

Study of pattern of anemia in children in and around Mahabub Nagar

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Abstract

Introduction: Anemia is a common concern in different age groups. Anemia leads to loss in physical function, affecting quality of life and has substantial social and economic effects. Because anemia is a sign, not a diagnosis, an evaluation is almost always warranted to identify the underlying cause so as to prompt appropriate clinical attention.

Objectives: As anemia is most commonly seen in children in whom it leads to growth retardation, the objective of this thesis is to calculate the prevalence of anemia and to study the pattern of anemia in this age groups, in an area which is of low socioeconomic standards.

Materials and Methods: A prospective study was undertaken at SVS Medical College and Hospital, Mahabubnagar. Children (1-15 years) were studied. Routine laboratory investigations like hemoglobin estimation by Cyanmethemoglobin method, hematocrit (packed cell volume) and peripheral smear examination was done along with other tests as felt necessary to fix the pattern and etiology of anemia.

Results: Prevalence of anemia in the study subjects with microcytic hypochromic anemia accounting for 84% in children, followed by normocytic normochromic anemia accounting for 7%.

Iron deficiency anemia accounted for 80% in children, followed by anemia of chronic disease accounting for 8%.

Conclusion: Identifying anemia is an important aspect of a comprehensive assessment. Confirming the type of anemia is critical to direct the investigation for profiling the etiology since it is well known that the treatment of anemia goes a long way in improving the overall outcome and quality of life.

Keywords: Anemia, Children, Serum ferritin.

Introduction

The term anemia as it is generally used in clinical medicine, refers to a reduction below normal in the concentration of hemoglobin or red blood cells in the blood. It is characterized by a decrease in red cell mass. As it is difficult to measure the red cell mass any of the three measures of concentration (hemoglobin, hematocrit, or number of red cell) may be used to establish the presence of anemia, but the blood hemoglobin concentration is often preferred, in part because its accuracy and reproducibility equal or exceeds those of other measures, and in part because it is the value most indicative of the pathophysiological consequences of anemia.¹

Anemia: Anemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development. It occurs in all age groups, but is more prevalent in pregnant women and young children. In 2002, iron deficiency anemia (IDA) was considered to be among the most important contributing factors to the global burden of disease.²

Etiology: Anemia is the result of a wide variety of causes that can be isolated, but more often coexist. Globally, the most significant contributor to the onset of anemia is iron deficiency so that IDA and anemia are often used synonymously, and the prevalence of anemia has often been used as a proxy for IDA. It is generally assumed that 50% of the cases of anemia are due to iron deficiency.³

The main risk factors for IDA include a low intake of iron, poor absorption of iron from diets high in phytate or phenolic compounds.

Among the other causes of anemia, heavy blood loss as a result of menstruation, or parasite infections can lower blood haemoglobin (Hb) concentrations. Acute and chronic infections, including malaria, cancer, tuberculosis, and HIV can also lower blood Hb concentrations.

The presence of other micronutrient deficiencies, including vitamins A and B12, folate, riboflavin, and copper can increase the risk of anaemia.

Health Consequences: Anemia is an indicator of both poor nutrition and poor health. The most dramatic health effects of anaemia, i.e., increased risk of maternal and child mortality due to severe anemia, have been well documented.⁴⁻⁶ In addition the negative consequences of IDA on cognitive and physical development of children, and on physical performance – particularly work productivity in adults – are of major concern.³ Anemia is a major public health problem, particularly in developing countries where nearly two billion individuals are affected, with a significant proportion being constituted by children and woman of child bearing age.³ In children it can lead to growth retardation and in women of child bearing age it can lead to maternal and child mortality.

Objectives

To calculate the prevalence of anemia in children (1 to 15 yrs), in and around Mahabubnagar.

To study the pattern of anemia in these children.

Previous Studies by Health Workers: Nirmala K Murty, Sivangani and P Rani in 1989 conducted study on anemia and endurance capacity among children and woman of 6-26 years at Coimbatore found that iron deficiency anemia was most common cause of anemia in these participants.⁷

In 1994 study conducted by Vasanthi et al in adolescent girls from rural area and urban area who have not attained menarche found rural girls <12 years showed higher prevalence of anemia (37.2%) as compared to urban girls.⁸

In 1997 I.W.Booth et al in their personal view on iron deficiency anemia in infancy and early childhood have shown that in inner cities in UK, iron deficiency anemia occurs in infant with the same frequency as in developing countries.⁹

In 1999 Balgir RS, Murmu B and Dash BP conducted study on nutritional status of the Ashram school for tribal children in Northern Orissa and found high prevalence ranging from 59 to 81% of children belonging to different tribes.¹⁰

In 1999 Jaishree P. Jandhale, Snehalata Reddy N and Vijay M. Nalwade conducted a study on prevalence of anemia among school going adolescents girls of Parbhani (India) and found that 88.3% of them to be anemic.¹¹

B. Sudhagandhi et al in 2009-2010 studying on prevalence of anemia in the school children of Kattankulathur, Tamil Nadu, India found among these children was 52.88%.¹²

Neeraj Jain and Vibha Mangal Jain conducted study in 2010 regarding prevalence of anemia in school children aged 5-16 years from government school of Rishikesh, Uttaranchal, India and found anemia in 51.5% of cases.¹³

Anemia:

Definition: Anemia is not a diagnosis in itself but is an objective sign for presence of disease. Anemia is defined as a condition in which the concentration of haemoglobin in peripheral blood is below the level that is normal for the level for that age and sex of individual. The normal limit of haemoglobin concentration varies somewhat with among definitions established by different organizations. World health organization criteria for anemia are haemoglobin less than 12 g/dl in women and less than 13 g/dl in men.¹⁴ This definition is the most frequently used.

Table 1: Severity of Anemia¹⁵

Severity	World Health Organization
Grade 0 (Within)	≥12 gm / dl

normal limits)	
Grade 1(Mild)	10-11.99 gm / dl
Grade 2(Moderate)	7.1-9.99 gm / dl
Grade 3(Severe)	<7gm/dl

Screening Tests: Blood counts, peripheral smear examination, PCV (Packed cell volume), MCV (Mean corpuscular volume), MCH (Mean corpuscular hemoglobin) and MCHC (Mean corpuscular hemoglobin concentration) are screening tests.

Other Diagnostic Tests: Serum ferritin, vitamin B12 assay, folic acid assay and bone marrow examination.

Materials and Methods

Source of Data: All the patients for whom investigations were sent to the central lab in SVS Medical College and Hospital from September 2010 to August 2012.

Method of Collection of Data: A prospective study of 200 patients, 50 cases in children (1-15 years) satisfying the inclusion criteria, managed by Departments of SVS Medical College Hospital were studied.

A detailed history of included patients was elicited. A complete general physical examination and systemic review of the patient was undertaken.

The following investigations were carried out for all the patients.

Haemoglobin estimation and Packed cell volume (PCV)

Mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), mean corpuscular hemoglobin (MCH).

Reticulocyte count, peripheral smear for blood picture Serum ferritin

Bone marrow studies (aspiration/biopsy) was carried out in patients with Blood Smear showing immature white cells or nucleated red cells or Indeterminate status of iron stores unexplained progressive or unresponsive anemia.

Vitamin B12 and folate assays were done in higher centres for dimorphic anemia and macrocytic anemia or in patients with normocytic or microcytic blood picture in whom no other cause could be found.

Additional investigations as indicated for detection of underlying cause. (Upper G.I endoscopy and colonoscopy, Serum electrophoresis, tissue biopsy, imaging).

Inclusion Criteria

1. Children in age group (1-15 years, male and female children)
2. Hb <11gm/dl in children 1-12 years
3. Hb < 12gm/dl in children 12-15 years

Exclusion Criteria

1. Patients with a history of recent transfusion.
2. Patients who were on haematinics.

Study Design: Prospective study

Sample Size: 1237 subjects for whom investigations were done at central lab from September 2010 at SVS Medical College Hospital were selected for the study of prevalence.

50 children were selected for the study of pattern of anemia as per inclusion and exclusion criteria adopted for this Study.

Table 2: Distribution of study subjects according to sex in children for prevalence

	Gender	Number of subjects	Percentage
Children	Male children	510	41
	Female children	727	59
	Total	1237	100

Graph 1: Distribution of study subjects according to sex in children for prevalence

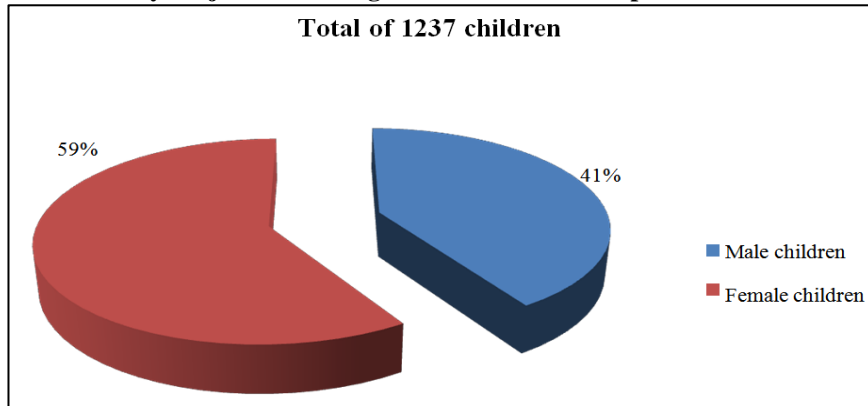


Table 3: Prevalence of anemia in study subjects

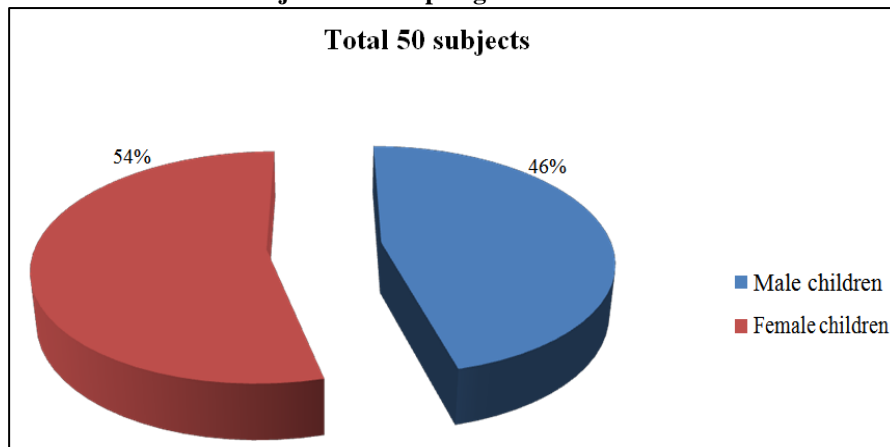
	Number of subjects	Anemia		Percentage
		yes	No	
Children	1237	823	414	66

Table 4: Prevalence of anemia according to sex in children

		Number of subjects	Presence of anemia	Percentage
Children	Male children	510	322	63
	Female children	727	501	69
	Total	1237	823	66

Pattern of Anemia in Children

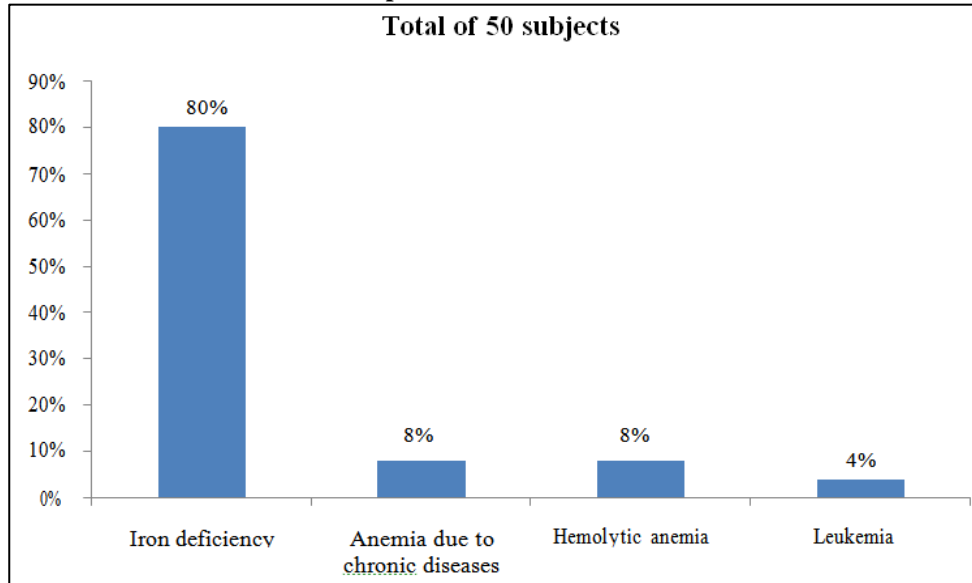
Graph 2: Distribution of number of subjects based upon gender



For studying the pattern of anemia in children total of 50 subjects were taken out of which 27 were female children and 23 were male children.

Based upon the peripheral smear study the most common type of anemia in children was found to of microcytic hypochromic anemia (84%) followed by normocytic normochromic anemia (14%) and normocytic hypochromic anemia (2%)

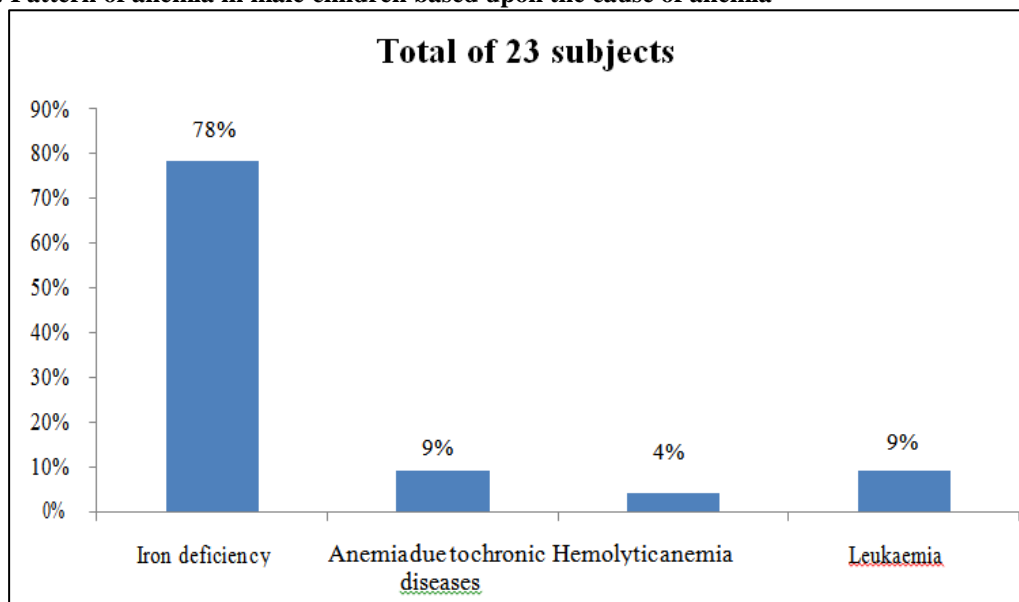
Graph 3: Pattern of anemia children based upon the cause of anemia



Iron deficiency was found to be the most common cause of anemia (80%) which was either due to decreased intake or loss of iron mostly due to hook worm infestations.

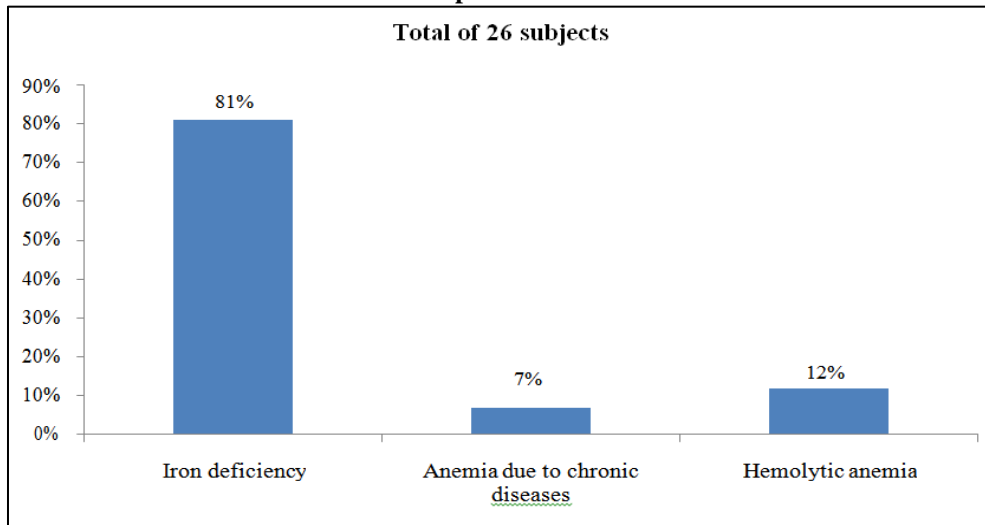
Anemia due to chronic diseases like pneumonia and tuberculosis accounted for 8% of cases. Haemolytic anemia due to thalassaemia and malaria accounted for 8% of cases. Anemia due to acute leukaemia accounted for 4%.

Graph 4: Pattern of anemia in male children based upon the cause of anemia



Iron deficiency was found to be the most common cause of anemia (87%) followed by anemia due to chronic diseases (9%) and leukaemia (9%) followed by haemolytic anemia accounting for (4%) in male children.

Graph 5: Pattern of anemia in female child based upon the cause of anemia



Iron deficiency was found to be the most common cause of anemia accounting for(81%) followed by haemolytic anemia (12%),anemia due to chronic diseases (7%).

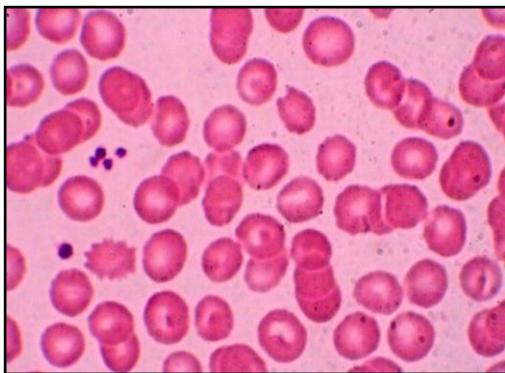


Fig.1: Normocytic normochromic blood picture (Leishman's stain)



Fig. 3: Macrocytic blood picture (Leishman's stain)

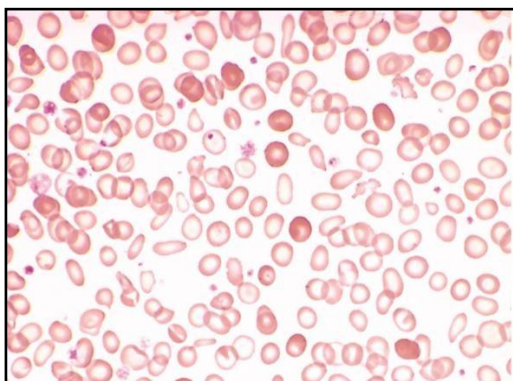


Fig. 2: Microcytic hypochromic blood picture (Leishman's stain)

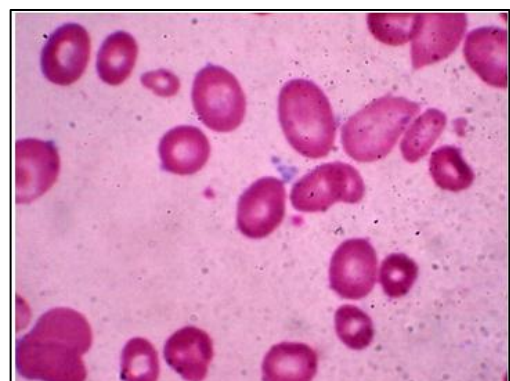


Fig. 4: Dimorphic blood picture (Leishman's stain)

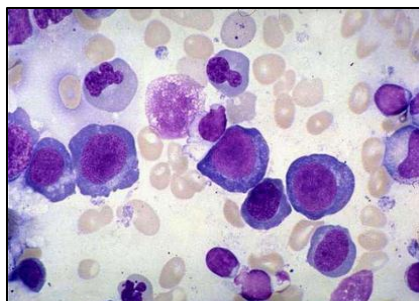


Fig. 5: Megaloblastic bone marrow picture (Leishman's stain)

Discussion

This study was undertaken to calculate the prevalence and to document the pattern of anemia in the three most common age groups affected by anemia in children.

In our study we found out that we were in agreement with study conducted by Balgir et al in 1999¹⁰ on nutritional status of the Ashram school tribal children in northern Orissa, who found very high prevalence of anemia ranging from 59 to 81%. Our present study showed a prevalence of 66% of anemia in children.

B.Sudhagandhi et al¹² in 2009-2010 studying on prevalence of anemia in the school children of Kattankulathur, Tamil Nadu, India found among these children was 52.88%. The frequency of the prevalence of anemia was significantly higher amongst girls as compared to the boys. Results of the study population reveal that 52.88% were anemic, girls (67.77%) were 32.2% higher than the boys (35.55%) and anemic children were underweight. Our study corroborates with this study showing prevalence of anemia to be 66% in children with a higher prevalence of 69% in girls compared to 63% in boys.

Neeraj Jain and Vibha Mangal Jain¹³ conducted study in 2010 regarding prevalence of anemia in school children aged 5-16 years from government school of Rishikesh, Uttaranchal, India and found anemia in 51.5% of cases. Most common blood picture was microcytic hypochromic and girl children were more anemic as compared to male children. Iron deficiency anemia was noted in 48.67% of children studied. In our study in children microcytic hypochromic anemia was found to be predominant type accounting for 84% with iron deficiency anemia being noted in 80% of cases.

Conclusion

Identifying anemia is an important aspect of a comprehensive assessment. Confirming the type of anemia is critical to direct the investigation for profiling the etiology since it is well known that the treatment of anemia goes a long way in improving the overall outcome and quality of life.

Iron deficiency anemia is a serious problem worldwide and a major concern in developing

countries. In our study we found to have higher prevalence of iron deficiency in children.

The main reason behind this nutritional anemia could be due to low socio economic status, increased demands, low dietary intake and excessive loss of blood, the possible causes of iron deficiency anemia in this region.

The implementation of national nutrition plans including the control of iron deficiency as one of the priorities and the participation of the public health and education sectors, food industries, the community and the media should contribute to the success of the interventions and to the control of iron deficiency. There is now need for the development of clear policy guidelines based on these simple and integrated interventions.

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