



Original Research Article

Study of prevalence of anaemia and haematological parameters in children below 12 years in Northern Karnataka

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ABSTRACT

Background: Anaemia may be defined as a reduction in red blood cell (RBC) mass or blood haemoglobin (HGB) concentration. The most common cause of anaemia in newborns include blood loss, Rh or ABO incompatibility in 3 to 6 months suggests hemoglobinopathy. Nutritional iron deficiency causes after six months hence symptoms of blood examination in children play a significant role below 12 years.

Materials and Methods: 92 children below 12 years of age having anaemia were studied. The blood examination was done to rule out PCV, MCV, MCH, MCHC, RPW, Hb%, PS study, reticulocyte count, and serum iron (Fe), Serum B₁₂, folic acids.

Results: The types of anaemia were 53(57.6%) anaemia, 13(14.1%) Thalassemia, 10(10.8%) Megaloblastic anaemia, 8(8.6%) Anaemia of acute haemorrhage, 5(5.4%) sickle cell anaemia, 2(2.1%) aplastic anaemia, 1(1.08%) leukaemia. Clinical manifestations had 92(100%) pallor, 78(84.7%) weakness and fatigability, 36(39.1%) fever, 26(28.2%) Icterus, 19(20.6%) shortness of breathing, 16(17.3%) hepatomegaly, 14(15.2%) cough, 13(14.1%) history of pica, 12(13%) splenomegaly, 10(10.8%) petechiae, 9(9.7%) vomiting, 9(9.7%) Koilonychia, 5(5.4%) hyper-pigmentation, 6(6.5%) tremors, 21(22.8%) was mild anaemia, 42(45.6%) moderate, 29(31.5%) severe anaemia on the basis of haemoglobin level.

Conclusion: This pragmatic study of anemia had iron deficiency was a major cause followed by thalassemia, megaloblastic, acute hemorrhagic sickle cell, aplastic anemia. This study will be helpful to the pediatrician to treat such children efficiently to avoid morbidity and mortality.

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1. Introduction

Anaemia is a serious public health problem in India. A national survey has reported a high anaemia prevalence rate of 72% children below 12 years and 52% in young women.¹ An estimated 50-95 % of anaemia in India is iron (Fe) deficiency anaemia.² Besides iron other nutrients such as vitamin A, E and C also play a key role in the formation and protection of red blood cells (RBC) by stimulating stem cells as well as by activating many antioxidant enzymes.³ Therefore inadequacy of any of these micronutrients may lead to anaemia in the vulnerable sections of the population.

In the children, age group under 12 years body grows rapidly and require high iron-rich and nutritious food that may not be fulfilled by their normal diet. Low economic status, less education, and poor health due to meagre dietary intake are the main causes of anaemia. Anaemia is the most predominant factor for morbidity and child mortality and hence, it is a critical health issue for children in India. Iron deficiency affects cognitive and motor development and increases the susceptibility to infections.⁴ Hence an attempt was made to evaluate the causes, types, clinical manifestations, and grades of anaemia in children below 12 years.

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2. Materials and Methods

92 (Ninety-two) children below 12 years regularly visiting paediatric OPD of Khaja Banda Nawaz university faculty of Medical Sciences hospital Kalaburgi-585101, Karnataka were studied.

2.1. Inclusive criteria

Children of age group 6 months to 12 years with pallor, clinically diagnosed as anaemia were selected for the study.

2.2. Exclusion criteria

Children more than 12 years, less than 6 months children with congenital heart disease, immune-compromised, tuberculosis, and hepatitis were excluded from the study.

2.3. Ethical approval

This research paper was approved by the Ethical committee of KBN Khaja Banda Nawaz University faculty of medical sciences Kalaburagi-585101, Karnataka.

2.4. Method

Routine blood examination for anaemia was morphologically based on peripheral findings packed cell volume (PCV), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin concentration (MCHC), and red cell distribution width (RDW) were determined by automated all counter. Haemoglobin was estimated by Sahli's method and expressed in gm% peripheral smear was stained by Leishman's Stain. Reticulocyte count was done by brilliant crystal stain method, serum iron determination was done by Romany's dipyrri capacity was determined by Ramsay's method serum vitamin B₁₂ and folic acid was determined by architect method.

The duration of the study was June-2019 to July-2021.

2.5. Statistical analysis

Various parameters and clinical manifestations grades of anaemia were classified by percentage. The statistical analysis was carried out in SPSS software. The ratio of male and female children was 2:1.

3. Observation and Results

Table 1 In the age-wise distribution of patients 15(16.3%) were 6 months to 1 year of age, 37(40.2%) were 1 to 5 years, 29(31.5%) were 5 to 10 years of age, 11(11.9%) were between 10 to 12 years of age.

Table 2 Prevalence of different types of anaemia 53(57.6%) had Iron deficiency anaemia, 13(14.1%) had Thalassemia, 10(10.8%) had megaloblastic anaemia, 8(8.6%) had anaemia of acute haemorrhage, 5(5.4%)

Table 1: Age-wise distribution of the patients with anaemia

Age in years	No of patients	Percentage %
6 months to 1 year	15	16.3
1 to 5 year	37	40.2
5 to 10 year	29	31.5
10 to 12 year	11	11.9
Total	92	

Table 2: Prevalence of different types of anaemia

Disease	No. of patients	Percentage %
Iron deficiency anemia	53	57.6
Thalassemia	13	14.1
Megaloblastic anemia	10	10.8
Anemia of acute hemorrhage	8	8.6
Sickle cell anemia	5	5.4
Aplastic Anaemia	2	2.1
Leukemia	1	1.08
Total	92	

Table 3: Clinical Manifestations in anaemia patients

Clinical Manifestation	No. of patients	Percentage %
Pallor	92	100
Weakness and fatigability	78	84.7
Fever	36	39.1
Icterus	26	28.2
Shortness of breathing	19	20.6
Hepatomegaly	16	17.3
Cough	14	15.2
History of Pica	13	14.1
Splenomegaly	12	13.0
Petechiae	10	10.8
Vomiting	9	9.7
Koilonychia	9	9.7
Hyper pigmentation	5	5.4
Tremors	6	6.5

Table 4: Grades of anaemia based on haemoglobin level

Grades of anaemia	Male	Female	Total	Percentage %
Mild	15	6	21	22.8
Moderate	30	12	42	45.6
Severe	19	10	29	31.5
Total	64	28	92	100

had sickle cell anaemia, 2(2.1%) had Aplastic anaemia, 1(1.08%) had leukaemia.

Table 3 Clinical manifestations in anaemia patients—92(100%) had pallor, 78(84.7%) had weakness and Fatigability, 36(39.1%) had fever, 26(28.2%) Icterus, 19(20.6%) shortness cough, 13(14.1%) history of pica, 12(13%) had Splenomegaly, 10(10.8%) had petechiae, 9(9.7%) had vomiting, 9(9.7%) Koilonychias, 5(5.4%) hyper pigmentation, 6(6.5%) had tremors.

Table 4 grades of anaemia based on globulin level 15 male, 6 female and total 21(22.8%) had mild Hb%, 30 male and 12 female 42(45.6%) had moderate Hb%, 19 male, 10 female and total 29(31.5%) had severe anaemia.

4. Discussion

In the present study of the prevalence of anaemia and haematological parameters in children below 12 years in northern Karnataka, 15(16.3%) were 6 months to 1 year of age, 37(40.2%) were 1 to 5 years, 29(31.5%) were 5 to 10 year of age, 11(11.9%) were between 10 to 12 years of age. (Table 1). The types of anaemia were 53(57.6%) was iron deficiency 13(14.1%) Thalassaemia, 10(10.8%) megaloblastic anaemia, 8(8.6%) anaemia of acute haemorrhage, 5(5.4%) sickle cell anaemia, 2(2.1%) aplastic anaemia, 1(1.08%) leukaemia (Table 2). The clinical manifestation were 92(100%) pallor, 78 (84.7%) weakness and fatigability, 36(39%) fever, 26 (28.2%) Icterus, 19(20.6%) shortness of breathing, 16(17.3%) hepatomegaly, 14(15.2%) cough, 13(14.1%) history of pica, 12(13%) splenomegaly, 10(10.8%) petechiae, 9(9.7%) vomiting, 9(9.7%) Koilonychias, 5(5.4%) had hyperpigmentation, 6(6.5%) tremors (Table 3). 21(22.8%) mild, 42(45.6%) moderate, 29(31.5%) severe anaemia based on Hb% (Table 4) These findings are more or less in agreement with previous studies.^{5–7}

Approach to anaemia in paediatric patients included is pertinent issues, related to the history, physical examination, and initial laboratory investigations. Hematocrit (HCT) is the fractional volume of the whole blood sample occupied by RBC, expressed as a percentage. As an example, the normal HCT in children aged 6 to 12 years is approximately 40% HGB in children 6 to 12 years is approximately 13.5 g/dL (135 g/L).

Characterizing the symptoms helps to elucidate the severity and chronicity of anaemia and may identify patients with blood loss or hemolytic aetiologies. Common symptoms of anaemia include lethargy, tachycardia, and pallor.⁸ Infants may present with irritability and poor oral intake. However, because of the body's compensatory abilities, patients with chronic anaemia may have few or no symptoms compared with those with acute anaemia at comparable haemoglobin (HGB) levels. Changes in urine colour, sclera icterus, or jaundice may indicate the presence of haemolytic disorders such as G6PD (glucose 6-phosphate dehydrogenase deficiency).

Bleeding from GIT (gastrointestinal tract) includes changes in stool colour; identification of blood in stool, history of blood symptoms should be reviewed. Severe or chronic epistaxis also may result in anaemia from blood loss and iron deficiency.

Past medical history also plays a vital role in anaemia in children, gestational age, duration of birth, hospitalization, and history of jaundice and/or anaemia in the newborn

period. Travel to/from areas of endemic infection (E.g. Malaria, hepatitis, tuberculosis) should also be taken into consideration to evaluate the cause of anaemia. Moreover herbal or oxidant drugs may cause haemolysis particularly in patients with underlying G6PD deficiency, possible environmental toxins exposure should be explored including lead exposure and nitrates in well water, Family history of inherited haemolytic anaemia's.

Anaemia with high ARC reflects an increased (ARC=Absolute Reticulocyte count) reflects increased erythropoietic response haemolysis or blood. Anaemia with a low or normal ARC reflects deficient production of RBC (i.e. reduced marrow response to the anaemia). However, haemolysis or blood loss can be associated with a low concurrent disorder that impairs RBC production (infection). In some cases, reticulocyte counts depend on the phase of the illness.

A review of peripheral smear is an essential part of anaemia evaluation. Even if the patient's RBC indices are a normal review of the blood smear may reveal abnormal cells that can help to identify the cause of anaemia.⁹

The diagnostic approach of anaemia includes pancytopenia in leukaemia, thrombocytopenia indicates haemolytic uremic syndrome, and thrombocytosis in iron deficiency, leukocytosis in elevated WBC count includes leukaemia and infection.

5. Conclusion

The present study of anaemia in children below 12 years of age is related to malnutrition. The prevalence of high lymphocyte count indicates viral infection. The prevalence of anaemia was higher in the lower age group which was furthermore due to frequent infections. Girls of preschool age had a probable iron, vitamin B12, or folate deficiency as indicated by high RDW values. Girls of adolescent age (11–12 years) were more anaemic indicating more nutritional requirements with the onset of puberty. Overall children below 12 years boys were found to be suffering from a higher level of hypo chromic and microcytic anaemia. This study recommends awareness about pure water, sanitation, and nutritional counselling to parents having low social-economic status.

6. Conflict of Interest

None.

7. Source of Funding

None.

References

1. Dasoha A. Report of children of all government primary schools in the state Government order No ED24MMS2003. In the office of joint director of public Instruction Mid-day Meal scheme ; 2003.

2. Sheshadri S. A database on iron deficiency anaemia. Department of women and child development, Ministry of human research: Development ; 1996.
3. Singh RK, Patra S. Extent of anaemia among pre-school children in EAG status India. *J Anaemia*. 2014;p. 1–9. doi:10.1155/2014/868752.
4. Sahu R, Sahani NC, Patnaik L. Childhood anemia - A study in tribal area of Mohana block in Orissa. *Indian J Community Med*. 2007;19(4):43–5.
5. Bulliyya G, Mallick G, Sethy GS, Kar SK. Hemoglobin status of non-school going adolescent girls in three districts of Orissa, India. *Int J Adolesc Med Health*. 2007;19(4):395–406.
6. Mettayya S, Thankachan P, Zimmermann MB, Andersson M, Eilander A, Misquith D, et al. Low anemia prevalence in school-aged children in Bangalore, South India: possible effect of school health initiatives. *Eur J Clin Nutr*. 2007;61(7):865–9. doi:10.1038/sj.ejcn.1602613.
7. Kakore K, Bileyre LK. Haematological status and anaemia prevalence among children aged 5 to 10 years. *Middle East J Sci Res*. 2013;14(4):461–70.
8. Gibson RS. Principles of nutritional assessment oxford university press. 2nd ed. UK: Oxford; 2005. p. 35–42.
9. Awasthi S, Das R, Verma T, Vir S. Anemia and undernutrition among preschool children in Uttar Pradesh, India. *Indian Pediatr*.

2003;40(10):985–90.

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