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Original Research Article

A Cross-Sectional Study of Anaemia in Children

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Abstract

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Introduction: Anaemia in children is a major health problem worldwide and specially in developing countries like India. Anaemia is associated with visual and auditory dysfunction, cognitive and behavioral abnormalities and delay in psychomotor development. Anaemia is not a diagnosis, but may be a sign of an underlying pathology.

Objectives: To study the morphological pattern of anaemia and its distribution among different age groups and gender in pediatric population .

Material and Methods: A hospital based prospective cross sectional study was under taken at a tertiary health care centre. 500 anaemic cases were included for the study as per WHO criteria and age group ranging from 0-15 years. Evaluation by complete blood count and peripheral smear was done.

Results: Out of 500 anaemic children, the proportion of anaemia in males and females was 64% and 36% respectively. Males outnumbered females in the study. 0-5 years age group children were maximally affected. Moderate degree of anaemia was seen in maximum cases. Microcytic hypochromic anaemia was the commonest type of morphological pattern followed by normocytic hypochromic and normocytic normochromic pattern.

Conclusion: Study of morphological pattern of anaemia is essential to direct the further management of underlying etiology.

Keywords: Anaemia; Microcytic; Hypochromic; Children.

Introduction

Anaemia in children is one of the major social health problems in India and in many parts of the world, since anaemic children have reduced exercise capacity, slower rate of growth, impaired cognitive development, and delayed wound healing [1].

Anaemia is considered as a proxy indicator of iron deficiency [2,3]. Iron deficiency anaemia affects the physical and mental development of the human body [4,5].

For instance, many studies have shown that iron deficiency reduces the learning capacity of the children aged below five years, decreases attentiveness, and causes low intelligence [6].

Anaemic children are also at an increased risk of dying due to complications associated with malnutrition and infection. Prevalence rate of anaemia is an important indicator of the nutritional status within the pediatric population.

Anaemia is defined as decreased concentration of hemoglobin and RBC mass as compared to the values in age-matched controls.

There are three primary causes:

1. Reduced production of red blood cells, which may result from nutritional deficiency or hormones, or from disease of bone marrow or other conditions.

2. Excessive destruction Red blood cells, often a hereditary problem; and

3. Excessive blood loss.

Anemia is a manifestation and not a disease per se. The most common cause for anemia is malnutrition and iron deficiency makes up the bulk of it.

Although higher sophisticated diagnostic modalities are available, yet the very inexpensive, simple peripheral smear study is still the most preferred basic investigation tool in the work up of anemia.

Material and Methods

During a period of two years, cross sectional study was carried out on 500 paediatriccases in the Department of Pathology, Index Medical College, Indore after getting approval from the Institutional Ethics Committee.

After collecting all the details and informing about the procedure to the guardians, the blood sampling was done. 3ml Intravenous blood was collected in EDTA (ethylene diamineterta acetic acid)vacutainers. CBC (complete blood picture) was analyzed using sysmex 800i analyzer, and peripheral smear was preparedusing standard staining techniques and studied.

Blood samples of the children below 15 years age and hemoglobin less than 11 g/dl were included in the study and children above 15 years with hemoglobin >11 g/ dl were excluded from the study.

Observation and Results

In this study the cases who fulfilled the WHO criteria were taken and divided on the basis of age, gender and other parameters. Cases from 0-15 years of age were studied and grouped as: 0-5 years, 6-10 years and11-15 years. Out of 500 anaemic children, the proportion of anaemia in males and females was 320 i.e 64% and 180 i.e36% respectively (chart 1). Male to female ratio of the study was 1.8:1. i.e. males outnumbered females in the study. 0-5 years age group children were maximally affected (Table 1). Moderate degree of anaemia (58%) was seen in maximum cases followed by mild degree (30.60%) and severe degree (11.40%) cases (Table 2) and on peripheral smear examination predominat morphological pattern was microcytic hypochromic anaemia in 384 i.e 76.8% cases.

Out of 500 cases, 320 were males and 180 were females i.e. males outnumbered females.
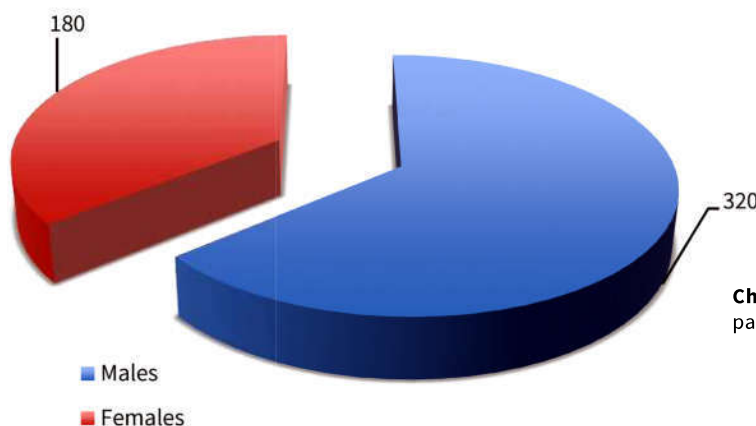
Chart 1: Gender distribution among paediatricpopulation:

Table 1: Maximally affected age group

	No. of children(n=500)	Percentage
0-5 years	259	51.8%
6-10 years	131	26.2%
11-15 years	110	22%

0-5 years age group children were maximally affected because of anaemia in comparison to other two age groups.

Table 2: Age wise Distribution of Cases accordingto Hemoglobin level

| Hb Grading | Age Group | | | | | | Total | |
| | 0-5 years | | 6-10 years | | 11-15 years | | | |
	No.	%	No.	%	No.	%	No.	%
Mild	61	23.55	49	37.40	43	39.09	153	30.60
Moderate	162	62.55	69	52.67	59	53.64	290	58.00
Severe	36	13.90	13	9.92	8	7.27	57	11.40
Total	259	100	131	100	110	100	500	100

Moderate degreeof anaemia was more common followed by mild degree and severe degree of anaemia.

Table 3: Distribution of the various morphological types of anaemia

Morphological Types	Number	Percentage
Microcytic Hypochromic Anaemia	384	76.8
Normocytic Hypochromic Anaemia	60	12
Normocytic Normochromic Anaemia	53	10.6
Dimorphic Anemia	3	0.6

Discussion

Pediatric anaemia is an important universal problem [7]. In India, about 89 million children are anaemic [4,2]. Thus, India is the highest contributor to child anaemia among the developing countries [2,8].

Nutritional anaemia is a well known public health problem worldwide [9]. In India, anaemia is affecting more than half of total population, particularly children and pregnant women.

In this study of 500 pediatric anaemia cases, 320 i.e. 64% were males and 180 i.e 36% were females. Male to female ratio of the study was 1.8:1. Thus, males outnumbered females in the study. A similar gender distribution was noted in the study conducted by Gomber et al9whereas a study conducted by Kapur et. al. [10] there was no difference between the gender distribution as the ratio was 1:1. A probable reason for this result may be the under reporting of female candidates because of illiteracy and ignorance of parents. Lack of awareness and education among parents also contribute to this.

In this study, 0-5 years age group children were maximally affected i.e. 51.8% or 259 out of 500 cases were under this age group. This was in concurrence with Stellinga Boelan [11] study. Another study conducted by Sharda et. al. [12] showed maximum anaemic cases in 2-3 years of age group.

For studying the severity of anaemia WHO criteria was considered and grading was done according to it and study was compared to other studies as: This study showed that the moderate degree of anaemia (58%) was most prevalent type followed by mild degree (30.60%) and severe degree (11.40%) which was in concurrence with the study conducted by S. Jain et. al. [12] that showed the same results i.e. moderate degree of anaemia predominated

(49.8%) followed by mild degree (26.8%) and severe degree (24.3%).

Another study conducted by KadhimHasan et. al. [13] showed mild degree as most prevalent type (55.4%) followed by moderate degree (26.7%) and severe degree (17.9%).

The peripheral smears of the pediatric cases were examined and the results were compared to different studies as : In this study microcytic hypochromic anaemia was the most prevalent type seen among 76.8% cases followed by normocytic hypochromic anaemia in 12%, normocytic normochromic anaemia in 10.6% and dimorphic in 0.6% cases. No case of macrocytic anaemia was reported. A similar study was conducted by Kapur et al10in which the predominant morphological pattern wasmicrocytic hypochromic type. Another study by S. Venkataraman et. al. [14] had different results, normocytic normochromic anaemia predominated in 55% cases followed by microcytic hypochromic in 27% cases. This could be due to the nutritional deficiency among children which is prevalent in paediatric age group and also because these anaemias are more in tribal belt of Central India.

Conclusion

Since anemia is more prevalent among low socio-economic groups, the higher diagnostic tests impose financial stress to the patients. The study of basic blood parameters and peripheral smear study are less expensive and mandatory in the work up of anaemia. Morphological pattern of anaemia reflects the underlying etiopathology, the study of which would ensure tremendous benefits in the early detection and appropriate management. WHO/ UNICEF/UNU [15] strongly advocate that when there is a

prevalence of anaemia above 40%, a universal supplementation is required and it is not cost-effective to screen children for anaemia. To differentiate severe anaemia, a screening for other causes is desirable and that is reflected in India's Tenth Five-year Plan's [16] nutritional goals, where all children are recommended to be screened.

References

1. Jain S, Chopra H, Garg SK, Bhatnagar M, Singh JV. Anaemia in children: Early iron supplementation. Indian Journal of Pediatrics 2000;67(1):19.

2. S. Pasricha, J. Black, S. Muthayya et al. Determinants of Anaemia among young children in rural India. Pediatrics, 2010;126:e140–49.

3. S. Dey, S. Gosawmi, and T. Dey. Identifying predictors of childhood anaemia in north-east India. Journal of Health and Population Nutrition. 2013;314):462–70.

4. S. Bharati, M. Pal, S. Chakrabarty, and P. Bharati, Socioeconomic determinants of iron-deficiency Anaemia among children aged 6 to 59 months in India. Asia-Pacific Journal of Public Health, 2013;6.

5. M. E. Bentley and P. L. Griffiths. The burden of Anaemia among women in India. European Journal of Clinical Nutrition. 2003;57(1):52–60.

6. A. Zhao, Y. Zhang, Y. Peng et al. Prevalence of Anaemia and its risk factors among children 6–36 months old in Burma. The American Journal of Tropical Medicine and Hygiene. 2012;87(2):306–311.

7. Miller CJ, Dunn EV, Berg B, Abdouni SF. A hematological survey of preschool children of the United Arab Emirates. Saudi Medical Journal 2003;24(6):609-13.

8. B. Benoist, E. McLean, I. Egli, and M. Cogswell. Worldwide Prevalence of Anaemia 1993–2005: WHO Global Database on Anaemia, WHO, Geneva, Switzerland, 2008.

9. Gomber et al, Prevalence & etiology of nutritional anaemia among school children of urban slums, Indian J Med Res 2003 Oct:118;167-71.

10. Kapur D, Agarwal KN, Sharma S, Kela K, Kaur I. Iron status of children aged 9-36 months in an urban slum integrated child development service project in Delhi. Indian Ped 2002;39:136-44.

11. Stellinga-Boelen AAM, Storm H, Neigerman PA, Bijelveld CMA. Iron deficiency among children of Asylum seekers in the Netherlands. Journal of Pediatric Gastro Enterology and Nutrition 2007;45(5):591-5.

12. SharadaSindhu, KantaKumari, ManjulaUppal. Prevalence of anemia in schedule caste preschool children of Punjab. Indian Journal of Medical Science 2002 May;56(5):218-21.

13. Kadhim Hasan Kamil, Nawsherwan Sadiq Mohammad. A Laboratory Study of Anaemia in Children Aged 6 Months to 6 Years in Erbil City. Medical Journal of Babylon 2014;11:2. Published :14 July 2014.

14. Venkatraman J, Rathna S,Govindaraj, Anand S. Patil, Pavithran. Study of Morphological Pattern of Anaemia in Children. Journal of Evolution of Medical and Dental Sciences 2014;3(27):7540-43, DOI:10.14260/jemds/2014/2931.

15. UNICEF/United Nations University/World Health Organization. Iron deficiency Anaemia. Assessment, Prevention, and Control: A guide for programme managers. Document WHO/NHD/01.3. Geneva: World Health Organization; 2001.

16. Government of India. 10th Five Year Plan, Planning Commission. India: Government of India. 2002.