Indonesian Journal on Health Science and Medicine
Vol 2 No 2 (2025): April
ISSN 3063-8186. Published by Universitas Muhamamdiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i2.111

The Main Risk Factors Related with Anemia among Preschool Children in Nasiriyah City

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Abstract. Anemia is a common problem of public health which associated with an increased risk of morbidity and mortality especially in children of poor countries. This study aimed to determine the prevalence and factors that related with anemia in children at pre-school going age. The current study includes 90 children (48 male and 42 female). According to age, 60% of children were under 3 years old, the rest (40%) of children were between 3-6 years old. For male children aged 1-3 years, the hemoglobin level was 6.77 g/dL and 31.25% of them had severe hemoglobin deficiency. As for females in the same age group, the hemoglobin level was 7.40 g/dL, but most of them (59.52%) suffered from moderate anemia. Iron deficiency was found in 14.58 % of male and 23.81% of female, however thalassemia was diagnosed in 18.75 % and 14.29 % of male and female, respectively with non-significant difference (P=0.50). In addition, 41.67% of the male children and 19.05% of the female children were malnourished. Diarrhea was common in both males and females where 39.59 % of males and 54.76% of females presented symptoms of diarrhea. In conclusion, the anemia in children under six years is complex, and highly associated with nutritional status, disease processes, and socio-economic status. If these causes are tackled through better nutrition, access to health and quality education anemia prevalence amongst this group might be greatly reduced.

Highlights:

1. High Prevalence in Young Children – Anemia is common among preschool children, with those under three years old being the most affected.
2. Nutritional Deficiencies & Health Conditions – Iron deficiency, thalassemia, malnutrition, and diarrhea contribute significantly to anemia in both male and female children.
3. Need for Comprehensive Interventions – Addressing anemia requires improving nutrition, healthcare access, and socio-economic conditions to reduce its prevalence.

Keywords: Anemia in Children, Iron Deficiency Anemia, Malnutrition, Chronic Infections.

Introduction

Anemia, defined as a reduction in the number of red blood cells or hemoglobin concentration, is a prevalent public health issue worldwide, particularly affecting children

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under six years of age. This age group is especially vulnerable due to their rapid growth and increased nutritional needs [1]. In children under 5 years of age, anemia was a major public health problem in low-, middle-, and high-income countries. Anemia defined by (World Health Organization) as a blood hemoglobin concentration of less than 11 g/dL in children under five years of age [2] [3]. Also, defined as a major cause of adverse health outcomes such as stunting, impaired cognitive development, impaired immunity, disability, and increased risk of disease and death. [4] [5]. About 43% of children under five in the world is anemic; anemia prevalence also varies widely between low and middle income countries (LMIC). Anemic children live in LMICs and Ghana and Cuba report highest prevalence rate (78%) and Cuba the lowest (26%). WHO reports that the African region has the highest proportion (62%) of anemic children. Several factors contribute to the development of anemia in this population, including nutritional deficiencies, infectious diseases, genetic conditions, and socioeconomic factors [6] [7]. One of the leading causes of anemia in children is nutritional deficiencies, particularly of iron, folate, and vitamin B12, which are essential for red blood cell production. Iron-deficiency anemia is the most common form, often linked to insufficient dietary intake of iron-rich foods such as meat, fish, and leafy greens, or poor absorption due to gastrointestinal conditions. Malnutrition, common in low- and middle-income countries, exacerbates the problem by limiting access to these critical nutrients [8] [9]. Infectious diseases also play a significant role in the development of anemia in young children. Malaria, for example, is a major cause of hemolytic anemia in endemic regions due to the destruction of red blood cells by the parasite [10] [11]. Intestinal parasites, such as hookworms, further contribute to anemia by causing chronic blood loss and impairing nutrient absorption. Moreover, genetic conditions such as sickle cell disease and thalassemia are important hereditary causes of anemia in specific populations. These conditions affect the structure and function of hemoglobin, leading to chronic anemia from an early age [12]. Finally, socioeconomic factors, including poverty, inadequate healthcare access, and poor sanitation, exacerbate these issues, particularly in resource-limited settings [13]. Therefore, the purpose of reporting this study is to establish the causes of anemia in children below the age of 6 years and the relationship between the biological/pathological factors.

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Materials and Methods

A-Study Design and Population

This is a cross-sectional study of 90 children with anemia aged from 1month to 6 years. The study included children under the age of 6 years suffering from anemia in hospitals in Al-Nasiriyah city, southern Iraq.

B-Sampling Method

The data were collected for this study and information was taken Children diagnosed with anemia were recruited from the Bint Al-Huda Teaching Hospital and Mohammed Al Mousawi Hospital from the period from February to the end of July 2024. Anemia was defined based on hemoglobin (Hb) levels below the normal age-specific range

C- Data Collection

Information obtained for each child included demographic information, nutritional status and breakfast intake, socio-economic status, and past medical history, including any chronic disease such as malnutrition or diarrhea. Venous blood was collected for haemoglobin estimation and detection of causes of anaemia including iron deficiency or thalassemia etc.

D-Measurement of Hemoglobin Levels

Hemoglobin concentration was estimated using automated hematology analyzer-China 2013. Hb levels of all the children were measured, and then classified under mild, moderate, and severe anemic groups according to the WHO standards.

E-Socioeconomic and Nutritional Data

Data on the children's housing and parental SES was collected from hospital data. The socioeconomic status was classified into three categories: weak, medium, and well-off.

F-Statistical Analysis

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SPSS version 20 software was used to analyze the collected data. To provide an account of the demographic and clinical details of the participants, descriptive statistics were applied. Sex differences and differences between age categories were identified with the help of chi square and t test. The results showed statistical significance at p ≤0.05.

Results

The present study was designed to detect anemia in children aged from one month to 6 years. The current study included 90 children, 48 males and 42 females.

In the table (1), 58.88% of male children suffering from anemia were within the age group less than 1month to 3 years, while 41.67% of them were within the age group from 3.1 to 6 years. As for female children, 61.90% of them were within the age group less than 1month to 3 years and 38.10% of them were within the age group from 3.1 to 6 years, without significant differences between male and female according to age group (P=0.73)

Table 1. Distribution of Children with Anemia According to Ages

Children with anemia	**n**	**Age (years) (n %)**		**P value**
		<1month – 3 years	**3.1 – 6 years**	
Male	48	28 (58.88%)	20 (41.67%)	0.73
Female	42	26 (61.90%)	16 (38.10%)	
Total	90	54 (60%)	36 (40%)	90(100%)

Χ2 = 0.11 , df =1 , P.value ≤ 0.05 Significant

The present study recorded a decrease in hemoglobin levels in all children. In age group less than 1 month to 3 years, the hemoglobin level was 6.77 ± 1.20 and 7.40 ± 1.21 in male and female children, respectively as shown in table 2.

Table 2. Hb Level in Children with Anemia

Children with anemia	**Hb level (mean ± SD)**	
	<1month – 3 years	**3.1 – 6 years**
Male	6.77 ± 1.20	8.53 ± 0.76
Female	7.40 ± 1.21	8.39 ± 0.81

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T.value	1.91	- 0.52
p.value	0.06	0.60

df = 88 , *P.value ≤ 0.05 Significant

The current study found 31.25 % of male children have severe deficiency of Hb, while 45.83% and 22.92% have moderate and mild deficiency of Hb, respectively. As for female, the majority of children with anemia (59.52%) have moderate deficiency of Hb as shown in figure 1

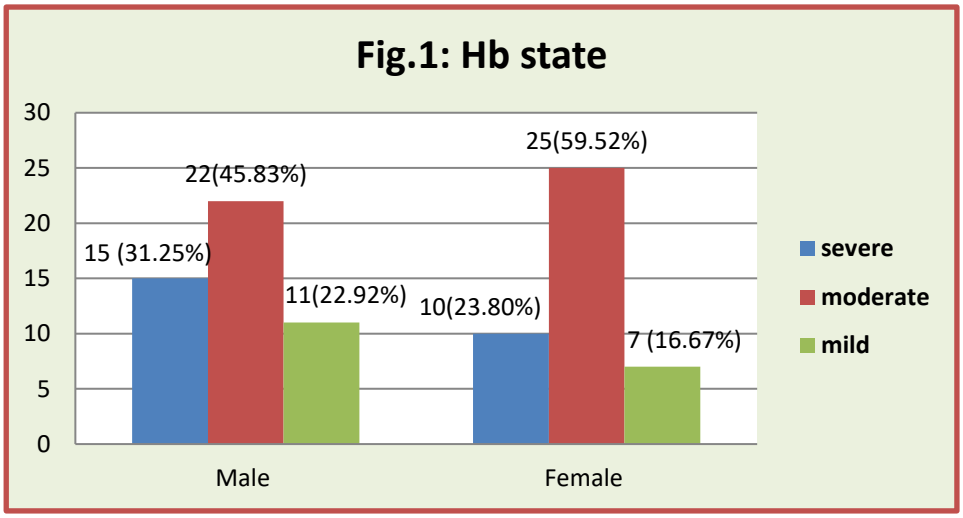

Figure 1. Hemoglobin Deficiency Severity in Male and Female Children with Anemia

The majority of children with anemia (males and females) live in middle-income families. The current study found that 50% and 42.86 % of males and females, respectively, live in middle-income families.

Table 3. Distribution of Children with Anemia According Living State

Children with Anemia	N	Living State (n %)			P Value
		Weak	Medium	Well	
Male	48	8 (16.67%)	24 (50%)	16 (33.33%)	0.32
Female	42	4 (9.52%)	18 (42.86%)	20 (47.62%)	
Total	90	12 (13.33%)	42 (46.67%)	36 (40%)	90 (100%)

X^2 = 2.24 , df =2 , P.value ≤ 0.05 Significant

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This study showed 14.58 % of male children suffered from iron deficiency, while 18.75 % suffered from thalassemia. As for female children, 23.81% suffered from iron deficiency and 14.29 % suffered from thalassemia with non-significant difference (P=0.50).

Table 4. Children with Iron Deficiency and Thalassemia Anemia

Children with anemia	N	Children with anemia (n %)			P value
		Iron deficiency	Thalassemia	None	
Male	48	7 (14.58%)	9 (18.75%)	32 (66.67%)	0.50
Female	42	10 (23.81%)	6 (14.29%)	26 (61.90%)	
Total	90	16 (17.78%)	15 (16.67%)	59 (65.56%)	90 (100%)

$X^2 = 1.35$, df =2 , P.value ≤ 0.05 Significant

The present study recorded that 39.59% and 54.76% of male and female children, respectively, suffer from diarrhea. While the current study found that 41.67% of males suffer from malnutrition and 19.05% of female children suffer from malnutrition as shown in Fig.2.

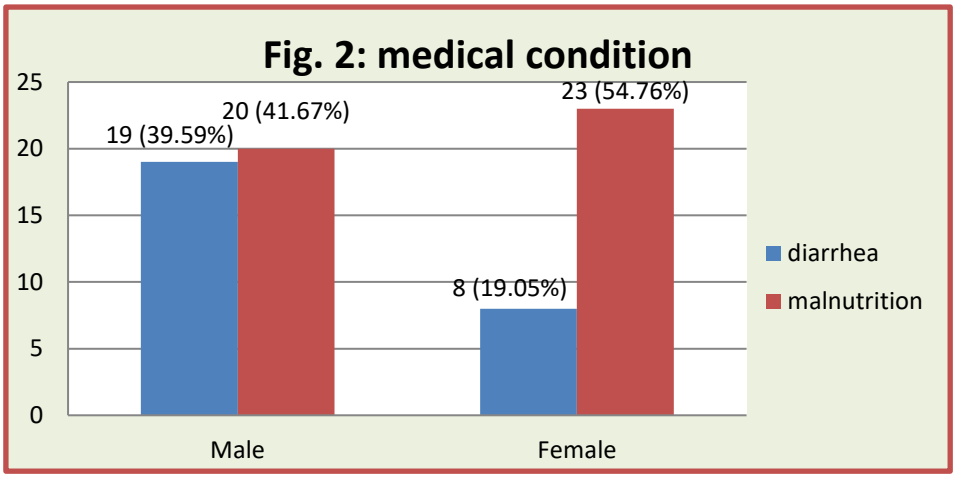

Figure 2. Prevalence of Malnutrition and Diarrhea Among Anemic Children

According to the educational level of the mothers, the current study found that the majority of mothers of children with anemia were in the middle school stage. Fig.3.

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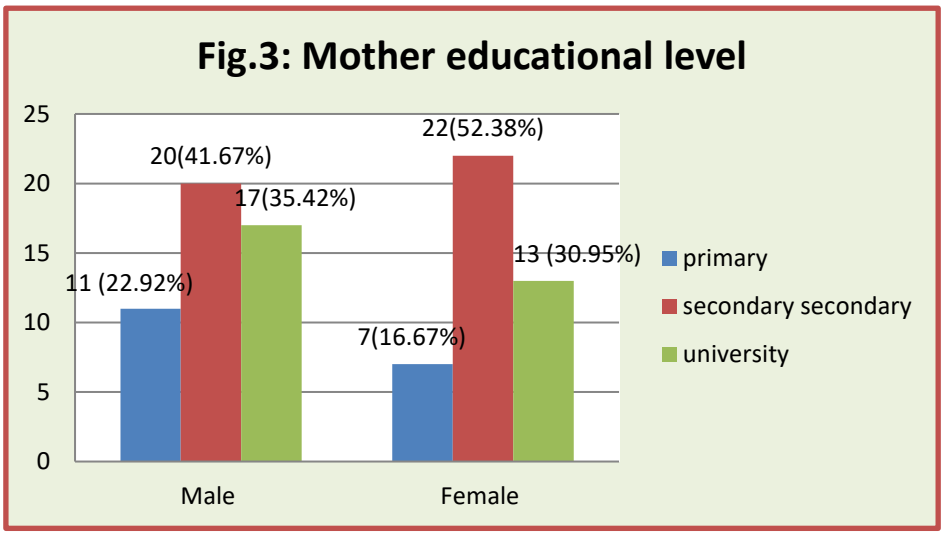

Figure 3. Educational Level of Mothers of Anemic Children

Discussion

Anemia, as a sign of overall health, in which the number of RBC or the amount of oxygen in them is lower than normal and that the dropped, it is low incapable of meeting one's physiological requirements [14] [15]. The present study noted a reduction in the hemoglobin levels among all cases. The children aged <1 month to 3 years were more probable to have anemia than children aged 3.1 to 6 years. These may be because of early weaning and unhealthy diets or continuing to breast feed for especially long times as observed in [16] especially if the mothers have low levels of iron. Moreover, it has been also suggested that the longer the duration of breastfeeding, the more severe the anemia in children because breast milk is low in iron. [17] [18] [19]. There were no significant differences in anemia prevalence by sex of the child (Table 2) which agrees with results of previous researches [20] [21], In contrast, As stated by reports , Ethiopian female are less possible than male to be anemic [22]. while the study found 31.25 % of male children have severe deficiency of Hb, while 45.83% and 22.92% have moderate and mild deficiency of Hb, respectively in Fig. 1. Regarding female, majority of children with anemia (59.52%) identified to have moderate deficiency of Hb. Anemia can therefore be classified according to WHO as mild, moderate and disease burden in a community if the prevalence is 5 to 19.9%, 20 to 39.9% and more than 40% respectively. Therefore, the degree of anemia in this study is relatively moderate thus

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we can term this as a mild public health problem [23]. In (Table 3 and Fig. 3), we found no association between maternal characteristics such living condition and educational achievement, and anaemia in contrast to other studies. An education level and the mother's profession were associated with anaemia elsewhere [24]. Mothers' higher education protects against anaemia in childhood [25] [26].

Malnutrition, diarrhea, iron deficiency, and anaemia were associated (Table 4 and Fig. 2). This is consistent with findings from other studies; however, they found an association between increased prevalence of anemia and children's dietary preferences. under 5 years of age [27] [28]. Meinzen-Der notified that infants who are exclusively breastfed for six months in developing countries may be at greater risk of developing anemia, especially among mothers with low iron levels. Additionally, there is a proof that the prolong the duration of exclusive breastfeeding, the more severe the anemia in children due to the lower iron levels in breast milk leading to iron deficiency anemia [29] [30] Iron deficiency is reported to be the most common nutrient deficiencies globally; epidemiological evidence indicates that its prevalence is much higher among infants, preschool children, and adolescents [31]. Another study found anemia prevalence of 13.2% among children under five attending Bole Hora General Hospital. Factors associated with anemia include (intestinal protozoan infections, soil-transmitted helminth infections, and malaria), which cause diarrhea in severe cases, emphasizing the need for early diagnosis and prevention [32]. The one most frequently seen in children is microcytic anemia which is majorly as a result of iron deficiency, often resulting from low dietary intake. Therefore, anemia in children is easily treatable with supplemental iron and if intervention is done early, there is no massive loss of cognition [33]. Rare causes of microcytic anemia include thalassemia, Iron deficiency anaemia coexists in over one-third of children with beta thalassemia minor, potentially increasing its severity. It should be identified and treated in thalassemia minors and at other times anemia of chronic diseases [34].

Conclusions

The prevalence of anemia was higher and it represents a health problem among children under 6 years of age. It can be caused by, among other things, nutritional deficiencies, poor eating habits, excessive growth rate, parasitic infections, genetic

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conditions and chronic diseases. There were no significant differences between children suffering from anemia according to sex. Early detection can help reduce the permanent consequences of a long-term health problem while at the same time helping in positive healthy development.

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