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Prevalence of anemia in the school children of Kattankulathur, Tamil Nadu, India

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Abstract

Anemia is the most widespread nutrition problem in the world and has predominance in developing countries like India, particularly in children and women. The magnitude of the anemia has been well-documented in pregnant women and infants, however, there is no data on the prevailing occurrence of anemia in school children. The main objective of this study was to estimate the prevalence of anemia and its correlation to variables such as age, gender and body mass index in school children of Kattangulathur, Tamil Nadu, India. A total of 900 children in the age group of 8-16 years were included in this study. Parental consent was obtained in the written format. Blood was collected by finger prick and the hemoglobin was determined by cyanmethemoglobin method. A preplanned questionnaire was used to collect the health details of the children. The children were grouped according to the age. Prevalence of anemia as per the World Health Organization (WHO) recommended cutoff value of hemoglobin, among these children was 52.88%. The frequency of the prevalence of anemia was significantly higher amongst girls as compared to the boys. Results of the study population reveal that 52.88% were anemic, girls (67.77%) were 32.2% higher than the boys (35.55%) and anemic children were underweight. Therefore our study results suggest that all the school children should be screened periodically and appropriate measures should be taken..

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Full Text

Introduction

Nutritional anemia refers to a condition in which the hemoglobin content of the blood is lower than normal as a result of a deficiency of one or more essential nutrients, regardless of the cause of such deficiency. [1] Anemia is associated with less than optimal behavior in infants and children. Anemia is a nutrition problem worldwide and its prevalence is higher in developing countries when compared to the developed countries. [2],[3]

Young children and pregnant women are the most affected, with an estimated global prevalence of 43% and 51% respectively. [4] Anemia prevalence among children of school-going age is 37.70%, among non-pregnant women 35% and among adult males 18%. [5] There are few data concerning anemia in adolescents and in elderly people which precludes any precise estimates for these two groups but it is thought that the prevalence rate for adolescents is close to that for adult females and the rate for the elderly is slightly higher than that for adult males. [6]

The prevalence of anemia in the developing countries tends to be three to four times higher than in the developed countries. [7] Recent studies on the prevalence of anemia have been on preschoolers only, [8],[9] so there is a need for more studies related to anemia in school children. Anemia affects the physical and mental development of an individual leading to decreased working capacity, which in turn affects the development of the country. [10] Since the technological advancement and economic development of a nation depend heavily on its trained human resources, the behavioral effects of anemia are highly relevant. Consequently, if anemia is highly prevalent in a country, it can substantially affect its intellectual and economical potential.

Anemia and physical fitness of school children of rural Hyderabad has been reported and the children who possessed normal and better hemoglobin were shown to be physically fit. [11] Prevalence of nutritional deficiency disorders among rural primary school children (5-15 years of age) and the effect of supplementation on hemoglobin and serum retinol levels and nutritional status of school children of northern India were studied. [12],[13] Prevalence of anemia among school-going adolescents of Chandigarh was reported. [14] Nutritional status of primary schoolchildren in Garhwali Himalayan villages of India was studied to assess the school-going children for anemia and malnutrition. [15] The magnitude of the anemia has been well-documented in pregnant women and infants, however, there is scarce data on the prevailing occurrence of anemia in school children in the Kanchipuram district of Tamil Nadu. The present study was undertaken to estimate the prevalence of anemia among school children aged 8-16 years from Kattangulathur area, Tamil Nadu, India and an attempt was also made to assess its correlation to variables such as age, gender, and body mass index (BMI).

Materials and Methods

The research protocol was reviewed and approved by the Institutional Ethical committee and it complied with the Helinski Declaration revised in 1983, SRM Medical College Hospital and Research Center, SRM University, Kattankulathur, India. The study subjects were school-going children and informed consent was obtained from parents.

Study design

The study was carried out from September 2009 to February 2010. A total of 900 students from four government schools in the age group of 8-16 years participated in the study. The selected schools were within a 10-km radius of our hospital and only those schools who gave us the permission to carry out this study were included. Preliminary visits were made to the schools and the Head of teachers instructed the children to obtain their parents' consent. Only those children whose parents consented were included in the study.

Experimental procedure

Blood was collected by finger prick method, 20 micro liter of blood sample was mixed with 5 ml of Drabkin's solution at the spot by micropipette. Hemoglobin in the blood is converted into cyanometh hemoglobin. The absorbance of cyanometh hemoglobin was measured at 540 nm by photoelectric colorimeter on the same day of sample collection. Mild anemia was defined as hemoglobin level of 10-12.9 g/dL in males and 10-11.9 g/dL in females, moderate anemia was defined as hemoglobin of less than 7-9.9 g/dL and severe anemia as hemoglobin less than 7 g/dL. [10] A preplanned questionnaire was used to collect the health details of the children. Weight and height of each child was measured. BMI was computed. WHO standards were used to detect anemia in school children.

Statistical analysis

Results of the study are presented in mean \pm SD and student t test was used to compare the anemic and non-anemic children. Analysis of variance chi square test was further applied to find out the statistical significance of hemoglobin values in different groups of children using SPSS software Version 17.

Results

The study showed that the overall prevalence of anemia among children in the age between 8 and 16 years was 52.88% (476/900). [Table 1] shows the prevalence of anemia in school children of Kattangulathur. The highest prevalence of anemia was present in the age group of the ninth year for both the sexes and the minimum frequency was in the age group of the tenth year in the girls and the 13 th year for boys. Children who participated in the study did not show any symptoms like easy fatigue or dizziness.{Table 1}

[Table 2] shows the prevalence of different grades of anemia in the school children of Kattangulathur. The prevalence of anemia was very much higher in girls when compared to boys during between the age of 8 and 14 years. The anemia was graded according to WHO standards. It showed that 30.4% of girls were mildly anemic, 37.33% were moderately anemic and there were no severely anemic children diagnosed. The minimum and moderate grades of anemia were statistically significant between boys and girls between the ages of 8 and 14 and it was not statistically significant between boys and girls between the age of 15 and 16.{Table 2}

The mean hemoglobin values according to the age in both sexes are shown in [Table 3]. The mean hemoglobin values of boys and girls aged between 11 and 15 were highly significant ($P < 0.05$). The mean hemoglobin values of boys and girls at age 8,9,10 and 16 were not statistically significant. The mean hemoglobin values of boys between the age 8 and 10 were linearly increasing. The mean hemoglobin values of girls were not linearly increasing between the age 8 and 16.{Table 3}

[Table 4] describes the relationship between hemoglobin and BMI of school-going children. BMI is used as a criterion to classify underweight, overweight and obesity. The study results showed 5.7% children to be overweight, 45.9% children were underweight and 1% children were obese. Results showed that 44.9% obese children were anemic, 55.9% underweight children were anemic and 43.1% overweight children were anemic. [Table 4] shows that 51.3% children with normal BMI were found to be anemic.{Table 4}

Discussion

The results of the study indicated that the prevalence of anemia was 52.88% in the school children of Kattankulathur. The results of the study showed that 52.88% were anemic, the prevalence of anemia in girls (67.77%) was higher than in the boys (35.55%). The result of the study corroborated the findings of Verma et al., that the prevalence of anemia in the 5-15 years age group of urban school children in Punjab was 51.5%. [16] Similarly, a study by Gomber et al., stated that the prevalence of anemia in school children from urban slums, aged 5-10.9 years was 41.8%. [17] The prevalence of anemia in our study was higher in underweight children when compared to children with normal BMI, and obese children.

According to WHO, if the hemoglobin concentration is above 10 g/dL but below the cutoff level it is mild anemia, moderate anemia when the concentration is between 7 and 10 g/dL and severe anemia when it is below 7 g/dL. Prevalence of anemia in girls was higher than in the boys as observed in the results of significantly higher prevalence amongst girls (23.9 %, 141/590) as compared to the boys (7.7%, 41/530). [18] It was observed that 77.7% of tribal children of Mysore District, Karnataka were suffering from anemia and also indicates similar results that the prevalence of anemia was significantly higher in girls when compared to boys (girls 83.33% and boys 70.89%). [19] The overall prevalence of anemia among school-going adolescent girls of urban Kathmandu, Nepal was 54.4%. [20] Another study of 393 children reported the prevalence of 66.4 % anemia amongst primary school children (6-11 years) in the national capital territory of Delhi [21]

It is evident from our results that a significant proportion of apparently healthy children suffer from anemia. The rising trend of consuming snack and junk food which supply empty calories is also responsible for healthy children being anemic.

A study in young adolescent school girls documented the prevalence of anemia as 67.8% wherein the prevalence of mild and moderate anemia in the adolescent age group was reported as 32.6% and 34.7% respectively and there is no severe anemia in this age group. [22] The higher prevalence of anemia in adolescent age could be because of hormonal changes which occur at the time of onset of menarche. The prevalence of anemia is disproportionately high in developing countries due to poverty, inadequate diet, certain diseases, pregnancy/lactation and poor access to health services. [23] This further emphasizes the need for corrective measures for anemia in girls before they enter adolescence so as to compensate the additional requirement for growth and development during puberty and combat the extra losses during menstruation. According to WHO if the prevalence of anemia at community level is more than 40%, it is considered as a problem of high magnitude. [24] The prevalence of various parasitic infestations and other chronic illnesses were not studied in this survey so it is difficult to comment on the causes of high prevalence among school children. Results of the study also highlight the fact that the prevalence of anemia was more in individuals having low BMI. Continued anemic situation during adolescence especially among girls reduces their BMI resulting in growth retardation. Although the present study was not designed specifically to study all the risk factors for anemia in this population, we stipulate that the higher prevalence could be due to the poor diets with low bioavailable iron combined with worm infestation.

Conclusions

From our study population, most of the anemic children were underweight because in developing countries like India, poor bioavailability of dietary iron coupled with low intake of heme iron derived from animal foods is a major etiological factor for anemia. Our study recommended that the high prevalence of mild and moderate anemia demands due emphasis so as to bring down the total prevalence of anemia in adolescent girls and school children. They should be screened periodically and appropriate measures should be taken.

References

- 1 National consultation of control of nutritional anemia in India. Department of Family Welfare (Maternal Health Division). Ministry of health and family welfare. New Delhi: Nirman Bhawan; 1998.
- 2 Djokic D, Drakulovic MB, Radojicic Z, Crncevic Radovic L, Rakic L, Kocic S, *et al*. Risk factors associated with anemia among Serbian school-age children 7-14 years old: Results of the first national health survey. *Hippokratia* 2010;14:252-60.
- 3 Hioui ME, Farsi M, Aboussaleh Y, Ahami AOT, Achicha A. Prevalence of malnutrition and anemia among preschool children in Kenitra, Morocco. *Nutr Ther Metab* 2010;28:73-6.
- 4 Iron deficiency anemia, Assessment prevention and control. A guide for programme managers. World Health Organisation; 2001. NHD/01.3.
- 5 Kotecha PV, Nirupam S, Karkar PD. Adolescent girls' anemia control programme, Gujarat, India. *Indian J Med Res* 2009;130:584-9.
- 6 Sharman A. Anemia testing in population-based surveys: General information and guidelines for country monitors and program managers. Calverton, Maryland USA: ORC Macro; 2000.

- 7 Gillespie S. Major issues in the control of iron deficiency Micronutrient Initiative/UNICEF, USA.
- 8 Sidhu S, Kumari K, Uppal M. Prevalence of anemia in Schedule Caste preschool children of Punjab. *Indian J Med Sci* 2002;56:218-21.
- 9 Kapoor D, Agarwal KN, Sharma S, Kela K, Kaur I. Iron status of children aged 9-36 months in an urban slum Integrated Child Development Services project in Delhi. *Indian Pediatr* 2002;39:136-44.
- 10 UNICEF/United Nations University/World Health Organization. Iron deficiency anemia. Assessment, Prevention, and Control: A guide for programme managers. Document WHO/NHD/01.3. Geneva: World Health Organization; 2001.
- 11 Satyanarayana K, Pradhan DR, Ramnath T, Rao NP. Anemia and physical fitness of school children of rural Hyderabad. *Indian Pediatr* 1990;27:715-21.
- 12 Awate RV, Ketkar YA, Somaiya PA. Prevalence of nutritional deficiency disorders among rural primary school children (5-15 years). *J Indian Med Assoc* 1997;95:410-1, 415.
- 13 Jood S, Gupta M, Yadav SK, Khetarpaul N. Effect of supplementation on haemoglobin and serum retinol levels and nutritional status of school children of northern India. *Nutr Health* 2001;15:97-111.
- 14 Basu S, Basu S, Hazarika R, Parmar V. Prevalence of anemia among school going adolescents of Chandigarh. *Indian Pediatr* 2005;42:593-7.
- 15 Osei A, Houser R, Bulusu S, Joshi T, Hamer D. Nutritional status of primary schoolchildren in Garhwali Himalayan villages of India. *Food Nutr Bull* 2010;31:221-33.
- 16 Verma M, Chhatwal J, Kaur G. Prevalence of anemia among urban school children of Punjab. *Indian Pediatr* 1998;35:1181-6.
- 17 Gomber S, Bhawna, Madan N, Lal A, Kela K. Prevalence and etiology of nutritional anemia among school children of urban slums. *Indian J Med Res* 2003;118:167-71.
- 18 Basu S, Basu S, Hazarika R, Parmar V. Prevalence of anemia among school going adolescents of Chandigarh. *Indian Pediatr* 2005;42:593-7.
- 19 Jai Prabhakar SC, Gangadhar MR. Prevalence of anemia in Jenukuruba Primitive Tribal Children of Mysore District, Karnataka. *Anthropologist* 2009;11:49-51.
- 20 Tiwari K, Seshadri S. The prevalence of anemia and morbidity profile among school going adolescent girls of urban Kathmandu, Nepal. *J Nep Med Assoc* 2000;39:319-25.
- 21 Sethi V, Goindi G, Kapil U. The Prevalence of anemia amongst primary school age children (6-11 years) in national capital territory of Delhi. *Indian J Pediatr* 2003;70:519-20.
- 22 Sen A, Kanani SJ. Deleterious functional impact of anemia on young adolescent school girls. *Indian Pediatr* 2006;43:219-26.
- 23 Kaur S, Deshmukh PR, Garg BS. Epidemiological correlates of nutritional anemia in adolescent girls of rural Wardha. *Indian J Community Med* 2006;31:255-8.
- 24 Seshadri S, Gopaldas T. Impact of iron supplementation on cognitive functions in preschool and school-aged children: The Indian experience. *Am J Clin Nutr* 1989;50:675-86.

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