ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 03 | March - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CLINICOHAEMATOLOGICAL & BIOCHEMICAL PROFILE OF ANAEMIA IN PEDIATRIC AGE GROUP

Pathology

Dr. Tanvi Singhvi Assistant Professor in Pathology, Hind Institute of Medical Sciences (HIMS), Mau, Ataria.

Dr. Kanhaiya Lal Mishra* Assistant Professor in Pathology, Hind Institute of Medical Sciences (HIMS), Mau, Ataria. *Corresponding Author

ABSTRACT

Aim: To evaluate the clinicohaematological & biochemical profile of anaemia in pediatric age group.

Material and method: The present study was conducted in the Department of Pathology at among children who were admitted in pediatric ward of Hind Institute of Medical Sciences (HIMS), Mau, Ataria. Haemoglobin estimation was done by Horiba's Pentra xlr (automated hematology analyzer) and peripheral blood smear was prepared simultaneously by a trained lab technician. WHO guidelines were used to diagnose anemia and its severity. Anemia was defined as Hb <11.5 g/dL in children between 5-11 years of age and <12 g/dL in those between 12 to 14 years. Red Cell indices were analysed and recorded.

Results: Maximum cases were of Microcytic Hypochromic type. Out of 118 cases with microcytic hypochromic blood picture, 105 cases (88.9%) showed reduced red cell indices. There was 100% correlation between macrocytic blood picture and red cell indices. IDA was diagnosed when serum iron was decreased, TIBC increased and serum ferritin decreased, which was 41.6%.

Conclusion: Preventive measures for anemia control in children must be accompanied by measures to prevent underweight and stunting by focusing on integrated child feeding, health and environmental core measures.

KEYWORDS

Anemia, Iron Deficiency Anemia, Pediatric

INTRODUCTION:

Anemia in children differs from those of adults as they tend to be more pronounced and develop rapidly. As much as 51% children in 0-4 years and 46% children 5-12 years are anemic in developing regions[1,2]. Anemia continues to be a public health problem of global proportions. It is the most common preventable nutritional deficiency in children. The 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 while prevalence of anemia among school children is 25.4%[3]. Iron deficiency anemia affects 30% of the world population[4]. The prevalence of anemia among children under 5 years of age is estimated to be about 20% in industrialized countries and 39% in non-industrialized countries[5].

The common belief that iron deficiency (ID) is the main cause of anaemia worldwide mainly comes from estimates which used Hb as a proxy to estimate the prevalence of ID[6]. Nevertheless, anaemia is multifactorial. Anaemia can be the consequence of a decreased production of RBC, an increased destruction of RBC and/or direct blood loss. Overall, iron deficiency (usually because of diet) is the most common cause but, in the developing world, infectious diseases such as malaria, helminth infections, HIV and tuberculosis are also important.[7]

Most infants and children with mild anemia do not exhibit overt clinical signs and symptoms. Since the hematological parameters are interrelated with each other as well as with the age and gender, relevant intervention strategy is required. Constant monitoring is needed while providing public health nutrition programs to eradicate anemia. Different biochemical and haematological tests are done to evaluate anaemia in children[8]. Hence the present study was conducted to find out the clinicohaematological & biochemical profile of anaemia in pediatric age group.

MATERIAL AND METHOD:

The present study was conducted in the Department of Pathology at among children who were admitted in pediatric ward of Hind Institute of Medical Sciences (HIMS), Mau, Ataria. It was a 1 year prospective study from a period of July 2018 to March 2019. Children with severe pallor aged 0 to 18 years admitted in the pediatric wards were enrolled. The subjects were recruited after taking consent from their guardians and ethical permission from the ethical committee of the institute.

Children guardians were interviewed that requests for the demographic, socioeconomic status, medical history and previous history of taking any medications and supplements. Demographic data obtained from patient included age, sex, height and weight, and body mass index. The subjects were selected according to the following inclusion and exclusion criteria:

INCLUSION CRITERIA:

- All the children presenting with anemia in age group 0-18 years of age with adequate clinical details.
- The child with clinical evidence of Anemia

EXCLUSION CRITERIA:

- Patients having mild to moderate anemia, severe anemia due to malaria,
- Children already on iron/ multivitamin supplements,
- Patients suffering from any chronic illnesses.
- Children having known history of coagulation and bleeding disorders.

Venous blood specimens were collected and within 20 seconds from blood sampling, blood was transferred to a tube containing ethylenediaminetetraacetic acid (EDTA), and within 4 hours a whole-blood count was performed using an automated cell counter. Notation was made, if clots were seen in the blood sample or if the amount of blood in the tube was grossly inadequate such that a disproportionately high concentration of EDTA would be present; these samples were excluded from the study. Haemoglobin estimation was done by Horiba's Pentra xlr (automated hematology analyzer) and peripheral blood smear was prepared simultaneously by a trained lab technician. WHO guidelines were used to diagnose anemia and its severity. Anemia was defined as Hb <11.5 g/dL in children between 5 - 11 years of age and <12 g/dL in those between 12 to 14 years[9]. Red Cell indices were analysed and recorded.

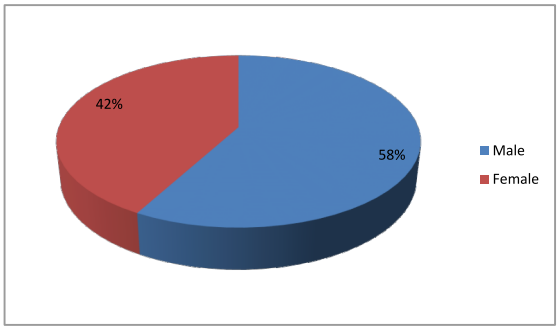
To estimate biochemical parameters, 6 ml of fasting blood sample in a plain vial was collected. After the sample has clotted completely, centrifugation was done at 3000 rpm for 6 minutes. The supernatant serum was collected. It was used for the estimation of Serum vitamin B12, folate, ferritin and Total iron binding capacity (TIBC). Estimation of serum B12, folate and ferritin was done by the Chemiluminescence method and estimation of TIBC was done by Ferene method in a semi automatic machine.

STATISTICAL ANALYSIS:

The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA). Difference between two groups was determined using chi square test and the level of significance was set at $p < 0.05$.

RESULTS:

The present study comprised of 250 subjects, out of which 58% were males and 42% were females (graph 1). Maximum subjects belonged to 1-6 year of age group and minimum subjects were in the age group of 13-18 years.



Graph 1: Gender distribution of the study population

Dimorphic, Macrocytic, Microcytic Hypochromic, Normocytic Hypochromic and Normocytic Normochromic Anaemia were reported in 11.2%, 3.2%, 47.2%, 2.4% and 36% of the subjects respectively (table 1).

Table 1: Distribution according to the types of Anaemia based upon the morphology

Type	Number	Percentage
Dimorphic anaemia	28	11.2
Macrocytic anaemia	8	3.2
Microcytic Hypochromic Anaemia	118	47.2
Normocytic Hypochromic Anaemia	6	2.4
NormocyticNormochromic Anaemia	90	36.0

185 cases out of 250 were found to have significant correlation between red cell indices and peripheral blood picture (table 2). As shown in Table 1, out of 118 cases with microcytic hypochromic blood picture, 105 cases (88.9%) showed reduced red cell indices. Out of 90 cases with normocytic normochromic blood picture, 72 (80%) showed normal red cell indices. There was 100% correlation between macrocytic blood picture and red cell indices.

Table 2: Correlation of red cell indices with the peripheral blood smear (N=185)

Types of Anemia	Red cell indices	No. of cases	Percentage (%)
Microcytic Hypochromic	MCV<80 MCH<27 MCHC<32	105	56.7
Normocytic Normochromic	MCV 80-100 MCH 27-32 MCHC 32-36	72	38.9
Macrocytic	MCV>100 MCH-↑/↓/N MCHC-N/↓	8	4.3

IDA was diagnosed when serum iron was decreased, TIBC increased and serum ferritin decreased, which was 41.6% (Table 3).

Table 3: Distribution of Anemia according to Iron profile (N=250)

Type of Anemia	S. Iron	TIBC	S. Ferritin	Total	Percentage
IDA	↓	↑	↓	104	41.6

DISCUSSION:

Hematological parameters are interrelated with each other as well as with the age and gender, relevant intervention strategy is required. Constant monitoring is needed while providing public health nutrition programs to eradicate anemia. Different biochemical and haematological tests are done to evaluate anaemia in children. Hence the present study was done to find out the clinicohaematological & biochemical profile of anaemia in pediatric age group.

The present study comprised of 250 subjects, out of which 58% were males and 42% were females. These results were in accordance with study done by Taskesen et al[10], Jain et al[11] and Gupta S et al[12]. Chauhan et al[13] reported dissimilar results who reported 44.2% boys and 55.8% girls in their study. Sastry CPV et al[14] also found female preponderance in their study (males 36.3%).

Our study revealed that children below 6 years were more likely to be anemic compared to the older children. This concurred with prior findings showing that at the younger age, there is high demand for nutrients to support the rapid body growth of children[15], which further increases their need for iron. Complementary foods are started when the children reach 6 months, if nutritionally poor complementary foods were introduced children were more likely to be anemic[16]. Children above 2 years are able to eat more variety of foods, which put them at less risk of being anemic[17].

In the present study, Dimorphic, Macrocytic, Microcytic Hypochromic, Normocytic Hypochromic and Normocytic Normochromic Anaemia were reported in 11.2%, 3.2%, 47.2%, 2.4% and 36% of the subjects. Sastry C.P.V[14] in his study found that peripheral smear examination showed Microcytic hypochromic anemia in 81.8% (90/110). Venkatesh G[18] observed Microcytic hypochromic anemia in 54.4%, macrocytic hypochromic anemiais seen in 11.8% and dimorphic anemia is seen in 36.6% of patients.

In the present study, iron deficiency was the most common type of anaemia found in 41.6% of the subjects. Asia comprises of 70% of world's malnourished children. Fifty percent of the preschool children are malnourished out of that 64% in Bangladesh and 16% in China. Due to protein energy malnutrition as well as micronutrient deficiency IDA affects 40-50% of preschool children[19]. In Pakistan IDA constitutes 83% of all anemia and is a major nutritional problem. Studies on nutritional status of boys and girls have been conducted in 11 different countries and Anemia prevalence was found to be 55% in India and 42% in Nepal. It is a problem mainly for infants, adolescent girls and women of child bearing ages in developing countries. In a study conducted in 2 districts in India, 72% of children aged (12-23 months) had low ferritin level. Highest prevalence of anemia was seen in children less than 10 years of age, seen specially in below 5 years of age[20].

In the present study, iron deficiency anemia was found in 104 patients i.e. 41.6%. When compared with other iron status parameter, serum ferritin is one of the lowest biologically varying iron status markers, thus making it one of the most useful parameters. Ali et al[21] in his study of 248 patients found lack of iron stores in 69 patients. Of these, the serum ferritin was elevated in 20 patients (29%) despite lack of demonstrable iron in the marrow specimen. They concluded that a low serum ferritin value probably indicates iron depletion, while an elevated value does not exclude that possibility.

This study was limited with the fact that it is a prospective study which reported the overall prevalence of Anemia and its severity.

CONCLUSION:

It can be concluded from the study findings that one of the major areas for improvement in primary health care is prevention of anemia because it has been associated with delay in psychomotor development especially in preschool age. Anemia in association with malnutrition is widely prevalent in our country. So there is a need for urgent community participation strategies in the form of counseling the parents for child feeding practices, immunization and sickness recognition from the first year of life. Preventive measures for anemia control in children must be accompanied by measures to prevent underweight and stunting by focusing on integrated child feeding, health and environmental core measures.

REFERENCES

1. Gupte S, Gupta RK, Gupta R. Iron Deficiency Anemia: A Diagnostic Approach in Children. J K Science 2000;2:175-9.
2. Gupte S. Pediatric Hematology. In Gupte S. The short textbook of pediatrics. 10th edn. New Delhi; Jaypee. 2004:454-62.
3. Worldwide Prevalence of Anemia 1993–2005. Geneva, Switzerland: World Health Organization; 2008.
4. Sarah EC, Zuguo M, Freedman DS, et al. Unexplained decline in the prevalence of anemia among US children and women between 1988-1994 and 1999-2002. Am J of Clin Nutr. 2008;88(6):1611-7.
5. Keikhaei B, Zandian K,Ghasemi A, Tabibi R. Iron deficiency anemia among children in southwest Iran. Food and Nutrition Bulletin©. The United Nations University 2007;28(4):406-11.
6. Stoltzfus RJ. Defining iron-deficiency anemia in public health terms: a time for reflection. J Nutr 2001;131(2S-2): 565S-567S.
7. Kassebaum NJ, Jasrasaria R, Naghavi M, et al. A systematic analysis of global anemia burden from 1990 to 2010. Blood. 2014;123(5):615-24.
8. Janus J, Moerschel SK. Evaluation of anemia in children. Am Fam Physician. 2010;81(12):1462-71.
9. World Health Organization. Iron deficiency anaemia: assessment, prevention and control. A guide for programme managers. Geneva: World Health Organization; 2001. World Health Organization (WHO): [Available from: http://www. who.

int/nutrition/publications/en/ida_ assessment_prevention_control. pdf. 2015.
10. Taskesen M, Yarami A, Katar S. Neurological presentations of nutritional vitamin B12 deficiency in 42 breastfed infants in Southeast Turkey. Turk J Med Sci.2011;41: 1091-1096.
11. Jain R, Singh A, Mittal M, Talukdar B. Vitamin B Deficiency in 12 Children: A Treatable Cause of Neurodevelopmental Delay. J Child Neurol 2015. 30:641-643.
12. Gupta S. Silent burden of anemia in school age children: A community based study in West Bengal. Indian Journal of Medical Sciences. 2012;66(7):163.
13. Chauhan A, Pathak G, Shah M. Clinico-Laboratory Profile of Vitamin B Deficiency in Children. GCSMC J Med Sci 2016;5(2):94-99.
14. Sastry CPV. Study on clinical and hematological profile of Anemia in children aged 5 to 12 years in rural Telangana. J Pediatr Res 2017;4(07):488-493.
15. Adu-Afarwuah S, Lartey A, Brown KH, Zlotkin S, Briend A, Dewey KG. Home fortification of complementary foods with micronutrient supplements is well accepted and has positive effects on infant iron status in Ghana. Am J Clin Nutr. 2008;87 (4):929–938.
16. Tatala S, Svanberg U, Mduma B. Low dietary iron availability is a major cause of anemia: a nutrition survey in the Lindi District of Tanzania. Am J Clin Nutr. 1998;68(1):171–178.
17. El Kishawi RR, Soo KL, Abed YA, Muda WAMW. Anemia among children aged 2–5 years in the Gaza Strip-Palestinian: a cross sectional study. BMC Public Health. 2015;15(1):1.
18. Venkatesh G, Soubhagya T, Bela H Shah. Clinical Profile of Anemia in Children. IOSR Journal of Dental and Medical Sciences 2013;10(5):65-69.
19. Khor GL. Update on the prevalence of malnutrition among children in Asia. Nepal Med Coll J. 2003; 5 (2): 113-22.
20. Alvarez-Uria G, Naik PK, Midde M, Yalla PS, Pakam R. Prevalence and severity of anaemia stratified by age and gender in rural India. Anemia. 2014;1-5.
21. Ali MA, Luxton AW, Walker WH. Serum ferritin concentration and bone marrow iron stores: a prospective study. Canadian Medical Association Journal. 1978;118(8):945.