Original Article

Assessment of the Prevalence, Severity, Risk Factors of Anemia Among 2-12 Years of Aged Children Attending a Hospital in Western Uttar Pradesh Region

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Abstract

Background: This study was done to create awareness among people about the problems of Anemia and health care providers in further management. The aim of this study was to assess the prevalence, severity, risk factors of anemia among 2-12 years of aged children attending a hospital. **Subjects and Methods:** Blood and stool samples were collected from the patient. Among those children with hemoglobin <11 g/dl, were screened for iron deficiency anemia (serum ferritin estimation is done). Among these 500 children, 100 children with a hemoglobin level of 11gm/dl and serum ferritin <12 μg/l were taken up for detailed study. **Results:** A total of 138 males 62.7% were having hemoglobin less than 11.4 gm. /dl indicating anemia. total 230 female children about 66.5% were detected with anemia, 73 (31.73%) children had Hemoglobin levels less than 8 gm. /dl indicating severe anemia and about 49 (21.30%) children had moderate anemia and 31 (13.47%) had mild anemia and only 77 (33.47%) were having their hemoglobin concentration of greater than 11.5 gm. /dl were classified as non-anemic. **Conclusion:** Anemia was slightly more prevalent in girls of the same age group as compared to boys.

Keywords: Hemoglobin, Children, Prevalence, Severity.

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Introduction

It is estimated that about 18 to 38 percent of the under 5 years old Iranian children are anemic.[1] In India, 89 million preschool age children suffer from Anemia.[2] As per the World Bank data, the prevalence of anemia among under 5 children, in India is 59 in 2011.[3] According to National Family Health Survey (NFHS-4) data, prevalence among children less than five years of age was reported to be 60%.[4]Anemia in children is an important health problem in almost all the developing countries of the world with an estimated prevalence of 43%.[5]The World Health Organization (WHO) has estimated that globally 1.62 billion people are anemic, with the highest prevalence of anemia (47.4%) among preschool-aged children; of these 293 million children, 89 million live in India.[6]The third National Family Health Survey (NFHS) 2005-2006 revealed that at least 80% of Indian children aged 12-23 months are anemic.[7]

Anemia has a variable impact on physical development and children show poor attentiveness, memory and academic performance.[8] Children who suffer from anemia have delayed psychomotor development and impaired performance; in addition, they experience impaired coordination of language and motor skills, equivalent to a 5-10-point deficit in intelligence quotient.[9-12]Anemia is associated with socioeconomic, biological, environmental and nutritional factors.

In developing countries, the most common cause of Anemia is nutritional; however, other factors like low birth weight, early cord clamping, maternal anemia, high rates of infectious disease including malaria, Helicobacter pylori, helminth infection, poverty, poor access to iron-rich foods and other nutritional deficiencies plays a role. The early years of life are one of the most critical stages of human development and any physical or psychological damage that causes sustained effects on other stages of human development.[13-17] Iron deficiency anemia continues to be an overwhelmingly major cause of anemia in the early childhood and a major global health challenge.[18,19] Anemia in children has significant impact. Longitudinal studies consistently indicate that children who were anemic in infancy continue to have poorer cognition, school achievement and more behavior problems into middle childhood.[20] As far as we know, there had been no such study on prevalence of anemia in western Uttar Pradesh zone of India, so this study was done to know the burden of disease in these areas which will help us to create awareness among people about the problems of Anemia and health care

providers in further management.

Subjects and Methods

This study was conducted in the pediatrics outpatient department (OPD) of a teaching hospital located in Banthra, district Shahjanpur, Uttar Pradesh a period of 6 months. The children (2-12 years age group), and their parents, who attended the OPD, were informed about the purpose and the method of the research and the voluntary nature of participation in the study verbally and in written form.

Inclusion Criteria
- Children in the age group of 2 Years to 12years;
- Those children with hemoglobin level less than 11 gm/dl;
- Those children with serum ferritin level less than 12µg/L

Exclusion Criteria
- Children with hemolytic anemia and bleeding diathesis
- Children with chronic disease
- Children with anemia secondary to leukemia, aplastic anemia.

On admission, a detailed history of the patient was recorded; a thorough physical examination was carried out and below mentioned investigations was done and recorded on a proforma. Blood and stool samples were collected from the patient. Among those children with hemoglobin <11 g/dl, were screened for iron deficiency anemia (serum ferritin estimation is done).Amongthese 450 children, 100 children with a hemoglobin level of 11gm/dl and serum ferritin <12 µg/l were taken up for detailed study.

Following haematological investigations done in enrolled patients: hemoglobin and haematocrit estimation, white blood cell count: total and differential, total red blood cell count, reticulocyte count, mean corpuscular volume, mean corpuscular hemoglobin concentration, red cell distribution width, erythrocyte sedimentation rate, peripheral blood smear examination, serum iron, serum ferritin, transferrin saturation and TIBC. The WHO criterion (hemoglobin <11 g/dL) was used to diagnose anemia. To categorize the degree of anemia, the following cut-off points were used: 10.0-10.9 g/dL, mild anemia: 7.0-9.9g/dL, moderate anemia: < 7 g/dL, severe anemia.

Sample Size
A total of 450 children of either sex were included. A 2 ml non- fasting blood sample was collected from each child from the antecubital vein into a heparinized Vacutainer by a trained phlebotomist. The sample was analyzed within 4 hours of blood sampling.

Statistical Analysis
Data were entered into a Microsoft excel spread sheet and then analyzed by SPSS 20.0.1 and graph pad prism version 5. Data have been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. Chi-square test or Fischer's exact test, Z-test (standard normal deviate) was used to test the significant difference between two proportions.

Results

220 of the children (48.88%) were male and 230 (51.11%) were female **Figure 1**. A higher proportion (48.87%) of children was in the age group of 2-6 years. The children were distributed into various age groups as depicted in **Figure 2**. Atotalof146(32.44%)children were anemic and mild, moderate, and severe Anemia was found in 56.16%, 41.78%, and 2.05%, respectively **Figure 3.** educational status of parents were shown in **Figure 4.**
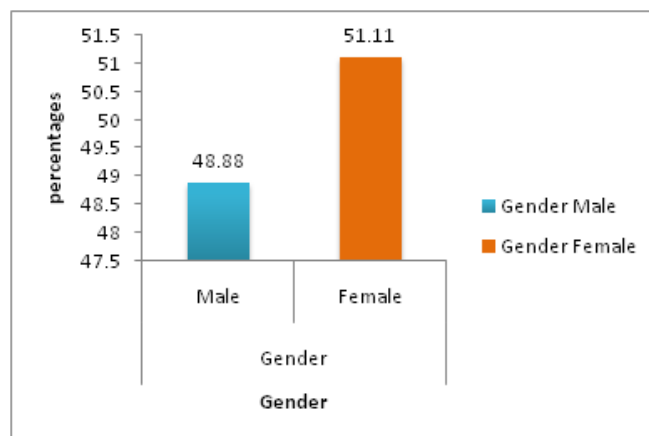

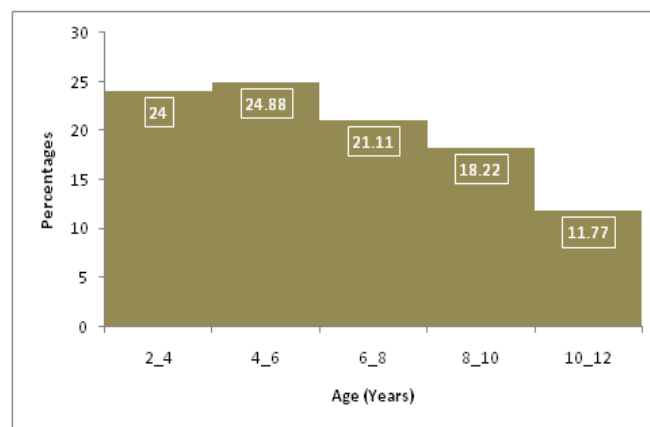**Figure 1: Gender wise distribution of total study group**

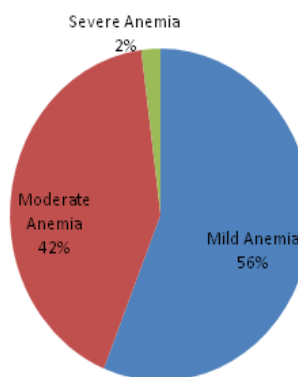**Figure 2: Age wise distribution**
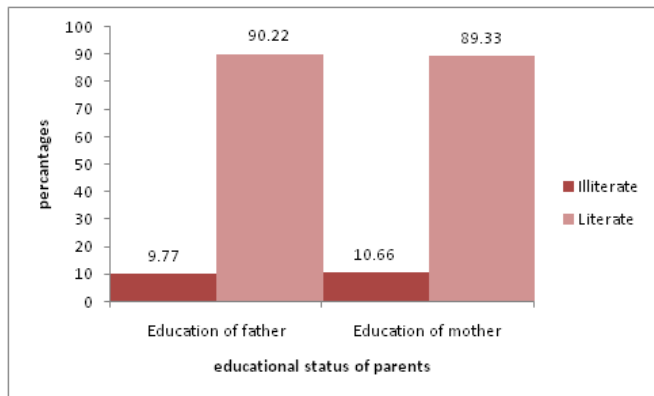

Figure 3: degree of Anemia

Figure 4: Educational status of parents

The degree of Anemia based on sex distribution showed that both mild and moderate Anemia was more prevalent in girls (19.38% and 14.54%) compared to boys (17.05% and 12.44%) (**Table No.1**).

Table 1: Frequency of Anemia in participants in the study by gender

Gender	Anemia				Total
	Absent	Mild	Moderate	Severe	
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Male	153 (69.54%)	38 (17.27%)	28 (12.72%)	1 (0.45%)	220 (100)
Female	150 (65.21%)	45 (19.56%)	34 (14.78%)	1 (0.43%)	230 (100)
Total	303(67.33%)	83 (18.44%)	62 (13.77%)	2 (0.44%)	450 (100)

Table No. 2 shows age wise distribution of number of male children, hemoglobin levels of < 11.4 gm. /dl were classified as anemic those with hemoglobin more than 11.5 gm. /dl were classified as non-anemic for children of 10 -12 years age14. A total of 138 males 62.7% were having hemoglobin less than 11.4 gm. /dl indicating anemia. While 27 (12.2%) having Hb levels less than 8 gm./dl indicating severe anemia and 42 (19.09%) having Hemoglobin levels ranging from 8-10gm/dl indicating moderate anemia and 69 (31.36%) had hemoglobin levels ranging from 10.1 – 11.4 gm./dl indicating mild anemia.

Table 2: Hemoglobin distributions in Male children of various age groups

Age group	No of children	< 8 gm./dl	8.1 – 10.0 gm./dl	10.1 – 11.4 gm./dl	> 11.5 gm./dl
2 – 4	24	6	6	3	9
4 – 6	34	2	7	8	17
6 – 8	62	4	14	31	13
8 – 10	76	7	11	21	37
10 –12	24	8	4	6	6
Total	220	27	42	69	82

Table No. 3 shows the female children of various age groups with hemoglobin concentration of the total 230 children about 66.5% were detected with anemia, 73 (31.73%) children had Hemoglobin levels less than 8 gm. /dl indicating severe anemia and about 49 (21.30%) children had moderate anemia and 31 (13.47%) had mild anemia and only 77 (33.47%) were having their hemoglobin concentration of

greater than 11.5 gm. /dl were classified as non-anemic.

Table 3: Hemoglobin distributions in female children of various age groups

Age group	No of children	< 8 gm./dl	8.1 – 10.0 gm./dl	10.1 – 11.4 gm./dl	> 11.5 gm./dl
2 – 4	23	6	5	5	7
4 – 6	46	19	9	3	15
6 – 8	43	12	8	5	18
8 – 10	83	24	17	12	30
10 –12	35	12	10	6	7
Total	230	73	49	31	77

Discussion

Iron Deficiency Anemia affects 43% of preschool children all over the world especially in developing countries, in which the present prevalence rates of four times higher than those found in industrialized countries, this high prevalence is associated with poor sanitary conditions and low socio economic status and high morbidity among infants.[21] In our study we found an overall prevalence of IDA in our population was 61%. There was slight difference in prevalence of IDA among males and females while in former the percentage was 58.9 in latter it was 63.2% and also the number of individuals suffering from severe anemia was different in males about 8.6% individuals had severe anemia and in females 32.18% were severely anemic. This could probably be due to the fact that in our population about 87 (n=174) 50.0% of females were older than 11 years and some of them may have reached menarche.

In a similar study by Verma M et al; reported the overall prevalence of anemia of 57.5% with girls having higher prevalence of anemia and more menarchal girls were anemic as compared to those who did not attend menarche.[22]Vasanthi et al. assessed the iron nutritional status among 312 rural school girls of Delhi.[23] The prevalence of anemia (Hb<12 g/dl) was 28% in girls who had attained menarche and 22% in girls who had not attained menarche. In another study by Sheshadri S among 1, 500 rural girls (10-19 yrs.) from 10 villages in Gujarat, the prevalence of anemia (Hb<12 g/dl) was reported to be 60%.[24] In another study in Delhi, anemia occurred in 46.6% of high socio- economic and 56% of lower middle socio-economic class girls.[25] In a similar study by Toteja et al in adolescent females in 16 districts of 11states across India found higher prevalence of anemia of 90.1%.

The most prevalent conditions were moderate and mild Anemia, probably because mild and moderate Anemia is usually asymptomatic, and may remain undetected and untreated.[26,27] This study showed a higher prevalence (43.9%) of Anemia, in the 2-4 years age group followed by 30.9% in the 4-6 years age group. A significantly higher prevalence of Anemia in the 1-3 years age group compared to 3-5 years age group was also reported in a study done on rural preschool children in Maharashtra.[28]The prevalence of Anemia in males in this study was 30% and slightly higher 34.4% in females. A similar higher prevalence (54.4%) of Anemia in girls has been reported in a study done on adolescent school children in urban Kathmandu, Nepal.[29] In a study on prevalence of Anemia in school children of Kattankulathur, Tamil Nadu, a higher prevalence of Anemia was found in girls.[30]Basu et al. also found a high prevalence

of Anemia among girls in Chandigarh.[31]

Conclusion

IDA was slightly more prevalent in girls of the same age group as compared to boys. Lower socioeconomic status was linked with decreased Hemoglobin levels probably due to nutritional deficiencies. The Government of India launched the National Program of Nutritional Support to Primary Education NSPE. Though the primary objective of this program was to improve school attendance, it is likely to have a major impact on nutritional status of school children. It should be investigated further and appropriate health care delivery steps should be initiated which might help in the improvement of cognition and learning process in children.

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