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Iron Deficiency Anaemia among 6-59 Months Aged Children Admitted in a Tertiary Care Hospital

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ABSTRACT

Iron deficiency (ID) is the most common nutritional deficiency in the world. Infants and young children are at the highest risk. Impaired growth, mental retardation, increased susceptibility to infection, poor school performance, and poor activity are the long-term consequences of iron deficiency anaemia. The aim of this study was to determine the prevalence of iron deficiency anaemia among children aged 6-59 months. This cross-sectional study was carried out in the department of Paediatrics, Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet from March 2021 to August 2021. A total of one hundred nineteen (119) admitted children in the Paediatrics ward were enrolled by consecutive sampling. The majority of the children (55.5%) were between the ages of 6 and 12 months. Iron-deficiency anaemia (IDA) was identified in 48.7% of children, and more than half of the male children (55.4%) were suffering from IDA. Serum ferritin and transferrin saturation, which are the primary indicators of IDA, were significantly decreased and red cell distribution width was significantly increased in children with IDA ($p<0.05$). The current study found that 6-59-months-old hospitalized children in Sylhet had a higher prevalence of IDA. Public health intervention should be established to counter the problem.

Keywords: *Iron deficiency anaemia, Children, Prevalence.*

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INTRODUCTION

One of the main public health issues affecting young children, especially in developing nations, is anaemia. Iron deficiency and iron deficiency anaemia (IDA) continue to be a worldwide concern. Iron is the most common single nutrient deficiency among the children of developing countries. In industrialized nations, despite a demonstrable decline in prevalence, iron deficiency anaemia remains a common cause of anaemia in young children. However, even more important is iron deficiency without anaemia which may adversely affect long-term neurodevelopment and behaviour. Some of these effects may be irreversible[1]. In iron deficiency, there are no mobilizable iron stores and in which signs of a compromised supply of iron to the tissues, including erythron, are noted. The more severe stage of iron deficiency is associated with anaemia. For this reason, anaemia is the most common indicator of iron deficiency. The terms anaemia and iron deficiency anaemia are sometimes used interchangeably[2]. Despite considerable economic and scientific advancement, a quarter of the world's population is anaemic. The highest prevalence of

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anaemia, 47.4%, is among preschool children[3]. IDA affects 43% of preschool children all over the world, especially in developing countries, which present prevalence rates four times higher than those found in industrialized countries. This high prevalence is associated with poor sanitation conditions, low socioeconomic conditions, and high morbidity among infants[4].

Though iron deficiency anaemia is thought to be the leading cause of anaemia in young children, one study in Bangladesh found that only 18% of anaemic children 2-6 years old had iron deficiency anaemia, considering their haemoglobin <11 gm/dl and ferritin level <12 mcg/ L[5].

In Bangladesh, most studies of anaemia in children are only based on the Hb level. Only a few studies have specifically focused on anaemia due to iron deficiency. Therefore, there is a need to determine the prevalence of iron deficiency. In the Sylhet region, there are limited studies available about the prevalence that will identify iron deficiency and protect children's health. Therefore, the aim of the study was to find out the prevalence of iron deficiency anaemia among children aged 6-59 months admitted at Jalalabad Ragib-Rabeya Medical College Hospital.

METHODS AND MATERIALS

This cross-sectional study was carried out at Jalalabad Ragib-Rabeya Medical College Hospital from March 2021 to August 2021. A consecutive sampling method was used to include 119 children aged 6 months to 59 months who were admitted to the paediatrics ward during this time period and whose guardians consented to participate in the study. Children who had lost blood in the previous three months due to a traumatic injury or surgery, children who had a history of blood transfusion in the previous three months, and children suffering from chronic illness, such as haematological, renal, or neurological disorders, chronic infection, and malnutrition, were excluded from the study. After enrolment, 5 mL of venous blood was collected from sterile venipuncture by trained personnel. All the lab analysis was done within six hours of the collection of the sample by a fully automated biochemistry analyzer (Vitros 250/350, made in the USA by Orthoclinical Diagnostics). Lab tests for complete blood count, ferritin, iron, total iron binding capacity (TIBC) and transferrin saturation (Iron/total TIBC x 100) were performed on venous blood samples. Anaemia was defined as a haemoglobin level <11 gm/dl in children between 6 months and 6 years[6]. Iron deficiency anaemia was defined as anaemia with abnormal values for two out of the following three iron status parameters: severe ferritin level <12 ngm/ml, transferrin saturation (TS) <16% and red cell distribution width (RDW) elevation >15%[7,8]. A structured questionnaire was used for recording all the information. Data input was done in Microsoft Excel and statistical analysis was done by the Statistical Package for Social Sciences (SPSS) version 25. Categorical data was presented as frequency and percentage, and quantitative data was presented as mean, median, and standard deviation. The association was tested by the Independent Student "t" test and the Chi-square (c^2) test as required. A p-value of below 0.05 was considered significant.

RESULTS

The total number of children who participated in the study was 119. Among them, males were 83 (69.7%)

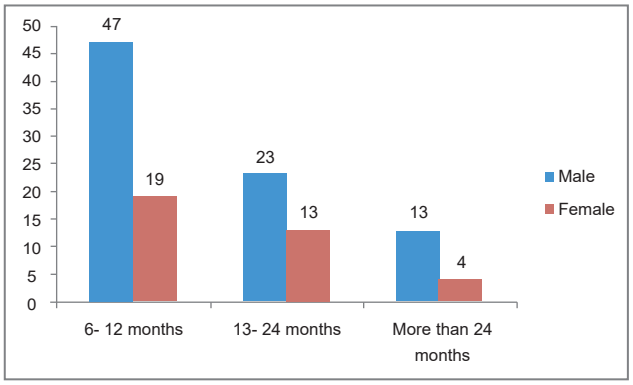

Figure-1: *Age and gender distribution of the children (N=119).*

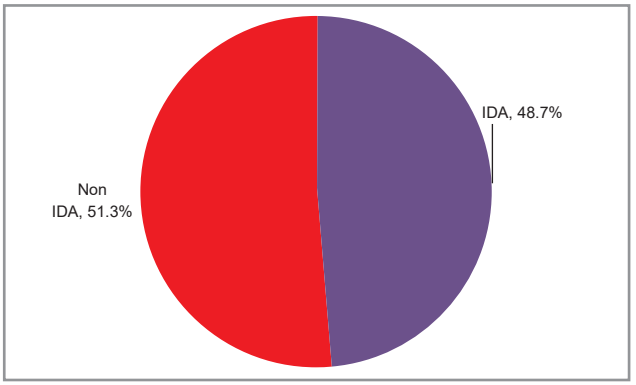

Figure-2: *Iron deficiency anaemia among the children (N=119).*

and 36 (30.3%) were females. The male to female ratio was 2.3:1. The mean age of the respondents was 15.6±10.1 months. More than half of the respondents (55.5%) were in the age group of 6 months to 1 year, 30.3% were in the age group of 13 months to 2 years, and 17 (14.2%) were more than 2 years old (Figure-1).

Table-I: *Gender distribution of normal and iron deficiency anaemia (N=119).*

Gender	Non-IDA	IDA	Total	p-value
	n (%)	n (%)	n (%)	
Male	37 (44.6)	46 (55.4)	83 (69.7)	0.000
Female	24 (66.7)	12 (33.3)	36 (30.3)	

Table-II: *Association between age of the children and iron deficiency anaemia (N=119).*

Variable	Non-IDA (61, 51.3)	IDA (58, 48.7)	p-value
Age in months	18.6±11.7	12.4±6.7	<0.01

Among the admitted children, Iron-deficiency anaemia (IDA) was identified in 48.7% of children (Figure-2). Iron deficiency anaemia affected 55.4% of the male children, whereas it affected 33.3% of the female youngsters. The difference found to be statistically significant (p=0.027) (Table-I). Mean age of the children having iron deficiency anaemia was lower than non-iron deficiency children (12.4±6.7 months vs. 18.6±11.7 months). The difference was found to be significant (p<0.01) (Table-II).

In the IDA group, the mean serum iron level was 28.1±9.6 µg/dl, while it was 53.6±27.9 µg/dl in the non-IDA group. The difference was statistically significant (p<0.01). The mean serum ferritin level was 47.2±78.5 ng/ml in the IDA group, whereas it was 111.5±142.3 ng/ml in the non-IDA group and the difference was found to be highly significant (p<0.01). The mean total iron binding capacity and transferrin saturation were 392.8±154.5 µg/dl and 8.2±3.5%, respectively in the IDA group, whereas 303.4±84.1 µg/dl and 19.6±16.6%, respectively in the non-IDA group. In comparison to the non-IDA group, which had a mean RDW of 13.9±3.0%, the IDA group's RDW was 18.3±2.2%. The differences in iron binding capacity, transferrin saturation, and RDW between IDA and non-IDA groups were statistically significant (p<0.01) (Table-III).

Table-III: *Differences of iron parameters among IDA and Non IDA group (n=119).*

Variable	Non-IDA	IDA (58, 48.7)	p-value
Serum iron level (µg/dl)	53.6±27.9	28.1±9.6	<0.01
Serum ferritin level (ng/ml)	111.5±142.3	47.2±78.5	<0.01
TIBC (µg/dl)	303.4±84.1	392.8±154.5	<0.01
Transferring saturation (%)	19.6±16.6	8.2±3.5	<0.01
RDW (%)	13.9±3.0	18.3±2.2	<0.01

DISCUSSION

Iron deficiency anaemia in children is a recognised public health problem that impacts adversely on child morbidity and mortality and impaired cognitive development. The goal of the study was to find out the prevalence of iron deficiency anaemia among the children admitted to the department of paediatrics, Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet. A total of 119 children were enrolled in the study. Among them, males were 69.7% and 30.3% were females, and the male to female ratio was 2.3:1. The mean age of the respondents was 15.6±10.1 months and 55.5% were in the age group of 6 months to 1 year, which was consistent with the study of Habib et al[9]. In the present study, the prevalence of IDA was 48.7%. The International Centre for Diarrhoeal Disease Research Bangladesh (icddr'b) reported that the prevalence of iron deficiency anaemia was 30% among under 2 year old children in a rural area, which was lower than in this study[5]. According to Paranjape et

al.[4], about 60% of the school-going children were suffering from iron deficiency anaemia in Maharastra, India. The findings were higher than in the present study. This might be due to different substances being taken as a complementary food. In Pakistan, a national survey reported the prevalence of IDA in under five children was between 40-70%[9]. Chowdhury et al.[10] also reported that iron deficiency is common among school-going children in Bangladesh.

In our study, among male respondents, 55.4% were suffering from iron deficiency anaemia, whereas only 33.3% of the female children had iron deficiency anaemia and the difference was statistically significant. This might be due to giving different ready-to-use low-nutrient substances other than homemade diets to a male child. In terms of age, younger children had more iron deficiency anaemia compared to non-iron deficiency anaemia children (12.4 months vs. 18.6 months) and the difference was statistically significant, which was consistent with icddr'b report[5].

Serum ferritin, transferrin saturation, and serum TIBC are the primary indicators of iron deficiency anemia. Lower transferrin saturation along with low ferritin is an indicator of iron deficiency and complete exhaustion of iron stores is considered when ferritin levels fall below 12 ng/ml and transferrin saturation is less than 15%[4,7,8]. In this study, serum ferritin levels and transferrin saturation were significantly decreased in children with IDA. There was also a significant increase in serum TIBC and RDW. These findings were supported by Paranjape et al[4].

LIMITATIONS

The study had some limitations. This was a hospital-based study with a small sample size, thus it might not accurately represent the situation as it would be in the community.

CONCLUSION

According to the findings of this study, iron deficiency anaemia is very common in children aged 6 to 59 months. To address the issue, public health interventions should be put in place. More studies are required to find out the prevalence in the general population and identify risk factors for iron deficiency anaemia.

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