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PREVALENCE OF ANAEMIA IN SCHOOL CHILDREN OF BIJAPUR, KARNATAKA

Shamshad Begum .A.Loni[1], Irshad Ahamed[1], Lizzy Sunny[2]

[1]Department of Physiology, College of Medicine, Qassim University,P.O 6666 Buraidah, KSA

2Department of Applied medical laboratories , College of Applied medical sciences , Qassim University, P.O 6666 Buraidah, KSA

Email for correspondence: owais.loni@yahoo.com

ABSTRACT

Objectives: Prevalence of anemia is high in India .Anemia is a serious health problem in Indian school children. Material and methods: Children of age group 6-15 years of Secab institution of Bijapur district of Karnataka were included in our study .Hemoglobin was determined by Salhi's method taking WHO standard .Result. Of the 1033 students included in the study, 594 were boys and 439 were girls. Overall prevalence of anemia was 67.1% with higher prevalence in girls (79.7%) as compared to boys (57.7%). The difference in prevalence was higher in the age-group >12 years (boys = 48.5%, girls = 82.5%) as compared to<_ 12 years (boys = 65.6%, girls = 78.0%). Further stratification of the age into smaller groups showed a highly significant difference in the mean hemoglobin levels between boys and girls in the age-group 6 to 8 years (boys = p=0.002). Among older children, the difference in the mean hemoglobin levels between boys and girls were highly significant for 13,14 &15 years. In 57.75% of anemic boys 41.07% had mild and 16.66% had moderate anemia .In girls of 79.33%, 53.07% were mild and 26.65% were moderate anemia. In age group of < 12 years we could find 30.69% mild and 25.1% moderate .In girls <12 years 54.2% mild, 25.87% moderate anemia. In age group of >12 years the mild prevalence of anemia in boys was 38.21 % and moderate 12.19 %. In girls 51.68% mild and 27.3% moderate. Conclusion: Anemia is a significant problem in our apparently healthy school going children of age group 6-16 years.

Keywords: Anemia, Salhi's method, Hemoglobin

INTRODUCTION

Anemia is a serious health problem in Indian school children. The nutritional status of children is a good indicator of the health status of a community[1].According to Dreyfuss et al (2000)[2] two billion children are affected with iron deficiency anemia worldwide. There is now need for the development of clear policy guidelines based on these simple and integrated intervention[3]. Anemia is estimated to effect one half (50%) of the school age children in developing countries[4].

Iron deficiency anemia affects a substantial portion of the world population pocking severe health problem to the people suffering these condition[5].

Iron deficiency is probably the only nutrient deficiency of significant prevalence in virtually all developed countries [6].

Recent studies on the nutritional status of Indian children in this age group have showed prevalence ranging from 10- 60 % [7, 8, 9,10,11,12].Adolescence is defined by WHO as the period of life between 10-19 years (WHO 1996)[13] .Causes of anemia are manifold ranging from nutritional deficiencies which includes iron deficiency, which is the world's largest nutritional problem (WHO) B12 and folate deficiency[14]. Dietary intake of haem iron (animal origin) is negligible in developing countries. Ascorbic acid, presence of food items of animal origin and low PH enhance while milk,

coffee and tea inhibit the iron absorption. Likewise, deficiency of Vitamin A limits the body ability to use stored iron, resulting in an apparent iron deficiency because Hb levels are low even though the body stores are normal[15].Daily iron requirement of children aged 6-11 years is 40ug/kg/day.[14].

Many south East Asian countries including India have started iron and folic acid supplementation in target population .Indonesia has covered 60% of its target population via iron and folic acid supplementatary[16].

We Indian still have not quantified anemia in our school age population .Hence our study is an attempt to estimate the magnitude of this problem of anemia in apparently healthy school children of age group 6-16 years of both sexes.

The united Nation's subcommittee on Nutrition held in Oslo in 1998 concluded that more data on health and nutrition of school age children are needed to assess their scale of problems [17].

However, recent studies have shown that the prevalence of malnutrition and anemia is high in these age group[18].

The most commonly used indicator of iron deficiency anemia is Hemoglobin. But it is true that not all anemias are due to iron deficiency and not all iron deficiency will reflect in anemia

Aim of study

The present study was conducted with the object of assessing the nutritional status of children of age group 6-15 years attending school in Bijapur. And to compare Hematological Measurements with the WHO standards for that age and sex groups.

MATERIALS AND METHODS

An observational descriptive cross sectional study was conducted in apparently healthy children of age group 6-15 years in Secab Intuitions of Bijapur.

Measurements

Hemoglobin was determined by Salhi's method. WHO standard values were considered to compare the value for those age groups and sexes. Salhi's method of hemoglobin estimation has been used since long[20].

Inspite of the availability of newer techniques which give more reliable and accurate results, this method is still in vogue [21.]

In our study children having Hb level <7, 7-10.5, 10.5-11.5 and >11.5 were classified as having sever, moderate, mild and no anemia respectively[22] (WHO 2001).

Statistical analysis_– was done by statistical package for SPSS software .Mean and SD of mean was computed for each group and sex

RESULTS

The study was carried out in apparently healthy school children of age group 6-16 years attending the schools of Secab institution of Bijapur district of South India. Relevant history was taken and completes physical examination done.

Of the 1033 students included in the study, 594 were boys and 439 were girls. Overall prevalence of anemia was 67.1% with higher prevalence in girls (79.7%) as compared to boys (57.7%). The difference in prevalence between boys and girls were higher in the age-group above 12 years (boys = 48.5%, girls = 82.5%) as compared to 12 years or below 12 years (boys = 65.6%, girls = 78.0%). Further stratification of the age into smaller groups showed a highly significant difference in the mean hemoglobin levels between boys and girls in the age-group 6 to 8 years (boys = p=0.002). Among older children, the difference in the mean hemoglobin levels between boys and girls were highly significant for 13, 14, &15 years (p=0.001), In the age group of 6-15 years our study showed the prevalence of Anemia of the total children screened (N=1033), 67.1% had Hb level below the normal (12 g dl) values, indicating anemia, out of which 57.7% were boys and 79.73% were girls.

In 57.75 of anemic boys 41.07% had mild and 16.66% had moderate anemia .In girls of 79.33%, 53.07% were mild and 26.65% were moderate anemia .In age group of < 12 years we could find 30.69% mild and 25.1% moderate .
In girls <12 years 54.2% mild and 25.87% moderate.
In age group of >12 years the mild prevalence of anemia in boys was 38.21 % and moderate 12.19 %
In girls it was 51.68% mild and 27.3% moderate out of which none had severe anemia...

Table 1 of our study shows the number of school going children selected. Of 1033 children 594 boys (57.7%) and 439 girls (42.5%) of age group 6-15 years.
Among 6-15 years age groups children selected highest number of children was in the age group of 10 years and 12-13 years.

Table 2 of our study shows the overall % of anemia in the school children.
Higher Prevalence of anemia was found in girls (79.7%) as compared to boys (48.5%).Among the girls of 6-15years high prevalence of anemia was found in age group of above 12 years. When compared to below 12 years group (78%).
Among the e boys higher prevalence was seen in <12 years group (65.6%) when compared to >12 years (48.5%).

The mean hemoglobin values according to the both age in both sexes are shown in table 3: The mean hemoglobin values of boys and girls aged between 13 and 15 years were highly significant
The mean hemoglobin values of boys and girls at age of 6,12 were not significant .
The overall mean hemoglobin values between the boys and girls were highly significant.
Table 3 depict the age wise mean_+SD of Hb with P value of <0.0001 as statically significant. Higher prevalence of anemia was found in girls of age groups 9 and 14 years, and in boy of 9 years.
Lowest prevalence of anemia was seen in boys of age group 15 years (18.75%).
Lowest prevalence of anemia was seen in boys of age group 15 years (18.75%).
Overall % of prevalence o f anemia in all age group were found to be 79.73% and boys 57.7% .Overall mild anemia in boys was 71.1% and moderate anemia 28.86%.Overall % of mild anemia in girls was 66.57% and moderate anemia was found to be 33.4%.compared to boys moderate anemia was in higher % in girls.
Statically significant value was seen in age groups of 13-15 years when compared between both sexes.

DISCUSSION

It is evident from our result that significant populations of apparently healthy children suffer from anemia. There are very few data on the impact of undernutrition and anemia in school of age group of 6-15 years .The nutritional status of children is a good indicator of the health status of the community[1.]

Apparently healthy school going children of lower and middle socioeconomic status in India are the one most neglected as far as health is concerned. Causes of anemia are manifold ranging from nutritional deficiency which includes iron deficiency, which is the world's largest nutritional problem (WHO), B12 and folate[14]. The most commonly used indicator of iron deficiency is Hemoglobin.
According to Stdtzfus RJ et al anemia is estimated to affect 50% of the school going children in developing countries[4].
Correct estimation combined with the challenges of limited human and financial resources add to the complexity of combating iron deficiency in developing countries (WHO) [13].
Adolescent mainly girls, are especially vulnerable to iron deficiency due to low intake and absorption of iron and increased iron retirements for growth and replacement of menstrual blood loss[23].

Global prevalence of anemia among school age children is 37 % .It is 46 % in developing regions with highest in South Asia and Africa[14].

Our study is an attempt to estimate the magnitude of this problem of anemia in apparently healthy school children of age 6-15 years of both sexes.

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 anemia is disproportionately high in developing countries due to poverty, inadequate diet, certain diseases, pregnancy, lactation and poor access to health series[25].

Recent studies on the nutritional status of Indian children in this age group have showed prevalences ranging from 10% to 60%.[7, 8, and 9,10,11,12]

Anemia prevalence among children of school age is 37.70 %[26].

The over result of our study indicated 67.1% of anemia in the school children of age group 6-15 years. The prevalence of anemia in girls was higher 79.7% when compared to boys 57.7%.The prevalence of anemia was higher in girls 82.5% for girls >12 years when compared with boys of same age 48.5%.Similarly in girls <12 years prevalence of anemia is 78% when compared with boys of same age group 65.6%.

The results of our study corroborated the findings of Verma et al, that the prevalence of anemia in 5-25 years of age groups of urban school children ,in Punjab was 51.5% [27].

Similarly a study stated that the prevalence of anemia in school children from urban slums aged 5-10.9 years was 41.8%[28]. Similar prevalence is reported by CMS Rawat *et al.* [29] at Meerut. A higher prevalence was noted by J Rajaratnam *et al.* in Tamil Nadu[30]. Toteja GS *et al.* found 90.1% prevalence of anemia among adolescent girls from 16 districts of India, with 7.1% having severe anemia[31]. Bulliyy *et al.* [32] found 96.5% prevalence among non school going adolescent girls in three districts of Orissa, of which, 45.2%, 46.9%, and 4.4% had mild, moderate, and severe anemia. They found significant association between Hb concentration and the educational level of girls, their parents' family income, and body mass index.

One study examined 368 Orang Asli children aged 2–15 years living in eight villages in the state of Selangor and found that 41.5% were anemic (Hb < 120 g/L).[33]

And B.Sudhagandhi et al stated that overall prevalence of anemia in age group of 8-16 years was 52.88 %(in girls 67.7% and boys 38%)[34]

It was observed that 77.7% of tribal children of Mysore District, Karnataka were suffering from anemia and also indicated similar results that the prevalence of anemia was significantly higher in girls when compared to boys (girls 83.33% and boys 70.89%)[35].

The overall prevalence of anemia among school going adolescent girls of urban Kathmandu, Nepal was 45.4%[36].

Another study reported the prevalence of anemia of 66.4% amongst primary school children 6-11 years in national capital territory of Delhi[37].

A single study in Kelaniya, Sri Lanka compared Veddah (tribal) children to Sinhalese (non-tribal) children between the ages of 6 and 15 years and found anemia (Hb < 115 g/L) was present in 67% of Veddah children compared to 36% of Sinhalese children [38] .It is evident from our results that a significant population of apparently healthy children suffers from anemia. Our result also corroborated with the study documented by Sena et al as 67.8% where in the prevalence of anemia of mild and moderate as 32.6% and 34.7% respectively and no severe anemia in this age group[39].

However Zimmermann et al.[40] (2003) suggested lower prevalence's of anemia among rural school age. .Children in a mountainous region from northern Morocco was 35 per cent. The frequency of iron deficiency anemia is not uniform in the same country (Morocco) as well as in different global regions.

Similar study was done by Ruchika Handa et al in the age group of 7-10 years and showed that the

prevalence of anemia was 65.33%, out of which 53.33% had mild and 12% moderate and none had severe anemia.[19]

Our study of 67.1% was close to that of Ruchika Handa et al[19] In India, the National Nutritional Anaemia Prophylaxis Programme (NNAP) has been in operation for more than 30 years, yet anemia remains a major public health problem.[41]

The effectiveness of daily iron-supplementation programs has been questioned because of poor efficiency of health services and lack of compliance by targeted groups[42].The study by Arlappa et al in West Bengal found that none of the rural preschool children (indigenous and non-indigenous) had received the government-funded iron plus folic acid tablets, indicating that strategies and funds to improve administrative efficiency and ensure need of transparency[41]

Limitation of our study

Our results could have much better and accurate if the Hb estimation was done by cynometh hemoglobin method. Prevalence of various parasitic infestations and chronic illnesses were not considered. A comprehensive study including anthropometric data, biochemical data, clinical sign and dietary intake data among the children will give better insight.

CONCLUSION

In our study more than 50% were anemic and higher prevalence of anemia was found in girls compared to boys of the same age groups. This may be due to India being a developing country, poor bioavailability of dietary iron, coupled with low intake of haem iron derived from animal sources.

Recommendations

There is now need for the development of clear policy guidelines based on these simple and integrated intervention[25.]

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Table 1: Distribution of students by age and sex

Age	Boys		Girls		Total	
6	4	0.7	0	0.0	4	0.4
7	0	0.0	13	3.0	13	1.3
8	11	1.9	2	0.5	13	1.3
9	46	7.7	47	10.7	93	9.0
10	107	18.0	109	24.8	216	20.9
11	57	9.6	30	6.8	87	8.4
12	134	22.6	67	15.3	201	19.5
13	147	24.7	93	21.2	240	23.2
14	40	6.7	21	4.8	61	5.9
15	48	8.1	57	13.0	105	10.2
Total	594	100.0	439	100.0	1033	100.0

Table 2: Prevalence of anemia by sex and broad age-group

Sex	No	Normal		Total anemia	
		No	%	No	%
Boys	594	251	42.3	343	57.7
<=12 years	359	130	37.2	229	65.6
>12 years	235	121	51.5	114	48.5
Girls	439	89	20.3	350	79.7
<=12 years	268	59	22.0	209	78.0
>12 years	171	30	17.5	141	82.5
Overall	1033	340	32.9	693	67.1

Table 3: Grading of anemia according to WHO's hemoglobin thresholds with number of students, mean, standard deviation and p values

Age	Sex	Grading of anemia according to WHO's hemoglobin (g/dl) thresholds								
		Nornal		Mild		Moderate		Total		P Values
		hemoglobin (g/dl)		Anemia						
		No	Mean±SD	No	Mean±SD	No	Mean±SD	No	Mean±SD	
6-8	Boys	3	12.0±0.00	10	10.6±0.33	2	10.0±0.00	15	10.8±0.70	0.002
	Girls	1	11.5±0.00	2	10.7±0.42	12	9.8±0.24	15	10.1±0.56	
9	Boys	2	13.1±0.14	22	10.7±0.32	22	9.9±0.17	46	10.4±0.74	0.117
	Girls	0	-	31	10.5±0.22	16	9.9±0.27	47	10.3±0.37	
10	Boys	37	12.4±0.76	52	10.75±0.35	18	9.8±0.29	107	11.1±1.11	0.08
	Girls	30	12.1±0.51	56	10.7±0.34	23	9.9±0.18	109	10.9±0.88	
11	Boys	26	12.0±0.31	19	10.8±0.36	12	9.8±0.39	57	11.1±0.97	0.26
	Girls	8	12.0±0.44	21	10.7±0.39	1	9.0±0.00	30	11.0±0.79	
12	Boys	62	12.2±0.40	43	10.9±0.26	29	9.6±0.49	134	11.2±1.07	0.17
	Girls	20	12.1±0.35	34	10.9±0.25	13	9.9±0.12	67	11.1±0.78	
13	Boys	59	12.4±0.49	74	11.0±0.38	14	9.6±0.56	147	11.4±0.99	0.0001
	Girls	18	12.3±0.49	55	10.9±0.40	20	9.8±0.26	93	10.9±0.90	
14	Boys	23	12.8±0.54	15	11.1±0.43	2	9.6±0.00	40	12.0±0.00	0.0001
	Girls	0	-	10	10.6±0.38	11	9.5±0.64	21	10.0±0.76	
15	Boys	39	12.7±0.65	9	11.4±0.32	0	-	48	12.5±0.80	0.0001
	Girls	12	12.5±0.37	24	10.6±0.43	21	9.3±0.64	57	10.6±1.25	
All	Boys	251	12.4±0.58	244	10.9±0.39	99	9.7±0.40	594	11.3±1.11	0.0001
	Girls	89	12.2±0.47	233	10.7±0.37	117	9.7±0.43	439	10.8±0.92	