

Study of anemia in children in Balkh Orphanage

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Abstract

The present study investigating the incidence of anemia in children in orphanage Balkh province in Afghanistan. In order to determine the status of blood parameters of hematology indices, a complete blood cell count was conducted in the laboratory of Hayat Al-Nisa Private Hospital which is funded by Taj Institute of Higher Education.

This descriptive cross-sectional study was conducted from 2021/01/09 to 2021/03/05 on 75 children between the ages of 6 to 18 years. After obtaining the consent of the orphanage directorate, in order to determine the status of blood parameters and hematology indices, the amount of 3ml of intravenous blood was taken using a disposable syringe. It was placed in tubes containing EDTA. The collected blood samples were sent to the laboratory of Hayat Al-Nisa Hospital on the same day for CBC tests. Finally, data was analyzed by SPSS 26 software.

Out of 75 children, 15 had anemia. The degree of anemia varies from mild to moderate. 9 children had a hemoglobin of between 11 and 11.9 gr/dl, 2 children had a hemoglobin of 12 gr/dl, and 4 children had moderate anemia, and their hemoglobin ranged from 9.5 to 10.9 gr/dl. The total incidence of anemia was 20%.

Keywords: Pediatrics, Anemia, Hemoglobin, Hematocrit, Orphanage.

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1. Introduction

Anemia is a decrease in hemoglobin volume that the (HV) of healthy individual with respect to age and sex. According to study 20% of children in orphanage located in Balkh province had anemia.

Anemia is a decrease in hemoglobin volume less than that is present in healthy individuals with respect to age and sex. Anemia is one of the most common diseases in the world. According to a study, 20% of children in orphanage in Balkh province had anemia.

The prevalence of anemia is high in developing nations, 9 out of 10 people living in these countries. So it is necessary to study this issue carefully and

comprehensively. The fact that a large number of people suffer from this significant problem forces us to pay special attention to it and to seek the fields of diagnosis, treatment and prevention.

It is clear, several factors like the social and economic situation, lack of awareness, negligence of government institutions, lack of recognition long with its factors in society, cause severe problems especially in children. The study of anemia and its affecting factors in children is of particular importance. It implemented to achieve the following goals:

1. Detection of anemia in children in Balkh orphanage, an abnormal hemoglobin

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concentration, abnormal living under similar economic and social conditions.

2. Evaluation of hemoglobin, hematocrit, mean cell volume (MCV), mean red blood cell hemoglobin or red blood cell indices.

Blood: It is clear, economic and social disorders, lack of awareness, lack of factors like that cause anemia in children, the prevalence of anemia is more common among children living in developing countries.

Significance and Rationale

- Evaluation of anemia based on decreased hemoglobin concentration and decreased hematocrit in children.
- Evaluation of anemia indicators and red blood cells, symptoms and adverse effects of anemia in children
- Percentage of anemia, the severity of anemia in children aged 6 to 18 years.

Research questions

- What are the affecting factors of anemia developing in children?
- Do malnutrition and parasitic infection have a direct effect on anemia development in children?
- What are the most common causes of anemia in children?

Hypothesis

- Poverty seems to have a significant nexus on the development of anemia due to poor social and cultural conditions.

Was thought that not paying attention to the causative factors and preventive steps of non-treatment in causing anemia has a significant relationship.

2. Literature Review

Definition of Anemia: Anemia is a decrease in the oxygen transport capacity of red blood cells, which is accompanied by a decrease in hemoglobin, red blood cell counts and leads to tissue hypoxia. (Molavizadeh and colleague, 2018, 1-2)

Anemia means a hemoglobin deficiency, which leads in a sharp decrease in the number of red blood cells or due to a very low concentration of hemoglobin in the red blood cells. (Ariapour et al., 2013, 98-99)

Hemoglobin: Unpainted red crystal, due to the presence of hemoglobin appears yellow. Hemoglobin makes up 33% of the volume of red blood cells and that is made of two components of protein (globin) and pigment (heme).

Four heme molecules are attached to each globin molecule. Heme is an iron-derived derivative of porphyrin that is the same in all animals, while the composition of globin is different in each animal. The average amount of hemoglobin is 16 grams in men and 14 grams in women. Hemoglobin is 18 to 20 grams at birth, then decreases for a short time,

increases again at 3 months, and becomes normal after puberty. If the amount of hemoglobin in the blood is normal, it is called normochromic, and if it is lower than normal, it is called hypochromic. In the hypochromic state, the RBC is less pronounced and indicates iron deficiency. In humans, hemoglobin is in the form of HbP, HbA, HbF. (Anwar, 2012, 377-378)

Stages of iron deficiency anemia:

The first stage (pre latent) of iron deficiency begins with a decrease in iron stores. At this stage, serum iron, hemoglobin, hematocrit and other iron-dependent proteins are normal and only serum ferritin is reduced.

The second or latent stage of serum iron also decreases and TIBC increases but no change in hematocrit occurs. At this stage, hemoglobin is at least normal and tissue cytochrome oxidase is reduced.

Stage III or Frank IDA (IDA) Serum iron decreases slightly and the hemoglobin concentration decreases and the red blood cells become smaller and paler. (Karimi, 2004, 83)

Iron deficiency is the most common nutritional deficiency in the world and leads to clinical signs and symptoms, most of which are associated with anemia. About 10 percent of developed communities and 25 to 50 percent of developing communities have anemia, and in both cases the most common cause of anemia is iron deficiency. (Kumar et al., 2018, 153)

Types of anemia: bleeding anemia, aplastic anemia, megaloblastic anemia, hemolytic anemia. (Guyton and Hall, 2020, 452)

Hemorrhage / Hemolysis: Hypovolemia, intravascular hemorrhage, autoimmune disease, hemoglobinopathy, mitochondrial defect of RBC membrane

Maturation disorder: Cytoplasmic defect of thalassemia, iron deficiency, sideroblastic, defect in the nucleus accumbens, folic acid deficiency, vitamin B12 deficiency and anemia.

Hypo proliferative: Bone marrow destruction, iron deficiency, kidney disease, inflammation, and metabolic diseases.

Classification of anemia: Normocytic (morphology) The average volume of normal red blood cells is between 80 and 100 femtoliters. Macrocytic The average volume of red blood cells is more than 100 femtoliters. Microcytics The average cell volume is less than 80 femtoliters.

Hematologic pathogenesis of hematopoiesis, decreased production of red blood cells, increased destruction of red blood cells (Kani M, 2018, 5, 31)

Types of inherited hemolytic anemia: Sickle cell anemia, Thalassemia, Hereditary spherocytosis, Hereditary elliptocytosis, G6PD and Pyruvate kinase deficiency. (Your guide to anemia, 2011, 43)

Sources of iron: Apples, rum, kale, lemons, grapes, turmeric, oranges, figs, plums, raisins. Vitamin C helps absorb iron in the body. (Soundary other, 2016, 10,17)

Epidemiology: Anemia reflects in the balance of production and destruction of erythrocytes and hemoglobin. In normal people, the lifespan of a red blood cell is 100 to 120 days and about 1% of these cells are destroyed daily and replaced with new cells. Anemia is a major global problem with a high prevalence that affects both sexes, all age groups (mostly pre-school) and economics, and about 30% (1,500 million) of the world's population have anemia to varying degrees. The prevalence of iron deficiency anemia has been reported to be 97-50% in various studies. Iron deficiency anemia is the most common cause of anemia in the world and the most common nutritional deficiency in children. Developing countries in pre-school and school-age children, the main reason is the lack of proper nutrition. Although its prevalence in developed countries has decreased in recent years, its global prevalence has not changed much. (Molavizadeh and colleague, 2018, 1-2)

This disease has caused important disorders in children, including delayed physical development, mental development disorder; Evolutionary; It is speech and behavior that can be reversed only if first diagnosed and treated properly, otherwise it can lead to irreversible mental and cognitive disorders. Due to the role of iron in myelination of normal neuron, its deficiency reduces the rate of transmission of nerve potential, in the auditory and visual nerves and finally changes the auditory reaction of the brain stem and stimulated visual potential, which does not improve even with iron therapy if established. In addition, it causes peripheral neuropathy and decreased motor activity, so that in some studies, the rate of nerve potential transfer in the median nerve is directly proportional to the level of iron in the blood. In addition, iron deficiency anemia causes disorder of cellular and humoral and cytokine immunity, which paves the way for various types of infections, especially otitis media (Molavizadeh et al., 2018, 1-2)

Iron plays a major role in enzymatic activities (catalase, retinucleotide reductase, and peroxidase), DNA synthesis, and hemoglobin structure (10).

Approximately 750 million children suffer from iron deficiency anemia worldwide. In the United States, 3% of children aged 12 to 36 months have anemia. Children aged 37 to 60 months have an anemia percentage of less than 1%. (Kawsari other, 2011, 1)

Pathology of anemia: Causes, blood loss (hemorrhage), increased destruction of red blood cells (hemolysis), decreased production of red

blood cells. Microcytic (iron deficiency, thalassemia), macrocytic (folate and B12 deficiency), normocytic but abnormally shaped (hereditary spherocytosis, sickle cell anemia). (Kumar et al., 2018, 153)

Effects of anemia on the circulatory system: In severe anemia, blood viscosity may decrease from normal, which is three times the viscosity of water, to 1.5 times the viscosity of water. an increase afterload in cardiac that may cause heart failure. (Ariapour et al., 2013, 99)

Etiology: Iron deficiency anemia in children is the main four causes: decreased reserves at birth, inadequate intake with the diet, reduced intestinal absorption, chronic losses of blood. (Roberto others, 2018, 1)

Clinical signs and symptoms of anemia: Mild anemia may not have symptoms. Symptoms and sign of anemia are more common in severe anemias: Pica, geophagia, pallor, koilonychia, decreased resistance against infections, decreased appetite, dysphagia, atropic gastritis, Increased cardiac output, Increased heart rate, cardiomegaly, heart failure, sleep disturbance, mental disorder, learning difficulty, attention deficit, fainting. (Roberto others, 2018, 8)

Clinical manifestations of anemia: Acute shortness of breath, organ failure, shock. chronic manifestations of pallor, fatigue, lethargy, with hemolysis of jaundice and gallstones, with ineffective hematopoiesis of iron overload, heart and endocrine. If severe and congenital, growth retardation, bone malformations due to hyperplasia, bone marrow reaction. (Kumar et al., 2018, 137)

Laboratory findings of anemia: In peripheral blood (IDA) Anisocytosis, RBC hypochromic and microcytic. In the diagnosis of iron deficiency anemia, the concentration of hemoglobin and serum ferritin is determined. (Roganovic other, 2018, 60)

Treatment of anemia: The most sensitive and definitive response of hemoglobin to iron therapy. increase of 1-2gr / dl within 3 to 4 weeks after treatment indicates iron deficiency. However, the hemoglobin concentration may be normal at the start of treatment. (Karimi, 2004, 83)

The recommended dose of iron in children is 3 to 6 mg per day for four months. (Rx Files, 2017, 4)

Methods: In this descriptive cross-sectional (analytical) study, 75 children between the ages of 6 and 18 years old were selected from 10/20/1399 to 12/15/1399. After obtaining the consent of the orphanage directorate, in order to determine the status of blood parameters and hematological indicators, the amount of 3ml of venous blood was collected using disposable sterile syringes. The collected blood was added to test for complete blood cell count (CBC) and to determine anemia in

tubes containing EDTA, then the collected blood samples were sent to the laboratory of Hayat Al-Nisa Hospital for the same tests on the same day. After several hours, blood parameters were detected and determined in a CBC machine. Out of 75 children in Balkh orphanage, 15 were anemic, 9 children hemoglobin were 11 to 11.9, four children hemoglobin were 9.5 to 10.9 gr/dl and 2 children hemoglobin were 12 grams per deciliter. Finally, the data the data by SPSS 26 software.

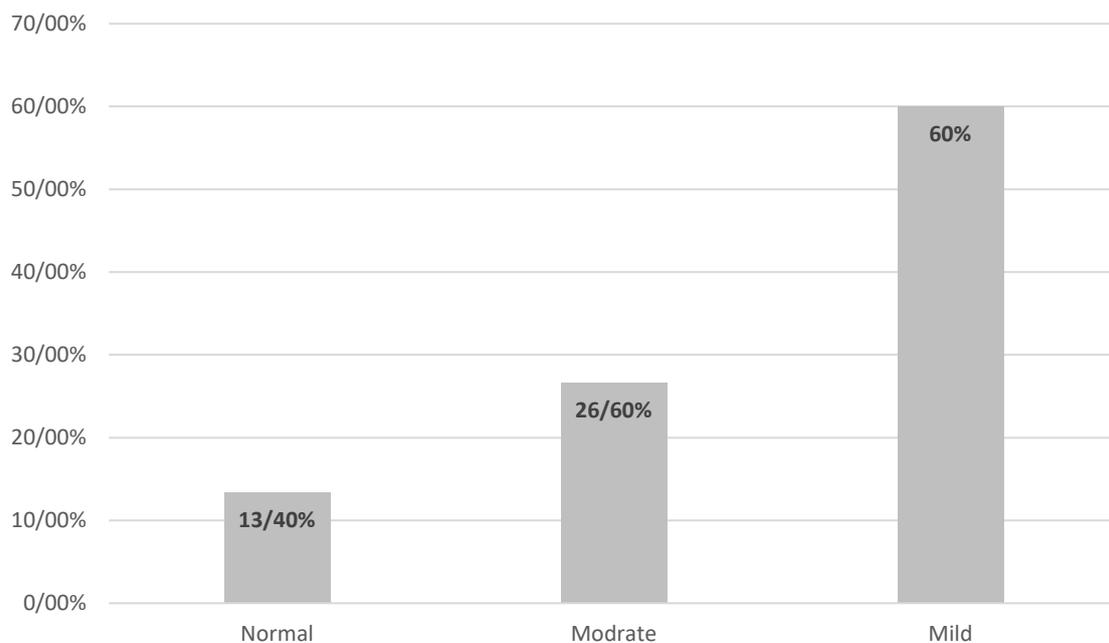
Results: This study was conducted on 75 children in Balkh orphanage between the ages of 6 and 18 years, including 15 children with 20% anemia. In general, the prevalence of anemia in children, due to the decrease in hemoglobin and hematocrit, 9 of them were mildly anemic and the hemoglobin concentration was from 11 to 11.9 g/dl, 4 of them were in moderate anemia with a hemoglobin concentration of 9.5 to 10.9 gr/dl. 2 of them had a hemoglobin of 12 grams per deciliter and the age of the majority was between 6 and 14 years old. The prevalence of anemia in children under study is higher than in other developed countries.

Table1: Category of respondents' anemia

Total	Mild	Moderate	Normal
Number of patients	9	4	2
Percentage	60%	26/6%	13/4%

Table (1) shows that out of 75 patients, 15 were anemic, ranging from 6-14 Sensen. The results

show that 15 people (9) have mild anemia, (4) moderate and (2) normal.



Graph1: Percentage of anemia in children

Graph (1) shows the percentage of pediatric anemia, including 15 children 9 children of hemoglobin between 11 to 11.9 gr/dl of mild anemia (60%), 4 children of hemoglobin between 9.5 to 10.9 gr/dl of moderate anemia (26.60%) and 2 children hemoglobin 12 g / dL was normal (13.40%).

3. Discussion

Results A total of 75 children studied showed 15 children with low hematocrit and low hemoglobin. Overall, the percentage of anemia in children was

20% due to a decrease in hemoglobin concentration.

Yahya Pasdar and his colleagues's study was performed on 310 female students of Kerman Shah University of Medical Sciences. About 10% had anemia. (Pasdar et al., 2015, 313-318)

A 2008 study by Akramipour et al., Which aimed to determine the prevalence of anemia in girls between the ages of 14 and 20 in Kerman Shah High School, showed a prevalence of anemia of 21.4%. (Abedini et al., 2012, 39)

A study by Sediqeh Abedini et al. Conducted in 2012 over 200 people showed that 20% of the

students had anemia (hemoglobin was below 12 grams per deciliter. (Abedini et al., 2012, 39)

Studies in which Lemia Shaban et al. Conducted research on 1,415 schoolgirls and boys who received an overall anemia percentage of 8%. (Shaban other, 2020, 4)

Different studies are conducted about anemia in foreign countries for instance in Brazil 332 school student have studied ranged 7 to 15 years of age and it is founded that 16.6 percent of student suffered from anemia. A survey is done in Indonesia among 1358 student of 10 to 12 years of age and it founded that 9.8 percent of them have anemia. Investigation have been done in Bangladesh among 548 school girls ranged 11-16 years of age which show 27 percent of anemia among them. A study has sketched in Kazakhstan among 159 students and it is founded that the rate of anemia was 49.8 percent. the reason for the difference in hemoglobin ended to define anemia and Venice is due to genetic and geographic differences.

The percentage study of the prevalence of anemia was 11.1% and 2.2% had mild to moderate anemia. (Mengistu others, 2019,8)

Kerman Shah high school was conducted and showed a prevalence of anemia of 21.4%. (Abedini et al., 2012, 39).

4. Conclusion

The results of the present study showed that out of 75 children surveyed, 20% of children in Balkh orphanage had anemia (hemoglobin less than 12 grams per deciliter), which is consistent with some studies conducted in this field.

5. Suggestions

Due to the high prevalence of anemia among children, especially children in orphanages in Balkh province, of Afghanistan. they should be evaluated for signs and hematological conditions, and in case of delayed anemia due to anemia, regular and adequate treatment should be continued to correct the delay in their membership. The high prevalence of anemia and the reduction of hemoglobin in this study confirm the imbalance between diet and the needs of children, especially orphans. It is necessary to pay more attention to this group. Educating children to follow a proper diet and include meat and protein in Children diet plan along with more fruits and vegetables that help absorb.

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