

Original Research Article

Prevalence of anemia in Government school children aged about 10-16 years

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Abstract

Introduction: Anemia is defined as a reduction in the red blood cell volume or hemoglobin concentration below the normal range of values occurring in healthy population (2 SD below the mean for normal population) with respect to age and sex. Anemia is a common problem throughout the world and iron deficiency is the most prevalent nutritional deficiency in the world. It affects mainly the poorest segment of the population. The purpose of the study is to assess the prevalence of Anemia among Government school going children aged 10-16 years in Pammal, Chennai.

Materials and methods: This study was conducted in Government schools of Pammal, Chennai, India. It was a cross sectional study conducted from January 2017 to September 2017, aged 10-16 years. The students, parents, school authority was assured for their confidentiality of their response.

Results: Results of the study revealed that overall prevalence of anemia in 10-16 year age children was 51%, in that 64% of the samples in girls and 48% in boys. After analysis and interpretation of data, severe anemia in girls was 9% and in boys 4% and the prevalence of iron deficiency anemia was 95.3% in anemic girls and 54.1% in anemic boys.

Conclusion: The prevalence of anemia is very high in adolescent age group. Iron deficiency anemia was the most common type seen. In order to reduce the prevalence, improvement in dietary habits related to consumption of green leafy vegetables should be included in diet plan, health education, seminars on menstrual hygiene for girls should be conducted at regular intervals.

Key words

Anemia, School children, Prevalence, Iron deficiency anemia, Hemoglobin.

Introduction

Anemia is defined as reduction in the red blood cell volume or hemoglobin concentration below the normal range of values occurring in healthy population (2 SD below the mean for Normal population with respect to age and sex. Anemia was defined according to World Health Organization cut-offs as Hemoglobin level < 11g/dl for girls and < 12 g/dl for boys under 15 years of age, 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 as defined as hemoglobin of < 7 – 9.9 g/dl and severe anemia as Hemoglobin < 7 g/dl.

Anemia is one of the most prevalent diseases in the world today. It is prevalent not only in infants and pre – school children, but also in adolescent age group. Nutritional anemia is the commonest cause in any age group. Nearly 35 – 40 % non-pregnant woman suffer from anemia worldwide [1].

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 is not a specific disease, but an indication of underlying pathological process or disease of various etiologies. Among all different etiologies, nutritional anemia is the most common in all age groups, Iron deficiency is responsible for most of the nutritional deficiency anemias. Numerous studies amongst children have shown that, prevalence of anemia ranges from 52.2 to 96.5% in India.

There are relatively few studies on the prevalence of anemia in the adolescent age group. The prevalence in developing countries is very significant in adolescence and in girls. It worsens further during pregnancy, leading to problem both to mother and foetus [5].

Iron and Folate supplementation in pregnant mother is well established in our country by National Anemia Control Program, but no concerted effort has been directed so far towards the care of adolescents. The most important way to prevent anemia is to take good diet rich in Iron. Adding vitamin c should also be provided for children who can improve the absorption of Iron [6].

Finally, by establishing more studies in developing countries and proposing strategies towards prevention of anemia may reduce the burden of Anemia and its associated morbidity in this age group. By comparing prevalence in boys and girls, focus can be directed to targeted groups. Hence, strategies can be directed towards that group.

Materials and methods

The present study was a cross sectional study which was conducted in Government schools in Pammal, Chennai, Tamil Nadu.

Inclusion criteria

- All children belonging to the age group of 10 – 16 years who are in government schools.

Exclusion criteria

- Children belonging to the age outside inclusion age limit.
- Children suffering from chronic illness.

Study population

200 children aged about 8 – 16 years including both boys and girls were taken up for the study.

Methodology

- The boys and girls were questioned about their dietary habits and thorough physical examination was carried out to look at presence of pallor, glossitis and nail changes.
- Venous blood samples were collected by venepuncture in glass bottles containing EDTA.

- Serum Iron and TIBC were done by calorimetric method using semi auto analyser. Values taken to account for Iron deficiency is serum iron less than 25mcg/dl, TIBC more than 250 mcg/dl.
- A peripheral smear was done by pathologist, the results obtained by the counter were cross checked to confirm Iron deficiency.
- A written permission from SMO had been taken, permission from Principals of schools were taken. Willingness to participate was asked from students.
- School authorities were informed about the purpose of the study and written informed consent of the parent and student were taken for the study.

Results

In our study, total 200 students were included. The age group was between 8 – 16 years. Out of the 200 students, total prevalence of Anemia is 112 (51%). In these 112 anemic subjects, 64 were girls and 48 were boys. The prevalence estimated in our study was 64% in girls and 48% in boys (**Table – 1, 2**). The hemoglobin ranged from 7 – 11 gm% with a mean of 9 gm%.

Table – 1: Prevalence of Anemia in Girls.

Total no	Hb < 11 g%, HCT < 36	Hb > 11 g%, HCT > 36
100	64 (64%)	36 (36%)

Table – 2: Prevalence of Anemia in Boys.

Total no	Hb < 11 g%, HCT < 37%	Hb > 11 g%, HCT > 37%
100	48 (48%)	52 (52%)

Table – 3: Break up of Anemic adolescents according to magnitude of Anemia.

Category	Severe Anemia < 7g%	Mild to Moderate Anemia 7 – 12 g%
Girls (64%)	6 (9.37%)	58 (90.62%)
Boys (48%)	2 (4.1%)	46 (95.9%)

Table – 4: Clinical Anemia with associated symptoms in Girls and Boys.

Category	Total	Pallor alone	Pallor with Nail changes	Pallor with Glossitis	Glossitis
Girls	32	18	3	8	3
Boys	22	14	3	5	2

Table – 5: Iron and TIBC status of Anemic children.

Category	No	Iron TIBC	Normal Iron Normal TIBC
Girls	64	61(95.3%)	3(4.68%)
Boys	48	26(54.1%)	22(45.9%)

Table – 6: Interpretation of Peripheral Smear study.

Category	Total	Normocytic, Normochromic anemia	Microcytic, Hypochromic anemia	Dimorphic anemia
Girls	64	20(31.25%)	36(56%)	8(12%)
Boys	48	18(37.5%)	22(45.85%)	4(8%)

In 64 anemic girls, 6 had Hb less than 7 gm% and in 48 anemic boys 2 had less than 7 gm% (**Table - 3**).

On clinical examination, 32 girls and 22 boys were found to be anemic, pallor alone was seen in 18 girls and 14 boys. Pallor with nail changes noted in 3 girls, 3 boys. Pallor with glossitis, seen in 8 girls and 5 boys. Glossitis alone was seen in 3 girls and 2 boys (**Table - 4**).

Among 64 anemic girls, 61 girls were iron deficient and among 48 boys, 26 boys were iron deficient. The prevalence of iron deficiency was 95.3% in anemic girls and 54.1% in anemic boys (**Table - 5**). Mean serum iron was 34mcg/dl and mean TIBC was 320 mcg/dl.

In peripheral smear study 37.5% boys and 31.25% girls had early onset of iron deficiency, which was reflected by normocytic, normochromic picture. A total of 56% boys and 45.8% girls had iron deficiency anemia, while only 8% boys and 12% girls had dimorphic anemia (**Table - 6**).

Discussion

Anemia is an important nutritional problem encountered in healthy 10 – 16 year age group children. Our study revealed that, overall prevalence of anemia in children was 51%. This was similar to observations by Kapoor and Aneja [7]. Their study from Delhi revealed a prevalence of about 56%.

In Vellore district of Tamil Nadu, Rajarathnam, et al. [8] showed a prevalence of 44.8% from rural areas.

But in rural Rajasthan, Chaturvedi, et al. [9] estimated a prevalence of 73.7% in adolescent girls. Another study by Sugandhi B, et al. [10] showed 51.5% prevalence of anemia in adolescent age group. Another study by Gupta and Shah [11] in semi urban Nepalese revealed a prevalence of 68.4%.

Our study showed a prevalence of anemia in boys as 48%, but a study conducted by Goel and Gupta, et al. [12] showed prevalence of anemia in boys as 12.9%. The study was conducted in hilly urban areas reflecting their relative polycythemia. In another study done by Garg N, et al. [13], the prevalence of anemia in males 5 – 16 years was 58.3%.

In our study, 92.18% of girls who were anemic were Iron deficient. Out of 64 anemic children 59 were Iron deficient. The reasons maybe nutritional associated with irregular dietary habits and food fats which are very common in 10 – 16 year age group. In those girls who attained menarche, menorrhagia maybe the leading factor causing Iron deficiency.

Clinical examinations form a vital part of any study. In our study all the girls and boys who were included were examined by the same medical officer and was classified as anemic and not anemic based on conjunctiva and oral mucosal pallor, nail changes and associated glossitis. 30% girls and 20% boys in our study clinically were anemic based and the above findings. However following laboratory investigations 64% girls and 48% boys of our study group were found to be anemic. The reasons for difference may be due to absence of clinical pallor in these girls with mild to moderate anemia.

The serum Iron and TIBC was done on those girls who were anemic as per the hemoglobin values. 95.3% girls and 54.1% boys were found to have low serum and high TIBC which is expected in IDA. Choudary, et al. [14] in his study showed that IDA was seen in 72% adolescent girls. Agarwal, et al. [15] mentioned that around 80% girls were Iron deficient and also mentioned that menstruating girls needed more Iron.

The prevalence of anemia in the developing countries tends to be three to four times higher than in the developed countries [16]. Anemia affects the physical and mental development of

an individual leading to decreased working capacity, which in turn affects the development of the country [17].

Conclusion

The study aimed at determining the prevalence of Anemia with special reference to Iron status. The important associated risk factors and existence of morbid illness, in the school going age (10 – 16 years) of both sexes.

Our study highlights the fact that, prevalence of Anemia in age group (10 – 16 year) of girls in Anemia and was seen in about 90% of anemic children.

Pallor was the most common sign of Anemia followed by glossitis and nail changes. In some children there were no symptoms and signs of Anemia, but serum Iron was less than normal.

Recommendations

- Implementation of Health program for all school children on a regular basis.
- Health education, seminars on menstrual hygiene for girls should be conducted at regular intervals.
- Students should be advised about improvement in dietary habits, regarding consumption of green leafy vegetables in diet.

References

1. Lokeshwar MR. Pediatric hematology.in: Parthasarathy A(ed); IAP textbook of pediatric, 5th edition, New Delhi; Jaypee, 2012, p. 649-650.
2. Djokic D, Drakulovic MB, Radojicic Z, Radovic CL, 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(4): 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.
5. Sokario DD, Depees S, Boem NW, Tijima R and Yip R, Schreus, et al. Socioeconomic status and puberty are the main factors determining anemia in adoloscent girls and boys in east Jakarta, Indonesia. Eur J Clin Nutr., 2001; 55: 932-939.
6. Mohapatra S, Maity S, Behera B, Mohanty S. revalence of anemia among school going children (<12 years of age) in selected slum schools of Bhubaneswar, Odisha. IOSR Journal of Nursing and Health Science, 2014; 3(6): 42-6.
7. Kapoor G Aneja S. Nutritional disorders in adolescent girls. Indian paediatrics, 1992; 29: 969-973.
8. Jolly Rajarathnam, Rajarathnam A, Asokan Paul Jonathan. Prevalence of anemia among adolescent girls of rural Tamil Nadu. Indian Pediatric, 2000; 37: 632-636.
9. Chaturvedi S, Kapil U, Gnanasekaran N, Sachdev HPS, Pandey RM, Bhanti T. Nutrient intake amongst adolescent girls belonging to poor socioeconomic groups of rural areas of Rajasthan. Indian Pediatrics, 1996; 33: 197-201.
10. Sudhagandhi B, Sundaresan S, W William WE, A Prema A. Prevalence of anemia in the school children of Kattankulathur, Tamil Nadu, India. International Journal of Nutrition, Pharmacology, Neurological Diseases, 2011; 1(2): 184-8.
11. Shah BK, Gupta P. Weekly verses daily iron and folic acid supplementation in adolescent Nepalese girls. Arch Pediatr Adolesc Med., 2002; 156(2): 131-5.
12. Goel S, Gupta BP. A study on low prevalence among adolescent of an urban

- hilly community. Indian J of community medicine, 2007; 32: 1-3.
13. Garg N, Bhalla M. To study the prevalence of anaemia among school going children in rural area of Faridkot district, India. Int J Contemp Pediatr., 2016; 3: 218-23.
 14. Choudary V.P, Arya IS: mental development and iron deficiency status. Indian J Paediatrics, 1984; 51: 427-436.
 15. Agarwal K, Gombe S, Bishat H. Anemia prophylaxis in adolescent girls by weekly or daily iron folate supplementation. Indian Pediatrics, 2003; 40: 296-301.
 16. Gillespie S. Major issues in the control of iron deficiency Micronutrient Initiative/UNICEF, USA.
 17. 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.