowledge and appropriate attitudes regarding healthy eating among children and adolescents and the consequent unhealthy eating behavior, all mentioned through a study conducted in Delhi to assess knowledge, attitudes, practices and behavior change about health in relation to anemia disease, (Singh,et al 2019).

The effect of anemia or low concentrations of hemoglobin negatively on cognitive and motor development and the ability to study and do better, and there is an increase in mortality among children through exposure to infection, which also imposes a great economic burden on the government. Asia is most affected, especially in South Asia, where improvement in hemoglobin status in children leads to a modest global increase in average hemoglobin and a marked reduction in the prevalence of anemia. Globally, anemia affects people in both developed and developing countries with different health risks. Virtually every age group and gender is vulnerable to anemia, (Wang, et al,2020).

Described as a silent but deteriorating health problem, iron deficiency anemia is very prevalent in developing countries. It affects approximately 25 percent of school-age children globally. 48% of children aged 5-15 years suffer from anemia in developing countries. Iron deficiency anemia also negatively affects fitness and endurance, and work efficiency, as it constitutes a major public health problem in childhood that leads to an increased risk of child mortality if neglected, as well as negative consequences of iron deficiency anemia on cognitive and physical development, (Jbireal & Azab,2020; Albaroudi,et al, 2018).

Anemia can result from increased blood loss or decreased red blood cell production, either through bleeding, hemolysis, or both. Anemia is determined by several genetic, infectious or nutritional factors. Genetic factors are responsible for hemoglobinopathy, such as thalassemia and sickle cell anemia, while in some places infectious diseases such as parasitic worms, soil-transmitted malaria and schistosomiasis are the main contributing factors to anemia. Nutritional anemia is also considered to be the result of insufficient nutrients needed during hemoglobin synthesis and red blood cell formation. In addition, exposure to toxic heavy metals such as lead and low levels of trace elements such as copper and zinc can contribute to anemia, and some recent literature has also reported that low levels of vitamin D help increase the risk of anemia in school-aged children, (Shaban,et al,2020).

The World Health Organization has released a report on the IDA global burden of iron deficiency anemia in the year 2000 of 1946.4 years lost, 9430.1 years lost due to disability, and 11376.5 years of life adjusted for disability. Fast-growing children from 0-15 years of age consume iron stores that accumulate during pregnancy, which can physiologically lead

to an absolute deficiency of ferritin, making them one of the populations most at risk of iron deficiency anemia, (Faysal,et al,2020).

1.2 Importance of the Study: -

Anemia is the result of a wide range of causes that coexist with other micronutrient deficiencies, iron deficiency is the most important contributor to anemia, socioeconomic factors such as maternal education, gender standards, low incomes, and intended diseases such as malaria, worm infection, schistosomiasis and other aspects include aspects of food deficiency are vitamin A, folic acid, and vitamin B12, (Mesfin, et al, 2015).

Anemia in children has a major impact on health for life. It affects the physical, mental and social health and development of the child. Anemia, known as low hemoglobin or hematocrit, is a widespread public health problem in both developing and developed countries. It affects more than two billion people worldwide with an estimated 36% of the developing world's population suffering from this disease, (WHO,2015).

It occurs in all age groups, but is more common in pregnant women and children. In particular, young children from low-income families run the risk of iron deficiency anemia due to high demand for iron during the rapid growth period, (Tabi, et al.2019).

Anemia is known to be an important global problem affecting 305 million (25.4%) of school-age children with an estimated prevalence of 40% in developing countries,(Salama & Labib, 2016).

Globally, anemia is a public health problem that affects people in both developed and developing countries with serious consequences for human health as well as social and economic development. Anemia is an important health concern because it negatively affects growth and energy

levels. It destroys immune mechanisms and is also linked to increased rates of disease. (Assefa et al., 2014).

Anemia is the second leading cause of disability in the world worldwide, the World Health Organization (WHO) estimates an estimated 2 billion people with anemia and about 50% of all anemias, iron deficiency cases. Anemia is responsible for about one million deaths annually, three quarters of which occur in Africa and Southeast Asia, (Ahmed,2016).

Anemia affects more than half of preschool-age children and pregnant women in developing countries. However, it is clear that the prevalence of anemia in developing countries is four times higher than in developed countries, (Fage, et al, 2020, ; O. O., 2012).

Anemia, a public health problem that is widespread in both developing and developed countries. It affects more than two billion people worldwide with an estimated 36% of the developing world's population suffering from this disease, (WHO, 2014).

In Arabic countries the prevalence of anemia is different according to the location of this countries and health services table (1.1) reflects the prevalence of anemia in Arabic countries according to report WHO.

Table 1.1. prevalence of child anemia in Arabic countries

Countries	Year period	Prevalence %
Bahrain	2016	30.07
Djibouti	2016	41.98
Egypt	2016	31.71
Eritrea	2016	56.56
Iraq	2016	24.09

Jordan	2016	31.12
Kuwait	2016	25.32
Lebanon	2016	25.05
Libya	2016	28.77
Morocco	2016	33.99
Oman	2016	38.40
Qatar	2016	26.34
Saudi Arabia	2016	37.80
Sudan	2016	57.21
Syria	2016	34.87
Tunisia	2016	28.79
United Arab Emirates	2016	27.23
Yemen	2016	83.51

WHO (2016).

In world countries the prevalence of anemia is different according to the location of this countries and health services table (1.2) reflect the prevalence of anemia in world countries by WHO.

Table 1.2. prevalence of child anemia in world countries

Countries	Time period	Prevalence %
Afghanistan	2016	46.44
Armenia	2016	31.46
Australia	2016	13.88
Bangladesh	2016	40.29
Brazil	2016	25.07
Bulgaria	2016	26.87
Cameroon	2016	62.51

Central African Republic	2016	71.88
China	2016	21.43
France	2016	12.93
Georgia	2016	23.62
India	2016	57.29
Indonesia	2016	36.78
Iran (Islamic Republic of)	2016	28.22
Kazakhstan	2016	29.27
Malaysia	2016	30.85
Pakistan	2016	58.82
Romania	2016	26.83
South Africa	2016	36.79
Turkey	2016	28.04
Uganda	2016	51.08

WHO (2016).

Table 1.3. Prevalence of Anemia by age group in developing and industrialized countries

Age group / Countries	1 mon-4 yrs. (%)	5-14 yrs. (%)
Developing countries	42	53
Industrialized Countries	17	8

(WHO, 2016).

In children, anemia can negatively affect their cognitive development, school performance, physical development and immunity. Iron deficiency is believed to be the most important cause of anemia among children due to a lack of iron intake in food and a lack of vital iron, (Kana, et.al, 2015).

Iron deficiency anemia can reduce the ability to work in adults and affect motor and mental development in children and adolescents. It may affect visual and auditory performance and is related to poor cognitive development in children, (Abdel Naser,et al 2015).

Knowing anemia and determining age and child characteristics can be helpful for improving anemia prevention strategies, understanding the relevant physiological condition, classification of anemia, and interpretation of relevant laboratory values will assist the pediatric and community health nurse in assessing the child with anemia. The pediatric nurse should be familiar with history taking and physical evaluation, performing routine screening tests and appropriate treatment and referring these children to a specific management agency, (Bander.K,2012).

Mentioned in his study on anemia also a global health problem linked to an increase in mortality and morbidity, and classified it as a dangerous disease if not treated and would lead to problems in the early childhood stage, especially at school age, such as delays in psychomotor and psychological development, poor cognitive performance, weak immunity and low ability to the work, (Birhanu, et al,.2018).

Anemia has a significant negative impact on the psychological and physical development, the ability of the patient to recover, the reproductive health of the individual, and the performance of his daily activities. Iron deficiency anemia has been identified among the ten most serious risks in countries with high infant morbidity and mortality, (Bandyopadhyay.L, et al,.2017).

1.3. Statement of the Problem

Effectiveness of an education program upon mother's knowledge and attitudes toward iron deficiency anemia among their elementary school children.

By referring to many previous studies, the researcher did not find any previous studies about educational programs for mothers of children with anemia among primary schools' children in Iraq, according to the researcher's best knowledge, this study is the first study that addresses this subject. According to the researcher daily practice, he noticed a poor of knowledge and attitudes among large number of mothers about how to provide nutritional necessary care to their children, and thus negatively affected their children in their natural growth and development, just like their peers, this behavioral problem bring researchers attention and led him to select this topic as area of research to tackle this priority health problem in order to interview to reduce the effects of anemia among children within the available resources.

1.4. Objectives of the study are:

1-To assess mothers' knowledge and attitudes of anemic children and their needs of an education program.

2-To construct an education program related to the knowledge and attitudes for mothers of anemic children of primary school in Al-Hilla City.

3-To determine the effectiveness of structured educational program interventions with mothers of anemic children through a follow – up process for three months' after program implementation.

4-To find - out the associations between the response of mothers to the education program with their demographic characteristics including, age, educational level, occupation, family income, residential area.

1.5. Definition of Terms

1.5.1 Effectiveness

-Theoretical definition

The extent to which the activity of instruction fulfills its intended purpose, function, and goals, it means it has an intended or expected outcome, (Stojković, et al., 2017).

-Operational definition

The extent of achieving the scientific objectives set for a current educational program, which helps improve mothers' knowledge and attitudes about anemia and develop their abilities to detect anemia early and how to reduce the spread of the disease among students.

1.5.2 Education program

-Theoretical definition

A string of scientific steps which are applied as educational methods to assist the patients or other people to get enough knowledge they are in need and trend that will update and preserve of typical degree of activities, (Mohamed.H,2016).

-Operational definition

It is a one or several lectures submitted to a certain group of mothers for improvement and development their awareness about important topics or problems through giving information suitable to their level under standings in order to change their behavior positively to overcome anemia in this age group.

1.5.3 Elementary schools Children

-Theoretical definition

It is the legal or cognitive age to enter the primary stage of education, which is usually not less than four years and not more than seven years, this level usually lasts six years. Primary education usually continues until the age of 10 to 12 years,(ISCED 2011).

1.5.4 Anemia

-Theoretical definition

Anemia is a condition in which the number of red blood cells is less or the hemoglobin concentration within red blood cells is lower than normal, (WHO, 2019).

-Operational definition

Anemia is defined as the child's hemoglobin level less than 11 g/dl. Anemia severity divided in mild, moderate and severe.

1.5.5 Knowledge

- Theoretical definition

Facts, information, and skills acquired through experience, education, or understanding gained through learning or experience, (Sechabe, 2011).

-Operational definition

Suggestion, evidences, accurate information obtained through the experience and education of mothers of children about how to deal with their children who have anemia to enhance the health status and not to deteriorate it.

1.5.6 Attitude

-Theoretical definition

A suitable method of sensation or thinking of somebody, typically one that is reflected in the behavior of the individual, (Oroujlou and Vahedi.2011).

-Operational definition

Attitudes refer to the way and approaches of mothers of children with anemia towards dealing with the condition of their children and how to act according to the changes and nature of their children.

Chapter Two

Review of literature

Chapter Two

Review of Literature

2.1. Historical background about Anemia: -

Anemia is the most common blood disorder in infants and children and indicates a low number of red blood cells and hemoglobin content below the normal level at a certain age. (Amal, et al., 2010).

Anemia, such as satirical anemia and anemia from ancient Greek anima, means "hypovolemia lack of blood " Chlorine poisoning was the first recognized "green disease" in 1500 Anno Domino (AD), and it was reported that this condition was common among girls while French doctor Gabriel Inderal introduced the term "anemia" around 1829 AD. (Bernadette, et al., 2007).

The word anemia in Greek consists of two roots that together mean "no blood" (Arulmozhi, 2008). German physician Anthony Bermer was first observed and described anemia in 1968 and produced by famous microbiologist Anthony van Leeuwenhoek 1632-1723.

In 1739, William Hewson who spread his post-mortem opinion that red cells are present in these numbers should be important. This earned him the nickname "the father of hematology". Iron deficiency anemia (IDA) around 1500 BC was described in Egyptian papyrus. It was called Chlorosis or a green disease in medieval Europe and iron salts were used for treatment in France by the mid-seventeenth century. Thomas Sydenham recommended iron salts as a treatment for chlorination, but iron therapy was controversial until the twentieth

century, when the mechanism of its action was fully explained. (Malathi, 2008).

Doctors who discovered and mentioned common types of anemia: Thomas Edison was the first doctor to be described as pernicious anemia known as megaloblastic anemia in 1885, while Paul Erlich was the first term used for megaloblastic anemia and description of abnormal cells in the bone marrow. Thomas B. Kohl was an American doctor who first reported thalassemia and hereditary anemia in 1922. Aplastic anemia caused by bone marrow damage or destruction was different in 1988 by German bacteriologist Paul Ehrlich. Fanconi Anemia is a genetic disease called Jade Fanconi, a Swiss pediatrician. A detailed description of chronic anemia by Austrian doctor Adolf Edelman in 1925. While the first description of sickle cell disease was made by a doctor in Chicago, James B. Herrick. Vanlier and Masius first described gene cell granules in 1871, (Thomason, 2005; Malathi, 2008).

2.2. Overview of Anemia

Anemia is a condition in which the number of red blood cells decreases or the hemoglobin concentration in red blood cells is lower than normal. Hemoglobin is necessary to carry oxygen and if you have very few or abnormal red blood cells, or do not have enough hemoglobin, the ability of the blood to carry oxygen to your body tissues will decrease, (WHO,2019).

It corresponds to a situation where the number of red blood cells is low, or its ability to carry oxygen (i.e. hemoglobin) is very weak, in order to meet the physiological needs of the organism.

The term anemia describes a condition in which the number of red blood cells (erythrocytes) or hemoglobin concentration (Hgb or Hb) is lower than normal age values. This reduces the ability of oxygen to carry

blood, which results in decreased oxygen availability in the tissues. Anemia is the most common blood disease between infancy and childhood and is not a disease in itself but an indication or manifestation of an underlying pathological process,(Wang, et al ,2016).

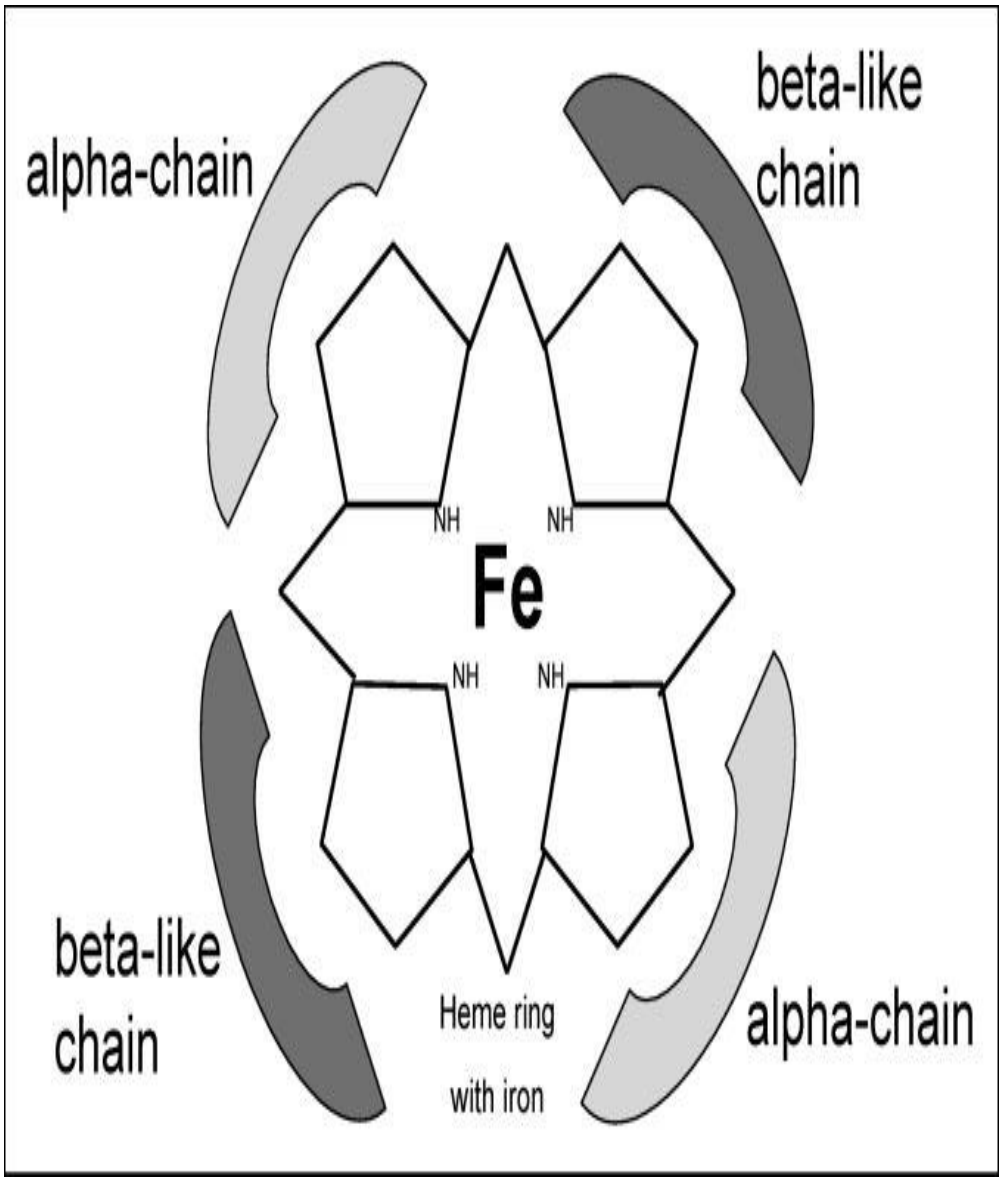
Anemia is a condition caused by a low concentration of hemoglobin, a decrease in the number of red blood cells, or both, which results in a decrease in the ability to deliver oxygen to support the activities of the body,(Gutema,et al , 2014).

2.3. Pathology

The pathophysiology of anemia varies according to its types or etiology, acute or chronic red blood cell loss, insufficient red blood cell production in the bone marrow, or increased hemolysis that can lead to anemia, (Hodges, et al., 2007).

Erythropoietin is the primary hormonal regulator for red blood cell production (RBC). In the fetus, erythropoietin comes from the macrophage system in the liver. Erythropoietin is produced after birth in the cells surrounding the tubules in the kidney, and all blood cells are produced by forming blood in the bone marrow. There are six types of hemoglobin in humans,((Bryant, 2013).

Hemoglobin consists of an iron-containing heme ring associated with four globin chains figure 2.1, (Matthew, 2007).



(Fig.2.1): Structured of hemoglobin.

Reduced red blood cell count reduces blood volume and the cardiovascular system becomes deficient in blood volume. Reduced blood viscosity reduces the number of red blood cells, along with increased fluid inside the blood vessels, causing blood to flow faster through the cardiovascular system and the flow becomes more disrupted. This process causes pressure on the ventricles and dilates the heart. Hypoxia contributes to changes in the cardiovascular system and respiratory system in anemia by causing the blood vessels and the heart

to dilate more strongly, which increases the demand for oxygen. Hypoxia in the tissues causes an increased rate of breathing and depth, (Bryant,2013).

When anemia becomes severe, the body directs blood to vital organs, such as the heart and brain, and renal blood flow decreases. Decreased renal blood flow in turn activates the response of the renin-angiotensin system, resulting in salt and water retention. This process increases blood volume to improve kidney function without altering tissue hypoxia in other organs. Excessive destruction of erythrocytes inside blood vessels is also reflected in an increase in bilirubin in the blood, (Ughasoro & Kela, 2017).

Anemia reduces the ability of the blood to merge with oxygen and transport it to the peripheral tissues. Hemoglobin with red blood cells (RBCs) carries almost all oxygen to body tissues. When the hemoglobin concentration decreases, the ability to carry oxygen in the blood also decreases. Although blood plasma carries some oxygen, muscles and organs require more oxygen, (Ughasoro, et al., 2017).

Pathophysiology of hemolytic anemia includes destruction of red blood cells and subsequent acceleration of red blood cells. Hemolytic anemia may be inherited or acquired. The inherited form of cellular dysfunction occurs in the membrane or enzymes that affect hemoglobin production. Acquired hemolytic anemia is caused by infection, chemical factors and abnormal immune response, (Camila, et al., 2019).

2.4. Classification of Anemia

General anemia can also be classified according to RBC morphology or by etiology. Morphology is the most common

classification, and includes cell size (cystic), color (chromium), and the shape of red blood cells. (Jennifer and Sarah, 2010).

Classification of anemia was summarized in Table 2.1 and table 2.2

2.4. 1.Classification by Morphology

According to the anemia morphology, they are classified as microscopic, developmental, and large, based on average particle size. Anemia caused by iron or thalassemia deficiency or lead poisoning. Regular anemia may be caused by chronic disease, hemolysis or bone marrow disorders. Major anemia develops due to nutritional deficiency (vitamin B12 deficiency, folic acid), drug toxicity, and hypothyroidism, (Wang et al., 2016).

Hemoglobin, hematocrit, and red cells provide information about the appearance of red blood cells, which helps in classification. Indicators for red cells include glomerular medium, hemoglobin average and hemoglobin concentration and red blood cell distribution display,(The Academy & Pediatrics, 2011).

In addition, the ferritin concentration in the blood is used to measure iron storage. Measuring the concentration of ferritin is important in obtaining a diagnosis of iron deficiency anemia, (Kunz et al., 2017).

2.4.2. Classification by Etiology

Anemia is usually multifactorial originally, because the causes of anemia are more complex. Anemia can be caused by poor cell production, blood loss and increased red cell damage. Blood loss occurs during severe conditions such as trauma or chronic disease and gastrointestinal bleeding. Whereas, the rate of destruction of red cells increases in degenerative anemia due to genetic or acquired diseases. Genetic diseases that cause anemia due to red cell membrane disorder. About 50% of cases of anemia are due to iron deficiency. Disturbances of enzymes within the red cell, such as glucose-6-phosphate

dehydrogenase (G6PD). Sickle cell anemia (SCA) and anemia are genetically modified diseases where red blood cells suffer from structural abnormalities, (Nifosì, 2016).

Conditions outside of the red blood cell include diseases that cause the destruction of red cells, such as blood transfusion reactions, thrombocytopenic purpura, or thrombosis within the blood vessels. Anemia also occurs due to renal cellular dysplasia, kidney failure or endocrine disorders. Poor cell production occurs when cells have defective DNA synthesis, such as other micronutrient deficiencies, including vitamins A and B12, folate, riboflavin and copper that can increase the risk of anemia, (Camila, et al., 2019).

Other causes of anemia, heavy blood, or parasite infections such as hookworms, ascariasis, and schistosomiasis can lower hemoglobin concentrations in the blood. Acute and chronic infections, including malaria, cancer, tuberculosis and HIV, (HIV) can lower hemoglobin concentrations in the blood, (WHO,2019).

2.4.3. Classification of Anemia Based on the Mean Cell Volume (MCV)

Anemia is the most common anomaly in pediatrics (Matthew, 2007), and the differential diagnosis of anemia in children includes congenital, acquired, malignant and unusually rare disorders. Most cases cause constant changes in the average size of red blood cells (RBCs).

According to the average cell size, there are three common types of anemia: microcytic anemia, normocytic anemia and macrocytic anemia, (Table 2.1), (Lanzkowsky, 2011).

Table 2.1. Summarized the Classification of Anemia Based on Red Cell Size

I. Microcytic anemia
1. Iron deficiency 2. Drug/toxin-mediated (including lead poisoning) 3. Thalassemia syndromes 4. Chronic inflammation
II. Normocytic anemia
1. Congenital hemolytic anemia a. Hemoglobinopathies b. Red cell enzyme defects c. Red cell membrane defects 2. Acquired hemolytic anemia a. Antibody-mediated b. Microangiopathic hemolytic anemia c. Anemia secondary to acute infection 3. Acute blood loss 4. Chronic renal disease 5. Aplastic anemia
III. Macrocytic anemia
1. With megaloblastic bone marrow (disturbance of DNA

synthesis)

a. Vitamin B12 deficiency and Folic acid deficiency

c. Thiamine-responsive megaloblastic anemia

d. Drugs (eg, methotrexate, certain anticonvulsants)

2. Without megaloblastic bone marrow

a. Aplastic anemia

b. Diamond-Blackfan anemia

c. Hypothyroidism/hypopituitarism

d. Liver disease

e. Bone marrow infiltration

2.4.3.1. Microcytic Anemia

In anemia caused by hypoglycemia, red cells are small and contain a reduced amount of hemoglobin. In children, small anemia often occurs due to disorders that lead to smaller red blood cells (more frequent pellets), (Jane, et al,2017; Mansen & McCance, 2006).

Many children with microcytic anemia have no complaints but common signs and symptoms in diagnosis may include fatigue, tachycardia, flatulence, or poor appetite, (Jennifer and Sarah, 2010).

2.4.3.2. Normocytic Anemia

Normocytic anemia is the most frequently encountered type of anemia. Normocytic anemia is found in children who have had acute

hemorrhage, disseminated intravascular coagulation, autoimmune hemolytic anemias, membranopathies (e.g., spherocytosis), enzymopathies (e.g., G6PD deficiency), infection, renal disease, leukemia, and a plastic anemia, (Maakaron,2019).

Determining the diagnosis of normocytic anemia in children is clinically difficult. The evaluation begins with a comprehensive history and a thorough physical examination. The basic diagnosis includes studying red blood cell distribution, retinal cell index correction, and peripheral blood smear. Treatment should be directed to correct the underlying cause of anemia. Another advanced treatment is the use of recombinant human erythropoietin, (Marks,2016).

Normocytic anemia can be diagnosed by the number of retinal cells to determine whether there is a decrease in production or an increase in the destruction of red blood cells,(Lanzkowsky, 2011).

Acute hemolytic anemia is manifested by fever, nausea, abdominal pain, splenomegaly, dark urine, jaundice and paleness. In severe cases, children may have signs of hypovolemic shock and need immediate intervention. Standard anemia treatment begins with a timely determination of its cause. In most children, treatment is assigned to the primary disorder. Treatments may include avoiding trigger exposure in children with hemolytic anemia and correction of iron, folic acid or vitamin B12 deficiency, (Jane, et al,2017; Datta, 2009).

2.4.3.3. Macrocytic Anemia

Macrocytic anemia occurs when the bone marrow produces very large cells called macrocytes. These cells are large in size, thickness, and volume. Macrocytic anemia in children are relatively uncommon, but are usually caused by a deficiency of vitamin B12 and folic acid, (Jennifer and Sarah , 2010).

Other possible causes include chronic liver disease and hypothyroidism. Folic acid deficiency is usually a secondary cause of insufficient food intake. Human milk and cow's milk provide sufficient sources of folic acid. Children may not have symptoms, and the disorder may be detected during a routine blood test. Others may experience fatigue, nausea (usually without vomiting), occasional diarrhea, weight loss, growth failure, and delayed growth. Children with pernicious anemia (caused by a lack of vitamin B12 or a deficiency of folic acid) may experience confusion, muscle weakness, loss of feeling in position and decreased feeling of vibration in the legs.(Tawfique and Jamal, 2018).

Table 2.2 Summarized other classification for anemia based on pathophysiologic mechanism

I. Failure of erythrocyte production
A. Bone marrow failure
1. Aplastic anemia (congenital or acquired)
2. Pure red cell aplasia
a. Diamond-Blackfan anemia (congenital)
b. Transient erythroblastopenia of childhood (acquired)
3. Marrow replacement
a. Malignancies
b. Osteopetrosis
c. Myelofibrosis
B. Impaired erythropoietin production

1. Chronic renal disease

2. Hypothyroidism, hypopituitarism

3. Chronic inflammation

4. Protein malnutrition

5. Hb mutation with decreased affinity for oxygen

C. Disorders of erythroid maturation / ineffective erythropoiesis

1. Abnormalities of cytoplasmic maturation

a. Iron deficiency

b. Thalassemia syndromes

c. Lead poisoning

d. Sideroblastic anemia

2. Abnormalities of nuclear maturation

a. Vitamin B12 deficiency

b. Folic acid deficiency

c. Thiamine-responsive megaloblastic anemia

d. Hereditary abnormalities in folate metabolism

3. Erythropoietic protoporphyria

II. Increased RBC loss or destruction

1. Hemoglobinopathies (including structural and synthetic mutants)

2. Red cell membrane defects

3. Red cell metabolic defects

4. Antibody-mediated or Infectious agent-induced red cell injury

5. Mechanical injury to the erythrocyte

6. Oxidant-induced injury to the erythrocyte

2.5. Causes of school age children anemia

There are many reasons for development of anemia. It can result from inherited blood disorders, nutritional problems, infections, chronic diseases, blood loss, or exposure to a drug or toxin. Even though there are many types and causes of anemia, (Getaneh et al., 2017 ;WHO,2016).

Anemia has multiple causes. Direct causes can be broadly categorized as weak, insufficient or abnormal production of red blood cells, excessive destruction of red blood cells, and excessive loss of red blood cells, contributing to causes related to malnutrition, quality of nutrition, sanitation, health and environmental behaviors, Lack of access to health services and poverty. The relative importance of these causes varies by region, (WHO,2016; Datta, 2009;).

According to (Jane, et..al,2017; Jennifer and Sarah, 2010; Data, 2009), there are three main causes of anemia categories:

2.5.1 Reduced red blood cell production:

Most patients with severe kidney disease, iron deficiency, or vitamins experience anemia.

2.5.2 Increased destruction of red blood cells:

If the destruction of red blood cells is rapid, the body will not be able

to catch up. This problem is sometimes inherited, such as sickle cell anemia and thalassemia.

2.5.3 Blood loss:

Severe bleeding from an accident, surgery can lead to anemia, additionally, although iron-deficiency anemia accounts for most of the anemia that occurs in deprived environments,(Cullis, 2013).

Several other possible causes should be noted such as hemolysis that occurs with malaria, as it plays a major role in pathology in endemic countries; dihydrogenase phosphate-6 hypoglycemia, genetic defects in hemoglobin synthesis and other nutrient deficiency, for example vitamins A, B12 and C, Folic acid. This blood loss can be associated with schistosomiasis, hookworm spread, bleeding at birth, trauma, HIV, and hemoglobinopathy. (Pasricha et al., 2009).

2.6. Risk Factors for Anemia

Anemia is a common condition. It occurs in all ages and ethnic and racial groups. During the first year of life, some children also run the risk of iron deficiency anemia, especially for children between 6 months and 2 years old, and if they drink a lot of cow's milk. Understanding anemia risk factors helped health professionals to identify early groups most at risk of this disease, noting priorities in prevention and control action plans and allocating available resources to improving and strengthening health care for children,(McLennan and Steele, 2016).

Common risk factors for anemia include low birth weight, a low-income family, and an ethnic minority. The main risk factors that increase a child's risk of anemia include the following: a diet that

contains low iron, vitamins or minerals, blood loss due to surgery or injury, and long or serious diseases, such as kidney disease, cancer,

diabetes, rheumatoid arthritis, Human (HIV), acquired immunodeficiency syndrome (AIDS), inflammatory bowel diseases, liver diseases, thyroid diseases, long-term infection, family history of hereditary anemia, such as thalassemia or sickle cell anemia, (McLennan & steele, 2016;Jennifer and Sarah, 2010).

2.7. Diagnosis of Child's Anemia

In many cases, anemia is a sign of an underlying disease and not a final diagnosis in itself. The goal of a child's diagnostic evaluation is to determine the underlying cause of anemia, (Bouri & Martin, 2018).

The diagnosis of anemia depends on clinical presentations as well as medical tests. A child with anemia may show signs of paleness, fatigue and jaundice, but it may not be seriously ill. Key points and historical findings about physical examination can reveal the underlying cause of anemia, (WHO,2016).

Characteristic symptoms of anemia include paleness of the eyelids, lips, tongue, and under the nails. Fatigue and dizziness. Headache; shortness of breath, (Jane,2017;Datta, 2009).

A child's history, including nutrition, antenatal history and disease, as well as other clinical presentations, may help determine the specific form of anemia and / or the underlying cause. For more diagnosis of anemia, several blood tests may be used.

Most children with anemia are asymptomatic and have abnormal hemoglobin or hematocrit level on routine screening infrequently. The initial approach to an anemic child includes a detailed history and physical examination, along with a panel of essential laboratory tests, (Jane,2017; Lanzkowsky,2011; Datta,2009;).

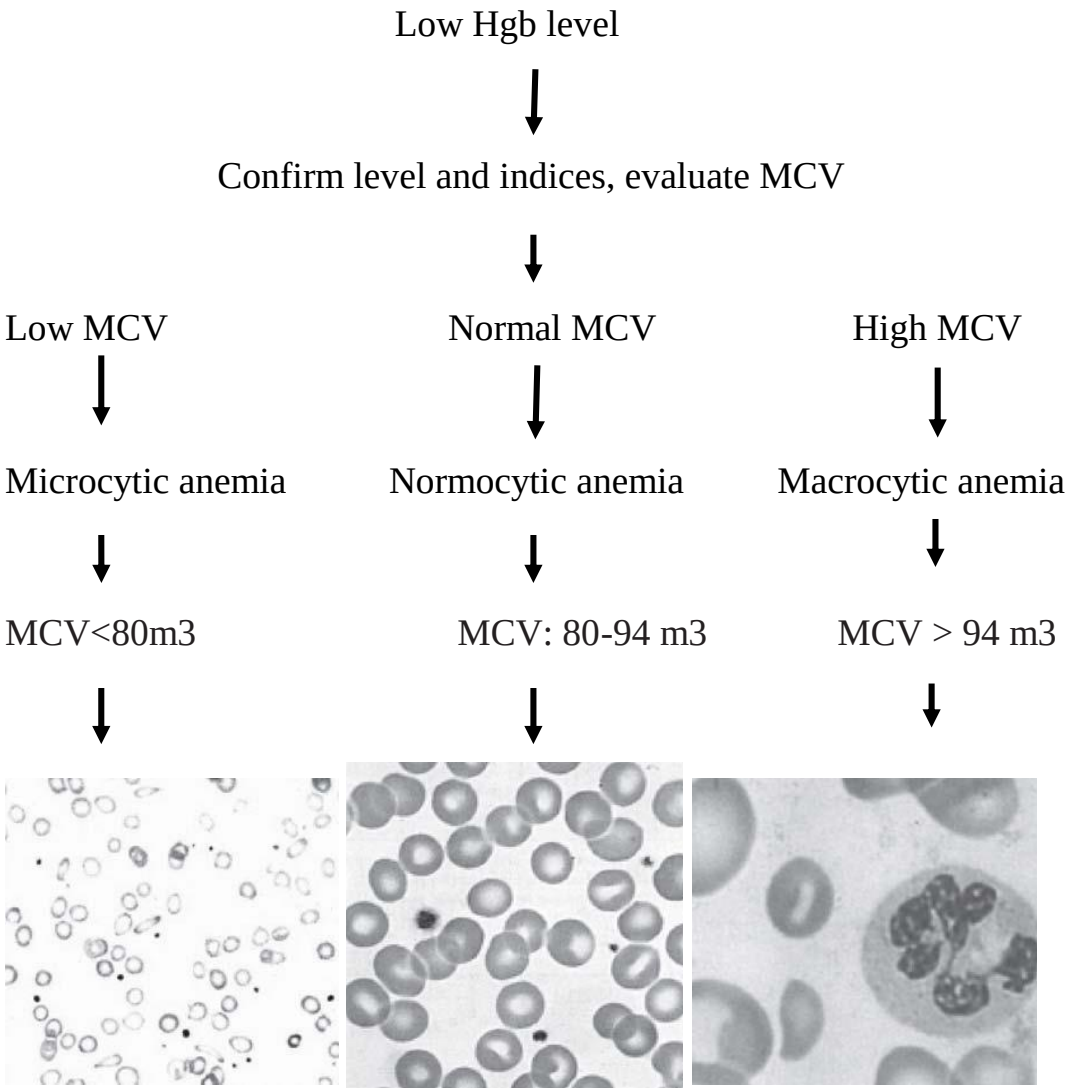


Figure (2.2)**:** evaluation of low hemoglobin levels based on mean of cell volume**.**

2.7.1. History

A detailed history is necessary to determine the cause of anemia (Datta, 2009). The acquisition must include the mother's history and the child's history. Mother's history includes family genetic disorders

or blood diseases such as (thalassemia, sickle cell anemia, G6PD deficiency ... etc.). It is important to get to know them, because one of them may be the cause of anemia, the ethnic origin of the family (as some anemia occurs more commonly, for example, in people of African or Asian descent) and the economic status of the family. The medical history of hyperbilirubinemia, activity level, acute or chronic infections, easy bruising and symptoms of anemia or underlying disorders should be evaluated. (Tawfique & Jamal,2018; Lanzkowsky,2011).

2.7.2. Physical Examination

(Tawfique and Jamal, 2018; Shah,et al, 2014), stated that Physical examination is another way to diagnose and use anemia in countries where there are no laboratories or the few health resources available, which are aimed at identifying skin or paleness of mucous membranes as clinical signs of anemia.

Most children with mild anemia do not experience any signs or symptoms. Some people may experience irritation, pica (iron deficiency), jaundice (in hemolysis), shortness of breath, or palpitations. Physical examination may reveal jaundice, rapid breathing, tachycardia and heart failure, especially in children with severe or acute anemia. (Jane, et al,2017; Jennifer and Sarah, 2010;Datta, 2009).

Clinical pallor is recommended as a simple method for detecting acute anemia, and the WHO has included assessment of palmar pallor of acute anemia (Appendix E) in an algorithm for managing a sick child.(Ughasoro , et al ,2019). Clinical evaluation of conjunctiva, palms and nails. Pallor was evaluated at three sites: the lower beard, palms (especially the fatty part at the base of the thumb), and the nail base. In the case of palm and nails, the examiner manually pressed the

site and turned it on to monitor the appearance of reddish color when pressure was released. To assess paleness of the palm, the examiner opened one of the hands of the children, partially extending the fingers, and note the color of the palm. Clinical pallor data was recorded to merge the "slightly pale" and "very pale" categories. Although evaluation of clinical paleness is a useful screening strategy for severe anemia, (Khan,et al, 2015).

2.7.3. Laboratory Tests Evaluation

The WHO 2016, identified anemia as low hemoglobin concentration and red blood cell mass compared to those in the age-appropriate control group. The tests and the degree of anemia were determined based on the hemoglobin level for the age group, (Adhiambo ,et al, 2017).

The range of laboratory tests varies greatly from one child to another, and the appropriate investigation of a child with anemia must follow the history and detailed examination. Determine the different patterns of anemia through the correct interpretation of red cell parameters and other features of the blood count that should guide supplementary tests in examination cases, such as a one-year examination, only hemoglobin level is obtained. When facing anemia during this examination, the sample should be upgraded to a complete blood cell count (CBC), (Gutema,et al, 2014 ;Lanzkowsky, 2011).

The cause of anemia can usually be determined by a very careful examination of CBC results. A particularly useful test is the MCV which is usually part of CBC. Average physical size varies with age, and determines whether MCV is low, normal, or elevated which greatly helps determine the cause of anemia. Once anemia has been identified, the following two parameters for review are mean particle

size and mean corpuscular hemoglobin (MCH),(Jane,et..al,2017; Lanzkowsky, 2011; Datta,2009).

Hemoglobin (HB) and hematocrit (HCT) measurements are common and inexpensive laboratory measurements and are commonly used in health and general environments to check anemia, make an initial diagnosis of anemia, and the prevalence of anemia in children under 12 years of age, (Ughasoro, et al., 2017;WHO,2016).

A child with low hemoglobin concentrations was considered the poorest of the proposed cut levels. The WHO pieces were used to determine the prevalence of anemia, (Tawfique, et al,2018; Jennifer and Sarah, 2010).

Table (2.3) Reflects the parameter that included in laboratory tests evaluation and normal Mean Values for Hemoglobin, Hematocrit, and MCV.

Age	*Hemoglobin, g/dL (g/L)*	*Hematocrit (%)*	*MCV, μm³ (fL)*	*MCHC, g/dL (g/L)*
26 to 30 weeks' gestation*	13.4 (134)	41.5 (0.42)	118.2 (118.2)	37.9 (379)
28 weeks' gestation	14.5 (145)	45 (0.45)	120 (120)	31.0 (310)
32 weeks' gestation	15.0 (150)	47 (0.47)	118 (118)	32.0 (320)
Term† (cord)	16.5 (165)	51 (0.51)	108 (108)	33.0 (330)
1 to 3 days	18.5 (185)	56 (0.56)	108 (108)	33.0 (330)
2 weeks	16.6 (166)	53 (0.53)	105 (105)	31.4 (314)
1 month	13.9 (139)	44 (0.44)	101 (101)	31.8 (318)
2 months	11.2 (112)	35 (0.35)	95 (95)	31.8 (318)
6 months	12.6 (126)	36 (0.36)	76 (76)	35.0 (350)
6 months to 2 years	12.0 (120)	36 (0.36)	78 (78)	33.0 (330)
2 to 6 years	12.5 (125)	37 (0.37)	81 (81)	34.0 (340)
6 to 12 years	13.5 (135)	40 (0.40)	86 (86)	34.0 (340)
12 to 18 years				
Male	14.5 (145)	43 (0.43)	88 (88)	34.0 (340)
Female	14.0 (140)	41 (0.41)	90 (90)	34.0 (340)
Adult				
Male	15.5 (155)	47 (0.47)	90 (90)	34.0 (340)
Female	14.0 (140)	41 (0.41)	90 (90)	34.0 (340)

(Marks, 2016 ;Jennifer and Sarah, 2010).

Anemia was defined according to the new WHO cut-off levels for hemoglobin as: blood hemoglobin <11.0 g/dl for children, (WHO,2016).

Table (2.4): Shows WHO cut-off levels for Hb thresholds and WHO's Hemoglobin thresholds or cut-off levels used to define anemia.

Age or gender group	**Hb threshold (g/dl)**	**Hb threshold (mmol/l)**
Children (0.5-5.0 yrs)	**11.0**	**6.8**
Children (5.0-12 yrs)	**11.5**	**7.1**
Children (12-15 yrs)	**12.0**	**7.4**
Women, non-pregnant (> 15 yrs)	**12.0**	**7.4**
Women, pregnant	**11.0**	**6.8**
Men (> 15 yrs)	**13.0**	**8.1**

(Chand, Nizamani, & Sciences, 2017; Le, 2016).

Iron in the blood and ferritin levels in the blood are sensitive and specific for children with iron deficiency, (Salama & Labib, 2016 Datta, 2009).

Other diagnostic tests used to diagnose anemia are the number of retinal cells (or percentage) that help distinguish between underproductive anemia (decreased red blood cell production) from the destructive process (increased destruction of red blood cells). Reduced number of retinal cells may indicate bone marrow disorders or an inflexibility crisis, while a large number generally refers to hemolysis or active blood loss, (Tezera, et al, 2018).

If hemolysis is suspected, a direct Coombs' test, G6PD assay hemoglobin electrophoresis, and lactate dehydrogenase (LDH), haptoglobin and bilirubin (indirect) determinations may help to confirm the diagnosis. RBC enzyme panel to diagnose enzymopathies, osmotic fragility to diagnose hereditary spherocytosis, hemoglobin isoelectric focusing to diagnose hemoglobin variants, membrane protein studies to diagnose membranopathies, and cytogenetic studies ,(Gutema,et al, 2014).

In certain cases, such as a suspected hematoma, bone marrow aspiration can be indicated. Red blood cell production can be evaluated when a bone marrow problem is suspected,(Tezera, et al, 2018; Chand, et al, 2017; Le, 2016).

2.8. Clinical Manifestations of Anemia

A child with mild anemia may not show any symptoms or they may not notice the symptoms because they have appeared slowly. The clinical manifestations of anemia depend on the child's ability to compensate for the loss of oxygen carrying capacity. Table 2.5 summarizes the clinical manifestations of anemia. However, in severe anemia, symptoms increase and become more serious. Early symptoms of fatigue for children with anemia and loss of appetite and symptoms of late anorexia may include paleness, weakness, fatigue easily, poor breastfeeding (infant), shortness of breath, fainting, or lightheadedness when moving, (Ocas-Córdova, et al, 2018).

Other features include pica (eating mud, snow, or putty), chest pain, irritation, numbness or coldness in the hands and feet, fast heartbeat, and headache.(Tawfique & Jamal,2018;Khan,et al, 2015; Datta,2009).

Physical signs are minimal, pallor often being the only sign. The assessment of this feature must be made from an examination of the

mucous membranes. The examiner may look for pallor in the conjunctiva, the lips, the gums, the tongue, and the palms and soles of the feet and nail beds , (Ocas-Córdova, et al., 2018).

Table 2.5. Summarized the physical findings in the child with anemia

Chronic hypoplastic anemia or anemia from decreased red blood cell production
-Pallor -Tachycardia and Systolic heart murmur -Nailbed deformities -Growth retardation -Development delay
Acute hemolytic anemia (e.g.,G6PD deficiency)
-Hematuria -Jaundice -Tachycardia -Hepatomegaly -Splenomegaly -Congestive heart failure
Chronic hemolytic anemia (e.g., sickle cell anemia)
-Icterus -Jaundice -Ulcer on lower extremities -Frontal bossing -Systolic heart murmur -Hepatosplenomegaly -Delay physical maturation

-Growth retardation

(Chanie,2021; datta,2009).

2.9. The Most Common Causes Childhood Anemia

2.9.1 Nutritional Anemia

Common causes of nutritional deficiency anemia are iron deficiency and megaloblastic anemia (vitamin B12 deficiency and folic acid deficiency), (Pektaş, Aral, & Yenisey, 2015).

2.9.1.1. Iron Deficiency

Iron deficiency is the most common and widespread nutritional disorder in the world which can have severe consequences if left untreated. However, it is a disorder that can usually be treated with only oral iron supplements and diet modification, (Abdel Naser, et.al, 2015).

As well as affecting a large number of children and most commonly in children aged 9 to 18 months **,** in United Status(US) about (7%) of children between the ages 1-2 years, (5 %) of children between 3-5 years and (4%) of children between 6-11 years developed Iron deficiency anemia, (Shanita, et al., 2018 ;Datta, 2009).

Globally, about 600 million pre-school and school-age children suffer from anemia, according to the World Health Organization, 65.5% of pre-school children in Southeast Asia suffer from anemia, and the World Health Organization defines anemia. Red blood deficiency cells to meet physiological needs, (Shanita et al., 2018; WHO, Geneva;2011;).

Iron deficiency (ID) was identified as a contributing factor in anemia. This is not surprising because iron is the most deficient micronutrient in developing and industrialized countries, (WHO: Geneva, 2015).

Hemoglobin concentration is the most reliable indicator of anemia

at the population level, while serum ferritin is used as an indicator of iron stores in the body for identity diagnosis. While the World Health Organization stated that the low level of ferritin in the blood is an indicator of iron deficiency, (WHO, 2015; WHO: Geneva,2011).

Iron is a major component of hemoglobin. In fact, it is the substance that is particularly associated with oxygen in the blood. Therefore, if iron is not available, then the results of anemia. Iron deficiency usually occurs due to insufficient iron in the diet (especially excessive consumption of whole cow's milk or long breastfeeding), but it can also be caused by excessive blood loss. The symptoms of iron deficiency anemia are subtle and nonspecific and often only appear with severe anemia, the common symptoms are paleness, irritation, and lack of activity, (Pektaş, et al., 2015).

Consequences of iron deficiency anemia, including delayed psychomotor development, poor cognitive functioning, poor growth, and increased morbidity, (Shanita et al., 2018).

Iron deficiency is treated with iron supplementation, and usually responds to iron oral medication,(Özdemir, 2015).

Iron deficiency should be prevented during breastfeeding and early childhood by breastfeeding, iron supplementation in breastfeeding over the age of 6 months, iron-fortified composition during the first year of life as an alternative to breastfeeding, and avoid excessive consumption of whole cow's milk later in childhood,(Rukuni, et al, 2015).

The significant complications of Iron deficiency anemia frequent infection, malabsorption, growth retardation and decrease in mental intelligence, (Jane, et al,2017; Datta,2009).

The Nursing management focuses on iron deficiency anemia to promote and provide adequate iron, and educate the family about the importance of using an iron composition and the best time to provide a solid food source for their children to prevent iron deficiency anemia,(Jimenez, et al, 2015).

2.9.1.2. Megaloblastic Anemia

A condition known as pernicious anemia (also called Addison's anemia). Common causes of megaloblastic anemia are deficiency of some vitamins, vitamin B12 and folic acid, which leads to the production of the marrow by larger red cells than normal and reduces the ability to carry oxygen. These abnormal red blood cells are called macrocytes. Deficiency sometimes occurs when a child's diet is deficient. Deficiency occurs because a person's body is not able to absorb vitamin B12. Megaloblastic anemia is treated by administering folic acid or vitamin B12 by mouth or parents. Vitamin B12 replacement can reverse pernicious anemia, reduce complications, and possibly prevent permanent nerve damage. Improving diet is also important in preventing megaloblastic anemia,(Shanita et al., 2018; Jimenez et al., 2015; Datta, 2009).

2.9.2. Hemoglobinopathies anemia

It is the condition in which abnormal hemoglobin is present, and the common causes of hemoglobinopathy are hereditary such as: sickle cell anemia and thalassemia. (Jane, et..al,2017).

2.9.2.1. Thalassemias

Thalassemia is a group of disorders that is caused by decreased production of the globin chain. Production of alpha-globin (alpha-thalassemia) or beta-globin (thalassemia beta) may decrease. Distortions

lead to quantitative changes in the globins, (Shanita et al., 2018; Jane, et al,2017).

The ward of 'thalassemia 'is derived from the Greek words 'thalassa' means the great sea, (Düzenli Kar,2020 ;Jane, et..al,2017).

2.9.2.1.1. Beta Thalassemia

Thalassemia is a group of genetic disorders caused by an imbalance or imbalance in the beta chain of the hemoglobin molecule. Thalassemia mostly occurs between blacks, Asians and people from the Middle East or the Mediterranean region, (Düzenli Kar,2020 ;Jane, et..al,2017).

When one beta chain is reduced, a mild form of anemia is called beta thalassemia. Children with beta thalassemia have no symptoms or physical consequences. Defects in both beta chains lead to severe anemia called major thalassemia or Cooley's anemia. (Özdemir, 2015).

Physical outcomes may include liver enlargement, poor growth, and the bone marrow may enlarge, causing abnormal skeletal growth (such as frontal bossing and maxillary enlargement), (Jane, et..al,2017; Özdemir, 2015).

Hematological studies reveal the blood count in beta thalassemia major shows a severe microcytic anemia and Hgb electrophoresis findings are essential in diagnosis of beta thalassemia. (Jane, et..al,2017).

Untreated thalassemia leads to death in childhood or adolescence, therefore, the goal of treatment is to maintain an appropriate level of Hgb, prevent bone deformities and support the normal growth of children. Beta thalassemia treatment requires no treatment, while a child

with major thalassemia needs treatment that includes blood transfusions or bone marrow transplants. (Aydogan et al., 2019).

The main complications of cardiac and hepatic thalassemia failure, plastic crisis, recurrent infection, growth retardation, and delayed puberty. Other complications associated with blood transfusion are hemosiderosis, while complications related to iron-chelation therapy are endocrine disorders (diabetes or hypothyroidism) and skeletal complications, (Jane, et..al,2017).

The common goal of nursing care is to help the child and his family copy with his illness and prevent multiple blood transfusion complications by promoting chelating therapy, (Jimenez et al., 2015).

2.9.2.2. Sickle Cell Disease

It is a group of hemolytic anemia which is a genetic disorder that affects African Americans, but it is also present among those of Mediterranean descent. Sickle cell anemia was the first disease understood at the genetic level, but it remains a serious chronic disease recommended for early intervention. (Inusa et al., 2019).

Mainly thalassemia and sickle cell anemia, are widespread worldwide. About 5% of the world's population carries genes responsible for hemoglobinopathy. Every year about 300-000 children are born with major hemoglobin disorders, including more than 200-000 cases of sickle cell anemia in Africa. (WHO,2016).

The World Health Organization has recognized that sickle cell anemia (SCA) is a major public health threat with significant morbidity and mortality, especially in developing countries, (Mansour et al., 2015).

(Aydogan et al, 2019 ;Jimenez et al., 2015),reported that the child

had red blood cells in the shape of a crescent, which led the red blood cells to tend to form a curve or sickle. The unusual shape prevents cells from carrying oxygen efficiently and makes cells trapped in capillaries. All of the somewhat infected children suffer from microscopic anemia. Sickle cell anemia can be detected before birth by sampling chronic villi, and it is often diagnosed early by examining the child. Electrical hemoglobin is used when the result is positive.

The treatment for sickle cell anemia is supportive and symptomatic. While the goal of nursing care is to prevent infection, hypoxia, dehydration and sickle, (Jimenez et al., 2015).

2.9.3. A plastic Anemia

Aplastic Anemia (AA) is a rare but serious disorder with high mortality and morbidity. The occurrence of AA worldwide is 2-5 children / million / year. It is characterized by insufficient supply of all types of blood cells, including abnormal or insufficient production of red cells in the bone marrow,(Kojima, 2017).

Common causes of aplastic anemia are congenital causes such as (Fanconi anemia) or acquired causes such as (medications, chemical exposure). Aplastic anemia can be caused by severe viral infection, immune system diseases and hepatitis. It is also linked to cancer treatments such as chemotherapy or radiotherapy, both of which negatively affect the ability of the bone marrow to produce red blood cells, (Noronha, 2018).

A plastic anemia causes the death of about 85% of people with this condition, and deaths range from severe cases from 80% to 90% if the treatment does not work. Identifiable causes must be eliminated and

strong supportive measures must be provided, such as red blood cell transfusions and packed platelets, (Kinam Park, 2014).

Diagnosis is based on laboratory evaluation, bone marrow biopsy, and peripheral blood examination, , (Noronha, 2018).

Aplastic anemia is a medical emergency, and bone marrow transplantation is performed as soon as possible after the diagnosis. A bone marrow transplant from a family member is the most successful one and is recommended for younger patients. The Nursing management for a child with Aplastic Anemia is the child's safety from injury and avoiding bleeding and the specific date of the child if he is exposed to pure inhibitory drugs or radiation therapy, (Barone et al., 2015).

2.9.4. Inflammatory Anemia

Any inflammatory condition, acute or chronic, can lead to standard or microscopic anemia, which is sometimes called anemia caused by chronic diseases. Chronic anemia is the most common type of standard anemia and the second most common form of anemia worldwide after iron deficiency,(Ganz, 2019).

Common causes of inflammatory anemia in children with a good foundation are recurrent mild infections (18-85%) from prevalence (such as ear, throat and intestinal infections) that temporarily suppress the bone marrow and cancer (30-77%), autoimmune (8-71%) and chronic kidney disease (23-50%). Potential serious disorders may cause inflammation that needs careful evaluation and follow-up, and treatment strategies include the initial treatment of disease, iron use, or blood transfusions, (Chaparro & Suchdev, 2019).

2.9.5. Glucose-6-Phosphate Dehydrogenase Deficiency (G6PD)

Glucose-6-phosphate dehydrogenase (G6PD) is a major enzyme for the pentose monophosphate pathway, and its deficiency is the most common genetic deficiency of the enzyme worldwide. As a recessive trait associated with X, it is predominantly a male disease that affects an estimated 400 million people worldwide, (Vizzi, et al, 2016).

The most common type of G6PD, which occurs in African American individuals, leads to mild and self-limited hemolysis, especially for individuals with oxidative stress [for example, infection and some medications (sulfonamides, chloramphenicol, nitrofurantoin), (Noronha, 2018).

2.10. Age and Anemia

According to the World Health Organization (2014) report, anemia is one of the most common diseases of undernutrition and affects nearly 2 billion people in the world, and among this huge group of children, women and pregnant women are the two main groups at risk.

Table (2-6) Show the Worldwide prevalence of anemia 1993-2005, WHO Global Database on Anemia Geneva, (WHO, 2008).

Population group	Prevalence of anemia		Population affected	
	Percent	95% CI	Number (millions)	95% CI
Preschool-age children	47.4	45.7-49.1	293	283-303
School-age children	25.4	19.9-30.9	305	238-371
Pregnant women	41.8	39.9-43.8	56	54-59
Non-pregnant women	30.2	28.7-31.6	468	446-491

Men	12.7	8.6-16.9	260	175-345
Elderly	23.9	18.3-29.4	164	126-202
Total population	30.2	22.9-26.7	1546	1500-1740

The prevalence of anemia in females was higher than among males between 6 months and 3 years. From the age of 4 to 14 years, there was a reversal as the males had a higher rate of anemia. Older females had a lower prevalence of anemia than younger females, (Chaparro & Suchdev, 2019).

The most common causes of neonatal anemia are blood loss, hemolysis is the most common cause of anemia in infants between the ages of 1-3 months, while iron deficiency anemia is the most common cause of children aged 6-24 months. At the age of 2-6 years, infection, taking medications and tumors are common causes of anemia. Chronic illness is a common cause in school-age children. The most common cause of anemia in adolescence is iron deficiency due to insufficient diet and rapid growth, (Chaparro & Suchdev, 2019; Shanita et al., 2018).

2.11. Race and anemia

(Accinelli & Leon-Abarca, 2020) reported that the World Health Organization estimated that anemia afflicts a quarter of the world's population and is concentrated among children and preschool-age women. Blacks (24.4%) and Mexican Americans (8.7%), (Asresie,2020).

Anemia is universal, but possible underlying causes are affected by race. Inherited red cell disorders are common in some ethnic populations, such as sickle cell disease in blacks, thalassemia in people of Mediterranean origin, alpha thalassemia in Asians, and African Americans, (Asresie,2020 ;Shanita et al., 2018).

2.12. Gender and Anemia

Sex predisposition to anemia varies according to the underlying causes. For example, some males have observed some inherited disorders associated with the red cell (such as G-6-PD deficiency), anemia caused by blood loss can be observed in males with a hemorrhagic disorder associated with X (such as hemophilia). Females with a physically inherited von Willebrand disease can impoverish them due to severe blood loss during menstruation. Acquired hemolytic anemia associated with autoimmune disorders such as systemic lupus erythematosus is more common in females because of their relative predisposition to autoimmune diseases, (Susumu,2019).

2.13. Medical Management

Medical management of anemia is depends upon type, cause and severity of the condition (Fenta,2020 ;Jane, et..al,2017).

Treatments may include dietary changes or supplements, medicines, or blood transfusion. The goal of treatment is to increase the amount of oxygen that the blood can carry. This is done by raising the red blood cell count and/or hemoglobin level and another goal is to treat the underlying condition or the cause of the anemia ,(Opoka et al., 2018).

Successful treatment of anemia depends on identifying and treating the underlying cause such as: blood loss, nutritional deficiency, cancer, bone marrow infiltration, chronic disease, inflammation, or decreased response to erythropoietin. Through the results of laboratory tests and physical examination, the doctor can determine the cause of anemia and determine the best way to treat it. Some children need a referral for further evaluation by a hematologist. Treatment should continue until

the normal hemoglobin level is achieved, (Fenta,2020 ;Jane, et..al,2017; Datta, 2009).

Anemia due to excessive blood loss should be treated accordingly, acute blood loss requires immediate control of bleeding and restoration of blood volume through intravenous fluids or blood transfusions.

Anemia due to excessive blood damage requires identification and treatment of a specific degenerative disorder,(Cappellini,2020 ;Özdemir,2015).

Anemia should be due to low blood formation due to bone marrow disorders or a specific deficiency in iron, folic acid and vitamin B12 and treatment with alternative therapies for specific nutrients. If the child's condition gets worse, consult a pediatrician. Some children eventually need to be referred to a hematologist for further evaluation and treatment. If the anemia is severe, he may need medical treatment to treat it. Procedures include blood transfusion and stem cell transplantation in the marrow, (Long & Koyfman, 2018).

2.14. Prevention of Anemia

Prevention is clearly of critical importance. Knowing anemia and specifying ages and characteristics associated with children can help better guide anemia prevention strategies, Current international recommendations for the prevention and treatment of anemia include the use of anthelminthic, antimalarial drugs, and folic acid in addition to supplemental iron. Iron deficiency should be prevented during breastfeeding and early childhood by breastfeeding, iron supplementation in infants over the age of 6 months, an iron-fortified formula during the first year of life as an alternative to breastfeeding, avoiding excessive consumption of whole cow's milk later in childhood, providing supplements Dietary iron-folic acid (IFA) or multiple

micronutrients (MMN) for children aged 24-59 months in school children, (Initiating, 2020).

The prevalence of anemia among women, infants and children concerned (WIC) was at risk of developing anemia. The Federal Government-funded Health and Nutrition Program has created a special program, and mandatory follow-up implementation by WIC or health care providers for all children affected by anemia should be considered to ensure accurate diagnosis, and for most of them, depletion of iron and anemia stores, (Initiating,2020; Matos, et al, 2016).

In conclusion, despite repeated examination, nutritional supplements, nutritional counseling and genetic counseling are the most common tools for preventing anemia in children.

2.15. Complications

Anemia is an indication of poor nutrition and poor health. The most serious health effects of anemia, i.e. an increased risk of child mortality due to severe anemia, (WHO,2016; Amal et al, 2010).

Additionally, negativity is the result of children's cognitive and physical development and physical performance. Complications of anemia are usually found such as breakdown of blood circulation and shock, recurrent infection, development retardation, mental or deceased retardation in intelligence and delayed puberty. Death caused by hereditary anemia, such as sickle cell anemia, can be severe and lead to life-threatening complications. Quickly losing too much blood leads to acute and severe anemia and can be fatal,(Ncogo et al., 2017 Scott, et al, 2014).

Other outcomes of childhood anemia including impaired cognitive function, physical development, motor development, and language

development. Severe anemia (Hb 5 g / dL) is associated with an increased risk of death, (Ughasoro,et al, 2015).

(Abdel-Aaty, et al., 2015) reported that iron deficiency anemia in children under 5 years of age and primary school students is accompanied by psychomotor retardation, weak intelligence and poor ability to learn.

2.16. Screening for Anemia in Children

Anemia screening program is very important in early detection and in determining the underlying causes of anemia, as it does not appear until it becomes acute. Therefore, all children need an examination program, (Accinelli, et.al, 2020).

Anemia screening tests will play a vital role in preventing and recognizing anemia early due to lack of nutrition and eating unsafe substances, (Tawfique & Jamal, 2018), reported that among the most common factors that are believed to contribute to the success of infants and children in reducing anemia in the past is the repeated examination of anemia.

2.17. Nurses responsibilities in prevention and controlling anemia among primary school child

The a nurse who determines abnormal hemoglobin values and gets a detailed history of children and families and comprehensive physical exams in the diagnosis of anemia. Since anemia is not a disorder but is a symptom of some underlying problems, nursing care is associated with identifying the cause and promoting appropriate supportive and therapeutic treatments. The nurse must be aware of the pathophysiology and etiology of anemia. A nurse when able to understand the anemia process and help the child and family manage the treatment plan are

valuable contributions they can make to the child's well-being,(Marianne.B,2017).

Nurses can perform a physical examination to uncover clinical features such as pallor of the skin and mucous membranes and evaluate the measurement of the human body (height, weight, skin fold, head and chest circumference) that are important with a child with anemia. Laboratory tests are also important to identify problems and implement nursing care, (Jane, et..al,2017;Datta ,2009).

Careful assessment and ongoing monitoring are essential**.**Nursing assessment is the corner stone of nursing intervention .It is done by obtaining details history to detect the main cause of the condition. An understanding of the associated physiologic condition, classification of anemia, and interpretation of pertinent laboratory values will assist the nurse practitioner in evaluating the child with anemia. Nurse practitioners should gain familiarity with performing routine screening tests, history taking, physical assessment, appropriate treatment, and referral of these child's with anemia need,(Jane, et..al,2017;Yee ,2017).

(Tawfique & Jamal, 2018; Marks, 2016), reported that the important aspects of a nursing evaluation include: history: current complaints, previous illness, chronic disease, presence of infection, warm infection, exposure to drug poisoning, history of food and habits, behavioral problems such as pica and family history of the disease. The evaluation of breastfeeding for a child with anemia includes personal and objective data. The nurse should review the child's medical history to determine the occurrence of blood loss or recent trauma, chronic liver disease, endocrine or kidney disease, gastrointestinal bleeding, malabsorption syndrome, ulcers, gastritis or hemorrhoids, surgery or radiotherapy or inflammatory disorders, exposure to radiation and

leadership Arsenic, gasoline and copper.

Nursing interventions depend on the etiology and type of anemia, the major nursing diagnoses that apply to many children with anemia include intolerance associated with weakness, fatigue, general malaise, change of nutrition and less than the body's requirements for insufficient intake of essential nutrients; change of exudation in tissues associated with insufficient blood volume or hematocrit; and failure to comply with the prescribed treatment. Blood or blood products can be ordered if severe blood loss is the cause of anemia. The nurse must also monitor vital signs and oxygen saturation, and nursing interventions should be directed toward balancing activities daily, planning rest periods, and creating a physical activity program, (Jane, et..al,2017).

The results of the nurses' control laboratory will guide understanding of the causes of anemia. The nurse must monitor the child to know the expected results of the nursing interventions. She must assess children's understanding of nutrition issues that contribute to anemia. Provide age-appropriate children's education (such as nutritional counseling and genetic counseling) and obtain appropriate, timely and proactive guidance for parents of anemia patients (for example, G6PD deficiency and sickle cell disease). You will be a nurse who will determine abnormal hemoglobin values and have a detailed history of children and families and comprehensive physical exams in the diagnosis of anemia. By obtaining additional laboratory studies as needed, the list of differential diagnoses will be appropriately narrowed, and referrals will be made on a time basis, (Nancy,2020).

Nutrition education and lifestyle changes will be required, financial planning may be needed if poverty or sudden loss of family income reduces iron intake or other food shortages. Child and family should be

involved in planning food changes, (Marianne,2017).

Therefore, the nursing management summary for children with anemia includes: preparing the child and his family for laboratory tests and final diagnosis, reducing the needs of o_2 tissue and preventing complications.

2.18. Previous studies

Anemia remains a significant worldwide public health problem. Studies of anemia in Iraq are less common especially school age children.

1. Guedenon, (2016), About interviewing a hundred mothers with children, they are randomly selected in counseling, vaccination waiting rooms and in the hospital. This study indicated that the forty mothers have not heard of anemia. Health workers were the main source of maternity information (29%), and the media made up 8% of the source of maternity information (Radio 5%, TV 3%). Low blood levels in the body are the most common definitions provided by mothers (44%). Malaria (24%) and malnutrition (19%) were the main causes cited by mothers. Iron deficiency was reported by 3% of mothers. Palmar - Plantar paleness (32%) was the most common clinical sign known to mothers. Most mothers (90%) did not help with an informational message and they continued to report anemia prevention. When their children were anemic, 25 mothers (65.8%) took their children to the health center, and five mothers (13.2%) provided tomatoes. 43% of mothers learned that iron was used in preventive treatment. The tomato milk mixture was the preventive treatment mentioned by 3% of mothers. Most mothers (77%) recommend a mother with children with

anemia to take him to the hospital. Maternal knowledge of anemia was associated with the level of education. But knowledge of prevention did not depend on the level of education.

2. Another study done in Tanzania in (2016) by Ngimbudzi, et..al, it was used to recruit a comfortable sample of 40 mothers diagnosed with anemia for their infants (through routine laboratory tests). Results: Within the sample, the majority of the children were male (52.5%). 6 to 39 months (87.5%); severe anemia (75.0%) was diagnosed as defined by the World Health Organization. More than a third (35%) of mothers reported a previous history of anemia in their other infants, and the majority (55%) heard of anemia before their child was hospitalized. Maternal anemia was reported by 67.5% of mothers. Mothers reported that maternal anemia (17.5%) and feeding practices (32.5%) were known factors in anemia in children. Mothers reported that anemia (55.0%) and herbal treatment (47.5%) could be prevented. Additionally, some mothers indicated that anemia was caused by magic (22.5%) and lemon intake (2.5%).

3. In Arab Republic of Egypt, Kasemy, et..al (2019), estimating the prevalence of G6PD deficiency among neonates with jaundice and assessing the mother's awareness of G6PD, this study indicated that the prevalence of G6PD deficiency was 10.10%. G6PD deficiency newborns showed higher levels of bilirubin in the blood ($P < 0.001$). Male sex, family history of G6PD deficiency and conjugation were risk factors for G6PD deficiency (OR = 4.27, 95% CI 1.66 - 10.99; OR = 9.54, 95% CI 4.80-18.95; OR = 10.219, 95% CI 5.39 - 19.33, respectively). Maternal perceptions of NNJ and G6PD were low, with only 30% having good knowledge of NNJ and 17.10% on G6PD deficiency, 46.8% with a positive attitude towards NNJ, 45.0% towards

G6PD deficiency, 29.9% with good practice towards NNJ and 19.9% towards deficiency G6PD.

4. Another study done in Egypt, by Nadia, (2018), The World Health Organization has reported that 29% of all females in the reproductive age group have been diagnosed with anemia. Objective of the study: To assess knowledge and attitude regarding iron deficiency anemia among pregnant women. A descriptive study was conducted between September 2015 and March 2016 to include 400 pregnant women who were recruited during routine antenatal care at the antenatal clinic at the Women's Health Hospital at Assiut University. Tool: personal data, physical math index, laboratory tests, knowledge and status of women in anemia. Results: This study showed that 91.8% and 80.8%, respectively, of the women in the study were housewives and from rural areas and 32.5% of them had iron deficiency anemia. The current study showed that 60% of the participants have weak knowledge and 21.0% of them have negative attitudes towards iron deficiency anemia with a statistically significant difference between the knowledge of pregnant women and their ages (p = 0.003) and between the position and level Education (value P 0.011) as well, between attitudes and anemia (p = 0.000) Conclusion and recommendations: Participants were generally less aware of the positive attitude towards iron deficiency anemia, and almost a third of women experienced anemia due to iron deficiency. To overcome iron deficiency anemia, health education must include prenatal care that focuses on eating iron-rich foods. The study also recommended raising awareness among pregnant women about anemia prevention through the media.

5. Another study was conducted on the knowledge and practices of mothers about nutritional anemia and its prevention in district sirmour

by (Kumari, & Dharni,2018), nutrition has an important role in anemia and of all the nutrients involved, iron is the most crucial and regarding dietary causes of anaemia, the most common kind of anaemia includes iron deficiency anaemia and one of the most common is an inadequate intake of iron in the diet. The deficiency may be latent or patent. It may be responsible for repeated infections and interfere with the child's psychomotor development. The disease is most often due to a low intake of dietary iron, and it can be prevented by supplementing the mothers during pregnancy and by an adequate diet. Aim & Objectives: To assess knowledge and practices regarding prevention of nutritional anaemia among mothers of under-five children. Methods: The study adopted descriptive research design and was conducted at selected villages of Sirmour District, H.P. A total of 100 mothers were selected by convenient sampling technique. A structured knowledge questionnaire was used to assess knowledge and structured questionnaire on self-reported practices were used to assess the practices regarding prevention of nutritional anaemia. Results: Data analysis was done by descriptive and inferential statistics. The study results showed that 71% respondents had the moderately adequate knowledge, 22% of respondents had inadequate knowledge and remaining 7% respondents had an adequate level of knowledge and 98% of mothers had good practices and remaining 2% were had poor practices. Correlation coefficient indicates that weak positive linear correlation between knowledge and practice score as the value of p= 0.097 and r= .336. Chi square test indicates that there is a significant association between age of mother, dietary habits, sources of information and knowledge score, the highly significant association between education of mother, the occupation of mother, education of father and knowledge score. Chi square test indicates that

not significant association between practice score and selected demographic variables. Conclusion: The results of the study suggest that there was an adequate level of knowledge and good practices regarding prevention of nutritional anaemia helps to reduce the chances of nutritional anaemia among under five children.

Chapter Three

Methodology

Chapter three

Methodology

3. Methodology

Chapter three will present the study design and the methods that are utilized which included many steps as following: the administrative arrangement, construction of program, validity, and reliability of the instrument, sample selection, pilot study, methods of collection and analysis data as well as limitations or barriers of the study.

3.1. Design of the study

A quasi-experiments study using an applying repeated measures analysis, because it uses the pre-post testing. Pre-test done before any data collected to see if there any participants have certain tendencies. Then the actual experiment is done with post test results recorded.

A quasi-experimental study using a design with analysis using repeated examination is carried throughout the present study with the application of test-retest approach of pre-test, post-test I, and post-test II; for both groups (study and control) mothers who attended in primary health care centers in Al-Hilla City; from the period 1st November 2019 to 19th June 2021. In the pre-test design is measured before implementing the program while the two post-test after implementing the program for mothers (study participants).

The design of the quasi-experimental study with repeated measures analysis is an effective design for implementing the educational program on the mothers of students with anemia and determining the effectiveness of the program after post-test.

3.2 Administrative Permissions:

A- Formal Permission:

First, the proposal was accepted by the Scientific Postgraduate Committee University of Babylon Faculty of Nursing Council. The researcher explained the objectives of the study, and the importance of the study which was presented in University of Babylon/ Faculty of Nursing at conference hall as a second step of the study. The official permission was approved by the Ministry of Health / Babylon Health Directorate/ Training and Human Development Center obtained at 24/8/2020 (Appendix: C). The other consents have been obtained from primary health care sectors (Al-Hilla first sector).

B- Ethical considerations:

Humanity views the face or respect of the participant's personality as a human being in the current study as a matter of moral consideration; the researcher takes certain steps to achieve moral considerations and obtains permission from mothers who accepted to participate in the study.

1- The mothers written consents were obtained after explaining the objectives of the study by the researcher in a simple way.

2- After explaining the purposes of the study, and explaining the non-use of medicinal substances and all practices that are not harmful. The researcher clarified the purposes of the study to the mothers who have children with anemia in primary school in order to participate in the study (Appendix B) with clarification of the participant's eligibility or not participation in the study in the event that he does not feel comfortable and confirmation use the information that is taken from the study participants for scientific purposes only.

3.3. Setting of the study

The study was conducted on the mothers of pupils with anemia who were selected during their visit of the primary health care centers for the purpose of examining and preventive and therapeutic services. The study was conducted at the primary health care centers (Al-Hilla first health sector).

The sessions of educational program was conducted at the model primary health care center (Shohada,a Nader) because are one of the modern typical health centers to provide primary health care and it has the most study requirements. The lecture room in this center with appropriate facilities, such as air conditioning, lighting and a data display screen to allow the researcher to interview the participants and implement the program.

All primary health care centers which is selected for doing this study receive the clients for the purpose of conducting initial checks and detecting diseases.

The primary health care centers (PHCC) belonging to the first sector of Al-Hilla , which were approved as a place to conduct the study for two groups (study and control) distributed as shown in the table (3-1):

Table (3-1) Clarification the setting of study according to the health sector

Name of Sector	Name of PHCC	Participant Group
Al-Hilla first sector	Al-Aasatitha Typical	Control Group
	Al-Mohandesen	
	Al-Imam Al-Hussein	

	Shaheed Al-Islam	Study group
	Al-Quds	
	Shohadaa Nader Typical	

3.4. The Target population

The target population for the study mothers with children of primary school age suffering from anemia who visit primary health care centers for treatment and routine checkups. Therefore, 60 mothers were selected as a sample for the study, 30 of them were selected as a sample for the study group, and another 30 mothers were selected as a sample for the control group from the primary health care centers affiliated to the first sector of Hilla, as they have the same demographic characteristics.

3.5. Sample of the study

A purposeful (non-probability) sample is selected from the primary health care institution with (60) mothers of anemic students using appropriate non-probability sampling technique. This sample included (30) mothers of students with anemia who visit primary health care centers as a study group. In the same way, (30) mothers of anemic students were selected as a control group. The control group was not exposed to the program.

Both groups of mothers who participate in the study was selected from different primary health care centers, in order to make the control group away from the study group to prevent any contact which might happen between the participants of both groups (study and control).

The study group participates in the educational program for four sessions, 40 minutes for each session; one sessions weekly over a period of four weeks. The program for study group took place in the primary health care center (Shohadaa Nader model Center). While the control group did not undertake any education program but completed the same tools (fill the Questionnaire) three times as the study group did.

3.5.1. Criteria of the Sample Selection:

3.5.1.A. The inclusion criteria for sample selection:

The participants were selected according to the following criteria:

1-Mothers of primary school students with previously diagnosed of anemia .

2-Mothers of elementary school students who are screened and tested for anemia (newly diagnosed).

3.5.1.B. The exclusion criteria for sample selection:

1. Mothers who participate in the pilot study.
2. Mothers who refuse to participate in the study.
3. Mothers who is their children were severity ill or having chronic diseases.
4. Mothers who is child less than 6 years

3.6. The Instrument of the Study:

For the purpose of the present study; a questionnaire was developed based on the study objectives and program. The questionnaire's items constructed by the researcher depending on extensive review of related books and available literatures. This consists of three major parts as follows (Appendix A).

Part 1: Socio-demographic data sheet, it consists of (11) items:

This part of the questionnaire contains information regarding; age, level of education of mothers and fathers, residence family income, family structure, age of anemic child, child order position in the family, number of children in the family for mothers.

Part 2: Assessment of knowledge of mothers of children with anemia:

This part of the questionnaire includes the Assessment of mother's knowledge of children with anemia: it consists of (18) items scale of mother's knowledge of children with anemia, the formulation of items is based on the extensive review of related literature and consultation the panel of experts.

Part 3: Assessment of mother's attitudes of children with anemia:

This part of the questionnaire includes the Assessment of mother's attitudes of children with anemia: it consists of (13) items scale of maternal attitude of children with anemia, the formulation of items is based on the extensive review of related literature and consultation the panel of experts.

3.7. Validity of the questionnaire

Content validity of the questionnaire are determined throughout the distribution for a panel of (15) experts, they are: 7 experts from College of Nursing / University of Babylon, 3 experts from College of nursing / University of Baghdad, 1 expert from College of nursing / University of Karbala, 1 expert from College of nursing / University of Kufa, 1 Specialist physician in pediatric from Babylon maternity and child

teaching Hospital, and 2 experts in College of Medicine / University of Babylon (Appendix D).

Their responses have indicated that all of them have agreed upon the questionnaire content clarity, relevancy and adequacy. Then, the questionnaire is considered valid after taking into consideration their suggestions and recommendations for modification.

3.8. Pilot Study

Pilot study is a test the feasibility of methods and procedures in order that applied on a larger scale and to search for possible effects that could be worth following up in a major study (Last, 2001; & Everitt, 2006).

The investigator conducted the pilot study on (10) mothers of children with anemia of those who visit the primary health care centers (Al-Hilla first sector) for the purpose of examination the consistency of study tool. The study was conducted throughout the period from 15th to 28th July 2020.

The sample of the pilot was excluded from the original sample of the study. The pilot study has aimed to:

1- Determine the reliability of the questionnaire.
2- To measure the feasibility of the steps that have to take place as part of the major study.
3- To find out whether the items of the questionnaire are clear and understandable by mothers of children with anemia.
4- Determine time consumed for the data collection for each respondent.
5- Giving the researcher experience through understanding and determine the required modification.

As a result; it shows that:

1. Determination of the time that required with each sample approximately 15 minutes.

2. The questionnaire was, understandable, clear, and easy to answer.

3.9. Reliability of the questionnaire

The aim of reliability is to ensure that the items of the questionnaire were simple, clear and understandable to identify the internal consistency of the instrument. The estimates of the reliability were determined through the use of Alfa- Correlation Coefficient (Cronbach's Alfa). Data have been collected from (10) mothers of children with anemia throughout interviewing.

The reliability coefficients are an important indicator of an instrument's quality. The pilot study performed as a small and primary study before starting the study procedures in order to assess the stability of the instrument which is prepared to collect the data. The results of the pilot study were statistically managed and the results revealed that the reliability which estimated for used instrument was (r = 0.78) which is statistically acceptable.

Table (3-2) Reliability Statistics

Cronbach's alpha	Number of Items
0.78	31

3.10 Rating and Scoring

The questionnaire which is used as a tool of study consist from three parts, the first part is demographic date while the part two is knowledge of mother regarding anemia, the questions in this part as multiple choice

from given for correct answer choice (2 point) and (1 point) for wrong answer.

The part three is the attitudes of mother regarding anemia consist from 13 items as three point Likert scale (agree, uncertain and disagree), the choice of agree given (3 point), uncertain (2 point) and disagree (1 point). The mean of score for mother knowledge is good if mean of score ranging between (1.5-2), while poor knowledge if mean of score was (1-.1.49). Regarding the mother's attitudes about anemia, the mean of score were from (1-1.66) is disagree, while uncertain if mean of score was (1.67-2.33) and agree if mean of score (2.34 and more).

3.11. The Construction of the educational Program:

The program is the most important part in the present study because it measures the information of the mothers and shows the researcher how it meets the needs of mothers' knowledge regarding anemia and advice for mothers of student with anemia and how to provide adequate care, food and treatment for student with anemia to sustain their lives.

At the commencing of any educational program, we need to know the knowledge level of participants by conducting an initial examination (pre-test) to determine what information we need to raise or increase their knowledge level in this topic by confided information from references; and meet their culture sensitivity.

There are no previous studies or program similar to the present study in Iraq and Babylon Governorate, therefore the researcher focuses and depending on books, global studies and WHO reports which is dealing this subject as a references through the constructed this program. Then the program presented to panel of experts (specialists in pediatric, family

and community health nursing and medicine field) to evaluate it and give their suggestions about the content of program. The expert's responses indicated that minor changes should be done to some items, few items were excluded and others were added, some of them modified according to experts notes and suggestions. The final form was completed to become appropriate lectures for the participants.

3.12. Implementation of the educational Program:

3.12.1. Pre-Test:

Before applying the educational program, the researcher conducted a pre-test for the study and control groups for the purpose of measuring the knowledge (information) and attitudes of both groups regarding anemia for mothers of student with anemia for the implementing the educational program.

3.12.2. Implementation The Program:

There is a pre-test before application of the program. Then the educational program was implemented on (30) mothers as a study group in typical center of Shohadaa Nader. The program was carried on throughout the period of 1st September 2020 to 30th September 2020.

The program application takes (4) sessions to discuss and explore the major domains of the program; each session of the program is designed and scheduled to be for (40) minuet. One sessions was weekly.

The educational sessions were presented in primary health care center (Shohadaa Nader model center) (Appendix B), the researcher used the discussion room in the health center to give the sessions of the program to the mothers (study group). The lecture begins at 10 AM to 11 AM o'clock after the mothers come to the lecture hall.

The researcher used method of class lecture by using data show, and discussion methods. The sessions of the educational program include the following:

(1) The First Session:

The first session of the program is concerned with topics which include: The Introduction, presentation of program, objectives, program contents, intended benefit, and the definition of anemia.

(2) The Second Session:

The second session of the program is concerned with topics which include: Types of anemia, its classification and the groups most at risk

(3) The Third Session:

This session is concerned with topics which include: Discuss about the causes, signs and symptoms of anemia and the diagnostic test that will be used to screen for this disease and risk factors.

(4) The Fourth Session:

During the last session of the program is concerned with topics which include: Discuss about the treatment and appropriate of preventive measures should be taken to avoid the anemia, care, and possible complications, and showed for the participants (mothers) educational videos about anemia, preventive and curative measures, and how to control it.

The researcher makes general review of all the topics who are previously discussed in the sessions:

- Listening to each participant's experiences in the program.

- The researcher asking the participants about the benefit of the program for them.
- Lastly, the researcher gave the participants an opportunity to discuss about their opinion related to program sessions, and provide advices for him.

3.13. Data Collection:

The data collection of the study was carried out from the period of 15th August 2020 to 10th February 2021.

1. Baseline set of data collection was meeting each mother of the study for explaining about the objectives of the program both groups (study and control).
2. The participants had fill a consent form in order to share in the study. The participants inform that they are free to withdraw from the recruitment even they had given their consent previously to participate in the study.
3. All the mothers (participants) of the study both groups (30 study group and 30 control group) are exposed to pre-test, to determine their knowledge about anemia who are children suffer from it.
4. All the mothers (participants) of the study group are exposed to the educational program, which was implemented at primary health care center (typical center of Shohadaa Nader).
5. All the mothers (participants) of both groups (study and control) are exposed to the first post-test after the educational program was finished immediately to measure changes in their knowledge regarding students with anemia.

6. All the mothers (participants) of both groups (study and control) are exposed to the second post-test after three months of the first post-test to measure changes in their knowledge regarding students with anemia.

The questionnaire has been received by the mothers in primary health care centers after simple explanation about the study and the goals; and how the mothers answer the questionnaire and kept on a closed envelop and just the researcher can see the questionnaire to keep the anonymity, so no names would be revealed in the writing up of the study for anyone except the researcher.

3.14. Research Framework:

According to the process and steps of recruitment, and based upon the research program, the following research framework was formulated (Fig. 3.1).

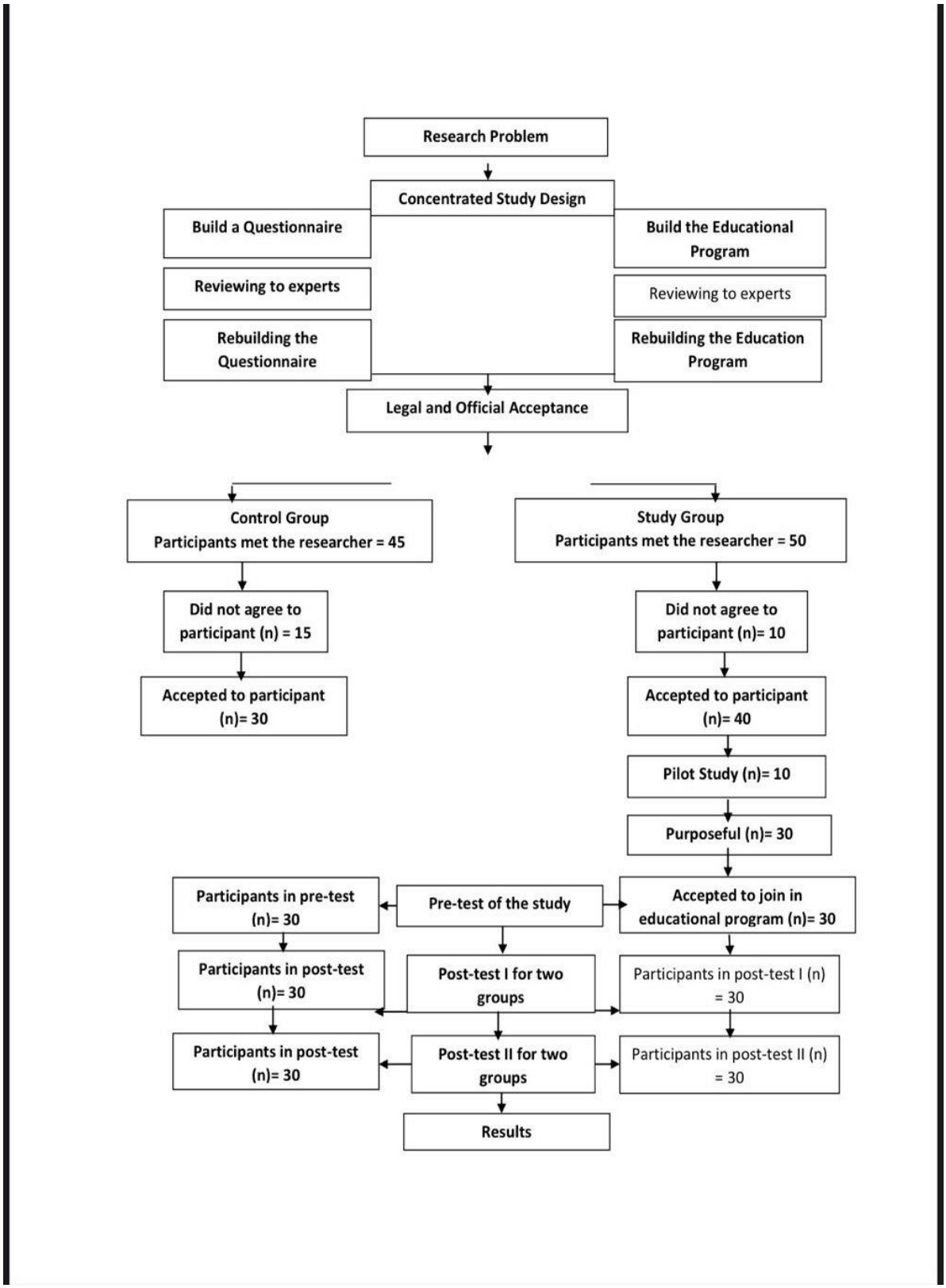


Figure (3-1) Structural framework for educational program process

3.15. Data analysis:

In order to determine whether the objectives of the study have met or not, the data of the present study has been analyzed through application of the following statistical approach:

The significant differences are divided into high significant differences (P value < 0.01), significant differences (0.01 > P value > 0.05), and non-significant differences (P value > 0.05).

3.15.1 Descriptive data analysis

This approach includes the measurement of **(**Shavelson, 1988; Pilot and Hungler, 1999):

1- Frequencies:

Frequency is used to calculate the description of demographic characteristics, and baseline for the levels of Knowledge regarding students with anemia. Distribution of the levels of knowledge regarding students with anemia on the demographic characteristics. Distribution of the levels of Knowledge regarding students with anemia on the control and study groups.

2- Percentage:

$$\text{percentage (\%)} = \frac{\text{frequencies (f)}}{\text{size of sample}} \times 100$$

3- Mean: use to estimate the value of the data

$$x = \frac{\Sigma x}{n}$$

4. Mean of scores: use to computed the items of mothers' performance of the educational program.

5. Standard deviation =

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

3.15.2 Inferential data analysis (Sppiegel, 1972)

This approach is performed through the application of the following:

1. Cronbach's Alpha Correlation coefficient procedures to determine the: the questionnaire's internal consistency and reliability of mother's knowledge and attitudes regarding anemia disease in their children.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum V_i}{V_t}\right)$$

2. t-test (independent t. test): it is used for determining the differences and for comparing 2 means (x a and x b) of the two groups, Control and Study groups.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}}$$

3. Repeated Measure analysis of variance (ANOVA) Test:

Applied to determine the effect of the educational program for the mothers: Main time effect, between group's effect, and Groups Interaction overtime for the mother's knowledge.

$$s^2 = \frac{\sum (X - \bar{X})^2}{N - 1}$$

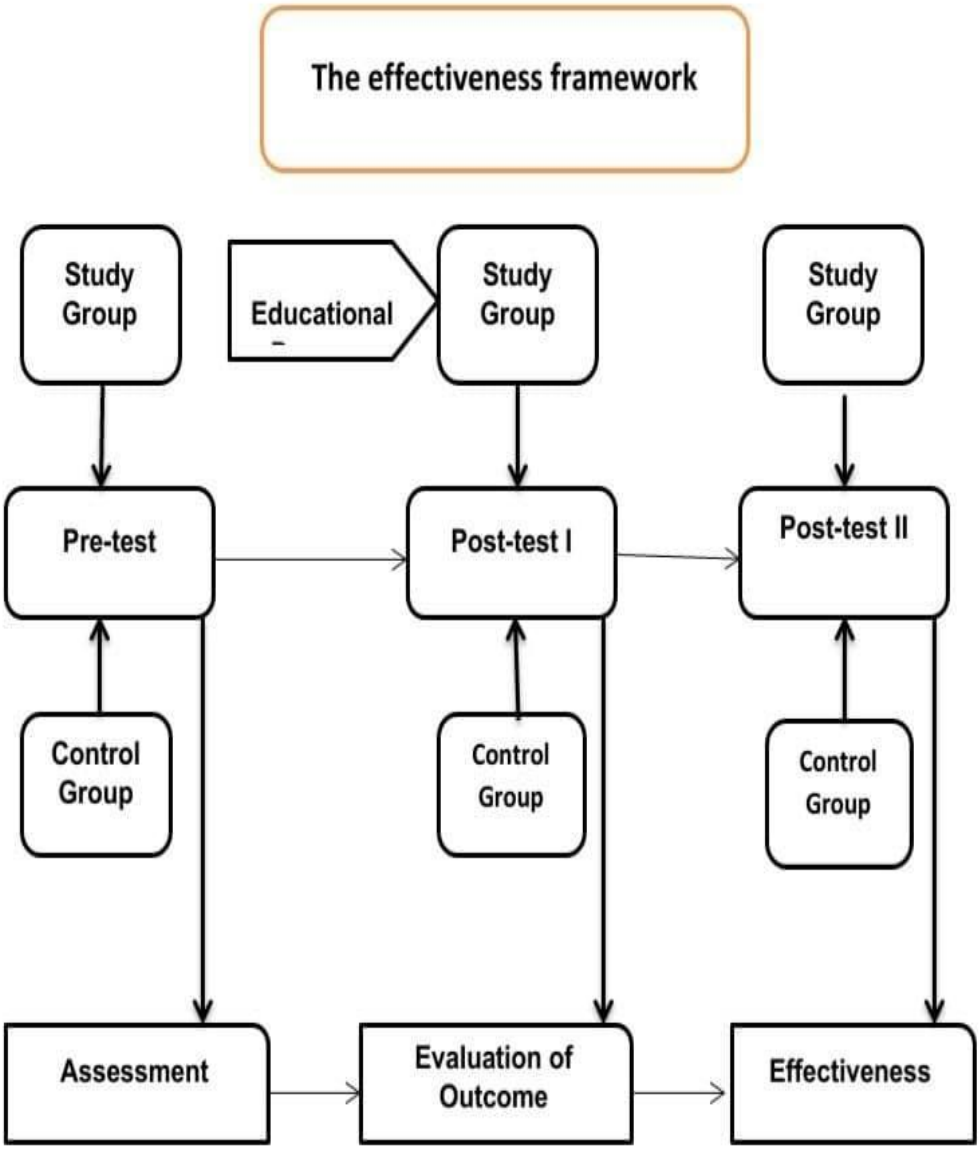


Figure (3-2) the effectiveness framework of educational pr

Chapter Four

Results

Chapter Four

Results of the Study

In order to evaluate the effectiveness of structured educational program upon mothers of primary school's students with anemia, data were collected from those mothers by using specific instrument prepared for the mentioned purpose. Many statistical methods were used to find out the outcome and detect if there are significant differences between variables after applying an educational program which applied for this reason among the participants.

Table (4-1) Frequency distribution of the study sample by demographic characteristics

Variables		Groups			
		Study group N=30		Control group N=30	
		F	%	F	%
Age of mothers / Years	18-27	12	40.0	10	33.3
	28-37	14	46.7	16	53.3
	38-47	4	13.3	4	13.3
	Total	30	100	30	100
Residence	Rural	8	26.7	9	30.0
	Urban	22	73.3	21	70.0
	Total	30	100	30	100
Family income	Not enough	15	50.0	9	30.0
	Enough some extent	15	50.0	20	66.7
	Enough	0	0	1	3.3

	Total	30	100.0	30	100.0
Father's educational level (for children)	Don't read and write	5	16.7	2	6.7
	Read and write	2	6.7	1	3.3
	primary	10	33.3	7	23.3
	secondary	12	40.0	11	36.7
	Institute	1	3.3	9	30.0
	Total	30	100.0	30	100.0
Mother's educational level	Don't read and write	5	16.7	2	6.7
	Read and write	1	3.3	2	6.7
	primary	13	43.3	10	33.3
	secondary	10	33.3	9	30.0
	Institute	1	3.3	6	20.0
	Bachelor and more	0	0	1	3.3
	Total	30	100.0	30	100.0
Occupation of mother	Housewife	27	90.0	19	63.3
	Employee	3	10.0	11	36.7
	Total	30	100.0	30	100.0
Marital status of mother	Marred	28	93.3	26	86.7
	Divorce	1	3.3	4	13.3
	separated	1	3.3	0	0
	Total	30	100.0	30	100.0
Family structure	extended	18	60.0	19	63.3
	Nuclear	12	40.0	11	36.7
	Total	30	100.0	30	100.0
Age of children / Years	5-8	19	63.3	12	40.0
	9-11	8	26.7	13	43.3

	More than 11	3	10.0	5	16.7
	Total	30	100.0	30	100.0
Child order in the family	1-3	23	76.7	29	96.7
	4-6	6	20.0	1	3.3
	More than 6	1	3.3	0	0
	Total	30	100.0	30	100.0
Number of children in the family	1-3	15	50.0	15	50.0
	4-6	12	40.0	14	46.7
	More than 6	3	10.0	1	3.3
	Total	30	100.0	30	100.0

This table presents the distribution of demographical data for (60) mothers of primary school's students with anemia who agree to participate in the study are divided into two groups: (30) mothers as study group and (30) mothers as control group related to age. The table shows that the higher percentage 14 (46.7), 16 (53.3%) of the study and control group were between (28-37) years age group.

Regarding to the residency the results shows that the highest percentage (70%) of the control group were urban area residency, and (30%) were rural area residency, while the major of study group (73.3%) were urban area residency and (26.7%) were rural area residency.

Related to family income this table show that 15 (50%) of study group with not enough and enough some extent, while control group 20 (66.7%) with enough some text. Related to father's educational level (for children) the results show that the high percentage of the study 12 (40%), and control group 11 (36.7%) were secondary school level, while mothers' educational level the high percentage 13(43.3%), 10 (33.3%)

among the study and control group were with primary school level. The mothers of primary school's students with anemia who participate in the study and control group recorded high percentage 27 (90%), 19 (63.3) were Housewife. Both group study and control recorded high percentage 28 (93.3%), 26 (86.7%) were married. In other side, this table show that large family structure in both study group 18 (60.0) and control group 19 (63.3). this table also show the majority of study group related to age of children with anemia are ranged from 5-8 are 19 (63.3) while in study group ranged from 9-11 are 13 (43.3). while the result of the study and control group related to child order in the family 1-3 show that 23 (76.7%), 29 (96.7) were with anemia. Finally, the results show number of children in family (1-3) that half percentage 15 (50%) in both groups which are study and control groups.

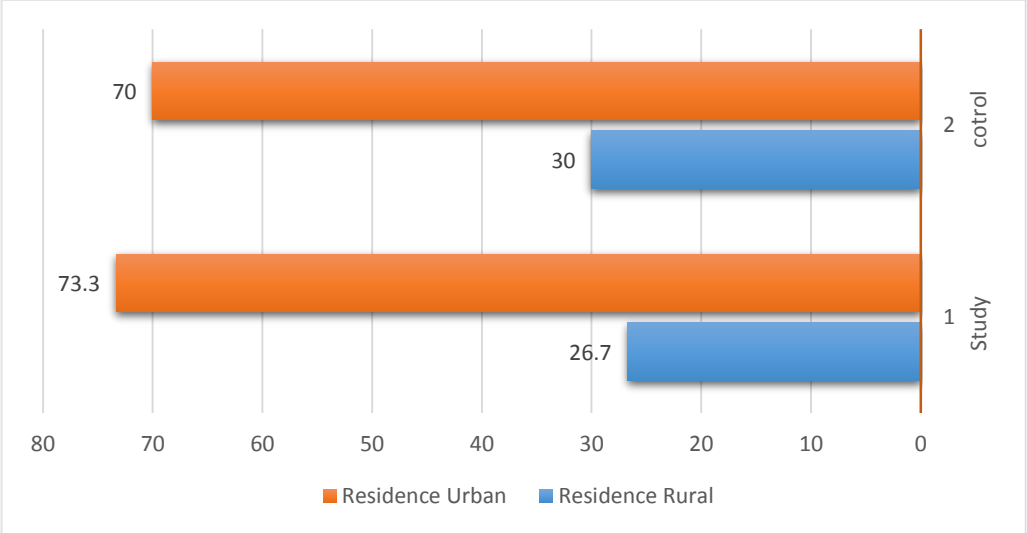


Figure 1: Distribution of the study sample according to their residences.

This figure shows that the highest percentage (70%) of the control group were urban area residency, and (30%) were rural area residency, while the major of study group (73.3%) were urban area residency and (26.7%) were rural area residency.

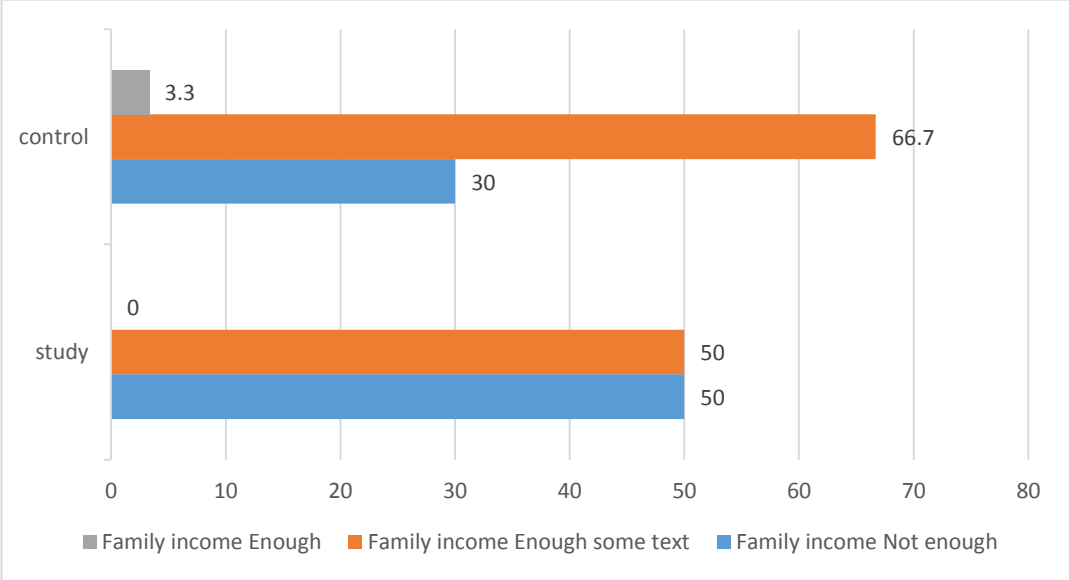


Figure 2: Distribution of the study sample according to their family income.

This figure shows that the family income that 15(50%) of study group with not enough and enough some extent, while control group 20 (66.7%) with enough some extent.

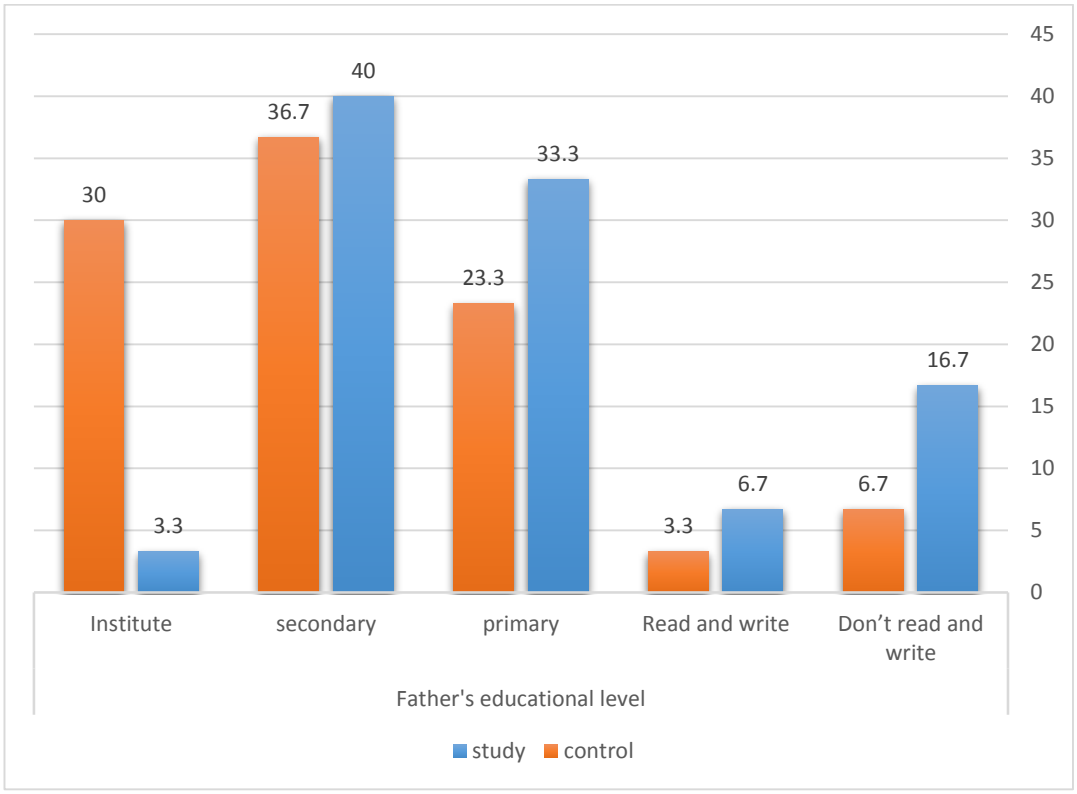


Figure 3: Distribution of the study sample according to their father's educational level.

Figure (3) show that father's educational level with high percentage of both study and control group recorded 12 (40%), were recorded as secondary school level 11 (36.7%).

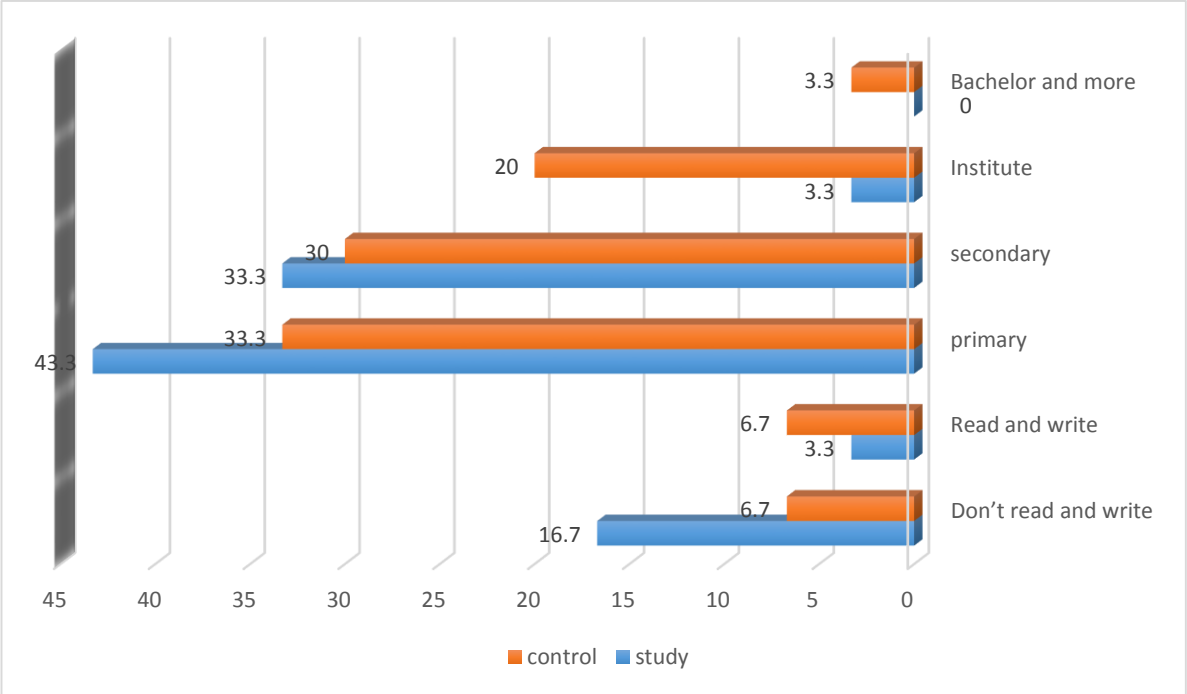


Figure 4: Distribution of the study sample according to their mother's educational level.

This figure appears that mothers educational level was recorded the high percentage 13 (43.3%) comparing with 10 (33.3%) among the study and control group were with primary school level.

Table (4-2) Pre and Posttest assessment of the study group related to the level of knowledge

N	Items	Study group					
		Pre test M.S\S.D	Assess	Posttest 1 M.S\S.D	Assess	Posttest 2 M.S\S.D	Assess
1.	Anemia is a chronic health problem	1.97 .183	good	2.00 .000	good	2.00 .000	good
2.	Anemia is a decrease in the number of	1.03 .183	poor	2.00 .000	good	1.97 .183	good
3.	One of the causes of anemia is	1.03 .183	poor	2.00 .000	good	1.97 .183	good
4.	The function of red blood cells is transport of oxygen and food	1.77 .430	good	2.00 .000	good	1.97 .183	good
5.	The most common type of anemia is	1.23 .430	poor	1.93 .365	good	1.80 .407	good
6.	Aplastic anemia occurs when Children who suffer from:	1.03 .183	poor	1.97 .183	good	1.23 .430	poor
7.	The age of the red blood cells ranges between	1.03 .183	poor	1.87 .346	good	1.60 .498	good
8.	The number of normal red blood cells	1.00 .000	poor	1.63 .490	good	1.40 .498	poor
9.	Children most at risk of iron deficiency anemia	1.00 .000	poor	1.63 .490	good	2.00 .000	good
10.	One of the causes of anemia in children is	1.00 .000	poor	1.97 .183	good	2.00 .000	good
11.	A child's anemia can be known through	1.07 .254	poor	2.00 .000	good	2.00 .000	good
12.	Effect of anemia is	1.00 .000	poor	2.00 .000	good	1.97 .183	good

13.	**When developing anemia in children, the color of the gums is**	**1.27 .450**	**poor**	**2.00 .000**	**good**	**2.00 .000**	**good**
14.	**The type of anemia is determined through action**	**1.03 .183**	**poor**	**2.00 .000**	**good**	**2.00 .000**	**good**
15.	**Anemia occurs in children who are vegetarians**	**1.17 .504**	**poor**	**1.93 .365**	**good**	**2.00 .000**	**good**
16.	**Anemia in children occurs as a result of not eating healthy foods**	**1.23 .379**	**poor**	**1.97 .183**	**good**	**1.97 .183**	**good**
17.	**Anemia can be treated through eating**	**1.30 .466**	**poor**	**2.00 .000**	**good**	**1.77 .430**	**good**
18.	**Anemia is compensated by eating the following foods**	**1.07 .254**	**poor**	**2.00 .000**	**good**	**2.00 .000**	**good**
	General mean	**1.03 .045**	**poor**	**1.97 .066**	**good**	**1.81 .066**	**good**

M.S. (mean of scores = 2), cut off point (0.5), N.S (poor) (M.S. 1-1.49), S (good) (M.S. 1.50-2)

This table presents the statistical analysis of knowledge of the mothers related of anemia. It indicates that the general mean and SD for study group (1.03 ± .045) in their pre-test, while significant change is clearly presented in the following two Post-test (1.97±0.066), (1.81±0.066).

Table (4-3) Assessment of the control group related to knowledge of mothers

N	Items	Control group					
		Pre test M.S\S.D	Assess	Posttest 1 M.S\S.D	Assess	Posttest 2 M.S\S.D	Assess
1	Anemia is a chronic health problem	1.97 .183	good	2.00 .000	good	1.97 .183	good
2	Anemia is a decrease in the number of	1.03 .183	poor	1.03 .183	poor	1.07 .254	poor
	One of the causes of anemia Is	1.03 .183	poor	1.03 .183	N.S	1.03 .183	poor
4	The function of red blood cells is transport of oxygen and food	1.50 .509	good	1.60 .498	good	1.63 .490	good
5	The most common type of anemia is	1.03 .183	poor	1.00 .000	poor	1.17 .379	poor
6	Aplastic anemia occurs when children who suffer from	1.00 .000	poor	1.00 .000	poor	1.03 .183	poor
7	The age of the red blood cells ranges between	1.00 .000	poor	1.00 .000	poor	1.10 .305	poor
8	The number of normal red blood cells	1.00 .000	poor	1.00 .000	poor	1.03 .183	poor
9	Children most at risk of iron deficiency anemia	1.00 .000	poor	1.00 .000	poor	1.03 .183	poor
10	One of the causes of anemia in children is	1.17 .379	poor	1.00 .000	poor	1.07 .254	poor
11	A child's anemia can be known through	1.03 .183	poor	1.00 .000	poor	1.03 .183	poor
12		1.00	poor	1.00	poor	1.53	good

	Effect of anemia is	**.000**		**.000**		**.507**	
13	**When developing anemia in children, the color of the gums is**	**1.20 .407**	**poor**	**1.00 .000**	**poor**	**1.00 .000**	**poor**
14	**The type of anemia is determined through action**	**1.00 .000**	**poor**	**1.00 .000**	**poor**	**1.13 .346**	**poor**
15	**Anemia occurs in children who are vegetarians**	**1.57 .504**	**good**	**1.53 .507**	**good**	**1.70 .466**	**good**
16	**Anemia in children occurs as a result of not eating healthy foods**	**1.53 .507**	**good**	**1.50 .509**	**good**	**1.60 .498**	**good**
17	**Anemia can be treated through eating**	**1.20 .407**	**poor**	**1.03 .183**	**poor**	**1.10 .305**	**poor**
18	**Anemia is compensated by eating the following foods**	**1.07 .365**	**poor**	**1.00 .000**	**poor**	**1.03 .183**	**poor**
	General mean	**1.05 .093**	**poor**	**1.08 .073**	**poor**	**1.03 .183**	**poor**

M.S. (mean of scores = 2), cut off point (0.5), N.S (poor) (M.S. 1-1.49), S (good) (M.S. 1.50-2)

This table presents the statistical analysis of knowledge of the mothers related of anemia. This table shows the general mean and SD for control group (1.05±.093) in their pre-test, while no significant change is clearly presented in the following two Post-test (1.08±0.073), (1.03±0.183.).

Table (4-4): Responses of the each participants related to knowledge of mothers about anemia based on mean of score of the study and control groups .

Participants	Study Group			Control Group		
	Pre test M.S	Posttest 1 M.S	Posttest 2 M.S	Pre test M.S	Posttest 1 M.S	Posttest 2 M.S
1.	22	35	32	21	21	24
2.	22	35	34	23	22	23
3.	22	35	33	26	22	25
4.	22	35	33	22	21	22
5.	23	35	35	24	21	24
6.	22	35	31	21	21	23
7.	25	34	34	20	20	21
8.	25	35	34	22	21	22
9.	21	35	34	22	21	24
10.	22	34	34	22	21	21
11.	20	35	34	21	20	21
12.	21	35	35	24	20	21
13.	23	35	34	19	19	20
14.	22	35	36	22	21	21
15.	23	35	32	19	19	19
16.	20	34	34	23	21	21
17.	23	36	34	21	20	21
18.	21	34	31	23	22	21
19.	24	36	34	21	21	22
20.	22	36	35	23	22	21
21.	24	34	34	29	22	20
22.	20	35	32	23	21	19
23.	20	35	33	24	20	21
24.	25	35	36	22	20	20

25.		22	36	34	21	19	19
26.		19	36	36	23	20	20
27.		21	36	33	22	21	20
28.		25	35	32	21	22	22
29.		24	34	31	21	21	21
30.		22	32	35	23	20	21
General mean	M.S	22.23	34.90	33.63	21.33	20.73	22.27
	S.D	1.654	.845	1.426	1.539	.907	1.964
assess		N.S	**S**	S	N.S	N.S	N.S

Mean of score = not significant (18 – 27), significant (28 – 36)

This table presents the statistical analysis of knowledge of the mothers related of anemia. This table shows the general mean and SD for study group (22.23 ±1.654) in their pre-test, while significant change is clearly presented in the following of Post 1, post 2-test (34.90±0.845), (33.63±1.426). In other side this table shows the general mean and SD for control group (21.33±1.539) in their pre-test, while no significant change is clearly presented in the following of Post 1, post 2-test (20.73±0.907), (22.27±1.964).

Table (4-5) Comparison of mean of score for mother's knowledge regarding to pretest, posttest 1, posttest 2 for the study and control groups

	knowledge for study group			knowledge for control group		
	pretest	posttest (1)	posttest (2)	pre test	posttest (1)	posttest (2)
N	30	30	30	30	30	30
Mean of score	22.23	34.9	33.63	21.33	20.73	22.27
Std. Deviation	1.654	0.845	1.426	1.539	0.907	1.964
Assess	N.S	S	S	N.S	N.S	N.S

Mean of score = not significant (18-27), Significant (28-36)

This table shows that the significant changes in mother's knowledge regarding their anemic students between study and control group

Table (4-6) Mean of scores Comparing for mother's knowledge regarding to pretest, posttest 1 and posttest 2 for study group.

	N	Mean	Std. Deviation	Minimum	Maximum
pretest	30	22.23	1.654	19	25
Posttest1	**30**	**34.90**	**.845**	**32**	**36**
Posttest2	30	33.63	1.426	31	36
Total	90	30.26	5.882	19	36

Mean of score = not significant (18-27), Significant (28-36)

This table shows that the significant change in mother's knowledge regarding their anemic students in post educational program at the mean of score= 34.9.

Table (4-7) Mean of scores comparing pretest for both study group and control group

Group Statistics							
	Groups	N	Mean of score	Std. Deviation	Std. Error Mean	**P-value**	**Assessment**
pretest knowledge	study	30	**22.23**	1.654	.302	**.810**	**N.S**
	control	30	**21.33**	1.539	.281		

Mean of score = not significant (18-27), Significant (28-36)

This table shows the comparison between responses of control group and trial group to pretest, there is no significant differences between responses of control group and study group to pretest (*P* value =.810).

Table (4-8) Comparing of mean of score for mother's knowledge regarding to pretest for both study group and control group

Independent Samples Test							
		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Ass
pretest knowledge for control group	Equal variances assumed	.215	.644	2.182	58	**.073**	**N. S**
pretest knowledge for study group	Equal variances not assumed			2.182	57.699		

This table show that not significant differences between mean of pretest knowledge for both group study and control at p-value (0.073) which are more than (0.05).

Table (4-9) Repeated measures ANOVA Tests for mother's knowledge about their children with anemia

ANOVA						
	Sum of Squares	df	Mean Square	F	Sig.	Ass
Between Groups	2920.089	2	1460.044	798.725	**.001**	**H.S**
Within Groups	159.033	87	1.828			
Total	3079.122	89				

This table show high significant differences between pretest and posttest 1 and posttest 2 for mother knowledge toward their child with anemia at p- value 0.001 which are less than 0.01.

Table (4-10) Differences within the three phases regarding mother's knowledge about their children with anemia by using post hoc tests.

Multiple Comparisons				
(I) knowledge	(J) knowledge	Mean Difference (I-J)	Std. Error	Sig.
Pretest	Posttest 1	-12.667*	.349	**.000**
	Posttest 2	-11.400*	.349	**.000**
Posttest 1	pretest	12.667*	.349	**.000**
	Posttest 2	1.267*	.349	**.001**
Posttest 2	pretest	11.400*	.349	**.000**
	Posttest 1	-1.267*	.349	**.001**
*. The mean difference is significant at the 0.05 level.				

Regarding the differences in the knowledge within the three phases this table indicates that there is a high significant differences in the knowledge between phase one and phase two (sig.= 0.000) and phase three (sig.= 0.001). This result indicates that there is a changing in levels of knowledge between all phases.

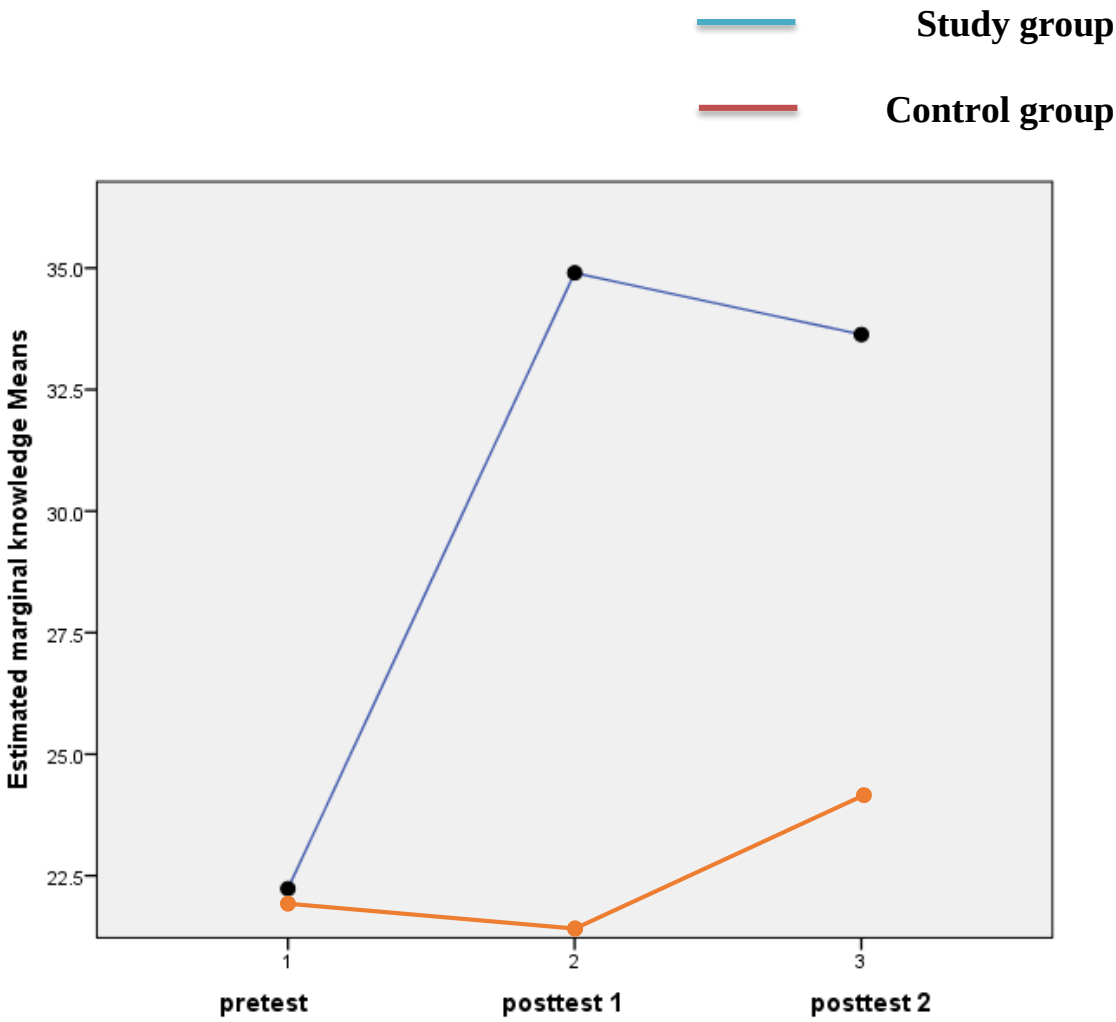


Figure (5) Estimated marginal knowledge means for both groups

Figure (5) show changes in the levels of the mothers Knowledge about their students with anemia in both study and control groups throughout the three phases of pretest and posttest 1, posttest 2.

Table (4-11) Relationship between mother knowledge for study group and their demographic data

demographic and clinical data	Chi-square Value	D.f.	P-Value	Assessment
Age of mother	113.292	96	.110	N.S
Residence	3.068	6	.800	N.S
Family income	13.600	6	.034	S
Father's educational level	22.733	24	.536	N.S
Mother's educational level	21.658	24	.046	S
Occupation of mother	3.889	6	.029	S
Marital status of mother	8.732	12	.726	N.S
Family structure	7.083	6	.027	S
Age of anemic child study	42.794	42	.437	N.S
Child order position in the family	26.044	30	.673	N.S
Number of children in family	33.301	42	0.039	S

This table show the significant association between mother's knowledge for study group with family income at p-value 0.034, mothers educational level at p-value 0.046, occupation of mother at p- value 0.029, family structure at p-value 0.027, number of children in family at

p-value 0.039 which is less than 0.05, will not significant association in remaining items.

Table (4-12) Assessment of the study group related to attitudes of the mothers

N	Items	Study group					
		Pre test M.S\S.D	**Ass**	**Posttest1 M.S\S.D**	**Ass**	**Posttest 2 M.S\S.D**	**Ass**
1	I worry about my child with anemia because he needs special care and attention	2.60 .621	Agree	2.93 .254	Agree	2.43 0.504	Agree
2	regular meals can prevent anemia like spinach chicken vegetable and liver	2.63 .556	Agree	2.93 .254	Agree	2.8 0.407	Agree
3	I think that mixing foods – rich calcium like eggs and others with foods that contain iron negatively affect iron absorption	1.53 .776	Uncertain	2.43 .626	Agree	2.83 0.379	Agree
4	I suspect that the increase in salts in foods negatively affects the absorption of iron	1.93 .740	Uncertain	2.43 .679	Agree	2.9 0.305	Agree
5	I imagine that repeated visits to the health center for the purpose of conducting anemia monitoring checks are very necessary	2.53 .571	Agree	2.83 .379	Agree	2.97 0.183	Agree
6	I suspect that nutritional supplements help reduce anemia	2.57 .626	Agree	2.93 .254	Agree	2.93 0.254	Agree
7	I think increasing your meals to five every day helps treat anemia	2.47 .571	Agree	2.93 .254	Agree	2.97 0.183	Agree
8	I would think that eating natural juices such as orange and lemon juice helps reduce anemia	2.57 .568	Agree	2.97 .183	Agree	3 0.00	Agree
9	I think breakfast is necessary for an anemic child	2.53 .507	Agree	3.00 0.00	Agree	2.97 0.183	Agree
10	A school child needs a supplementary meal to help treat anemia	2.60 .498	Agree	3.00 0.00	Agree	3 0.00	Agree

11	I think treating worms that infect children helps reduce the incidence of anemia	2.63 .556	Agree	3.00 0.00	Agree	3 0.00	Agree
12	I would think that removing processed foods and soft drinks reduces anemia	2.53 .629	Agree	3.00 0.00	Agree	3 0.00	Agree
13	Attention and diligence to wash the child's hands before and after eating is necessary in case of anemia	2.60 .621	Agree	3.00 0.00	Agree	3.00 0.00	Agree
General mean	M.S	2.29	Agree	3.00	Agree	3.00	Agree
	S.D	.490		.000		.000	

M.S. (mean of scores = 2), cut off point (0.66), Disagree (M.S. 1-1.66), Uncertain (1.67-2.33), Agree (M.S. 2.34-3)

This table presents the statistical analysis of attitude of the mothers related of anemia. This table shows the general mean and SD for study group (2.29 ± .490) in their pre-test, while not significant change is clearly presented in the following two Post-test (3.00 ± 0.00), (3.00 ± 0.00).

Table (4-13) Assessment of the control groups related to attitudes of the mothers

N	Items	Control group					
		Pre test M.S\S.D	**Assess**	**Posttest 1 M.S\S.D**	**Assess**	**Posttest 2 M.S\S.D**	**Assess**
1	I worry about my child with anemia because he needs special care and attention	2.53 .507	Agree	2.27 .450	Uncertain	2.20 .484	Uncertain
2	regular meals can prevent anemia like spinach chicken vegetable and liver	2.43 .504	Agree	2.17 .379	Uncertain	2.30 .466	Uncertain
3	I think that mixing foods – rich calcium like eggs and others with foods that contain iron negatively affect iron absorption	1.53 .507	Disagree	1.47 .571	Disagree	1.40 .498	Disagree
4	I suspect that the increase in salts in foods negatively affects the absorption of iron	1.70 .466	Uncertain	1.43 .504	Disagree	1.40 .498	Disagree
5	I imagine that repeated visits to the health center for the purpose of conducting anemia monitoring checks are very necessary	2.27 .583	Uncertain	2.30 .535	Uncertain	2.67 .547	Agree
6	I suspect that nutritional supplements help reduce anemia	1.97 .183	Uncertain	2.00 0.000	Uncertain	2.03 .183	Uncertain
7	I think increasing your meals to five every day helps treat anemia	1.90 .305	Uncertain	2.00 0.00	Uncertain	2.00 0.00	Uncertain
8	I would think that eating natural juices such as orange and lemon juice helps reduce anemia	1.93 .254	Uncertain	2.00 0.00	Uncertain	2.00 0.00	Uncertain
9	I think breakfast is necessary for an anemic child	2.03 .320	Uncertain	2.00 0.00	Uncertain	2.03 .183	Uncertain
10	A school child needs a supplementary meal to help treat anemia	2.03 .183	Uncertain	2.00 0.00	Uncertain	2.00 0.00	Uncertain

11	I think treating worms that infect children helps reduce the incidence of anemia	2.00 .371	Uncertain	1.90 .305	Uncertai n	1.90 .305	Uncertai n
12	I would think that removing processed foods and soft drinks reduces anemia	2.00 .371	Uncertain	1.97 .183	Uncertai n	2.03 .320	Uncertai n
13	Attention and diligence to wash the child's hands before and after eating is necessary in case of anemia	2.47 .507	Agree	2.33 .479	Uncertai n	2.70 .466	Agree
General mean	**M.S**	**2.03**	**Uncertain**	**2.00**	**Uncerta in**	**2.03**	**Uncertai n**
	S.D	**.183**		**0.00**		**.183**	

M.S. (mean of scores = 2), cut off point (0.66), Disagree (M.S. 1-1.66), Uncertain (1.67-2.33), Agree (M.S. 2.34-3)

This table presents the statistical analysis of knowledge of the mothers related of anemia. This table shows the general mean and SD for control group (2.03 ± .183) in their pre-test, while no significant change is clearly presented in the following two Post-test (2.00 ± 0.00), (2.03±0.183).

Table (4-14) Overall mother's attitudes for both study and control groups

Items	Study group			Control group		
	Pre test M.S\S.D	Posttest 1 M.S\S.D	Posttest 2 M.S\S.D	Pre test M.S\S.D	Posttest 1 M.S\S.D	**Posttest 2 M.S\S.D**
Overall mothers attitude for both study and control groups	2.63 .490	3.00 .000	3.00 .000	2.03 .183	2.00 .000	**2.03 .183**
Assessment	Agree	Agree	Agree	Uncertain	Uncertain	**Uncertain**

M.S. (mean of scores = 2), cut off point (0.66), Disagree (M.S. 1-1.66), Uncertain (1.67-2.33), Agree (M.S. 2.34-3)

Table (4-15) Mean differences between study and control groups regarding attitudes

	study group			control group		
	pretest attitude	posttest (1) attitude	posttest (2) attitude	pretest attitude	posttest (1) attitude	posttest (2) attitude
N	30	30	30	30	30	30
Mean	31.73	37.40	37.80	26.80	25.83	26.67
Std. Deviation	2.993	1.102	.761	1.562	.950	1.322
Assessment	Agree	Agree	Agree	Uncertain	Uncertain	Uncertain

Mean of score = Disagree (13 – 21), Uncertain (22 – 30), Agree (31 – 39)

Table (4-16) show mean differences between study group regarding Attitudes

Mean of score = Disagree (13 – 21), Uncertain (22 – 30), Agree (31 – 39)

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Pretest	30	31.73	2.993	.547	25	39
Posttest1	30	37.34	1.078	.200	35	39
Posttest2	30	37.80	.761	.139	36	39
Total	90	35.61	3.356	.356	25	39

Table (4-17) Repeated Measures ANOVA Tests for mother's attitudes about their children with anemia

	Sum of Squares	df	Mean Square	F	Sig.	ASS
Between Groups	682.018	2	341.009	94.842	.001	H.S
Within Groups	309.218	86	3.596			
Total	991.236	88				

This table show high significant differences between pretest and posttest 1, posttest 2 for mother attitude toward their child with anemia at p.value 0.001 which are less than 0.01.

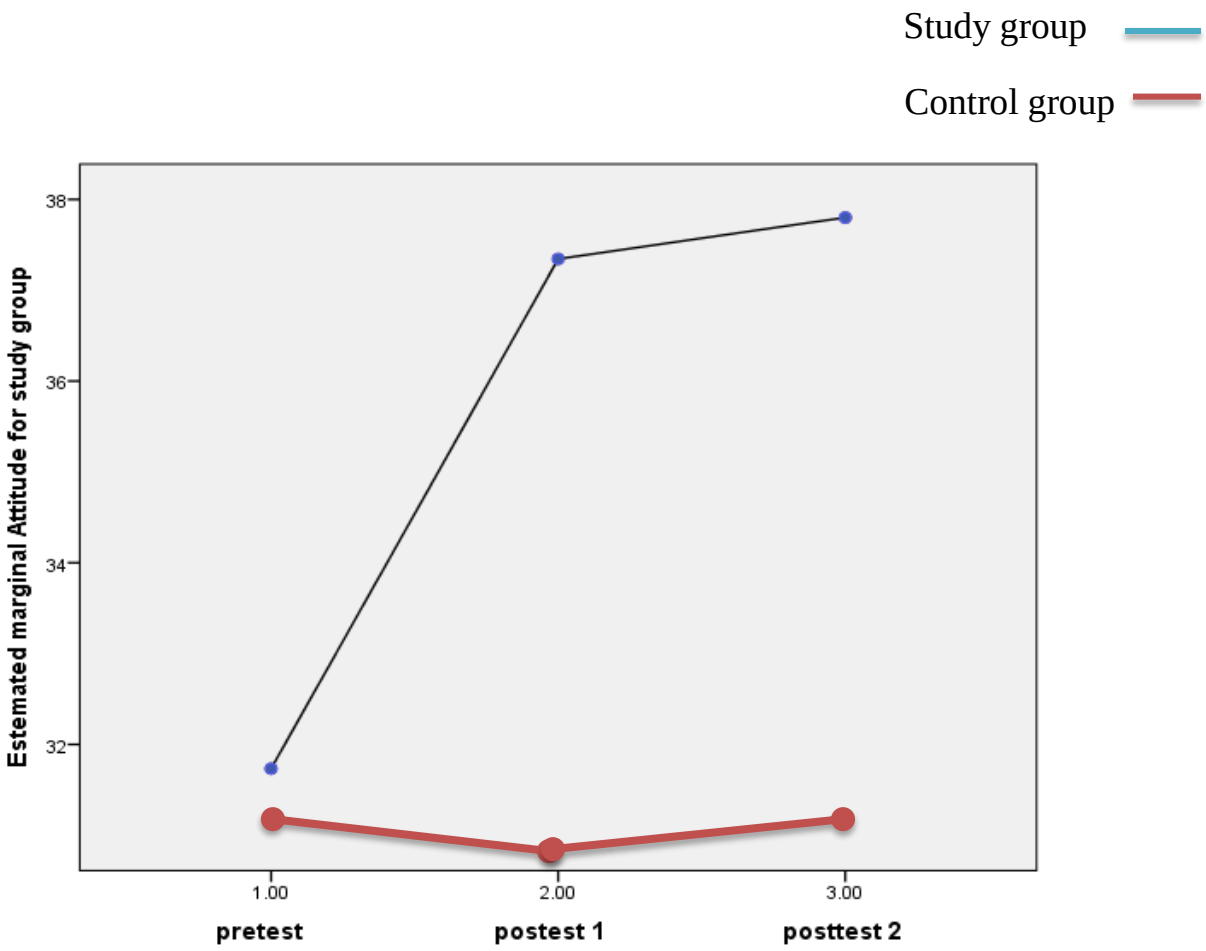


figure (6) Estimated marginal attitude means for both groups

Figure (6) show changes in the levels of the mother's attitude about their students with anemia in both study and control groups throughout the three phases.

Table (4-18) Relationship between mother attitudes for study group and their demographic characteristics

demographic and clinical data	Chi-square Value	D.f.	P-Value	Assessment
Age of mother	162.917	160	.421	N.S
Residence	11.250	10	.338	N.S
Family income	12.333	10	.023	S
Father's educational level	31.083	40	.043	S
Mother's educational level	40.288	40	.457	N.S
Occupation of mother	17.037	10	.039	S
Marital status of mother	39.286	20	.006	H.S
Family structure	7.083	10	.718	N.S
Age of anemic child study	75.764	70	.298	N.S
Child order position in family	41.556	50	.797	N.S
Number of children in family	60.476	70	.035	S

This table show the high significant association between mother's attitude for study group with marital status of mother at p-value .006. This table also show the significant association between mother's attitude for study group with family income at p-value 0.023, father's educational level at p-value 0.043, occupation of mother at p-value 0.039, marital status of mother at p-value .006, number of children in family at p- value 0.035, which is less than 0.05, will not significant association in remaining items.

Chapter Five

Discussion of The Results

Chapter five

Discussion of results

After analyzing the study data collected from the sample that participating in the study and dealing with it statistically through the use of SPSS program, these results will be discussed in this chapter and compared with the results of different studies.

The researcher conducted this study to compare between (pre-test phase) the knowledge and attitudes of mothers of students that are suffering from anemia in primary school age through construction and application of an educational program for this purpose in Al-Hilla city.

In this chapter, the study findings after carrying out the program be presented with the scientific discussion and a systematic interpretation of results. Which compared and supported through the accessible literature from national and international research related to the study topic.

5.1. Discussion the Demographic Characteristics of Study Sample

After analyzing the demographic data, in relation to the age of participants, the range of age of both the study and control groups was (28-37) years, this age group constitute 46.7%, this result is consistent with the study done by (Osei et al., 2017) to measure the impact of the improved homestead food program which consist of poultry raising, home garden and nutrition education applied through 2.5 years ago, there result indicate the majority of mothers age who are participated in the study ranged between 27-33 years old.

This result corresponding with the result of study conducted by (Choi et al., 2011) in Korea to which contributed find out the association between state of socioeconomic factors and possibility of exposure to anemia and iron insufficiency in an area. These results provide that both the study and control groups were homogeneous in age.

Related to the researcher point of view, this result considers suitable as age of group (28-37) to provide health care for their children because the women in this age are considered more mature and able to maintain the health of their children from the complications that may occur due to the exacerbation of the disease and the deterioration of the health condition.

Related to the mothers' residency, presented the higher proportion were among mothers living in urban area for both group, in study group the result was (73.3%) and (70.0%) in control group, the results agree with a study carried out in the Malaysian primary school by (Shanita et al., 2018) to determine the prevalence of anemia as well as iron deficiency states (ID) and to show the relationships between demographic information, social characteristics, nutritional status of children and conditions that cause various infectious disease in the body that contribute to anemia and exposure to intellectual disability in children, the results showed that the vast majority of the women participating in this study lived in urban areas (76.7%). On the contrary, this study not compatible with study conducted by (Tabi, et al, 2019) who found that the highest percentage of mothers living in rural area.

Relevance to the monthly income of the family, the results showed the highest proportion was (50.0%) in the study group have not enough and enough some extent, these results are consistent with a study conducted in Egypt by (Abdel-Rasoul, et al., 2017), on anemia in

children, which showed that the socioeconomic status of the family plays a role in the occurrence of anemia in children, and the highest percentage of study participants did not have enough monthly income (62.8%). While regarding the monthly income in control group the highest percentage was (66.7%) for family with enough some text. Through this result and the results of previous studies, monthly income is an important and influential factor in the occurrence of anemia, which increases the complications and progression of the disease, thus anemia often increases in societies that suffer from poverty.

Regarding the educational level of fathers, the highest percentage was found among fathers of children with secondary school for both group, in the study group the highest percent was (40.0%) while in control group the highest percent was (36.7%), these results are consistent with the findings of a study conducted in Southwest Ethiopia (Assefa et.al., 2014), which explain the magnitude of anemia among children in which secondary school age, their results indicate that the majority of fathers have educational level of secondary school at (31.5%).

In the current study the level of education of mothers, the highest percentage of mothers (43.3%) for study group and (33.3) for control group, the result of both group in regard this parameter is among mothers with primary school as a highest percentage. This results agree with the findings of study performed by (Goyal1and Rawat, 2018) which investigate the social and demographic factors that play a crucial role in anemia among school age girls in adolescent period, their results indicate the higher percentage of mothers' educational levels were (27.79%) as primary school. On other hand this result also match with the outcome of study done in Western Iran by (Akramipour et al., 2008)

to evaluate the anamic disease prevalence and iron deficiency in school student at Kermanshah province. Researcher point of view about this parameter is high percentage of mothers who graduate from primary school an indicator of their lack of knowledge and have negative attitudes about their children's anemia and how to deal with their children to avoid the progressive of illness.

Concerning the mother occupation, the result indicated that the highest percentage was house wife for study group (90.0%) and also for control group at (63.3%), these results are consistent with study of (Mesfin et al., 2015) done in Eastern Ethiopia to assess the prevalence and clarify the correlates of anemia disease among school age children, their results indicated that the majority of mothers who are participated in that study were housewife (93.5%).

Regarding the marital status of the study participants. The results showed that a largest percentage of the both groups was married, in regarding the study group the majority percentage was (93.3%) and the percentage of control group was (86.7%), this result goes in line with the study of (Getaneh, et al., 2008) performed in northwest Ethiopia to determine the prevalence of anemia among students in the primary schools in government schools and its relationship to the various factors that play a role in the burden of the disease in the city of Gondar, their results indicated the majority of mothers who are participated in the study are married at (72.5%). This was another challenge for most of the sample participants due to the responsibilities and duties of families, especially in our culture but despite this, they showed a good interest in enrolling in the tutorial sessions.

Regarding the size of the family or its components, most of the mothers participating in the educational program in both the study and control groups (60.0%) (63.3%) respectively live in large families. The finding of this study agrees in terms of the family structure with several studies, including a study conducted in the southwest Ethiopia (Assefa. et. al, 2014) on the prevalence and severity of anemia among school children, and it was found that most children with anemia live in large, multi-person families (58.4%). As well as this study coincide with the results of study (Gutema et al., 2014) conducted at Filtu city through the Somali area in the part of Southeast Ethiopia in order to clarify the prevalence and incidence of anemia among children during elementary school age and the factors that is associated with this disease, their results express the children with anemia living with large family at (28.36%).

Regarding the children suffering from anemia, whose mothers were participants in the study, for the two groups study and control, the results of this study indicated, the highest percentage being between (5-8) years old at (63.3%) in the study group, while the (9-11) years old at (43.3%) in the control group, these results consistent with the findings of (Shanita et al., 2018) and (Assefa et al., 2014) to measure the occurrence of anemia among elementary students' school in Malaysia and Southwest Ethiopia. According the researcher opinion, the arrangement of the child in the family had an effect on the exposure to the anemia due to the neglect of older children by his parents and focusing attention on younger children in terms of nutrition and the achieve rest of his needs, this was supported by study through the results, which was the ranking of the child with anemia in both groups was high in the study group and the control group (76.7%) (96.7%).

The last parameter in demographic characteristics is number of children in the family, the results express the highest percentage in both groups was (50.0%) among children with age group 1-3 years' old, this result agree somewhat with study done in Mkuranga District Hospital by (Ngimbudzi et al, 2016) to determine the mothers' beliefs, attitudes, knowledge and their practices in regarding to anemia and its associated factors. Also this results coincide with the findings of study conducted in districts of Wolaita area/ Ethiopia by (Alemayehu et al., 2019) to locate the extent of spread anemia and relevance factors between children.

5.2 Discussion of the Mothers' Knowledge about Anemia Disease in Study Group

In these paragraphs, mothers' knowledge about anemia is discussed for each of the following: Is it a problem, a deficiency in any part of the blood components, as well as the reasons for its occurrence, and what is the function of the red blood cells, the most common types of anemia, the number of red blood cells, and from They are most likely to develop anemia, what are the symptoms and signs of disease, what are their effects on the child, how the condition is diagnosed, general knowledge of anemia, signs and symptoms of the disease, its complications, and prevention and treatment of anemia. Study and control groups on two parts, the first in general and the second through the level of knowledge towards this disease. A pre-test was conducted on both the study and control groups before to the implementation of the educational program, and the results revealed minor variations between the two groups on the majority of anemia-related topics. It indicates that mothers have roughly the same level of knowledge about anemia.

After completing the educational program and comparing it with the post-test for both groups, the results indicated that there are statistically significant differences in study group between most questions related to the disease, this means that the mothers have improved their knowledge of the anemia, these findings are supported by the results of study carried out in Bengal at area of Hooghly by (Bandyopadhyay et al., 2017) to identify the effectiveness of interventional health education program on basic knowledge of adolescents' students about how to prevent anemia. Their results indicate there is a significant change in the study sample knowledge between pre-test and post-test in study group after applying educational program sessions, this means that there is improvement in knowledge of study sample.

Improvement and increase the mothers' knowledge about anemia and the negative effects which associated with it deem very important principle.

WHO 2014 mention, that the health literacy extends beyond education and communication for health, and truly embraces strategies that improve and motivate individuals to access and use the information to improve health outcomes. A one third of mothers reported a previous episode of anemia with other children and admitted to having acquired prior knowledge primarily through mothers and child health programs and services. Maternal knowledge included an understanding of the relationship between mother's anemia and childhood anemia, feeding practices, and future health conditions. These findings clearly indicate an opportunity to work with mothers about the causes and treatment of anemia and help them avoid repeating the anemia among other children. The data analysis demonstrates that during the pre-test period, the vast

majority of women in the study group had a low level of knowledge in related to anemia questions, but that this result improved after application of the educational program. According to the researcher point of view, there was a clear advancement in the level of knowledge of mothers in the study group, followed by a minor decline in the degree of knowledge related to the anemic information provided in the questionnaire in the second post-test. This is understandable given the variety of factors that influence knowledge. Over the course of three time of test, while those in the control group exhibit a poor level of knowledge of the questionnaire information concerning anemia, demonstrating the value of the educational program.

5.3 Discussion the Mothers' Knowledge about Anemia Disease in Control Group

The second group that participated in the study is the control group that consists of mothers who have students in the primary school suffering from anemia. The same study tools that were used with the study group was applied here, the researcher done for them the pre-test then the first post-test and the second post-test respectively, but in this group, the group was not included in the predetermined educational program sessions about anemia. The results showed that the mothers' knowledge level in the pre-test did not change in the first and second post-test for all almost all questions because they did not receive any health education that could change their knowledge about the disease of their children. These findings are similar to the results of a study performed by (Hazavehei, et al., 2006) in Kerman, Iran for the purpose to explain the impact of using the precede educational program model as an approach for controlling IDA between children in the age group of

1-5 years', their results indicate the knowledge level for mothers in control group (not attended to educational program sessions) weren't changed and stayed as it.

5.4 Discussion of the Compression of Mothers' Knowledge regarding Anemia in (Pre-test and Post-test) for Study and Control Group.

The results showed that there is a difference with regard to the knowledge of the mothers in the study group between the pre-test at mean of score of (22.23), the first post-test was (34.9) and the second post-test (33.63), while in the control group, there was not significant change in the level of the mothers' knowledge among mean of scores in pre-test (21.33) and post-test one (20.73) and post-test two (22.27). This result was supported with the findings of study carried out in Egypt at El-Othmanyia Village by (Metwally et al., 2020) aimed to identify and ameliorate the dietary knowledge and perilous nutritional patterns of the mothers who had children with anemia in the age group 2–12 years. They found that a significant alteration between pre-test and post-test in mothers' knowledge regarding anemia. In other hand this result agrees with the results of

(Hazavehei, et al., 2006) in Kerman, Iran which for the purposed to explain the impact of using the precede educational program model as an approach for controlling, the researchers in their study reported that there was alteration with regard the mother's knowledge toward anemia in pre-test and post-test level.

Statistical analysis express the comparing in pre-test examination for both group (study and control) depend on the mean of score and probability value (P. value) to explain the response rate of study sample

in regarding knowledge about anemia before doing educational program sessions for study group, the findings in these tables indicate the level of mothers' knowledge in study group depend on the mean of score at (22.23) the assessment were poor knowledge, in control group the results indicated the mothers also with poor knowledge depending on the mean of score at (21.33). The measurement of mothers' knowledge regarding anemia disease for both groups (study and control) was depending on the probability value, the results indicated non significance assessment for knowledge level in two groups at (P. value = .810). Nevertheless, after applied the educational program sessions for study group.

Repeated measures for mother's knowledge about their children with anemia showed there are alteration in mothers' knowledge level depend on the assessment of groups by used probability value, statistically there is a highest significant difference in the study group at P value .001 which are less than 0.05. From the researcher's point of view, based on the results that were presented based on statistical analysis, there is a clear change in the knowledge of mothers in the study group who have children suffering from anemia in the pre-test and then the first and second post-test that were conducted after giving them the sessions scheduled for the educational program in these studying. This indicates that there is an urgent need to activate educational programs that target different societal groups in order to build correct healthy habits towards many of the health problems prevalent in society.

5.5 Discussion of the Relationship between Mother Knowledge for Study Sample and their Demographic Data

In this part the researcher will discussing the relationship between demographic characteristics of study sample and their knowledge regarding anemia. The results of relationship between demographic parameters of mothers and their knowledge as following, the age of mother, residence, father's educational level, marital status of mother, age of anemic child study and child order position in the family, the results of these parameters was not-significant association at p. value more than 0.005. while the others demographic characteristics which include family income, mother's educational level, occupation of mother, family structure and number of children in family. These results supported by the findings of study doing by (Khan et al., 2020) to reconnoiter the anemia disease status of children and mother pairs in Bangladesh, their results indicate that there was a significantly association between some demographic characteristics and anemic status, while another demographic characteristics was not-significant associated. As well as, this result corresponding with outcomes of (Ghimire & Pandey, 2013) who concucted their study at the Kathmandu city capital of Nepal to identify the knowledge and practice of women's who got a delivery in Tribhuvan University Teaching Hospital toward the anemia prevention through pregnancy, their results showed a significant correlation between some demographic characteristics and mothers knowledge while another demographic characteristics was not-significantly associated.

5.6 Discussion of the Mothers' Attitudes about Anemia in Study Group

An attitude is an important feature of human behavior that is frequently influenced by culture (DeSmet et al., 2016). According to (Eagly and Chaiken, 2007), an attitude is a psychological inclination shown by favoring or disfavoring a certain entity. Furthermore, attitudes are not visible and must be inferred from responses to questions.

The findings of this work showed that most of the mothers in the study group before implementing the educational program had a positive attitudes, their concerns about their anemic children because they need special care and attention, and they be life that regular meals can prevent anemia such as vegetables, chicken, spinach and liver, and that frequent visits to the health center for the purpose of conducting tests to monitor the level of anemia is very necessary, and that nutritional supplements help reduce the level of poverty, increasing meals to five meals a day helps in treating anemia, and eating natural juices such as orange and lemon juice helps reduce anemia, and breakfast is necessary for the anemic child, and the child's need in school for a complementary meal to avoid anemia, treating worms that infect children helps reduce the incidence of anemia, and that the removal of processed foods with soft drinks reduces anemia, and finally attention and care on washing the child's hands before and after eating is necessary in case of anemia prevention, while two of the paragraphs of the mother's attitudes about the disease were negative. This is due to their lack of knowledge about the disease control, such as mixing calcium-rich foods example drinking tea immediately after meals reduce iron absorption, eggs and dietary products with foods that contain iron negatively affect iron absorption,

the increasing salt in foods is also negatively affects iron absorption. While their answers improved after implementing the program and all their answers were positive. While the results about the mother's attitudes toward prevention of the disease of their children with anemia in the control group varied in the first test and also in the post one and post two tests, this result in consistence with the results of study doing by (Vengatramani, 2015) in order to identify the impact of teaching program upon mothers had children in preschool age with iron deficiency anemia where the results of mothers' attitudes altered after implementing educational sessions in post-test than it was in the pre-test.

5.7 Discussion of the Mothers' Attitudes about Anemia in Control Group

Depending on the mean of score, the results in table (4-13) show the assessment of the control group regarding the mothers' attitudes items about anemia there was no noticeable change between the pre-test and the post-test, where the items exposure to change in pre-test and post-test are (I worry about my child with anemia because he/she needs special care and attention, regular meals can prevent anemia like spinach chicken vegetable and liver, I think that mixing foods –rich with calcium like eggs and others with foods that contain iron negatively affect iron absorption, I suspect that the increase in salts in foods negatively affects the absorption of iron, I imagine that repeated visits to the health center for the purpose of anemia monitoring checks are very necessary and attention and diligence to wash the child's hands before and after eating is necessary in case of anemia), while another items (I suspect that nutritional supplements help reduce anemia, I think increasing your meals to five every day helps treat anemia, I would think that eating

natural juices such as orange and lemon juice helps reduce anemia, I think breakfast is necessary for an anemic child, A school child needs a supplementary meal to help treat anemia, I think treating worms that infect children helps reduce the incidence of anemia and I would think that removing processed foods and soft drinks reduces anemia) stilled without any change in pre-test and post-test, this findings supported by the results of a study conducted at Philippines in Cavite province by (Angeles, Agdeppa et al., 2019) in order to measure the impact of nutrition education program on enhancing the mothers' knowledge, attitudes and practice and also improvement of the children nutritional condition, their results in relation mothers' attitudes in control group don't changed and still as it.

5.8 Discussion of the Overall Mothers Attitudes for both Study and Control groups

The results of the current study showed the overall mothers' attitudes regarding anemia disease in both group (study & control) depending on the value of mean of score (negative at M.S. 1-1.66, uncertain at 1.67-2.33 and positive M.S. 2.34-3). With regard the study group, the finding indicates the assessment of mother attitudes in pre-test was positive at mean of score (2.63) after implemented the educational program sessions the value of mean of score in post-test one and post-test two altered in little degree. While the assessment of mothers' attitudes in control group was uncertain at mean of score (2.03) in post-test one and post-test two the result doesn't change. This result is supported by the results of a study conducted in Birjand city in Iran by (Rezaei et al., 2014) in order to measure the knowledge and attitude levels of the mothers regarding nutritional behaviors enveloped geographical area by the urban health care centers where the results of

this study indicated the mothers' in this study with positive attitudes regarding the nutritional behaviors.

From the researcher's point of view, this result is somewhat acceptable, as positive attitudes are an indication of mothers' ability to properly deal with their anemic children, as well as avoid complications and problems that anemia may cause. However, the need for educational programs and health education seminars remains. In order to promote the health culture of the community, not only with regard to anemia, but also with other diseases and priority health problems.

5.9 Discussion of the Relationship between Mother Attitudes for Study Sample and their Demographic Data

Study found out the relationship between the attitudes of study sample regarding anemia disease and their demographic characteristics, the results show the six of demographic parameters was not-significantly associated with the variables following (age of mother, place of residence, mother's educational level, family structure, age of anemic child study and child order position in family) at (P. value more than 0.05), while another four demographic parameters (family income, father's educational level, occupation of mother and number of children in family) was significantly associated at (P. value > 0.05) and one demographic item (marital status of mother) were highly significant at (P. value = 0.006). These findings coincide with the results of study contucted by (Anjani et al., 2020) in Bali Territory-Indonesia to develop an approach of the health promotion with the project of Pender theory in behavior of mothers on the prevention of anemia during childhood period. On other hand the result of this study goes with the findings of a study carried out by (Oh et al., 2019) in Dakar city capital of Al-

Senegal, the purpose of the was study to clarify the knowledge, attitudes, and practices of women with breastfeeding regarding right nutritional habits and to determine the correlated nourishment practices factors to achieve the basic level for improving a children and maternal feeding scheme, where the results of this study showed a non-significant association between women attitudes and their demographic data while another demographic characteristics was a significant association with the woman attitudes.

Chapter Six

Conclusions and Recommendations

Chapter Six

Conclusions and Recommendations

Throughout this chapter of the current dissertation, the conclusions that reached after the application of the current program and considered most important will be addressed, and recommendations of interest to several sides regarding the issue of drug addiction and abuse will be mentioned.

6-1 Conclusion

The most important conclusions reached by the researcher in this study are:

6.1.1 The highest proportion of study sample in regarding the age in both group was among mothers with age group (28-37 years old), regarding the residency the highest percentage of mother's live areas urban are for both groups.

6.1.2 Regarding the monthly income, in study group the highest percentage was among women with not enough and enough some time monthly income, while in control group the more percentage was among women with enough monthly income.

6.1.3 In relation to the father educational level, the more percent in both group having secondary school, while the mother educational level was among women with primary school as highest percent.

6.1.4 The mother occupation, the result indicated the highest proportion was among housewife women and more percent of mothers who are participated in the study was married as marital status.

6.1.5 The highest percent of study sample living in large family and the age of children the highest percent in study group was among child in (5-8 years) and in control group was among (9-11 years

old), the number of children in both groups were (1-3) as a highest proportion.

6.1.6 The level of mothers' knowledge in study group altered significantly, where it's in pre-test before performing educational program sessions was (22.23) then become in post-test one after applied educational program sessions (34.9) and in post-test two (33.63).

6.1.7 The knowledge of mothers in control group stayed the same in pre-test and post-test one and post-test two.

6.1.8 The attitudes of mothers towards the anemia disease that their children suffer from are positive in the study group during the pre-test and the first and second post-test, while in control group the assessment of mothers' attitudes were uncertain in pre and post-test

6.1.9 Regarding the difference in knowledge level in study group among pre-test and post-test one and two, where the level elevated this mean the educational program is effective.

6.1.10 The result shows that there is a significant relationship between some demographic characteristics of study sample and their knowledge, attitudes at positive significantly.

6-2 Recommendations

The recommendations of the scientific research, which is the last part of the study, where the researcher relies in writing on the results and conclusions that are reached, as it is a set of solutions that the researcher deems valid from his point of view to treat the research problem after listing the results related to the research in an objective and codified manner, according to the set of indications that marketed by the researcher. Where the relationship of the results to the recommendations is an absolute constructive relationship, the main recommendations of this study are:

6.2.1 Encourage families with children to carry out periodic screening to detect anemia early and prevent complications and problems that it causes.

6.2.2 Conducting seminars and educational programs in health and educational instituations to improve mothers' knowledge about anemia, as well as teaching them the correct preventive measures that are followed in order to obtain correct nutritional behaviors in their children.

6.2.3 The need for joint cooperation between the Ministry of Education and the Ministry of Health to create health educational programs for teachers to give children the correct health instructions related to anemia for the primary school stage through improving school health program.

6.2.4 Establishing programs to support schools in order to provide meals that are rich in iron and vitamins that reduce exposure to anemia among primary school students.

6.2.5 Directing parents to encourage children to eat fruits and vegetables and to avoid foods and meals that do not benefit children, such as chips and chocolate.

6.2.6 Improving the school health program in our society to maintain and promote the health of school children and prevention of anemia in this age group.

6.2.7 Refreshing the role of parents, teachers' association as a program for cooperation between teachers and mothers to prevent and control anemia.

6.2.8 Mass treatment of school children with severe and moderate iron deficiency anemia tablets or syrup.

6.2.9 This program should be applied in primary health care centers as a proper health education program to increase mother's knowledge and to change their attitudes and practices toward early detecting and treatment of iron deficiency anemia.

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Appendices

Appendix A - Administrative Arrangements.

Appendix B - (1) English and Arabic Questionnaire.

(2) Constructed program in Arabic.

Appendix C - Panel of Experts.

Appendix D – Extra Tables and figures.

University of Babylon
College of Nursing
Research Ethics Committee
Issue No: 47
Date: 23/03/2021

جـامـعة بـابـل
كـلية التمريـض
لجنة اخلاقيات البحث العلمي

Approval Letter

To,
Ahmed Shakir Mahdi

The Research Ethics committee at the **University of Babylon, College of Nursing** has reviewed and discussed your application to conduct the research study entitled **"Effectiveness of an Educational Program upon Mother's Knowledge and Attitudes of Primary School Students with Anemia in Al-Hilla City."**

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.

Dr.
Prof. Dr. Salma K. Jehad
Chair Committee
College of Nursing
Research Ethical Committee
23 / 3 /2021

وزارة التعليم العالي والبحث العلمي
جمهورية العراق
Ministry of Higher Education and Scientific Research
جامعة بابل
كلية التمريض
University of Babylon
College of Nursing
لجنة الدراسات العليا

العدد : ١٤٧٩
التاريخ : ٢٠٢٠/٨/٢٤

Ref. No. :
Date: /

(العمل الطوعي مسؤولية الجميع لبناء العراق)

الى / دائرة صحة بابل – مركز التدريب والتطوير والتنمية البشرية
م/ تسهيل مهمة

تحية طيبة :
يطيب لنا حسن التواصل معكم ويرجى تفضلكم بتسهيل مهمة طالب الدكتوراه (أحمد شاكر مهدي جاسم) لغرض جمع عينة دراسة الدكتوراه والخاصة بالبحث الموسوم :

فاعلية برنامج تعليمي على أمهات طلاب المدارس الأبتدائية المصابين بمرض فقر الدم في مدينة الحلة

Educational Program for Morhers of Primary Schools Students with Anemia

مع الاحترام ...

الدكتور
حسام عباس داود
معاون العميد للشؤون العلمية والدراسات العليا
/ ٨/ ٢٠٢٠

الدكتور
ناجي ياسر سعدون
عـ / معاون العميد للشؤون العلمية والدراسات العليا
٢٠٢٠ /٨ / ٢٤

صورة عنه الى //
- مكتب السيد العميد للتفضل بالاطلاع مع الاحترام .
- لجنة الدراسات العليا مع الأوليات .
- الصادرة .

Elaf

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جمهورية العـــراق

وزارة الصحة / البيئة محافظـــة بابـــل دائرة صحة محافظة بابـــــل المديـــر العـــام مركـــز التدريب والتنمية البشرية وحدة ادارة البحوث العـــدد : ٥٧٦ التاريخ: ٢٣ / ٨ /٢٠٢٠		*Ministry Of* Health Babylon Health Directorate فصائل الحشد الشعبي ابناء بزره للعراق

الى / مستشفى الامام الصادق (ع)
مستشفى بابل للنسائية والاطفال
قطاع الحلة الاول
قطاع الحلة الثاني
م / تسهيـــل مهمـــة

وزارة الصحة
دائرة صحة بابل
مركز التدريب والتنمية البشرية

السلام عليكم ....
اشارة الى كتاب جامعة بابل / كلية التمريض ذي العدد ١٢٧٩ في ٢٠٢٠/٨/٢٣ ربطا" استمارات الموافقة المبدئية لمشروع البحث العائد للباحث طالب الدراسات العليا دكتوراه (احمد شاكر مهدي جاسم) من جامعة بابل / كلية التمريض .
للتفضل بالإطلاع وتسهيل مهمة الموما اليها من خلال توقيع وختم استمارات اجراء البحث المرفقة في مؤسساتكم وحسب الضوابط والإمكانيات لاستحصال الموافقة المبدئية ليتسنى لنا اجراء اللازم على ان لا تتحمل مؤسساتكم اية تبعات مادية وقانونية ... مع الاحترام .

المرفقات:
- استمارة عدد /٢

الدكتـــور
محمد عبد الله عجرش
مدير مركز التدريب والتنمية البشرية
/ /٢٠٢٠

نسخة منه الى /
- مركز التدريب والتنمية البشرية / وحدة ادارة البحوث / مع الاوليات.

Questionnaire

Dear mother…….

Between your hand the questionnaire about (***Effectiveness of an education program upon mother's knowledge and attitude of primary schools Students with anemia in Al Hillah City***), so please answer all questions with thanks.

Part one

Demographical Data

1- Age of mother ☐ yrs.

2 -Mother's educational level: -

Don't read and write ☐ Read and write ☐ primary ☐

secondary ☐ institute and more ☐

3 -Father's educational level: -

Don't read and write ☐ Read and write ☐ primary ☐

secondary ☐ institute and more ☐

4- Occupation of mother: - Housewife ☐ Employee ☐ Not employed ☐

5- Marital status of mother: - Divorce ☐ separated ☐ ☐

widow ☐

6-Residence: - Urban Rural ☐

☐ ☐ ☐

7-**Family income: -** Not enough Enough Enough and more

8-**Family structure: -** Nuclear ☐ Large ☐

9- Age of anemic child: - ☐ years

10- Child order position in family: - ☐

11- Number of children in family: - ☐

Part tow

Assessment of mothers knowledge of children with anemia

1- Anemia is a chronic health problem

□- Yes

□ - No

2- Anemia is a decrease in the number of

□-White blood cells

□ - Red blood cells

□- Platelets

□- I don't know exactly

3- One of the causes of anemia is

□ - Hereditary

□ - Acquired

□ - Both

□ - I don't know exactly

4- The function of red blood cells is transport of oxygen and food

□ - True

□ - False

5- The most common type of anemia is

□- Sickle cell anemia

□- Pernicious anemia

□- Iron deficiency anemia

□- I don't know exactly

6-Aplastic anemia occurs when Children who suffer from:

□- Problem in the bone marrow
□- Lack of calcium
□- A lack of potassium
□- I don't know exactly

7- The age of the red blood cells ranges between

□-130-150 days
□- 80 - 90 days
□ - 100 - 120 days
□- I don't know exactly

8- The number of normal red blood cells

□- 6 - 7.5 million
□- 1 - 3.5 million
□- 4 - 5.5 million
□- I don't know exactly

9- Children most at risk of iron deficiency anemia

□-Those who do not eat foods rich in iron
□-Those who do not eat foods rich in vitamin B12
□-Those who do not eat foods rich in vitamin B6
□-I don't know exactly

10- One of the causes of anemia in children is

□-Kidney failure
□- B- Vitamin B12 deficiency + folic acid
□- All of the above
□- I don't know exactly

11- A child's anemia can be known through

□-Fatigue and sickness the following symptoms and signs
□-Pallor and yellowing of the skin
□- Tachycardia
□- All of the above
□- I don't know exactly

12- Effect of anemia is

□-Decreases growth and development
□-Decreases learning ability
□- Decreases working capacity
□- All of the above
□- I don't know exactly

13- When developing anemia in children, the color of the gums is

□-Gray
□- Red

□- White
□- I don't know exactly

14- The type of anemia is determined through action

□ - Complete blood count
□- General urine examination
□- Physical examination
□- I don't know exactly

15- Anemia occurs in children who are vegetarians

□- True
□- False

16- Anemia in children occurs as a result of not eating healthy foods

□- True
□- False

17- Anemia can be treated through eating

□-Iron supplement
□-Eat foods rich in iron and vitamins
□- All of the above
□- I don't know exactly

18- Anemia is compensated by eating the following foods

□- Vegetables, meat and products Dairy
□- Wheat, barley, oats
□- Drinking tea and coffee
□- I don't know exactly

Part three

Part three: Assessment of mothers attitude of children with anemia

No	Tools	agree	Partial agree	disagree
1	I worry about my child with anemia because he needs special care and attention			
2	regular meals can prevent anemia like spinach chicken vegetable and liver			
3	I think that mixing foods –rich calcium like eggs and others with foods that contain iron negatively affect iron absorption			
4	I suspect that the increase in salts in foods negatively affects the absorption of iron			
5	I imagine that repeated visits to the health center for the purpose of conducting anemia monitoring checks are very necessary			
6	I suspect that nutritional supplements help reduce anemia			
7	I think increasing your meals to five every day helps treat anemia			
8	I would think that eating natural juices such as orange and lemon juice helps reduce anemia			
9	I think breakfast is necessary for an anemic child			
10	A school child needs a supplementary meal to help treat anemia			
11	I think treating worms that infect children helps reduce the incidence of anemia			
12	I would think that removing processed foods and soft drinks reduces anemia			
13	Attention and diligence to wash the child's hands before and after eating is necessary in case of anemia			

Appendix-A2

الاستبيان

عزيزتي الام.....

بين يديك استمارة الاستبيان الخاصة ب (**فاعلية البرنامج التعليمي على معارف واتجاهات أمهات طلاب المدارس الابتدائية المصابين بفقر الدم في مدينة الحلة**) لذا نرجو الاجابة على جميع فقراتها مع الشكر.

الجزء الاول

البيانات الديموغرافية

1- عمرا لام: ☐ سنة

2- السكن: ريف ☐ مدينة ☐

3- الدخل اليومي للعائلة: لا يكفي ☐ يكفي ☐ يكفي و أكثر ☐

4- المستوى التعليمي للاب: لا يقرأ ولا يكتب ☐ يقرأ ويكتب ☐

ابتدائية ☐ ثانوية ☐ دبلوم ☐ بكالوريوس وأعلى ☐

5- المستوى التعليمي للأم:- لا تقرأ ولا تكتب ☐ تقرأ وتكتب ☐

ابتدائية ☐ ثانوية ☐ دبلوم ☐ بكالوريوس وأعلى ☐

6- مهنة الام : ربة بيت ☐ موظفة ☐ غير موظفة ☐

7- الحالة الاجتماعية للام : مطلقة ☐ منفصلة ☐ ارملة ☐

8- مكونات العائلة: عائلة كبيرة ☐ عائلة صغيرة ☐

9- عمر الطفل المصاب بفقر الدم : ☐ سنة

10- ترتيب الطفل المصاب بالأسرة: ☐

11- عدد الأبناء بالأسرة: ☐

الجزء الثاني: تقييم معارف أمهات الأطفال المصابين بفقر الدم

1- هل فقر الدم مشكلة صحية

☐ – نعم

☐ – كلا

2- فقر الدم هو نقص في عدد

☐ - كريات الدم البيضاء

☐ - كريات الدم الحمراء

☐ - الصفيحات الدموية

☐ - لا أعرف بالضبط

3- من أسباب فقر الدم

☐ - وراثي

☐ - مكتسب

☐ - كلاهما

☐ - لا أعرف بالضبط

4- وظيفة كريات الدم الحمراء هي نقل الأوكسجين والغذاء

☐ - صح

☐ - خطأ

5- أكثر أنواع فقر الدم انتشارا هو

☐ - فقر الدم المنجلي

☐ - فقر الدم الخبيث

☐ – فقر الدم نقص الحديد

☐ - لا أعرف بالضبط

6- فقر الدم اللاتنسجي يحدث عند الأطفال اللذين يعانون من

☐ - مشكلة في نخاع العظم

☐ - نقص في نسبة الكالسيوم

☐ - فقر الدم نقص الحديد

☐ - لا أعرف بالضبط

7- يتراوح عمر كريات الدم الحمراء بين

☐- 130 - 150 يوم

☐ - 80 - 90 يوم

☐- 100 – 120 يوم

☐ - لا أعرف بالضبط

8- عدد كريات الدم الحمراء الطبيعي

☐- 6 – 7.5. مليون

☐- 1 – 3.5 مليون

☐- 4 – 5.5 مليون

☐- لا أعرف بالضبط

9- الأطفال الأكثر عرضة للإصابة بفقر الدم نقص الحديد هم

☐- الذين لا يتناولون الأغذية الغنية بالحديد

☐- الذين لا يتناولون الأغذية الغنية بفيتامين B12

☐- الذين لا يتناولون الاغذية الغنية بفيتامين B6

☐- لا أعرف بالضبط

10- من اسباب فقر الدم عند الأطفال هي

☐- الإصابة بالفشل الكلوي

☐- نقص فيتامين B12 + حامض الفوليك

☐- كل ما ذكر أعلاه

☐- لا أعرف بالضبط

11- يمكن معرفة اصابة الطفل بفقر الدم من خلال الأعراض والعلامات التالية

☐- التعب والأعياء

☐- شحوب واصفرار الجلد

☐- تسارع ضربات القلب

☐- كل ما ذكر اعلاه

☐- لا اعرف بالضبط

12- عند الإصابة بفقر الدم لدى الاطفال يكون لون اللثة هو

☐- رمادي

☐- احمر

☐- أبيض

☐- لا أعرف بالضبط

13- تأثير فقر الدم هو

☐- يقلل النمو والتطور

☐- يقلل من قدرة التعلم

☐- يقلل من القدرة على المواظبة بالدوام

☐ - كل ما سبق

☐- لا أعرف بالضبط

14- يتم تحديد نوع الإصابة بفقر الدم من خلال عمل

☐- تحليل الادرار للطفل

☐- تحليل فحص الدم الشامل

☐- الفحص الجسدي للطفل

☐- لا أعرف بالضبط

15-يحدث فقر الدم عند الأطفال نباتي التغذية

☐- صح

☐- خطأ

16-يحدث فقر الدم لدى الأطفال نتيجة عدم تناول الأغذية الصحية

☐- صح

☐- خطأ

17-يمكن علاج فقر الدم من خلال تناول

☐- مكملات الحديد

☐- تناول الاغذية الغنية بالحديد والفيتامينات

☐- كل ما ذكر اعلاه

☐- لا أعرف بالضبط

18-يتم تعويض فقر الدم بتناول الأطعمة الآتية

☐- الخضروات، اللحوم ومنتجات الألبان

☐- القمح، الشعير، الشوفان

☐- شرب الشاي والقهوة

☐- لا أعرف بالضبط

الجزء الثالث: تقييم اتجاهات أمهات الأطفال المصابين بفقر الدم

ت	الفقرات	أوافق	أوافق جزئيا	لا اوافق
1	أقلق على طفلي المصاب بفقر الدم كونه يحتاج الى رعاية واهتمام خاص			
2	وجبات منتظمة يمكن أن تمنع فقر الدم مثل الخضار الدجاج السبانخ والكبد			
3	أعتقد أن خلط الأطعمة الغنية بالكالسيوم مثل البيض وغيرها مع الأغذية التي تحتوي على الحديد تؤثر سلبا على امتصاص الحديد			
4	أظن ان زيادة الاملاح في الأطعمة تؤثر سلبا على امتصاص الحديد			
5	أتصور ان زيارات متكررة للمركز الصحي لغرض اجراء فحوصات مراقبة مستوى فقر الدم ضرورية جدا			
6	أظن أن المكملات الغذائية تساعد في تقليل مستوى فقر الدم			
7	أعتقد أن زيادة وجبات الطعام الى خمس وجبات يوميا تساعد في معالجة فقر الدم			
8	أتصور أن تناول العصائر الطبيعية مثل عصير البرتقال والليمون يساعد على التقليل من فقر الدم			
9	أعتقد أن وجبة الإفطار ضرورية للطفل المصاب بفقر الدم			
10	يحتاج الطفل في المدرسة الى وجبة غذائية تكميلية للمساعدة في علاج فقر الدم			
11	أعتقد أن معالجة الديدان التي تصيب الاطفال تساعد في تقليل نسبة الإصابة بفقر الدم			
12	أتصور أن ابعاد الأغذية المصنعة والمشروبات الغازية تقلل من الاصابة بفقر الدم			
13	أن الاهتمام والحرص على غسل يدي الطفل قبل وبعد تناول الطعام ضروري في حالة الإصابة بفقر الدم			

وزارة التعليم العالي والبحث العلمي

جامعة بابل / كلية التمريض

البرنامج التعليمي المصمم للعناية بالأطفال المصابين بفقر الدم من قبل أمهاتهم

اعداد طالب الدكتوراه

أحمد شاكر مهدي الزهيري

اشراف

ا.د قحطان هادي حسين الجبوري

أ.د حسن علوان بيعي

Educational Program

Consent Form for Participation in a Study

Faculty of nursing / Babylon University

Title of Study: (Effectiveness of an education program upon mother's knowledge and attitude of primary school's students with anemia in Al Hillah City)

Description of the research and your participation:

You are invite to participate in current research study, the purpose of this research is (To find out the effectiveness of an education program upon mothers of primary schools Students with anemia and how to care for them(. Your participation will involve:

A. **Pretest:** which involve(Interview) collection data related to the demographical data, knowledge, attitude for mothers of anemic students by two methods in instrument prepared for this reason.
B. **Educational sessions:** which involve attending to four educational sessions about 40 minutes for each session in order to present the structured educational program content, you may involve to attend these sessions or not.
C. **Posttest one:** conduct after three weeks of education program with the same instrument and same methods of data collection doing in order to find out the change in effectiveness of an education program upon mothers of anemic students related knowledge, attitude of study sample**.**
D. **Posttest two:** conduct after three month of education program with the same instrument and same methods of data collection doing in order to find out the change in effectiveness of an education program upon mothers of anemic students related knowledge, attitude.
E. Among these point time of assessment, the participant should adhere to apply all practices that presented at program sessions.

Risks and discomforts:

There are no known risks associated with this research or with apply of structured educational program contents.

Potential benefits:

This research may help us to identify (the Effectiveness of an education program upon mothers of primary schools Students with anemia and promote knowledge, attitude about disease).

Protection of confidentiality:

We will do everything we can to protect your privacy, your data will use for the research purpose. Your identity will not be revealed in any publication resulting from this study.

Voluntary participation:

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Contact information:

If you have any questions or concerns about this study or if any problems arise, please contact the researcher (**Ahmed Shakir Mahdi**) at phone number (---).

Consent:

I have read this consent form and have been given the opportunity to ask questions and attained the education program . I give my consent to participate in this study.

Participant ID: ----------. Participant's signature: ----------.

Date: ----------.

Educational Program for mothers of primary schools Students with anemia

By

Ph.D. Student

Ahmed Shakir Mahdi Al-Zuhiri

Family & Community Health Nursing Branch

Supervisor

Prof. Dr. Kahtan .H.H Al-Jebori

Prof. Dr. Hassan. A. Baiee

Introduction to the program:

In this program, there is a review of anemia and advice for mothers of student with anemia. And how to provide adequate care, food and treatment for student with anemia to sustain their lives.

First Session

In the first session of the educational program, Program objectives, program contents, intended benefit and definition of anemia will be presented

The objectives of the education program

1 - Defining the anemia and what the signs and symptoms that may appear on the child as well as the causes of this disease and how to diagnose the anemic child.

2 - Clarification of the strategy used to treat this disease and its approved by the World Health Organization and also what complications may occur in children with anemia.

3- Improve the ability of mothers about how to deal with their child with anemia by increasing their knowledge and attitudes regarding this disease.

1- Definition of Anemia

A decrease in red blood cell (RBC) mass. The function of the RBC is to deliver oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs. In children the number of RBC is about 3.8 – 5.5 million, this is accomplished by using hemoglobin (Hb). In anemia, a decrease in the number of RBCs transporting oxygen and carbon dioxide impairs the body's ability for gas exchange. Anemia may occur related to genetic or acquired or both.

Session Two

In this session of the educational program, a brief explanation of the previous lecture with an explanation of the types of anemia will be discussed.

2- Types of Anemia

A- Iron-Deficiency Anemia

Is the most common type of anemia, the body needs iron to make hemoglobin, the protein in RBCs that carries oxygen. The main way you get iron is from food. At certain times such as during pregnancy, growth spurts, or blood loss, the body may need to make more RBCs than usual.

- **Groups at risk**
  - Infants and children, adolescents, and women of childbearing age.
  - Children who have certain diseases and conditions, such as Crohn's disease, celiac disease, or kidney failure.
  - Children who don't get enough iron from the foods they eat.
  - Children who have internal bleeding.

B- Pernicious Anemia

Vitamin B12 and folate (another B vitamin) are needed to make healthy RBCs. The body absorbs these vitamins from foods. Pernicious anemia

occurs if the body can't make enough RBCs because it can't absorb enough vitamin B12 from food.

- **Groups at risk**
- Children who have conditions that prevent them from absorbing vitamin B12
- Children who don't get enough vitamin B12 in their diets.

C- Aplastic Anemia

The term "anemia" usually refers to a condition in which your blood has a lower than normal number of RBCs. However, some types of anemia, such as aplastic anemia, cause lower than normal numbers of other blood cells, too. Aplastic anemia can occur if your bone marrow is damaged and can't make enough RBCs, WBCs, and platelets. The causes of aplastic anemia can be acquired or inherited.

- **Groups at risk**
- Children undergoing radiation or chemotherapy, exposed to toxins, or taking certain medicines.
- Children who have diseases or conditions that damage the bone marrow

D- Hemolytic Anemia

Normally, RBCs have a lifespan of about 100-120 days. The body constantly makes new RBCs to replace ones that die. Sometimes, RBCs are destroyed before their normal lifespan is up. Hemolytic anemia occurs if your body can't make enough RBCs to replace those destroyed. Acquired hemolytic anemia occurs if your body gets a signal to destroy RBCs even though they are normal. Inherited hemolytic anemia is related to problems with the genes that control RBCs.

- **Groups at risk**

- Risk groups differ depending on the cause and type of hemolytic anemia.

E- Sickle cell anemia

Is an inherited form of anemia — a condition in which there aren't enough healthy red blood cells to carry adequate oxygen throughout your body. Normally, your red blood cells are flexible and round, moving easily through your blood vessels. In sickle cell anemia, the red blood cells become rigid and sticky and are shaped like sickles or crescent moons.

Session Three

In this session of the educational program, Causes, signs and symptoms of anemia and a diagnostic test that will be used to detect this disease and risk factors, will be discussed.

3- Causes of Anemia

Many medical conditions cause anemia. Common causes of anemia include the following:

- ***Anemia from active bleeding:*** Loss of blood through heavy bleeding or wounds can cause anemia.
- ***Iron deficiency anemia:*** The bone marrow needs iron to make red blood cells. Iron (Fe) plays an important role in the proper structure of the hemoglobin molecule. If iron intake is limited or inadequate due to poor dietary intake, anemia may occur as a result.
- ***Anemia of chronic disease:*** Any long-term medical condition can lead to anemia such as a chronic infection or a cancer may cause this type of anemia.
- ***Anemia related to kidney disease:*** The kidneys release a hormone called the erythropoietin that helps the bone marrow make red blood cells.
- ***Anemia related to poor nutrition:*** Vitamins and minerals are required to make red blood cells. In addition to iron, vitamin B12 and folate (or folic

acid) are required for the proper production of hemoglobin (Hgb). A deficiency in any of these may cause anemia because of inadequate production of red blood cells. Poor dietary intake is an important cause of low folate and low vitamin B12 levels. Strict vegetarians who do not take sufficient vitamins are at risk to develop vitamin B12 deficiency.

4- Signs and Symptoms of anemia

- Tiredness or weakness
- Pale or yellowish skin
- Faintness or dizziness
- Increased thirst
- Sweating
- Weak and rapid pulse, rapid breathing
- Shortness of breath
- Lower leg cramps
- Heart-related symptoms (abnormal heart rhythms, heart murmur, enlarged heart, heart failure)

5- Diagnosis of anemia

People find out they have anemia in a variety of ways. If the child is having symptoms, and go to a physician, who discovers the anemia through the following tests:

- **Medical and Family Histories**

A doctor will want to know about the signs and symptoms and how long had them. He or she also may ask whether having an illness that can cause anemia. Also may be asked about diet, any medicines or supplements that necessary to take, and whether have a family history of anemia or anemia-related conditions.

- **Physical Examination**

The physician use a physical examination to can confirm the presence of anemia in child by checking some body organs such as a color of skin, gums become white, and nail beds.

- **Complete blood count (CBC)**

The doctor will recommend blood tests to identify the type of anemia. Depending on the CBC results, the doctor may recommend further tests of blood or bone marrow (the soft tissue inside bones that makes blood cells).

6- Risk Factors of Anemia

Many children are at risk for anemia because of poor diet, intestinal disorders, chronic diseases, infections, and other conditions. The risk of anemia increases as people grow older.

If you have any of the following chronic conditions, you might be at greater risk for developing anemia:

- Rheumatoid arthritis or other autoimmune disease
- Kidney disease, cancer, liver disease, thyroid disease, inflammatory bowel disease (Crohn disease or ulcerative colitis)
- A vegetarian person.
- People with donating blood frequently.

Session Four

In this session of the educational program, Treatment, prevention of anemia, care and complications that can be will be discussed.

7- Treatment of Anemia

Treatment of Iron-Deficiency Anemia include Iron supplements and dietary changes (eating food rich in iron and vitamin C, which increases iron absorption from food). Regarding Pernicious Anemia the treatment include vitamin B12 supplements and dietary changes (eating foods rich in vitamin B12, such meat; fish; eggs; dairy products; and breads, cereals, and other foods fortified with vitamin B12). Also the treatment of plastic anemia depends on the

cause of the anemia. Treatments may include blood transfusions, medicines, blood and marrow stem cell transplants, and lifestyle changes. As well as the hemolytic Anemia can treated by depends on the cause of the anemia. Treatments may include blood transfusions, medicines, surgery and procedures, and lifestyle changes. The sickle cell anemia treated by a transplant of bone marrow, also known as stem cell transplant, offers the only potential cure for sickle cell anemia. It's usually reserved for people younger than age 16 because the risks increase for people older than 16.

8- Preventing or Controlling Anemia

The mother can take steps to prevent or control on the anemia in children. These actions can give a greater energy and improve the child health and quality of life. This steps include the following:

- **Follow a Healthy Diet**

Following a healthy diet ensures that child gets enough of the nutrients that the body needs to make healthy blood cells. These nutrients include iron, vitamin B12, folate, and vitamin C. These nutrients are found in a variety of foods. Healthy eating also is good for your overall health.

The basics of healthy eating include:

1- Focus on nutrient-dense foods and beverages—vegetables, fruits, whole grains, fat-free or low-fat dairy products, seafood, lean meats and poultry, eggs, beans and peas, and nuts and seeds.

2- Limit your intake of salt, solid fats, added sugars, and refined grains.

3- Maintain a healthy weight by balancing the calories you get from foods and beverages with the calories you use through physical activity.

4- Follow food safety guidelines when preparing and eating foods to reduce the risk of foodborne illnesses.

- **Avoid Substances That Can Cause or Trigger Anemia**

Contact with chemicals or toxins in the environment can cause some types of anemia. Others types of anemia are triggered by certain foods or cold temperatures. If the child have one of these types of anemia, must avoid these triggers. With some types of anemia, the mother want to reduce the chances of getting an infection. To do this, wash the child hands, avoid people who have colds, and stay the child away from crowds.

- **Work with the Doctor**

Visit the doctor if you have signs or symptoms of anemia. If the children diagnosis with anemia, follow the doctor's advice about diet, supplements, medicines, and other treatments. Visit the doctor regularly for checkups and ongoing care, and tell him or her about any new or changing symptoms. Older children and teens who have severe anemia may have an increased risk of injury or infection. Talk with the doctor about ways to keep them as healthy as possible and whether they need to avoid certain activities. Girls and women who have heavy menstrual periods may need regular screenings and follow up with their doctors to prevent or control iron-deficiency anemia.

9- Complications of anemia

- **Tiredness**

As iron deficiency anemia can leave the child tired and lethargic (lacking in energy), may be less productive and active at work. The child ability to stay awake and focus can be reduced, and may not feel able to exercise regularly.

- **Immune system**

Anemia can effect on the immune system (the body's natural defense system) of children, making the child more susceptible to illness and infection.

- **Heart and lung complications**

A child with severe anemia may be at risk of developing complications that affect their heart or lungs. For example, you may develop:

- Tachycardia (an abnormally fast heartbeat).

- Heart failure, when the heart is not pumping a blood around the body very efficiently.

Appendix-B2

الـــــبرنامج التـــــعليمي المصمم للـــعـــناية بالأطفال المصابين بفقر الدم من قبل أمهاتهم

نموذج موافقة للمشاركة في دراسة (بحث) لكلية التمريض\ جامعة بابل

عنوان الدراسة او البحث: ***فاعلية البرنامج التعليمي على معارف واتجاهات أمهات طلاب المدارس الابتدائية المصابين بفقر الدم في مدينة الحلة***

❖ وصف البحث وكيفية المشاركة:

ندعوك للمشـــاركة في هذه الدراســـة البحثية، والغرض من هذا البحث هو (للوصـــول الى مدى فاعلية البرنامج التعليمي المصـــمم على أمهات المدارس الابتدائية لأطفالهم الذين يعانون من فقر الدم وكيفية العناية بهم)، ومشاركتكم ستتضمن ما يلي:

أ- **الفحص القبلي:** والذي يتضـمن (مقابلة) جمع البيانات المتعلقة بالبيانات الديموغرافية والمعرفة والاتجاهات، بالنســـبة لأمهات الطلاب المصـــابين بفقر الدم بطريقتين في أداة تم إعدادها لهذا السبب .

ب- الجلسات التعليمية: والتي تشمل الحضور الى أربع جلسات تعليمية بمدة زمنية 40 دقيقة تقريباً لكل جلسة والغرض منها لعرض محتويات البرنامج التثقيفي.

ت- الفحص البعدي: يجرى بعد ثلاث أســابيع يتم الفحص البعدي وبنفس الاســتمارة وبنفس الطرق المذكورة لجمع البيانات لغرض معرفة مدى التغيرات الحاصـــلة في فاعلية البرنامج التعليمي المقدم لهم.

ث- الفحص البعدي الثاني: يجرى بعد ثلاثة أشـهر من برنامج التعليم مع نفس الأداة ونفس أسـاليب جمع البيانات, من أجل معرفة التغيير في فعالية برنامج تعليمي على أمهات الطلاب المصـابين بفقر الدم ،ومدى تطور المعرفة والاتجاهات حول المرض.

ج- ما بين هذه الفحوصـات او التوقيتات الزمنية للتقييم على المشـترك ان يؤدي كل الانشـطة المذكورة في البرنامج التثقيفي.

❖ **المخاطر والمضايقات:**

لا توجد مخاطر معروفة مرتبطة بهذا البحث أو بتطبيق محتويات برنامج تعليمي منظم.

❖ **الفوائد المحتمل الحصول عليها:**

قد يساعدنا هذا البحث في تحديد (فعالية برنامج تعليمي على أمهات المدارس الابتدائية الطلاب المصابون بفقر الدم وتعزيز المعرفة والاتجاهات من المرض).

❖ **حفظ الخصوصية:**

نحن سوف نعمل كل ما بوسعنا لحماية خصوصية المريض، وبيانات المرضى ستستخدم للأغراض البحث فقط، هوية المريض سوف لا تكشف لأي منشور من هذا البحث.

❖ **طوعية المشاركة:**

مشاركتك في هذا البحث طوعية. انت ربما تختار عدم المشاركة وربما تسحب موفقتك في أي وقت. انت سوف لا تتعرض لأي عقوبة بأي طريقة تقرر بها عدم المشاركة او الانسحاب من هذه الدراسة.

❖ **معلومات للتواصل:**

اذا كان لديك أي اسئلة او متعلقات عن هذه الدراسة او ظهرت لك أي مشكلة، رجاءً اتصل بالباحث (**أحمد شاكر مهدي**) على الرقم (.....).

❖ **الموافقة:**

انا قرأت نموذج الموافقة هذا وأعطيتُ الفرصة للأسئلة. وقد اعطيت موافقتي للمشاركة بهذا البحث.

البرنامج التعليمي المصمم للعناية بالأطفال المصابين بفقر الدم من قبل الأمهات

مقدمة عن البرنامج:

في هذا البرنامج يحتوي على مراجعة او استعراض لمرض فقر الدم نصائح موجهة الى أمهات الاطفال المصابين بفقر الدم. وكيفية تقديم الرعاية والغذاء والعلاج المناسب للأطفال المصابين بفقر الدم لديمومة حياتهم.

الجلسة الأولى

- **عنوان الجلسة:** سوف يتم عرض أهداف البرنامج، ومحتويات البرنامج والفائدة المتوخاة وتعريف فقر الدم.
- **وقت وتاريخ الجلسة:** 9 صباحاً \ \2020
- **مدة الجلسة:** 40 دقيقة
- **مكان الجلسة**: قاعة الدرس في مركز
- **الوسائل التوضيحية:** عرض الجلسة وصور توضيحية وفيديو توضيحي.
- **اهداف الجلسة:** - تزويد المشتركين بمعلومات عن مرض فقر الدم.

أهداف البرنامج التعليمي

1 - تحديد فقر الدم وما هي العلامات والأعراض التي قد تظهر على الطفل وكذلك أسباب هذا المرض وكيفية تشخيص الطفل المصاب بفقر الدم.

2- توضيح الاستراتيجية المستخدمة لعلاج هذا المرض واعتماده من قبل منظمة الصحة العالمية وأيضًا المضاعفات التي قد تحدث عند الأطفال المصابين بفقر الدم.

3- تحسين قدرة الأمهات على كيفية التعامل مع أطفالهن بفقر الدم عن طريق زيادة معرفتهم ومواقفهم بشأن هذا المرض.

1-تعريف فقر الدم

انخفاض في خلايا الدم الحمراء (RBC) الكتلة. تتمثل وظيفة خلايا الدم الحمراء في توصيل الأكسجين من الرئتين إلى الأنسجة وثاني أكسيد الكربون من الأنسجة إلى الرئتين. في الأطفال، يكون عدد كرات الدم الحمراء حوالي 3.8 - 5.5 مليون، ويتم تحقيق ذلك باستخدام الهيموغلوبين (Hb).في فقر الدم، يؤدي انخفاض عدد كرات الدم الحمراء التي تنقل الأوكسجين وثاني أكسيد الكربون إلى إضعاف قدرة الجسم على تبادل الغازات. فقر الدم قد يحدث نتيجة اسباب وراثية أو مكتسبة أو كليهما.

الجلسة الثانية: في هذه الدرس من البرنامج التعليمي ، سيتم

- **عنوان الجلسة:** شرح مختصر للمحاضرة السابقة مع شرح لأنواع فقر الدم .
- **وقت وتاريخ الجلسة:** 9 صباحاً \ \2020
- **مدة الجلسة:** 40 دقيقة
- **مكان الجلسة**: قاعة الدرس في مركز .....
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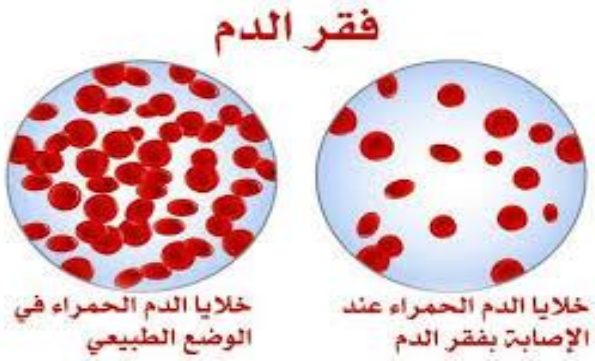
- **اهداف الجلسة:** - تزويد المشتركين بمعلومات عن مرض فقر الدم

2-أنواع فقر الدم

أ- فقر الدم بعوز الحديد

هو أكثر أنواع فقر الدم شـــيوعًا، حيث يحتاج الجســـم إلى الحديد لصـــنع الهيموغلوبين، وهو البروتين الموجود في كرات الدم الحمراء التي تحمل الأوكسجين. الطريقة الرئيسية للحصول على الحديد هي من الطعام. في أوقات معينة، مثل أثناء الحمل أو طفرات النمو أو فقدان الدم، قد يحتاج الجســـم إلى إنتاج خلايا دم حمراء أكثر من المعتاد.



الفئات الاكثرعرضة لخطر المرض

الرضع والأطفال والمراهقون والنساء في سن الإنجاب.

الأطفال الذين يعانون من أمراض وحالات معينة، مثل مرض كرون، أو مرض الاضـــطرابات الهضمية، أو الفشل الكلوي.

الأطفال الذين لا يحصلون على ما يكفي من الحديد من الأطعمة التي يتناولونها.

الأطفال الذين لديهم نزيف داخلي.

ب- فقر الدم الخبيث

هناك حاجة إلى فيتامين ب 12 والفولات (فيتامين ب آخرى) لصنع خلايا الدم الحمراء الصحية. يمتص الجسم هذه الفيتامينات من الأطعمة. يحدث فقر الدم الخبيث إذا لم يتمكن الجسم من إنتاج ما يكفي من خلايا الدم الحمراء لأنه لا يمكنه امتصاص ما يكفي من فيتامين ب 12 من الطعام.

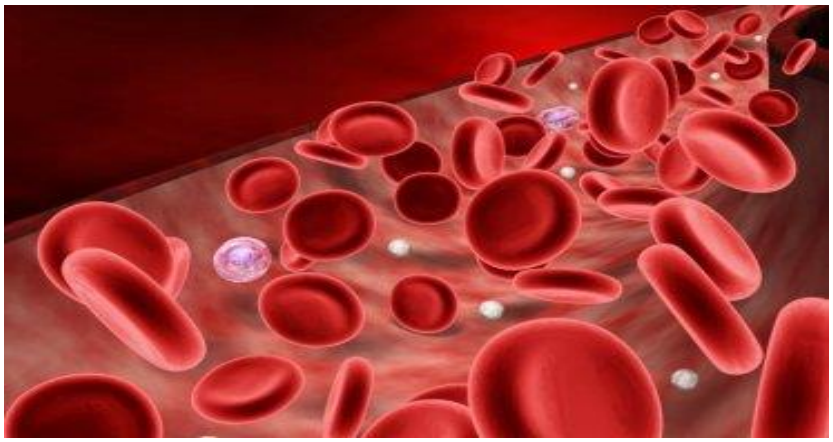
الفئات الاكثرعرضة لخطر المرض

-الأطفال الذين يعانون من ظروف تمنعهم من امتصاص فيتامين ب 12

-الأطفال الذين لا يحصلون على ما يكفي من فيتامين ب 12 في وجباتهم الغذائية.

ج- فقر الدم اللاتنسجي

يشير مصطلح "فقر الدم" عادةً إلى حالة يكون فيها الدم أقل من العدد الطبيعي من كريات الدم الحمراء. ومع ذلك، فإن بعض أنواع فقر الدم، مثل فقر الدم اللاتنسجي، تسبب أعدادًا أقل من المعدل الطبيعي لخلايا الدم الأخرى أيضًا. يمكن أن يحدث فقر الدم اللاتنسجي في حالة تلف النخاع العظمي وعدم القدرة على إنتاج خلايا الدم الحمراء وخلايا الدم البيضاء والصفائح الدموية. يمكن ان تكون أسباب فقر الدم اللاتنسجي مكتسبة أو وراثية.



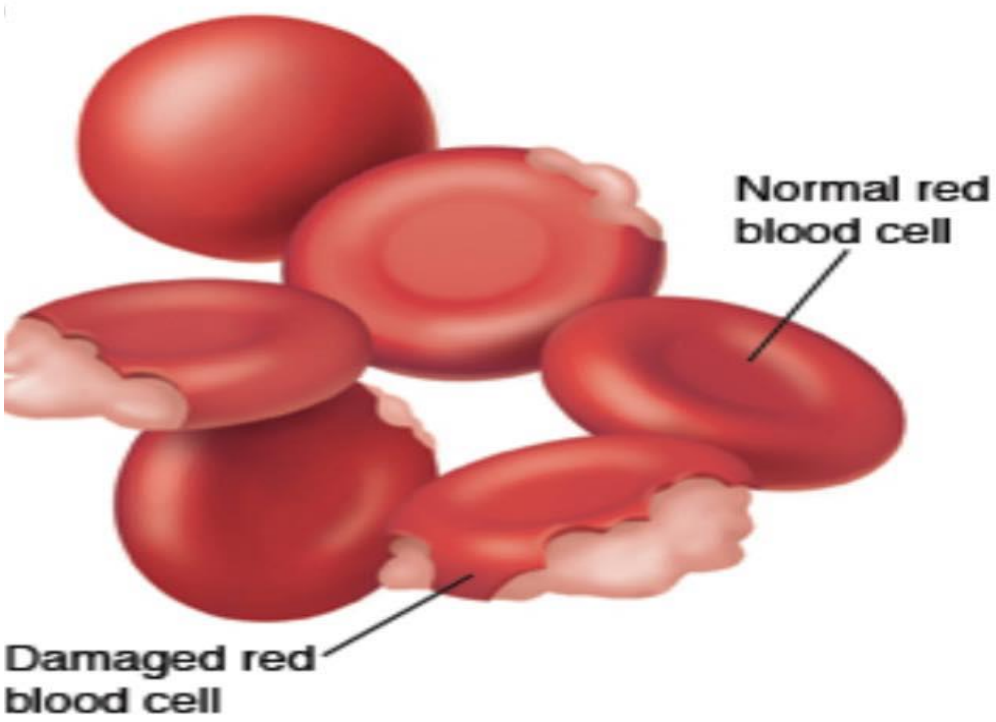
الفئات الاكثرعرضة لخطر المرض

-الأطفال الذين يخضعون للإشعاع أو العلاج الكيميائي، أو يتعرضون للسموم، أو يتعاطون أدوية معينة

-الأطفال الذين لديهم أمراض أو حالات تضر بنخاع العظام.

د- فقر الدم الانحلالي

عادة ، يكون عمر كرات الدم الحمراء حوالي 100-120 يومًا. يصنع الجسم باستمرار كريات الدم الحمراء الجديدة لتحل محل تلك التي تموت. في بعض الأحيان ، يتم تدمير كرات الدم الحمراء قبل انتهاء عمرها الطبيعي. يحدث فقر الدم الانحلالي إذا كان جسمك لا يستطيع صنع كريات الدم الحمراء الكافية لاستبدال تلك التي تم تدميرها. يحدث فقر الدم الانحلالي المكتسب إذا حصل جسمك على إشارة لتدمير كرات الدم الحمراءعلى الرغم من كونها طبيعية. يرتبط فقر الدم الانحلالي الوراثي بمشاكل الجينات التي تتحكم في كريات الدم الحمراء.

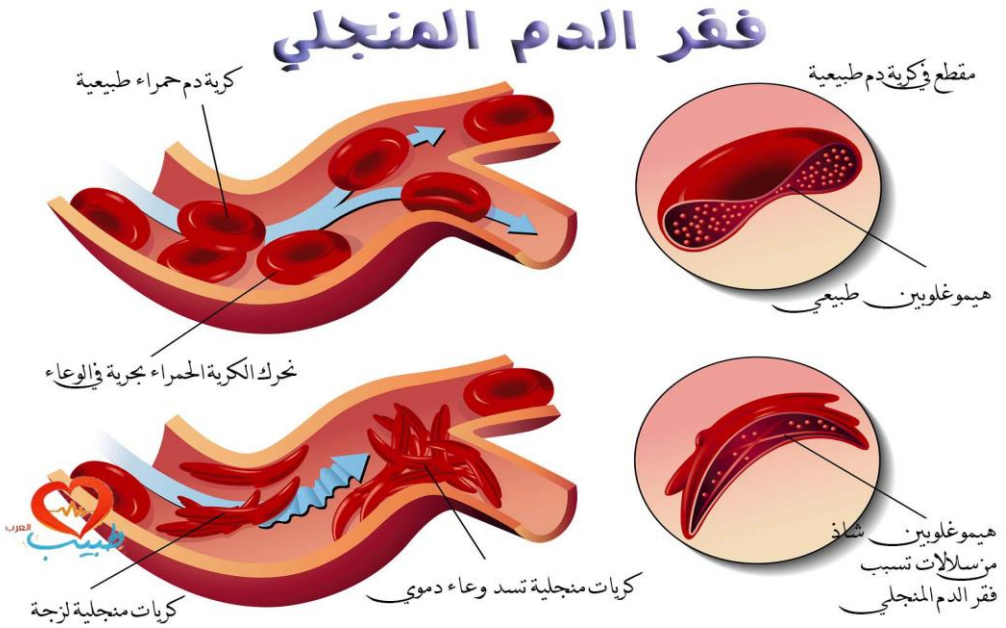


الفئات الاكثرعرضة لخطر المرض •

تختلف الفئات الاكثرعرضة لخطر المرض اعتمادًا على سبب ونوع فقر الدم الانحلالي

فقر الدم المنجلي

هو شكل وراثي من فقر الدم - وهي حالة لا توجد فيها خلايا دم حمراء صحية كافية لحمل الأوكسجين الكافي في جميع أنحاء الجسم. عادة ، تكون خلايا الدم الحمراء مرنة ودائرية ، وتتحرك بسهولة عبر الأوعية الدموية. في فقر الدم المنجلي ، تصبح خلايا الدم الحمراء صلبة ولزجة وتتشكل مثل المنجل أو هلال الاقمار.



الجلسة الثالثة:

- **عنوان الجلسة:** مناقشة أسباب وعلامات وأعراض فقر الدم واختبار التشخيص الذي سيتم استخدامه للكشف عن هذا المرض وعوامل الخطر.
- **وقت وتاريخ الجلسة:** 9 صباحاً \ \2020
- **مدة الجلسة:** 40 دقيقة
- **مكان الجلسة**: قاعة الدرس في مركز.....

- **الوسائل التوضيحية:** عرض الجلسة وصور توضيحية وفيديو توضيحي.
- **اهداف الجلسة:** - تزويد المشتركين بمعلومات عن مرض فقر الدم

3- أسباب فقر الدم

العديد من الحالات الطبية تسبب فقر الدم. تشمل الأسباب الشائعة لفقر الدم ما يلي:

•فقر الدم الناجم عن النزف النشط: قد يؤدي فقدان الدم بسبب النزيف الشديد أو الجروح إلى الإصابة بفقر الدم.

•فقر الدم الناجم عن نقص الحديد: يحتاج نخاع العظام إلى الحديد لصنع خلايا الدم الحمراء. يلعب الحديد (الحديد) دورًا مهمًا في التركيب الصحيح لجزيء الهيموغلوبين. إذا كانت كمية الحديد محدودة أو غير كافية بسبب سوء التغذية ، فقر الدم قد يحدث نتيجة لذلك.

•فقر الدم الناجم عن مرض مزمن: أي حالة طبية طويلة الأجل يمكن أن تؤدي إلى فقر الدم مثل العدوى المزمنة أو السرطان قد يسبب هذا النوع من فقر الدم.

•فقر الدم المرتبط بمرض الكلى: تطلق الكليتان هرمونًا يسمى الإريثروبويتين يساعد نخاع العظم في تكوين خلايا الدم الحمراء.

•فقر الدم المرتبط بسوء التغذية: الفيتامينات والمعادن مطلوبة لصنع خلايا الدم الحمراء. بالإضافة إلى الحديد ، فيتامين B12 وحامض الفوليك (أو حمض الفوليك) ضروريان لإنتاج الهيموغلوبين بشكل صحيح. نقص في أي من هذه قد يسبب فقر الدم بسبب عدم كفاية إنتاج خلايا الدم الحمراء. سوء تناول الطعام هو سبب مهم لانخفاض مستويات حمض الفوليك وانخفاض فيتامين ب 12. النباتيون المشددون الذين لا يتناولون الفيتامينات الكافية معرضون لخطر الإصابة بنقص فيتامين ب 12.

4 -علامات وأعراض فقر الدم

-التعب أو الضعف

-شحوب واصفرار الجلد

-إغماء أو دوار

-زيادة العطش

-التعرق

-نبض سريع وضعيف، وسرعة في التنفس

-ضيق في التنفس

-تقلصات الساق السفلى

الأعراض المرتبطة بالقلب (إيقاعات القلب غير الطبيعية، نفخة القلب، تضخم القلب، قصور القلب).

5- **تشخيص فقر الدم**

يكتشف الناس أن لديهم فقر الدم بطرق متنوعة. إذا كان الطفل يعاني من أعراض ، وتوجه إلى الطبيب الذي يكتشف فقر الدم من خلال الاختبارات التالية:

التاريخ الطبي والعائلي

سيرغب الطبيب في معرفة العلامات والأعراض والفترة التي قضاها. قد يسأل هو أو هي أيضًا ما إذا كان هناك مرض يمكن أن يسبب فقر الدم. قد يُسأل أيضًا عن النظام الغذائي وأية أدوية أو مكملات ضرورية لتناولها ، وما إذا كان لديهم تاريخ عائلي من فقر الدم أو حالات متعلقة بفقر الدم .

الفحص الجسدي

يستخدم الطبيب الفحص البدني لتأكيد وجود فقر الدم لدى الأطفال عن طريق فحص بعض أعضاء الجسم مثل لون الجلد واللثة تصبح بيضاء والاظافر.

تعداد الدم الكامل(CBC)

سيوصي الطبيب بإجراء اختبارات دم لتحديد نوع فقر الدم. بناءً على نتائجCBC ، قد يوصي الطبيب بإجراء مزيد من اختبارات الدم أو النخاع العظمي (الأنسجة الرخوة داخل العظام التي تصنع خلايا الدم).

6-عوامل خطر فقر الدم

يتعرض العديد من الأطفال لخطر الإصـــابة بفقر الدم بســـبب ســـوء التغذية والاضـــطرابات المعوية والأمراض المزمنة والالتهابات وغيرها من الحالات. يزيد خطر الإصـــابة بفقر الدم مع تقدم الســـن في السن.

إذا كنت تعاني من أي من الحالات المزمنة التالية، فقد تكون أكثر عرضة للإصابة بفقر الدم:

•التهاب المفاصل الرثوي أو غيره من أمراض المناعة الذاتية

•أمراض الكلى والســـرطان وأمراض الكبد وأمراض الغدة الدرقية ومرض التهاب الأمعاء (مرض كرون أو التهاب القولون التقرحي)

• النباتيون.

•الأشخاص الذين يتبرعون بالدم باستمرار.

الجلسة الرابعة:

- **عنوان الجلسة:** مناقشة العلاج والوقاية من فقر الدم والعناية والمضاعفات التي ممكن ان تكون.
- **وقت وتاريخ الجلسة:** 9 صباحاً \ \2020
- **مدة الجلسة:** 40 دقيقة
- **مكان الجلسة**: قاعة الدرس في مركز.....
- **الوسائل التوضيحية:** عرض الجلسة وصور توضيحية وفيديو توضيحي.
- **اهداف الجلسة:** - تزويد المشتركين بمعلومات عن مرض فقر الدم.

7 -علاج فقر الدم

علاج فقر الدم الناجم عن نقص الحديد، تشـــمل مكملات الحديد والتغيرات الغذائية (تناول طعام غني بالحديد وفيتامينC ، مما يزيد من امتصاص الحديد من الطعام).

فيما يتعلق بفقر الدم الخبيث، يشمل العلاج مكملات فيتامين ب 12 والتغييرات الغذائية (تناول الأطعمة الغنية بفيتامين ب 12 ، مثل اللحوم والأســـماك والبيض ومنتجات الألبان والخبز والحبوب وغيرها من الأطعمة المدعمة بفيتامين ب 12).

أيضـــا علاج فقر الدم البلاســـتيكي يعتمد على ســـبب فقر الدم. قد تشـــمل العلاجات نقل الدم ، والأدوية ، وزرع الخلايا الجذعية في الدم والنخاع ، وتغيير نمط الحياة.

وكذلك فقر الدم الانحلالي الذي يمكن علاجه يعتمد على سـبب فقر الدم. قد تشـمل العلاجات نقل الدم والأدوية والجراحة والإجراءات وتغيير نمط الحياة.

إن فقر الدم المنجلي الذي يعالج بواسـطة زرع نخاع العظم ، والمعروف أيضًـا باسـم زرع الخلايا الجذعية ، يقدم العلاج المحتمل الوحيد لفقر الدم المنجلي. عادة ما يكون مخصصًا للأشخاص الذين تقل أعمارهم عن 16 عامًا لأن المخاطر تزيد على الأشخاص الذين تزيد أعمارهم عن 16 عامًا.

8 -منع أو السيطرة على فقر الدم

يمكن للأم أن تتخذ خطوات لمنع فقر الدم لدى الأطفال أو السيطرة عليه. هذه الإجراءات يمكن أن تعطي طاقة أكبر وتحسن صحة الطفل ونوعية الحياة. تشمل هذه الخطوات ما يلي:

اتباع نظام غذائي صحي

إن اتباع نظام غذائي صـحي يضـمن حصـول الطفل على ما يكفي من العناصـر الغذائية التي يحتاجها الجسم لصنع خلايا دم صحية. وتشمل هذه العناصر الغذائية الحديد وفيتامين B12 والفولات وفيتامين

.Cوتوجد هذه العناصـــر الغذائية في مجموعة متنوعة من الأطعمة. الأكل الصـــحي هو أيضـــا جيد لصحتك العامة.

أساسيات الأكل الصحي تشمل:

1 -التركيز على الأطعمة والمشـروبات الغنية بالمواد الغذائية - الخضـروات والفواكه والحبوب الكاملة ومنتجات الألبان الخالية من الدهون أو قليلة الدســـم والمأكولات البحرية واللحوم الخالية من الدهون والدواجن والبيض والفاصوليا والبازلاء والمكسرات والبذور.

2 -قلل من استهلاكك الملح والدهون الصلبة والسكريات المضافة والحبوب المكررة.

3 -حافظ على وزن صـــحي من خلال موازنة الســـعرات الحرارية التي تحصـــل عليها من الأطعمة والمشروبات مع السعرات الحرارية التي تستخدمها من خلال النشاط البدني.

4- اتبع إرشـــادات ســـلامة الأغذية عند إعداد وتناول الأطعمة لتقليل مخاطر الأمراض التي تنقلها الأغذية.

تجنب المواد التي يمكن أن تسبب أو تؤدي إلى فقر الدم

الاحتكاك مع المواد الكيميائية أو الســموم في البيئة يمكن أن يســبب بعض أنواع فقر الدم. أنواع أخرى من فقر الدم تنجم عن بعض الأطعمة أو درجات الحرارة الباردة. إذا كان الطفل يعاني من أحد هذه الأنواع من فقر الدم ، فعليك تجنب هذه العوامل المسببة للإصابة. مع بعض أنواع فقر الدم ، ترغب الأم في تقليل فرص الإصـــابة بالعدوى. للقيام بذلك ، اغســـل يدي الطفل ، وتجنب الأشـــخاص المصـــابين بنزلات البرد ، وابتعاد الطفل عن الزحام.

العمل مع الطبيب

زيارة الطبيب إذا كان لديك علامات أو أعراض فقر الدم. إذا كان الطفل مصابًا بفقر الدم ، فاتبع نصيحة الطبيب حول النظام الغذائي والمكملات الغذائية والأدوية والعلاجات الأخرى. قم بزيارة الطبيب بانتظام لإجراء فحوصـــات ورعاية مســتمرة، وأخبره عن أي أعراض جديدة أو متغيرة. الأطفال الأكبر ســنًا والمراهقون الذين يعانون من فقر الدم الوخيم قد يزيد لديهم خطر الإصابة أو العدوى. تحدث مع الطبيب حول طرق الحفاظ عليها صـحية قدر الإمكان وما إذا كانت تحتاج إلى تجنب بعض الأنشـطة. قد تحتاج الفتيات والنســاء اللائي لديهن فترات طمث شـديدة إلى فحوصــات منتظمة ومتابعة مع أطبائهن لمنع أو السيطرة على فقر الدم الناجم عن نقص الحديد.

9 -مضاعفات فقر الدم

-التعب

نظرًا لأن فقر الدم الناجم عن نقص الحديد يمكن أن يترك الطفل متعبًا وخاملًا (يفتقر إلى الطاقة)، فقد يكون أقل إنتاجية ونشاطًا في العمل. يمكن تقليل قدرة الطفل على البقاء مستيقظًا والتركيز، وقد لا يشعر بالقدرة على ممارسة الرياضة بانتظام.

-الجهاز المناعي

يمكن أن يؤثر فقر الدم على الجهاز المناعي (نظام الدفاع الطبيعي في الجســم) للأطفال، مما يجعل الطفل أكثر عرضة للإصابة بالأمراض والعدوى.

مضاعفات القلب والرئة

قد يتعرض الطفل المصــاب بفقر الدم الوخيم لخطر الإصــابة بمضــاعفات تؤثر على القلب أو الرئتين. على سبيل المثال، يمكنك تطوير:

- عدم انتظام دقات القلب (نبضات سريعة غير طبيعية).
- قصور القلب، عندما لا يضخ القلب الدم حول الجسم بكفاءة عالية

خبراء تحكيم الاستبانة

ت	اسم الخبير	اللقب العلمي	الاختصاص	مكان العمل
1	د. منى عبدالوهاب خليل	أستاذ	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بابل
2	د. محمد فاضل خليفة	أستاذ	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بغداد
3	د. أمين عجيل الياسري	أستاذ	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بابل
4	د. حسين جاسم الابراهيمي	أستاذ	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بابل
5	د. هدى باقر حسن	أستاذ	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بغداد
6	د. هالة سعدي عبد الواحد	أستاذ	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بغداد
7	د. هديل فاضل فرهود	أستاذ	طب الأسرة والمجتمع	كلية الطب \جامعة بابل
8	د. وجدان عبد سبتي	طبيب استشاري	طبية أطفال اختصاص	مستشفى بابل للنسائية والأطفال
9	محمد قاسم الدوري د. نهاد	استاذ مساعد	تمريض صحة الطفل والوليد	كلية التمريض \جامعة بابل
10	د. عبد المهدي عبد الرضا	استاذ مساعد	تمريض صحة النفسية والعقلية	كلية التمريض \جامعة بابل
11	د. سلمان حسين فارس	أستاذ مساعد	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة كربلاء
12	د. ضياء كريم عبد علي	أستاذ مساعد	تمريض بالغين	كلية التمريض \جامعة الكوفة
13	د. حيدر حمزة الحدراوي	استاذ مساعد	تمريض الصحة النفسية والعقلية	كلية التمريض \جامعة بابل
14	د. ناجي ياسر سعدون	أستاذ مساعد	تمريض صحة الأسرة والمجتمع	كلية التمريض \جامعة بابل
15	د. أمير كاظم حسين	أستاذ مساعد	طب الأسرة والمجتمع	كلية الطب \جامعة بابل

الخلاصة

فقر الدم هو حالة مرضية يكون فيها عدد كريات الدم الحمراء منخفضًا، يشير مصطلح فقر الدم إلى الحالة التي يكون فيها مستوى الهيموجلوبين في الدم أقل من الطبيعي بسبب نقص في عنصر او مجموعة من العناصر الغذائية الأساسية، يعتبر هذا المرض من الأمراض الشائعة لدى الأطفال في المرحلة الابتدائية في العديد من البلدان. تهدف هذه الدراسة إلى لبيان تأثير البرنامج التعليمي على معارف واتجاهات الأمهات الاتي لديهن الأطفال مصابين بفقر الدم من خلال تطبيق الاختبار القبلي والبعدي والتعرف على العلاقة ما بين استجابة الأمهات للبرنامج التعليم مع متغيراتهم الديموغرافية.

دراسة شبه تجريبية تم اجراءها باستخدام البرنامج التعليمي الذي اعد لهذا الغرض والاعتماد على الاختبار القبلي والبعدي للأمهات اللاتي لديهن اطفال مصابين بفقر الدم. للفترة 1 نوفمبر 2019 إلى 19 يونيو 2021. عينة غرضية غير احتمالية تتكون من (60) من الأمهات اللاتي لديهن اطفال في المرحلة الابتدائية يعانون من فقر الدم. تضمنت هذه العينة (30) أم كمجموعة دراسة ، فيما تم اختيار (30) أم أخرى كمجموعة ضابطة، من مراكز الرعاية الصحية الأولية في القطاع الصحي الأول.

أظهرت النتائج أن مستوى معارف الأمهات في مجموعة الدراسة قد تغير بشكل ملحوظ، حيث كان في الاختبار القبلي قبل تنفيذ البرنامج التعليمي كانت (22.23) ثم أصبح في الاختبار البعدي الأول بعد تنفيذ البرنامج التعليمي (34.9) وفي الاختبار البعدي الثاني أصبحت (33.63)، بينما بقيت معارف الأمهات في المجموعة الضابطة كما هي دون أي تغيير في الاختبار القبلي والبعدي والاختبار الثاني. كانت اتجاهات الأمهات تجاه مرض فقر الدم الذي يعاني منه أطفالهن إيجابية في مجموعة الدراسة خلال الاختبار القبلي والبعدي والأول والثاني، بينما في المجموعة الضابطة كان تقييم مواقف الأمهات سلبية في الاختبار القبلي والبعدي.

استنتجت الدراسة إلى أن الذسبة الأعلى لعينة الدراسة من حيث العمر في كلا المجموعتين كانت بين الأمهات في الفئة العمرية (28-37 سنة). كما تحسنت معارف واتجاهات الأمهات في مجموعة الدراسة بعد تطبيق البرنامج التعليمي واجراء الاختبارين البعدي الاول والثاني وكانت هناك علاقة معنوية بين معارفهم الأمهات حول فقر الدم ومعظم خصائصهم الديموغرافية، بينما في

المجموعة الضـــابطة لم يكن هناك تغيير في معارف الامهات حول المرض. أما بالنســـبة لمواقف الأمهات من المرض فقد تحسنت بعد تنفيذ البرنامج وكانت جميع إجاباتهن إيجابية، بينما تغيرت في المجموعة الضابطة بشكل طفيف. هذا يعني ان البرنامج التعليمي فعال ومؤثر على عينة الدراسة.

وأوصـــت الدراســـة بضـــرورة التعاون بين وزارة الصـــحة ووزارة التعليم العالي والبحث العلمي ووزارة التربية والتعليم لوضـــع خطط للوقاية فقر الدم ومعالجته وتجنب ازدياد معدلات الاصابة خاصة بين أطفال المرحلة الابتدائية. العاملين في التدريس بهدف تقديم النصائح والتعليمات الصحية للمرضى. تحسين المستوى الصحي للأطفال.

يجب تدريب وتعليم الأمهات وأعضاء هيئة التدريس بشكل رئيسي من قبل ممرضات صحة المجتمع، في مجال خدمات الصحة المدرسية، وتعزيز الصحة من خلال سلوكيات الأمهات لتحقيق أهداف التنمية المستدامة في عام 2030 لتحسين المستوى الصحي للأطفال.

وأوصـــت الدراســـة بضـــرورة التعاون بين وزارة الصـــحة ووزارة التعليم العالي والبحث العلمي ووزارة التربية لوضـــع خطط للوقاية من فقر الدم ومعالجته خاصـــة بين أطفال المدارس الابتدائية. يجب تدريب وتعليم أعضـــاء هيئة التدريس بشـــكل أســـاســـي من قبل ممرضـــات صـــحة المجتمع، في مجال خدمات الصـــحة المدرســـية، وتعزيز الصـــحة من خلال الأمهات لتحقيق أهداف التنمية المستدامة في عام 2030 لتحسين المستوى الصحي للأطفال.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة بابل- كلية التمريض

فاعلية البرنامج التعليمي على معارف الأمهات واتجاهاتهن نحو أطفالهن المصابين بفقر الدم نقص الحديد في عمر المدرسة الابتدائية

أطـــروحـــة

مـقـدمـة الـى مجـلـس كـلـيـة الـتـمـريـض/ جـامـعـة بـابـــل - جزء مـن مـتـطـلـبات نـيـل درجـة الـدكتوراه - فـلـسـفـة فـــي الـتـمـريـض

مـــن قـبـل

أحمد شاكر مهدي الزهيري

بأشراف

الأستاذ الدكتور قحطان هادي حسين الجبوري
الأستاذ الدكتور حسن علوان بيعي

تموز 2021 ميلادية **ذو الحجة 1442هجرية**