

ORIGINAL ARTICLE

Prevalence of iron deficiency anaemia among school going children

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ABSTRACT:

Background: The study was conducted to assess the prevalence of iron deficiency anaemia among school going children. **Material and methods:** In this study, 1000 students participated. As part of an effort to validate a portable equipment for haemoglobin determination, this cross-sectional investigation was conducted. When required, the data from the questionnaire were prearranged in a certain format to ensure accuracy and facilitate data collection. Anaemia was the variable being measured in this investigation. **Results:** In this study, there were 500 male subjects and 500 female subjects. 633 out of 1000 subjects presented with iron deficiency anaemia. Most of the subjects were females. **Conclusion:** Majority of the school going children showed iron deficiency anaemia.

Keywords: iron, anaemia, children.

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INTRODUCTION

Iron in the form of haem is vital to many metabolic functions including oxygen transportation in haemoglobin. Iron is also a component of multiple enzymes, including cytochromes, necessary for energy generation and drug metabolism.¹ Through the donation or acceptance of an electron, iron exists in either a reduced ferrous (Fe²⁺) or an oxidative ferric (Fe³⁺) state. The majority of functional iron is contained in haemoglobin, with smaller quantities found in myoglobin and cytochromes.² The liver, which is the site of production of iron transport proteins, contains the largest non-functional iron stores either as ferritin or hemosiderin.³ Ferritin is both diffuse and soluble, and is the primary iron storage protein.⁴ Hemosiderin is similar in structure, but has more iron relative to protein and is insoluble.³ Iron is also stored in reticuloendothelial cells of the bone marrow and spleen, but is not commonly stored in the bone marrow of cats.¹⁻³

30%–50% of anaemia in children and other groups is caused by iron deficiency.⁵ Because 1.6 billion people are anemic⁶, several hundred million manifest iron deficiency anaemia. As such, iron deficiency is the most common cause of anaemia worldwide. Iron deficiency anaemia afflicts a subset of the two billion people worldwide who are nutritionally iron deficient (Viteri 1998).⁷ Therefore, the health burden of iron deficiency may be extrapolated from the global prevalence of anaemia. Anaemia is not distributed evenly throughout the world, as there is a fivefold increase in underdeveloped geographies. In some global regions, the prevalence of anaemia among young children is >50% (Table 1) and even approaches 100% in some locales (Lutter 2008).⁸ In the same regions, 40%–50% of the population remains anemic at all ages with the exception of

nonelderly men.⁷ This study was conducted to assess the prevalence of iron deficiency anaemia among school going children.

MATERIAL AND METHODS

In this study, 1000 students participated. As part of an effort to validate a portable equipment for haemoglobin determination, this cross-sectional investigation was conducted. When required, the data from the questionnaire were prearranged in a certain format to ensure accuracy and facilitate data collection. Anaemia, was the variable being measured in this investigation. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis.

RESULTS

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Males	500	50%
Females	500	50%
Total	1000	100%

There were 500 males and 500 females in this study. The mean age of the children was 13.1 years.

Table 2: Incidence of Iron Deficiency Anaemia.

Incidence	Number of subjects	Percentage
Present	633	63.3%
Absent	367	36.7%
Total	1000	100%

633 out of 1000 children presented with iron deficiency anaemia. Hence; the prevalence was 63.3 percent. Most of the subjects were females.

DISCUSSION

Iron deficiency anaemia (IDA) is by far the most common anaemia worldwide. World Health

Organization (WHO) estimates that close to two billion people or 25% of the world's population are anemic, and approximately half of them suffer from IDA.⁹ Besides, for every patient with IDA, there is at least one more with iron deficiency without anaemia. Therefore, there are more than two billion people with iron deficiency with or without anaemia, and most of them reside in resource-poor countries.¹⁰ Additional causes of anaemia in low-income countries include other nutritional deficiencies (vitamin B12, folic acid, riboflavin), chronic diseases, parasitic infections like malaria, haemoglobinopathies, and lead poisoning.¹¹ Since anaemia is the most important indicator of iron deficiency, the terms ID and IDA are often used interchangeably. However, iron deficiency may develop in the absence of anaemia and the tissues may be affected from this condition. Iron deficiency is manifested in different stages. If iron requirement is below intake, iron stores are reduced primarily. After the iron stores are reduced, haemoglobin levels may stay normal for a while which means that iron deficiency is observed in the absence of anaemia. At this time, only plasma ferritin level and plasma transferrin saturation are reduced. Negative iron balance which continues after iron stores are exhausted is manifested with decreased haemoglobin. Conclusively, reduced body iron stores has been defined as ID and worsening of this condition and development of anaemia is defined as IDA.¹² This study was conducted to assess the prevalence of iron deficiency anaemia among school going children. In this study, there were 500 male subjects and 500 female subjects. Iron deficiency anaemia was discovered in 633 out of 1000 children. Hence; the prevalence was 63.3 percent. Siegel EH et al.¹³ described the distribution of haemoglobin and prevalence of anaemia in Nepali children living in the Terai region by potential risk factors for deficiency. Participants were weighed and measured and had their blood drawn. Their mothers contributed demographic, morbidity, and feeding data. There were 569 4- to 17-month old children. Statistical models were based on 490 children. Anaemia was prevalent: 58% of the children had a haemoglobin < 105 g/L. Iron deficiency anaemia (anaemia with erythrocyte protoporphyrin (EP) > 90 µmol/mol haem) was present in 43% of the children. Severe anaemia was rare: less than 2.0% of the children had a haemoglobin < 70 g/L. The mean 35 (SD) haemoglobin concentration was 101 (12.5) g/L. Stunting and wasting were prevalent: 30.8% were stunted (length-for-age Z-score < -2) and 18.1% were wasted (weight-for-length Z-score < -2). Bivariate analyses revealed age, caste, socio-economic status (SES), dietary diversity, stunting, and underweight were associated with haemoglobin concentration and/or anaemia. In multivariate models with and without EP, age and caste were found to be strong predictors of both haemoglobin concentration and anaemia. Anaemia and iron deficiency increased strongly with

age and low caste status among the study children. The data reveal the importance of targeting interventions to children in the first year of life before they become anemic and iron deficient. Ferreira MU et al.¹⁴ performed a cross-sectional survey in the agricultural settlement known as Ramal do Granada in Acre, Brazil (elevation, 100–208 m above sea level). All 473 inhabitants were invited to participate, and 467 (98.7%) respondents in 113 households were enrolled. Serum ferritin and soluble transferrin receptor concentrations in 379 (93.6%) participants were measured using an enzyme immunoassay (Ramco, Houston, TX). Attributable fractions were estimated for risk factors for anaemia associated with AORs significantly greater than 1 ($P < .05$); AORs were converted to adjusted prevalence ratios, as previously described. Anaemia (overall prevalence, 16%) was most common in school children and women, no cases of severe anaemia (haemoglobin < 70 g/L) were diagnosed. Anaemia was uniformly prevalent across all socioeconomic strata (16.1% among the poorest and 18.2% among the least poor). Iron deficiency was found in 19% of subjects, with the highest prevalence among school children and women, but only 30% of iron-deficient subjects were anemic. The overall prevalence of iron deficiency anaemia was 5.6%.¹⁴

CONCLUSION

Majority of the school going children showed iron deficiency anaemia.

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