Original Research Article

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20181524

Clinico-epidemiological profile of nutritional anaemia and its impact on developmental outcome in children aged 6 months to 5 years

Neha Jaiswal^{1*}, Naman Kalra¹, Sanjata R. Chaudhary¹, Nitesh Mohan²

¹Department of Paediatrics, ²Department of Pathology, Rohilkhand Medical College, Bareilly, Uttar Pradesh, India

Received: 06 February 2018 **Accepted:** 07 March 2018

*Correspondence: Dr. Neha Jaiswal.

E-mail: nehajais28@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Anemia is a global public health problem and is a significant contributor to the global health disease. Young children are more vulnerable to the effects of anemia since it retards the physical and mental growth and development. Objective of this study was clinico-epidemiological profile of nutritional anemia and its impact on developmental outcome in children aged 6 months to 5 years.

Methods: The study was a prospective observational study. A total of 100 patients with hemoglobin <11g/dl admitted in our hospital were included in the study. Detailed clinical history with developmental assessment was elicited and thorough clinical examination was performed. Complete haemogram with Peripheral smears of these patients were examined. Bone marrow examination was done where ever possible.

Results: Maximum numbers of the patients were in the range of 3 to 4 year. Proportions of anemia in males were 68% when compared to females (32%). Iron deficiency anemia (IDA) was the most common in males. The correlation between anemia and developmental delay was 7.9% in iron deficiency anemia and 87.5% in megaloblastic anemia (MBA) which was highly significantt.

Conclusions: Anemia poses a biggest challenge in the improvement of primary health care particularly in young children since it is associated with delay in psychomotor development and increased morbidity and mortality. Initial screening and subsequent diagnostic tests enable early diagnosis and appropriate management.

Keywords: Anemia, Developmental delay, Iron deficiency anemia

INTRODUCTION

Anaemia in children is one of the major social health problems in India, especially in rural India and in many parts of the world. Anaemic children have reduced exercise capacity, slower rate of growth, impaired cognitive development, and delayed wound healing. Prevalence rate of anaemia is an important indicator of the nutritional status within the paediatric population. According to WHO, anemia is diagnosed if Hb% is <11gm/dl in children of 6 months to 6 years age group

and Hb% is <12gm/dl in children of 6 years to 14 years age group. Globally 50% of anemia is attributable to iron deficiency and accounts for around 841,000 deaths annually worldwide. National family health survey (NHFS)-2data shows that 74% children between the age of 6 - 35 months are anemic.

Iron deficiency occurs from 6 months of age onwards when the child's total body mass is expanding in the face of an inadequate iron intake. Iron deficiency anemia adversely affects health, cognitive development, school achievement, and work performance. In developing countries, nutritional anemia due to iron deprivation affects more than 50% of children aged from six months to five years and is considered to be one of the four worldwide risk factors for abnormal child development and a serious public health problem that must be combated urgently.⁵ Thus, knowledge about correct breastfeeding and complimentary feeding practices are dismal and significantly contribute towards anemia in infancy.

As anaemia accounts for significant morbidity and mortality, and in view of no enough studies being done in this age group children, there is a need for study to know the clinical manifestations, haematological changes in nutritional anaemia and its association with development in children in study population.

METHODS

The present study is a prospective observational study was done in Department of Paediatrics, Rohilkhand Medical College, Bareilly in a period of 12 months from 1st November 2015 to 30th October 2016. A total of 410 children presented to the OPD and out of which 205 patients were admitted in IPD, in which 100 patients fulfilled the inclusion and exclusion criteria and had given the informed written consent were enrolled in the study.

Inclusion criteria

Children from 6 months to 5 years of age group with symptomatic or asymptomatic anaemia (Hb <11g/dl) attended in OPD or admitted in IPD were taken in the study.

Exclusion criteria

Anaemia due to acute blood loss secondary to bleeding disorder or trauma, malignancies, haemolytic anaemia and aplastic anaemia, H/O birth asphyxia, cerebral palsy, seizure disorder, neuro-regressive and neurodegenerative disorder. Children with HIV, chromosomal disorder like Down's syndrome and hypothyroidism, chronic kidney disease, chronic liver disease, congenital heart disease.

Method of collection of data

A detailed history was elicited along with a thorough clinical examination. The required quantity of venous blood was collected in EDTA tubes, which was send for Complete hemogram, Peripheral blood smear examination by Leishman's stain, Reticulocyte count by new methylene blue staining whenever required, bone marrow examination in relevant cases. Among the anaemic cases, only few patients agreed for bone marrow examination. Infants/children will be evaluated as per Trivandrum Developmental Scale and development quotient was evaluated.

Data analysis

Data was analyzed by SPSS version 22 and p value <0.05 was considered statistically significant.

RESULTS

In the present study of 100 patients, the patients were distributed in 4 groups according to the age. In group 1 (<1 years) had 9 (9%) patients, group 2 (1-2 years) had 39 (39%), group 3(3-4 years) had 44 (44%) patients and group 4 (>5 year) had 8 (8%) patients (Table 1).

Table 1: Age group distribution.

Age group	Number	Percentage
<1 year	9	9
1-2 year	39	39
3-4 year	44	44
≥5 year	8	8
Total	100	100

In the present study of 100 patients, 68 (68%) were males and 32 (32%) were females. Males were more affected (Table 2).

Table 2: Gender distribution.

Gender	Number	Percentage
Male	68	68
Female	32	32
Total	100	100

Out of 100 patients 92 (92%) had IDA in which 62 (67.4%) were males and 30 (32.6%) were females. Out of 100, 8 had MBA, in which 6 (75%) were males and 2 (25%) were females (Table 3).

Table 3: Distribution of iron deficiency with megaloblastic anemia in male and female.

Sex	IDA	MBA	Total
Male	62 (67.4%)	6 (75.0%)	68 (68 %)
Female	30 (32.6%)	2 (25.0%)	32 (32 %)
Total	92 (92 %)	8 (8 %)	100 (100)

In the present study, the total of 100 patients were divided into 4 age groups <1-year, 1-2-year, 3-4 year and >5 years. These group patients were divided into mild, moderate and severe grade of anemia. Age group <year 1 consist of total of 9 patients in which 1(11.1%) belong to mild anemia, 7(77.8%) belong to moderate anemia, 1(11.1%) belong to severe anemia. Age group 1-2 years consists of 39 patients in which 2(5.1%) belong to mild anemia, 29(74.4%) belong to moderate anemia and 8(20.5%) belong to severe anemia. Age group 3-4 years consists of 44 patients in which 6(13.6%) belong to mild anemia, 34(77.3%) belong to moderate anemia and 4(9.1%) belong to severe anemia. Age >5 years consists

of 8 patients in 2(25.0%) belong to mild anemia, 5(62.5%) belong to moderate anemia, 1(12.5%) belong to severe anemia (Table 4).

Table 4: Anemia in age groups.

Age	Grade of anemia			
group	Mild	Moderate	Severe	Total
<1 year	1(11.1%)	7(77.8%)	1(11.1%)	9
1-2year	2(5.1%)	29(74.4%)	8(20.5%)	39
3-4year	6(13.6%)	34(77.3%)	4(9.1%)	44
≥5 year	2(25.0%)	5(62.5%)	1(12.5%)	8
Total	11	75	14	100

Out of 100 patients, 92 patients had IDA in which 85 (92.4 %) were developmentally normal while 7 (7.6 %) had delay and in MBA out of 8 patients 1 (12.5 %) were normal while 7 (87.5%) had delay (P value= 0.000 which was highly significant) (Table 5).

Table 5: Anemia / developmental delay.

Anemia	Developmental delay		
	Normal	Delay	Total
Iron deficiency anemia	85(92.4%)	7(7.6%)	92(100%)
Megalo blastic anemia	1(12.5%)	7(87.5%)	8(100%)
Total	86(86%)	14(14%)	100(100%)

DISCUSSION

The profile, patterns and the morphological types of anaemia were analysed in the present study of 100 cases of anaemia were compared with the other similar studies.

In the present study, more number of male children was found to be anaemic as compared to female children. A similar gender distribution was noted in the study by Gomber et al, whereas in a study conducted by Kapur et al, there was no significant difference found in the gender distribution.^{6,7}

In the present study, more patients were affected of age group 3-4 years which was similar with the study done by Pita GM et al, whereas in a study by Pandey A et al. 8.9 1-2 years age group were more affected which does not correlate with the present study. The difference is may be due to affected population in a particular area.

In the present study, out of 100 cases, 44 (77.3%) cases were of moderate anaemia with p value of 0.813 which was not significant and which correlates with the study by Gibel HN et al, in which 38.8% had moderate anaemia. The difference is due to other factor that lead to anaemia is pica whereas in Pandey A et al, showed 46% had moderate anaemia with p value 0.07 which does not correlate with present study.^{9,10}

The per cent distribution of various morphological types of anaemia found in our study were microcytic hypochromic anaemia (92%), and macrocytic hypochromic anaemia (8%) which was similar to the study done by Kapur D et al, with maximum percentage of microcytic hypochromic anaemia which correlate with the present study.¹¹

In the present study, 92 (92%) patients had iron deficiency anemia in which 7(7.6%) had developmental delay whereas out of 8(8%) patients had megaloblastic anaemia in which 7(87.7%) had developmental delay with a p value of 0.000 which was highly significant which shows that anaemia can lead to developmental delay which was similar with the study done by Palti H et al, who found that children who were moderately anaemic showed lower cognitive development score at both 3 and 5 years of age than compared to non-anaemic children of the same age which correlates with the present study (P-Value= 0.000 which was highly significant). 12

Other study conducted by Cantwell RJ et al, on infants of 6-18 months who were treated with iron and examined at 6 and 7 years of age, the recorded observations indicated that the subjects who were formerly anaemic exhibited difficulty in the development of motor control tasks.¹³ The difference in this study is in the age group and after given iron therapy the patients were evaluated which was not possible in the present study due to poor follow up of patients.

Thus, the present study indicates that anaemia has its impact on developmental outcome in children and mainly in age group 3 to 5 years. Other factors that contribute are breastfeeding, complementary feeding and socioeconomic status which lead to poor developmental outcome. Further research, by comparing subgroups of the population with high and low prevalence, is required to determine potential risk factors associated with the prevalence of childhood anaemia. Further study is also needing to determine appropriate target intervention. Therefore, it is highly recommended that this age group should be compulsorily screened for anaemia to avoid its deleterious effects on growing children.

CONCLUSION

Anemia still continues to be a major health problem in developing countries like India and paediatric age group is most commonly affected. Several years elapse between onset of symptoms and in arriving at an accurate diagnosis due to lack of primary health care services, particularly in rural India. Rural population should be educated to improve their living standards and to recognize symptoms of illness at an early stage. It is highly recommended for the medical health personals to make an appropriate diagnostic approach towards anaemia, where in clinical examination and peripheral blood smear examination are at the baseline in the

diagnostic algorithm and hold a key position. Also, technological advances should be looked upon. If properly implemented, these recommendations can definitely help in reducing the burden of anaemia in this age group and hence the morbidity and mortality.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Jain S, Chopra H, Garg Sk, Bhatnagar M, Singh JV. Anaemia in children: Early iron supplementation. Pediatr. 2000;67:19-21.
- 2. Irwin JJ, Kirchner JT. Anaemia in children. Am Fam Physician. 2001;64(8):1379-86.
- 3. Sachdev HPS, Chandhary P. Nutrition in children: Developing country concerns Reprint. 1995;1.
- 4. National Family Health Service-2 1998-1999, International Institute of Population sciences, Mumbai, 2000.
- Walker SP, Wachs TD, Gardner JM, Lozoff B, Wasserman GA, Pollitt E, et al. Child development: risk factors for adverse outcomes in developing countries. Lancet. 2007;369:145-57.
- 6. Gomber S, Bhawna, Madan N, Lal A, Kela K. Prevalence and etiology of nutritional anaemia among school children of urban slums Indian J Med Res. 2003;118:167-71.

- 7. 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.
- 8. Pita GM, Jiménez S, Basabe B, García RG, Macías C, Selva L, et al. Anemia in children under five years old in Eastern Cuba, 2005-2011. MEDICC Rev. 2014;16(1).
- 9. Pandey A, Pandey M, Dombale VD, Sawke GK, Sawke N, Khairker P, et al. Haematological Profile of Anaemia in Children in Southern Rural India PJSR. 2016:9(1):48-52.
- Giebel HN, Suleymanova D, Evans GW. Anemia in Young Children of the Muynak District of Karakalpakistan, Uzbekistan: Am J Public Health. 1998;88:5.
- 11. Kapur D, Agarwal KN, Sharma S, Kela K, Kaur I. Indian Pediatr. 2002;39:136-44.
- 12. Palti H, Meijer A, Adler B. Learning achievement and behaviour at school of anemic and non-anemic infants. Early Hum Dev. 1985;10:217-23.
- 13. Cantwell RJ. The long term neurological sequelae of anemia in infancy 1974 Pediatr Res. 342:68.

Cite this article as: Jaiswal N, Kalra N, Chaudhary SR, Mohan N. Clinico-epidemiological profile of nutritional anaemia and its impact on developmental outcome in children aged 6 months to 5 years. Int J Contemp Pediatr 2018;5:973-6.