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Prevalence of Anemia in School Going Children: A Prospective Study

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Abstract
Background: *Anemia is one of the most important health problems throughout the world. Adolescent children are one of the major risk groups for anemia. Low oxygenation of brain tissues, a consequence of anemia, may lead to impaired cognitive function, growth and psychomotor development, especially in children. Hence; we planned the present study to assess the prevalence of anemia among school going children.*
Materials & Methods: *The present study included assessment of prevalence of anemia in school going children. Net sample size was 200 students. For collection of the health details of the children and the socio-economic status of the patients, we used a preplanned questionnaire. Complete physical examination was done for all children. Venous blood sample was collected in all children under strict aseptic precautions in EDTA anticoagulant for hematological investigations. Recent WHO guidelines were used for grading the anemia on the basis of haemoglobin levels. All the results were recorded and analyzed by SPSS software.*
Results: *We included a total of 200 school going children in the present study. Severe anemia was present in 0.019 percent of the males study population; while it was present in 0.030 percent of females of the study population.*
Conclusion: *Anemia was present in higher proportion in females*
Keywords: *Anemia, Prevalence, School children.*

Introduction

Anemia is one of the most important health problems throughout the world. Adolescent children are one of the major risk groups for anemia. Most anemia cases develop gradually and progressively and are due to iron deficiency.[1- 3] In early childhood, bad feeding habits, especially during the weaning period, exacerbate the problem. Anemia frequently develops as breast milk is replaced by foods that are poor in iron and other nutrients, including vitamin B12 and folic acid.[4,5] Low oxygenation of brain tissues, a consequence of anemia, may lead to impaired cognitive function, growth and psychomotor development, especially in children. Infants, under 5-year-old children and pregnant women have

greater susceptibility to anemia because of their increased iron requirements due to rapid body growth and expansion of red blood cells.[6] Hence; we planned the present study to assess the prevalence of anemia among school going children.

Materials & Methods

The present study was planned in the department of physiology the present study is conducted in Department of pediarics, Bangur District Hospital, Pali, Rajasthan, India Itincluded assessment of prevalence of anemia in school going children. Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. This was a one year prospective study. We included all the nearby government schools in the vicinity of the institution. School children of age group of 8 to 12 years were included. Sample size included a total of 50 students from each school, and a total of four schools were included. Net sample size was 200 students. We made preliminary visits to the schools and instructed the teachers to obtain consent from the parents. Exclusion criteria for the present study included students with history of any systemic illness and students with any known drug allergy. For collection of the health details of the children and the socio-economic status of the patients, we used a preplanned questionnaire. Complete physical examination was done for all children. Venous blood sample was collected in all children under strict aseptic precautions in EDTA anticoagulant for hematological investigations. Hemoglobin (Hb) estimation was done using cyanmethemoglobin method 20micro liter of anticoagulated blood was added to 5ml of freshly made standardized Drabkin's solution in a vial. For mixing of the solution, this was inverted several times, followed by allowing it to stand for 10 minutes. Recent WHO guidelines were used for grading the anemia on the basis of haemoglobin levels.[7] We also performed peripheral blood smear film in all the patients, followed by staining with Leishman's stain. All the results were recorded and analyzed by SPSS software. Chi- square test was used for assessment of level of significance.

Results

We included a total of 200 school going children in the present study. Out of 200, 102 were males while the remaining 98 were females. Mild anemia was found to be present in 35 children, while moderate and severe anemia was found to be present in 65 and 5 children respectively. Anemia was found to be present more among females in comparison to males; however; the results were non- significant. Severe anemia was present in 1.96 percent of the males study population; while it was present in 3.06 percent of females of the study population.

Table 1: Distribution of subjects

Parameter	No. of subjects
Males	102
Females	98
Total	200

Table 2: Prevalence of anemia

Grading	No. of students
Normal (>11.5gm/dl)	95
Mild (11- 11.4gm/dl)	35
Moderate (8- 10.9gm/dl)	65
Severe (< 8gm/dl)	5

Graph 1: Prevalence of anemia

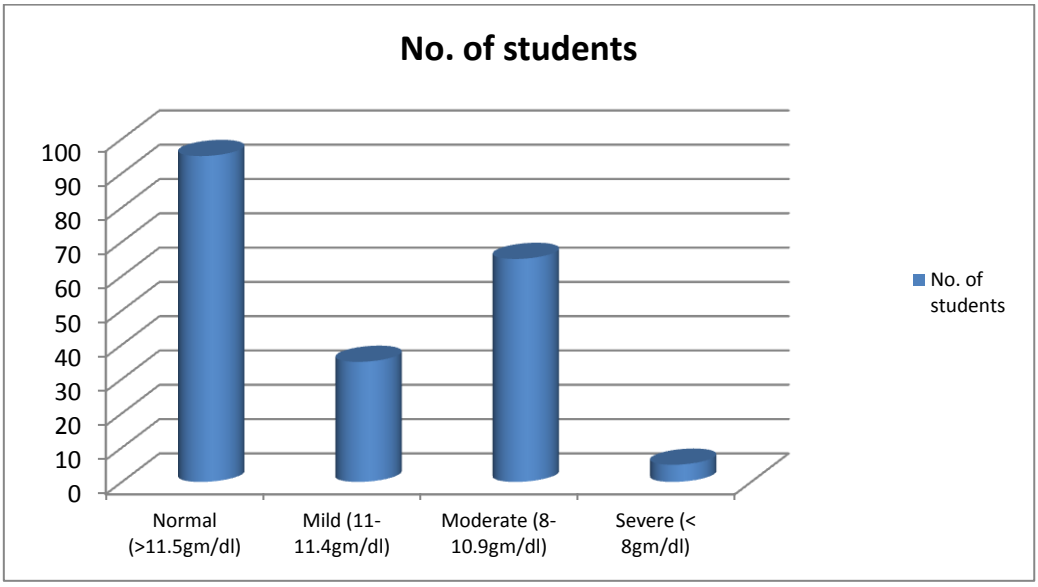

Table 3: Prevalence of anemiaamong males and females

Grading	Males	Females	Total	p- value
Normal (>11.5gm/dl)	55	42	95	0.80
Mild (11- 11.4gm/dl)	15	20	35	
Moderate (8- 10.9gm/dl)	30	33	65	
Severe (< 8gm/dl)	2	3	5	

Discussion

In the present study, we found that prevalence of anemia was higher among female school going children in comparison to the male children. Işık Balcı Y et al evaluated the prevalence and risk factors of anemia among adolescents in Denizli where Mediterranean cuisine (fresh fruit and vegetables) is adopted. They accepted hemoglobin values below 12 g/dl for girls and 13 g/dl for boys as the criteria of anemia. We recorded a detailed history including nutritional habits, consumption of animal source foods especially red meat, consumption of fresh fruit and vegetables, presence of parasitic infestation, psychosocial status, school success and any materials consumed except ordinary food. They investigated the prevalence of anemia in 1120 children (672 girls and 448 boys), aged 12 to 16 years. They found that the overall prevalence of anemia was 5.6%. 8.3% of the girls and 1.6% of the boys were anemic. We diagnosed iron deficiency anemia in 37(59%) anemic patients and combined iron deficiency and vitamin B12 deficiency anemia in 26 (41%) anemic patients. None of the patients had folic acid deficiency. Their results suggested that the socioeconomic status of the family, traditional eating habits of the region, the fear of gaining weight and irregular eating habits are of great importance in the development of adolescent anemia in Denizli.[8] Dos Santos RF et al evaluated the prevalence of anemia and associated factors in patients of a children's hospital in Recife. A cross-sectional study was developed involving 595 male and female children aged from 6 to 59 months old, who were hospitalized in 2007. Children with a hemoglobin concentration less than 11 g/dL were considered anemic. The relationship between studied variables and anemia was evaluated by Poisson regression analysis. There was a 56.6% prevalence of anemia (95% CI: 46.6-54.6). Anemia was significantly correlated with low weight (Prevalence ratio - PR = 1.39; 95% CI: 1.18-1.64), young age (PR = 2.01; 95% CI: 1.57-2.56) and a diagnosis of acute lower respiratory disease (PR = 1.57; 95% CI: 1.27-1.96). The high prevalence of anemia suggested that it may contribute as a causal factor for hospitalization, especially because the period of hospitalization

was short and the patient was likely to be anemic at the time of admission. This study stressed the importance of evaluating the overall nutritional status of patients, including their ingestion of microelements. This is especially important in children, because of their greater susceptibility to anemia.[9]

Villalpando S et al described the epidemiology and analyzed factors associated with iron deficiency anemia in a probabilistic sample of the Encuesta Nacional de Nutrición 1999 (ENN-99) [National Nutritional Survey 1999 (NNS-99)]. The sample included 8,111 children aged 1 to 12 years, and was nationally representative by rural and urban strata and by four geographical regions. Capillary hemoglobin was measured using a portable photometer (HemoCue). The analysis of the determining factors of anemia was performed by odds ratios derived from a logistic regression model and multiple regression models. The prevalence of anemia was 50% in infants < 2 years of age, with no significant differences between urban and rural strata or among regions. It varied between 14 and 22% in 6-11 year-old children and was higher in the South region and among the indigenous children. Dietary intake of iron was 50% of the recommended daily allowance in children < 2 years of age, but not in older children. Phytate (approximately 500-800 mg/d) and tannin (approximately 19 mg/d) intakes were very high in children over 7 years of age. Hemoglobin was positively associated with nutritional status of children ($p = 0.01$), socioeconomic status (p range 0.05-0.001), duration of lactation in children under 2 years of age ($p = 0.1$), and iron and calcium intake ($p = 0.02$), but not with folic acid or vitamin B12 intake. Hemoglobin was negatively associated with maternal education ($p = 0.01$) in older children, but not in those under 2 years of age. They presented evidence of an alarming national epidemic of anemia, particularly marked in children 12 to 24 months of age. The control of anemia should be considered as an urgent national concern given its grave consequences on the physical and mental development of these children and on their long-term health.[10]

Conclusion

From the above results, the authors concluded that anemia was present in higher proportion in females. However; future epidemiological studies are recommended.

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