Kufa Journal for Nursing Sciences
Open Access Full Text Article

Publisher
University of Kufa, Faculty of Nursing

Received: 10 June, 2023
Accepted: 14 July, 2023
Published: 09 August, 2023
Vol. 13(2), 2023: 81 – 90

https://doi.org/10.36321/kjns.vi20232.12392

ORIGINAL RESEARCH

The Relationship Between Hemoglobin Level and Mother-Child Medical History of Children with Anemia who are Under Five Years Old.

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ABSTRACT

Background: The prevalence of anemia is a global public health concern, affecting both developed and developing countries. The effects of childhood anemia are devastating, ranging from stunted growth and impaired cognitive and motor development to an increased risk of mortality.

Objectives: The study aims to determine the mother and child medical history associated with hemoglobin levels among under-five children in Kut City.

Methodology: A cross-sectional study with a convenience sample (non-probability) was conducted among 264 children admitted to hospitals in Kut City. From September 1st, 2022, to March 1st, 2023. Data were collected via questionnaires, and descriptive and inferential statistics were used to evaluate the data.

Results: The total number of children participating in the study was 264, with 39.0% having mild anemia and 60.0% having moderate anemia, according to the WHO classification of anemia. The results showed that the children most at risk of developing anemia were born to mothers with prenatal medical problems. As well as the period of admission of the child to the hospital. Children who were partially immunized showed the lowest mean of hemoglobin. In contrast, children with a History of acute blood loss showed the lowest mean of hemoglobin. The degree of anemia was significantly associated with a long duration admission in pediatric word or neonatal care unit

Conclusion: According to the study, the most critical factors facing anemia were high significant with partially immunized and a history of blood loss.

Keywords: anemia, children under five years, medical history of mother, medical history of children.

How to Cite: Al-Kaabi, S. Z., Al-Saad, D. S., Al-Rubaye, A. K., & Al-kinani, A. A. A. (2023). The relationship between hemoglobin level and mother-child medical history of children with anemia who are under five years old. *Kufa Journal for Nursing Sciences, 13*(2), 81 -90. https://doi.org/10.36321/kjns.vi20232.12392

INTRODUCTION

Anemia is the second most prominent cause of disability globally. As a result, it is one of the most significant concerns affecting public health worldwide. An estimated one to three billion individuals around the globe are afflicted with anemia, and around six to nine million of the world's preschoolers are suffering from a severe form of the condition (Aliyo & Jibril, 2022). Anemia is defined by a decrease in the total number of red blood cells or the hemoglobin level in the blood that is below its normal levels. Both of these changes contribute to a lower oxygen-carrying capacity inside the blood. Because of this, blood's ability to carry oxygen decreases throughout the body, resulting in reduced oxygen delivery (WHO, 2022).

Maternal risk factors can strongly influence anemia in children younger than five before and after giving birth. The mother's poor nutritional state develops anemia during pregnancy or shortly after giving birth. The fetal iron transfer is impaired, and breast milk iron content is lowered when the mother has an iron shortage (Essineer et al., 2023).

The risk of anemia in a child is increased when the mother has a condition that hinders her ability to absorb or use iron, such as renal disease, inflammatory bowel disease, or an autoimmune problem. Moreover, maternal anemia, which can be caused by excessive bleeding after childbirth, increases the risk of anemia in the newborn (Vol, 2022) .

Several adverse effects are associated with childhood anemia, including an increased risk of contracting infectious diseases, feelings of exhaustion and brittleness, trouble concentrating, and probably impaired mental and motor development in children (Ibrahim et al., 2020). Anemia is a disorder that is frequently prominent in countries with low incomes and civilizations with moderate gains, with the areas of South East Asia and Africa having the most excellent incidence rates (Aldeen Hameed et al., 2021). The incidence rate of anemia among children less than five years old in Iraq was 29.4 percent (WHO, n.d.). In addition, the World Health Organization (WHO) conducted a survey and discovered that the prevalence of anemia is highest in younger kids (those under the age of five)(Mbabazi & Kanyamuhunga, 2021).

Anemia is a condition that can have many various origins; it can be nutritional, caused by deficiencies in iron, folate, and vitamin B12; it can also be caused by clinical infectious illnesses, such as intestinal worm infections, tuberculosis, HIV/AIDS, general inflammatory disorders, and malaria (Ageru et al., 2019). Anemia is a condition that affects the body's ability to produce enough red blood cells to carry oxygen throughout the body (Maiti et al., 2021). It is likely inherited and brought on by a deficiency in a specific gene (Sampa, 2021). Anemia has many detrimental effects on a child's health, including growth retardation, poorer cognitive development, decreased immunity, disability, and an increased risk of morbidity and mortality(Stelle et al., 2019). Regarding adults, anemia is one of the top causes of mortality and cardiovascular disease (Mboya et al., 2022) .

In conclusion, anemia in children under the age of five can be caused by a number of factors, including poor nutrition, infections, and inherited disorders. Long-term impacts on a child's growth and development can be avoided if anemia is diagnosed and treated early. Preventative measures, such as providing expectant women with high-quality prenatal care and keeping close tabs on their diets, as well as access to quality healthcare, have all been shown to reduce the prevalence of anemia in young children (Lemoine & Tounian, 2020).

AIMS OF THE STUDY

The aim of the study is to identify medical history of mother and child associated to the

hemoglobin level in children under the age of five in kut City.

METHODOLOGY

Study design and duration:

A descriptive cross-sectional study design, study conducted from September 1st, 2022, to March 1st, 2023.

The Study Setting:

The research was carried out at three hospitals in kut city. They (AL-Zahra Teaching Hospital, AL-Karama Teaching Hospital, AL-Kut Teaching Hospital) These hospitals are located in Kut City.

Study Sample:

This study included 264 of children. Using a convenience sample selected throughout the using a non-probability sampling approach.

Ethical Considerations:

The current study approvals were officially obtained from the Department of Community Health Technologies and the Deanship of Graduate Studies and Scientific Research at Southern Technical University. Also, consent was obtained from the Iraqi Ministry of Health, Wasit Health Department, Office of the Director-General, Center for Training and Human Development , Unit of Knowledge Management , Research according to the lettery number 458 dated17/10/2022. Parents of children have been informed of the goals, objectives, and methodology of the study before sample collection. The researcher announced and is committed to the participants regarding the confidentiality of the survey. The study is optional and unspoken. Non-personal data has been presented or discussed. All ethical considerations, including respect for issues, legality, and confidentiality, were preserved.

Study stages:

The current analysis tools included the main components, such as filling out a study form, laboratory tests, and measuring height and weight.

Classification of anemia

According to the WHO classification, which considered patients with a hemoglobin level of 11.0 to 8.9 g/dl per liter to be patients with mild anemia, Patients with moderate anemia have hemoglobin levels between 9.0 to 7.0 g/L, those with severe anemia have less than 7g/L, and healthy individuals have hemoglobin levels over 11.0 g/L. One hundred three of our patients have mild cases, while the rest, 161, have moderate cases. Another classification is divided into cell sizes based on Hb levels and MCV(Murata et al., 2015).

Inclusion criteria:

- Children in the age group from 6 months to 5 years;
- Those children with a hemoglobin level of less than 11 gm/dl.

Exclusion Criteria:

This study excluded children diagnosed with hereditary blood diseases such as thalassemia, sickle cell anemia, glucose-6-phosphate dehydrogenase deficiency (G6PD), and children with infection or fever.

Data Collection Method:

After completing the required approval, the data was collected by questionnaire from the patient's parents interviewed and consisted of a child's medical record data. Each interview lasted about 15-20 minutes.

Questionnaire

Data were collected by conducting a direct interview with the parents of children through a questionnaire. the questionnaire included closed questions. consisting of questions related to the maternal and child history, such as gestational age, type of delivery, mother had any medical problem before delivery and which type, mother has anemia before delivery and which type, take a ferrfolic cap during pregnancy, the child requires hospital admission and NCU admission and how long, birth order of the child, number of children in the family, immunization status of the child, helminthic infection of the child, history of acute blood loss and when and how long, history of recent surgical procedure.

Statistical Analyses

Data analysis was done using the available statistical package, SPSS-27 (Statistical Packages for Social Sciences, version 27). Data were presented in simple measures of frequency, percentage, mean, standard deviation and range (minimum-maximum values) using graphs.

The Crosstabs procedure forms two-way and multiway tables and provides a variety of tests and measures of association for two-way tables. The table's structure and whether categories are ordered determine what test or measure to use.

The One-Way ANOVA procedure produces a one-way analysis of variance for a quantitative dependent variable by a single factor (independent) variable. Analysis of variance is used to test the hypothesis that several means are equal. This technique is an extension of the two-sample t-test. In addition to determining that differences exist among the means, you may want to know which means differ. Statistical significance was considered whenever the P value was equal to or less than 0.05.

RESULTS AND DISCUSSION

Distribution of the participants according to the medical histories of the mother and the child

Table (1) shows the distribution of the participants according to the medical histories of the mother and the child. A large percentage of the mothers completed the gestational age by 61.7%, and the type of childbirth had been planned for 28.8%. 55.3% of the mothers had medical problems before childbirth (high blood pressure, 19.3%; diabetes, 19.3%; Corona, 7.6%; bleeding, 9.1%). Most mothers do not have anemia before childbirth, with a rate of 57.6%. 1.84% of mothers take Ferrfolic capsules during pregnancy. A high percentage of children, 54.5%, did not enter the NCU hall or the children's hall, and the sequence of the second children was 43.9%. Most parents had more than three children, at a rate of 47.3%. Children infected with worms were at a rate of 59.1%. 2.93% of the children have no history of acute blood loss and have not undergone surgeries; 2.60% have.

The factors associated with the severity of anemia in children under five years of age, according to the medical histories of the mother and child

Table (2) shows the factors associated with the severity of anemia in children under five years of age, according to the medical histories of the mother and child, as follows:

Initially, the table shows the gestational age. We found that children born prematurely had the lowest percentage of mean hemoglobin and the standard deviation (9.42 + 0.95), and there was no statistical relationship (p-value> 0.05). This study agrees with Li et al., 2020 This study revealed no connection between childhood anemia and preterm birth or low birth weight. This may be because iron supplements (2 mg/kg/day) were given to preterm and low-birth-weight infants starting in the fourth week after birth and continuing until they were one year old. This effectively made up for the lack of iron stores caused by preterm birth or low birth weight and prevented iron-deficient anemia in these infants (Li et al., 2020).

As for the type of birth, the children who were born vaginally were found to have the lowest percentage of hemoglobin in the mean and standard deviation (9.29+0.88). There was no relationship between them (p-value> 0.05). This study agrees with Ofori et al., 2020. The reason is that First newborns have very little iron stored in their systems after birth, which may help anemia develop. Secondly, during the birthing process, babies may lose some blood, resulting in the loss of red blood cells. This may make babies more prone to anemia (Ofori et al., 2020).

The study showed that children whose mothers did not have medical problems before birth had the lowest percentage of hemoglobin, and no statistical relationship appeared. In contrast, children whose mothers had health problems (Covid 19) seemed to have the lowest rate of hemoglobin, the mean and standard deviation for them (9.06 + 0.92). They had a statistical relationship (p-value= 0.05). This study

agrees with Fatmah et al., 2022. The reason is that anemia occurs when the body lacks healthy red blood cells to provide oxygen. It causes weariness, weakness, shortness of breath, and other symptoms. COVID-19 causes fatigue and shortness of breath, making both conditions difficult (Fatmah et al., 2022).

The study shows us that mothers with iron deficiency anemia before birth have the lowest mean hemoglobin and standard deviation (9.58 + 0.90), and there was no statistical relationship (p-value > 0.05). This study disagrees with ElAlfy et al., 2020 because Maternal anemia is a severe condition that can have significant health consequences for both the mother and the baby. Pregnant women must receive regular prenatal care and be screened for anemia to identify and treat potential problems.(Elalfy et al., 2020).

The study showed us that the mothers who took ferrfolic pills during pregnancy had the lowest percentage of the mean hemoglobin and the standard deviation for them (9.47 + 0.96). No statistical relationship appeared between them. This study disagrees with Ngethe et al., 2020. during pregnancy, iron and folate insufficiency increases due to the increased demand for these nutrients necessitating a supplement to meet daily requirements caused by pregnancy-related physiological and hormonal changes in mothers and fetal (Ngethe et al., 2020).

The study shows us that the children who needed admission to the hospital and the care unit appeared to have the lowest percentage of hemoglobin mean and standard deviation for them (9.45 + 0.94). It has a statistical relationship (p-value = 0. 044). This study agrees with Olupot-olupot et al., 2022 (Olupot-Olupot et al., 2022).

The order of birth of the child in the family: the study shows us that most of the children were either the first or the second, they had the lowest percentage of the mean hemoglobin and the standard deviation for them (9.46 + 0.99), and therefore there is no statistical relationship (p-value > 0.05). This study agrees with Kassie & Workie, 2020 (Kassie & Workie, 2020).The table shows the number of children in the family and its relationship to anemia. The family with one or two children showed the lowest percentage of the mean hemoglobin and the standard deviation for them (9.46 + 0.97), and there was no relationship with a value of (p-value > 0.05). This study agrees with Mya et al., 2019. A more significant amount of anemia was more likely to occur in children with two older siblings. It is expected that anemia in children is caused by the mother's decreased intake of nutrients, including iron, folate, and vitamin B12, which may be connected to the rising birth order. (Mya et al., 2019) .

Regarding the vaccination status of children, it was found that the children who have taken part in the vaccinations appeared to have the lowest percentage of hemoglobin, with a mean and standard deviation (9.34 + 0.95). There was a statistical relationship between the child's vaccination status and the ratio of hemoglobin p-value = 0.007. This study agrees with Ribaudo et al., 2021. There are some indirect associations between a child's immunization history and anemia, even if there is no direct link. Anemia can be a side effect of several infectious illnesses that immunizations are meant to prevent, such as measles. Additionally, some vaccinations include trace levels of iron, a mineral crucial for avoiding anemia (Ribaudo et al., 2021).

The child was infected with helminths. It was found that the children who did not get helminths had the lowest percentage of hemoglobin, and there was no relationship between them (p-value > 0.05). This study disagreed with Djuardi et al., 2021 (Djuardi et al., 2021).

The study shows us that children with a history of severe blood loss have a lower percentage of the mean hemoglobin, and their standard deviation is (9.08 + 1.00). A statistical relationship appeared (p-value = 0.050). As for the date of blood loss, it was found that the period from one to two weeks is the lowest percentage of the mean hemoglobin and its standard deviation (9.26 + 1.10). There was a statistical relationship between them (p-value =

0.000). This study agrees with Berhe et al., 2019. Had a strong correlation with anemia. This may be caused by excessive blood loss, which depletes stored iron and results in a greater-than-usual need for iron. On the date of the last surgery, it appeared to us that there was no difference between those who underwent surgery and those who had not, and they had the same percentage of mean hemoglobin and the. standard deviation for them (9.48 + 0.91), and there was no relationship;(p-value > 0.05) (Berhe et al., 2019).

CONCLUSIONS

Regarding risk factors, the child's Immunization status is most likely to develop a low hemoglobin level, especially among the partially immunized. History of acute blood loss is among the most risk factors for anemia. However, there was a statistically significant relationship between the Mother with the type of medical problem before delivery, how long the child requires hospital and NCU admission, the Immunization status of the child, and how long the History of acute blood loss.

RECOMMENDATION

The study recommends Encouraging the mother to seek regular prenatal care during pregnancy. Proper prenatal care helps monitor the mother's health, including screening for anemia, and ensures that any nutritional deficiencies are addressed early on. Iron supplementation for the child: A healthcare professional may sometimes recommend iron supplementation, especially if there are signs of anemia or inadequate iron intake through diet alone. Child visits to monitor the child's growth and development, including screening for anemia. Promote practices that reduce the risk of parasitic infections.

Acknowledgments

We thank all the children and their families who voluntarily participated in the study. We also thank all the hospital workers in the city of Kut for cooperating in supporting this work.

Funding: For this work, the authors were not financially funded.

Conflict of interest statement: There is no stated conflict of interest.

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TABLES:

Table (1): Distribution of the participants according to maternal and child history:

	Categories	F.	%
Gestational age	Pre-term	76	28.8
	Full-term	163	61.7
	Post-term	25	9.5
Type of delivery	Scheduled cesarean	76	28.8
	Scheduled induction	4	1.5
	Unplanned cesarean	69	26.1
	Vaginal birth after C-Section	19	7.2
	Vaginal birth	96	36.4
Mother had any medical problem before delivery	No	118	44.7
	Yes	146	55.3
Which type	Hypertension	51	19.3
	Diabetes	51	19.3
	Covid 19	20	7.6
	Bleeding	24	9.1
Mother has anemia before delivery	No	152	57.6
	Yes	112	42.4
Which type	iron deficiency	74	28.0
	B12 deficiency	40	15.2
Take a ferrfolic cap during pregnancy	No	42	15.9
	Yes	222	84.1
The child requires admission to the pediatric ward or NCU.	No	144	54.5
	Yes	120	45.5
How long	1 - 3	62	23.5
	4 - 6	38	14.4
	≥ 7	20	7.6
Birth order of the child	1	13	4.9
	2	116	43.9
	3	101	38.3
	≥4	34	12.9
Number of children in the family	1	11	4.2
	2	79	29.9

	3	125	47.3
	≥4	49	18.6
Immunization status of the child	Full immunized	122	46.2
	Partially immunized	142	53.8
Helminthic infection of the child	No	108	40.9
	Yes	156	59.1
History of acute blood loss	No	246	93.2
	Yes	18	6.8
When and how long	1-2 weeks	10	3.8
	3-4 weeks	8	3.0
History of recent surgical procedure	No	159	60.2
	Yes	105	39.8
Total		264	100.0

Table (2): Factor associated with severity of anemia in children under five years based Maternal and child history

Maternal and child history	Categories	Severity of anemia		Hemoglobin level	P. Value
		Moderate, n (%) 161(61.0)	Mild, n (%) 103(39.0)	Mean + SD	
Gestational age	Pre-term	49(64.5)	27(35.5)	9.42±0.95	0.786
	Full-term	99(60.7)	64(39.3)	9.50±0.93	
	Post-term	13(52.0)	12(48.0)	9.54±1.13	
Type of delivery	Vaginal birth	67(69.8)	29(30.2)	9.29±0.88	0.113
	Scheduled cesarean	43(56.6)	33(43.4)	9.53±1.00	
	Unplanned cesarean	39(56.5)	30(43.5)	9.58±0.99	
	Vaginal birth after C-Section	10(52.6)	9(47.4)	9.78±0.96	
	Scheduled induction	2(50.0)	2(50.0)	9.92±0.47	
Mother had any medical problem before delivery	No	78(66.1)	40(33.9)	9.42±0.08	0.339
	Yes	83(56.8)	63(43.2)	9.53±0.98	
Which type	Hypertension	31(60.8)	20(39.2)	9.42±0.85	0.050
	Diabetes	25(49.0)	26(50.0)	9.50±0.97	
	Covid 19	16(80.0)	4(20.0)	9.06±0.92	
	Bleeding	11(45.8)	13(54.2)	9.73±1.04	
Mother has anemia before delivery	No	105(69.1)	47(30.9)	9.40±0.911	0.118
	Yes	56(50.0)	56(50.0)	9.59±0.95	
Which type	Iron Deficiency	39(52.7)	35(47.3)	9.58±0.90	0.319
	B12 Deficiency	18(45.0)	22(55.0)	9.60±1.12	
Take a ferrfolic cap during pregnancy	No	25(59.5)	17(40.5)	9.59±0.92	0.487
	Yes	136(61.3)	86(38.7)	9.47±0.96	
The child requires admission to the pediatric ward or NCU.	No	85(59.0)	59(41.0)	9.51±0.97	0.600
	Yes	76(63.3)	44(36.7)	9.45±0.94	

How long	1 - 3	46(74.2)	16(25.8)	9.24±0.97	0.044
	4 - 6	17(44.7)	21(55.3)	9.79±0.90	
	≥ 7	13(65.0)	7(65.0)	9.45±1.00	
Birth order of the child	1 or 2	79(61.2)	50(38.8)	9.46±0.99	0.893
	3	63(62.4)	38(37.6)	9.50±0.09	
	≥4	19(55.9)	15(44.1)	9.53±0.93	
Number of children in the family	1 or 2	58(64.4)	32(35.6)	9.46±0.97	0.872
	3	75(60.0)	50(40.0)	9.48±0.08	
	≥4	28(57.1)	21(42.9)	9.54±0.96	
Immunization status of the child	Full immunized	65(53.3)	57(46.7)	9.66±0.93	0.007
	Partially immunized	96(67.6)	46(32.4)	9.34±0.95	
Helminthic infection of the child	No	64(59.3)	44(40.7)	9.42±1.02	0.340
	Yes	97(62.2)	59(37.8)	9.53+0.91	
History of acute blood loss	No	148(60.2)	98(39.8)	9.51±0.95	0.050
	Yes	13(72.2)	5(27.8)	9.08±1.00	
When and how long	1-2 weeks	6(60.0)	4(40.0)	9.26±1.10	0.000
	3-4 weeks	7(87.5)	1(12.5)	8.86±0.87	
History of recent surgical procedure	No	94(59.1)	65(40.9)	9.48±0.98	0.994
	Yes	67(63.8)	38(36.2)	9.48±0.91	