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Determine the Morphological and Etiological Types of Anaemia that are Common in Children Between the Ages of 3 and 15 Years

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ABSTRACT

Background: A serious issue with world health is anaemia. An accurate morphological and etiological subtyping of anaemia can help clinicians manage patients more effectively. Red blood cell and platelet indices, which can now be obtained from widely used blood cell counters in the laboratory, along with peripheral smear analysis, aid in the accurate classification of anaemia.

Aim and Objective: To detect the morphological and etiological types of anaemia prevalent among children in the age group of 3 years to 15 years.

Methodology: This study was conducted in the haematology wing of Pathology Department, Santosh Medical College & hospital. It was a descriptive and cross sectional study done over a period of November 2018 to December 2019 with 300 cases. Patients' venous blood samples were taken in EDTA vacutainers while requests for complete blood counts and complete haemograms were being sent by various clinical departments. Daily quality checks were done as per standard protocols.

Result: Out of 300 cases studied, 147 (49%) were males and 153 (51%) were females. Mild degree of anaemia was more prevalent in school going children than in pre-school children, while severe anaemia was equally present in both preschool and school going children. The most common morphological type of anaemia was microcytic hypochromic anemia (57.33 %)

Conclusion: Children need to be screened early for anaemia and related disorders because they are the group most at risk for nutritional deficiencies. Utilizing prenatal diagnostic methods and spotting these illnesses early would guarantee enormous advantages and pain relief.

Keywords: Peripheral smear analysis, Anaemia, Microcytic hypochromic anaemia, Nutritional deficiencies

1. INTRODUCTION

Children suffering from anaemia are at a higher risk of mortality, due to associated complications like malnutrition and infection. Prevalence rate of anaemia provides an important indicator of the nutritional status within the paediatric population.[3] The National Family Health Survey (NFHS- 4, 2015- 2016) data showed, 58.6% of children in the age

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group of 6-59 months in India are anaemic with a higher prevalence of 68.5% in infants between 6-11 months of age. World Health Organization (WHO) considers this level of prevalence of anaemia (≥40%) as one of severe public health significance.[1]Therefore, the study of the etio-pathogenesis of anaemia in childhood has attracted wide attention in the recent years in India.[3]

G6PD deficiency or aplastic anemia may be caused as a sideeffect of certain medications in use. Viral illness in the recent past may lead to red cell aplasia. Malabsorption due to diarrhea and occult blood loss can give rise to suspicion of celiac sprue and inflammatory bowel disease.The physical examination in children with anaemia is usually normal, however it does constitute an important aspect in diagnosis of the type of anaemia. Pallor, glossitis, a systolic cardiac murmur, delayed growth, irritability and changes in the nailbed are suggestive of chronic anaemia. Children presenting with jaundice, tachypnoea, tachycardia, splenomegaly, hematuria and congestive heart failure may suggest acute anaemia. [2]

Based on morphology of red cells in peripheral smear, etiology of anaemia can be narrowed down further. Basophilic stippling representing aggregated ribosomes can be seen in thalassemia syndromes, iron deficiency and lead poisoning. In cases of asplenia, pernicious anaemia and severe iron deficiency, Howell-Jolly bodies (nuclear remnants) are seen. Cabot's ring bodies are also nuclear remnants and are seen in lead toxicity, pernicious anaemia and 3 hemolyticanemias. Heinz bodies (denatured aggregated hemoglobin) can be seen in thalassemia, asplenia and chronic liver disease.[2]

A detailed history, physical examination of the patient, complete hemogram 4 along-with peripheral blood picture examination and the required biochemical investigations would help in starting the evaluation. The present study is to evaluate the biochemical parameters to aid in understanding the morphological and etiological types of anemia prevalent among children in the age group of 3 years to 15 years.

According to another study,among the 26 cases of IDA, upper GI lesions were observed in 15 patients(57.6%), which included chronic gastritis in 8 (30.7%), peptic ulcer disease with bleed in 3 (11.5%), esophagitis with hiatus hernia in 2 (7.7%), carcinoma esophagus in 1 (3.8%), and celiac disease in 1 (3.8%). Lower GI lesions were seen in four patients, i.e. adenocarcinoma, terminal ileal ulcers, and ulcer cecum. GI malignancy was found in two (7.7%) of IDA patients. Nutritional IDA was seen in five patients (30.7%).

2. METHODS AND MATERIALS

This cross sectional and descriptive study was conducted on 300 children in the age group of 3 years to 15 years, who were admitted to the pediatric ward of Santosh Medical College & Hospital, Ghaziabad with anaemia and also those who presented with other complaints and were incidentally found to have anaemia . The children with haemoglobin values of less than 11.2 gm/dl in the age group of 3 years to 5 years those with hemoglobin values of less than 12 gm/dl in the age group of 5 years to 15 years, were included in the study which was conducted from December 2018 to November 2019. Pathogenic classification is very important to understand the mechanisms involved in the genesis of anaemia. However, in

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daily clinical practice, it is more useful to start with the analytical parameters of the hemogram. MCV allows us to classify anemia as microcytic (MCV < 82 fL), normocytic (MCV = 82-98 fL) and macrocytic (MCV > 98 fL). MCV has a relationship with mean corpuscular hemoglobin (MCH), which reports on the mean hemoglobin per erythrocyte expressed in picograms (normal range: 27-32 pg). Therefore, MCV and MCH decrease (microcytic, hypochromic anemia) or increase (macrocytic, hyperchromicanemia) jointly.

3. RESULTS

300 paediatric patients between the ages of three to fifteen who were anaemic, participated in the current study. These 300 patients were divided into the pre-school and school-age age groups, and their anaemic condition was examined in each group. Out of 300 cases studied, 147 (49%) were males and 153 (51%) were females. Among the pre-school children, 57 (38.78%) were males and 52 (17.33%) were females. Among the school going children, 90 (61.22%) were males and 101 (66.01%) were females. Children belonging to 5 to 15 years age group 191 was more affected as compared to 109 in pre-school age group children of 3 to 5 years. In this study, among 109 pre-school children, 46 (27.88 %) had mild anaemia, 51 (45.95 %) had moderate anaemia and 12 (50 %) had severe anaemia. Out of the 191 school going children, 119 (72.12 %) had mild anaemia, 60 (54.05 %) had moderate anaemia and 12 (50 %) had severe anaemia. Significance was observed between the severity of the anaemia and age group distribution. 165 out of 300 children had mild degree of anaemia amongst whom, 77 (50.32 %) were females and 88 (59.86 %) males. 111 children were found to have moderate degree of anaemia, amongst whom, 46 (31.29 %) were males and 65 (42.48 %) females. Severe degree of anaemia was found in 24 children amongst whom, 13 (8.84 %) were males and 11 (7.19 %) were females. Non-significance was observed between the severity of the anaemia and gender distribution. Table 3 showed that, the most common morphological type of anaemia was microcytic hypochromic anemia (57.33 %) followed by normocytic hypochromic anaemia (18.33 %), normocytic normochromic anaemia (13 %) and dimorphic anaemia (09%). macrocytic anaemia (2.33 %) was the least common morphological type. Iron deficiency anaemia (53.67 %) was the most common type followed by Megaloblastic anaemia (7%). Thalassemia trait (2.7 %) was the least common types. Distribution of anaemia based on etiologyis iron deficiency anaemia (53.67 %) was the most common type followed by Megaloblastic anaemia (7 %). Thalassemia trait (2.7 %) was the least common types. In the present study, it was observed that, among 161 iron deficiency anaemia cases, 145 were microcytic and hypochromic and 16 had varied morphological types, out of which, three were normocytic hypochromic and thirteen were dimorphic. Out of the 32 cases of megaloblastic anaemia, six had macrocytic picture and twenty-six had dimorphic picture. Among the 11 cases of Thalassemia trait, ten were microcytic hypochromic and one was normocytic hypochromic. The specific etiological factor could not be definitively established in 107 cases and these patients were grouped under the category of anaemia of undetected etiology.

4. DISCUSSION

The morphological and the etiological types of anemia as analyzed in the present study of 300 pediatricanemia cases were compared with the other similar studies.People all throughout

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the world are aware of anaemia, particularly in developing nations like our own. Low socioeconomic position, a lack of health education, and limited access to healthcare due to the majority of the population living in rural areas are contributing factors in addition to the underlying cause. [4] Up to this point, studies have been carried out on specific target populations like women, expectant mothers, and kids. However, because they come from a rural background and our institute is nearby, we have included both males and girls in the current study. This will not only help study the average value of haematological indices in this study population, which when done on a wider scale, would provide a general concept of the distribution of the pattern of anaemia.

5. CONCLUSION

Children being the most vulnerable group for nutritional deficiencies require early screening for anaemia and associated illnesses. Initial screening and subsequent diagnostic tests enable early diagnosis and appropriate management. Utilization of technologic advances is beneficial in arriving at a definite diagnosis. The basal blood parameters are mandatory before initiating treatment in pediatric anaemia cases. A central smear test in addition to a study of the fundamental red cell characteristics provided by the analysers is conclusive in its initial anaemia categorization. In addition to lowering inter observer variation, this also eliminates the possibility of false positive categorization. Particularly in the rural population, where testing may be expensive and difficult to obtain, early detection of the more common microcytic anaemia of iron deficiency aetiology can be achieved by carefully observing changes in previously ignored parameters like RDW and the Mean Platelet Volume/Platelet Count Ratio.

6. REFERENCES

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Table1: Age group and Gender wise distribution of pediatric anemia

Characteristics	Gender	Number	Percentage
Gender	Male	147	49
	Female	153	51
Age-groups	3 to5years	109	36.33
	5to15 years	191	63.66

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Total	300	100

Table2: Age Group and Gender wise gradation of paediatric anaemia

Grade of Anaemia	Mild (Hb%10-11.5gm/dl)	Moderate (Hb%7-10gm/dl)	Severe (Hb%<7gm/dl)
3 to 5 years	46(27.88%)	51(45.95%)	12(50%)
5 to 15 years	119(72.12%)	60(54.05%)	12(50%)
Male	88(59.86%)	46(31.29%)	13(8.84%)
Female	77(50.32%)	65(42.48%)	11(7.19%)

Table 3: Distribution of the various morphological and etiology types of anaemia

Morphologicaltypes	Number	Percentage
Microcytichypochromicanemia	172	57.33
Normocytichypochromicanemia	55	18.33
Normocyticnormochromicanemia	39	13
Dimorphicanemia	27	09
Macrocyticanemia	07	2.33
Etiology		
Irondeficiencyanemia	161	53.67
Megaloblasticanemia	21	7
Thalassemiatrait	11	3.66
Anemiaofundetectedetiology	107	35.67
Total	300	100

Table 4: Cross table showing comparative prevalence of morphological and etiological types of anemia

Etiological type	Morphological type					
	Microcytic hypo-chromic anaemia	Normocytic hypo-chromic anaemia	Normocytic normo-chromic anaemia	Di-morphic	Macrocytic anaemia	Total
Iron deficient anaemia	145	03	0	13	0	161
Megaloblastic anaemia	0	0	0	26	06	32
Thalassemia trait	10	01	0	0	0	08

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Anaemia of undetected etiology	17	51	39	0	0	107
Total	172	55	39	39	06	