Prevalence of anemia in the children of tribal ashram schools in Ahmednagar district of Maharashtra

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Abstract

Anemia is a very common problem in paediatric age group in many developing countries with an estimated prevalence of 43% of the World's children. School children constitute 20.25% of total population in India and those are more vulnerable to this disease due to their rapid growth need of high iron. To study the prevalence of anemia among school children aged 8-16 years of the Tribal community from Tribal Ashram Schools in Ahmadnagar district of Maharashtra region and also assess its correlation to variable such as Gender and Body Mass Index (BMI). Total 310 children (including both boys & girls) between the ages of 8-16 years were selected from Two Ashram schools of Ahmednagar district of Maharashtra state. The school health check-up was undertaken in Ashram schools. All children were present in the school were interviewed and examined by a team of trained medical doctors. Hemoglobin estimation was done using Sahli's Acid-Hematin methods. Statistical analysis was done by using SPSS software version 17. The overall prevalence of anemia among children in the age group of 8 to 16 years was 77.10 % (239/310). The highest prevalence of anemia was present in the girls (87.8 %) than boys (65.1 %) and there was high statistical significant difference of anemia between girls and boys (p = 0.000). It is concluded that anemia still constitutes a health problem among school children with the present prevalence of 77.1%.

Keywords: Anemia, Hemoglobin, Iron, Body Mass Index, Tribal Ashram School

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1. Introduction

Iron deficiency is the most common nutritional deficiency worldwide today (UNICEF/United Nation University/ WHO, 2001). Anemia is a very common problem in paediatric age group in many developing countries with an estimated prevalence of 43% of the World's children (De Maeyer et al., 1989; Awate et al., 1997). School children constitute 20.25% of total population in India but data are even more limited on younger children (Aggarwal et al., 1972; Goyal and Chavan, 1993). School children's are more vulnerable to this disease due to their rapid growth need of high iron. Therefore, it is a critical health concern because it affects growth and physical performance (Seshadri and Gopaldas, 1989; Visweswara Rao et al., 1980; Grantham-McGregor and Ani, 2001).

In recent years several studies indicated that Iron-deficiency anemia leads to serious health problems, such as poor cognitive and motor development, behavioral problems in children (Grantham-McGregor and Ani, 2001). Anemia is defined as a decreased concentration of hemoglobin and red blood cell mass compared with that of age and sex matched controls (Fauci et al., 1998; Ghai, 2000). According to Dreyfuss et al. (2000) two billion children are affected with iron deficiency anemia worldwide. There are multiple causes of iron deficiency anemia, including inadequate iron intake, respiratory infections, helminthes' infestation, malaria, diarrhea, vitamin A and vitamin C deficiencies (World Health Organization/United Nations University/UNICEF, 2001; UNICEF/UNU/WHO/MI, 1998). Raju and Bindu (2005) reported that deficiency of iron is also produced by bleeding and sloughing of cells (menstrual flow) and transfer to developing fetus (Raju and Bindu, 2005).

Educational inequality among tribal children is the resultant of the socio-economic backwardness of their home environment and the illiteracy of their parents. Scheduled Tribes (ST) are the Indian communities that are explicitly recognized by the Constitution of India as previously 'depressed classes'. After independence, several educational and welfare attempts have been made to improve the educational attainments of their children. Ashram school is one of such input specially designed to suit these underprivileged children from extremely poor local families. Ashram schools are residential schools providing lodging and boarding, uniforms, books and notebooks and educational equipments to its inmates and helping them to remain in the school system without dropping out. The scheme of Ashram School for tribal students is under implementation since 1952. World Health Organization (WHO) launched 'Global School Health Initiative', in 1995, to mobilize and strengthen health promotion and education activities at the local, national, regional and global levels. The Initiative is designed to improve the health of students, school personnel, families and other members of the community through schools.

The present study was carried out to study the prevalence of anemia among school children aged 8-16 years of the Tribal community from Tribal Ashram Schools in Ahmednagar district of Maharashtra region and also assess its correlation to variable such as Gender and Body Mass Index (BMI).

2. Materials and methods

2.1. Study area

The present study was done in Ahmednagar district of India (Maharashtra state). Two Ashram schools were selected for the present study. Total 310 children (including both boys & girls) between the ages of 8-16 years were selected from theses schools.

2.2. Ethical consideration

The health and education departments of Ahmednagar District were approved the permission for this study. Before the blood collection, all children's' parent or guardians were informed in writing about the purpose of the study, also informed that the authors will withdraw 5 ml of venous blood from the child.

2.3. Selection of Ashram schools

One day orientation program was organized for principal and teachers of Ashram schools. They were explained the objectives of the study activities. The Ashram schools who were attended the program and were willing to participate in the study, we selected these Ashram schools depending upon accessibility and available resources.

2.4. Data collection

The school health check-up was undertaken in Ashram schools. All children were present in the school were interviewed and examined by a team of trained medical doctor, medical interns, Auxiliary Nurse Midwife (ANM) and social workers by using pre-designed and pre-tested questionnaire. We also take help from some other Doctors, Nurses and Technician from nearby health centers.

All children were examined for pallor clinically as seen from palpebral conjunctiva, lips, tongue, skin and nail beds. All Children were also examined clinically thoroughly for the evidence of any disease, personal hygiene, physical status, nutrition, environment, physical activity, substance abuse and others. Pulse and blood pressure were recorded. Children with age 12 years or more were also enquired about feelings and friendships, awareness about HIV/AIDS. These questions were based on Global School-based Student Health Survey (GSHS). Anthropometric measurements such as height and weight of each child were obtained.

2.5. Determination of Hemoglobin level

Eight days camp was arranged, Hemoglobin estimation of forty students was done in one day so three hundred and ten students were done in eight days according to their classes. Twenty sets of Sahli's haemoglobinometer and one ambulance were arranged. Blood was drawn by venepuncture in EDTA vials. Hemoglobin (Hb) estimation was done using Sahli's Acid-Hematin methods.

Based on their hemoglobin levels, anemia among these children was classified as per the standards of WHO 2007 Criteria (Ghai, 2000):

Normal   : >12 gm/dl

Mild   : 10 – 11.9 gm/dl

Moderate: 7 – 9.9 gm/dl

Severe   : < 7 gm/dl

2.6. Statistical analysis

Result of the study are presented in mean ± 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.

3. Results and Observations

Table 1. Gender Variation of Hemoglobin

Hemoglobin (gm/dl)			F Value	Signi.
Gender	Mean ± SD	N		
Girls	10.13 ± 1.82	164		
Boys	11.32 ± 1.91	146	31.11	0.000(VHS)
Total	10.69 ± 1.95	310		

Table 1 shows, Mean hemoglobin of boys (11.32 ± 1.91) was higher as compared to girls (10.13 ± 1.82) and also high statistical significant difference between mean hemoglobin of boys and girls (p = 0.000). Present study showed that overall prevalence of anemia among children in the age group of 8 to 16 years was 77.10 % (239/310). The highest prevalence of anemia was present in the girls (87.8 %) than boys (65.1 %). There was high statistical significant difference of anemia between girls and boys (p = 0.000) [Table 2].

Table 3 Shows prevalence of different grades of anemia i.e. 41.5% of girls and 44.5% of boys were mildly anemic, 38.4% of girls and 16.4% of boys were moderately anemic and 7.9% of girls and 4.1% boys were severed anemic. There was also high statistical significant differences in grades of anemia between girls and boys (p = 0.000).

Table 2. Prevalence of Anemia

			Gender		Total
			girls	boys	
HB	Less Than 12	Count	144	95	239
		% within Gender	87.8%	65.1%	77.1%
	12 & More Than 12	Count	20	51	71
		% within Gender	12.2%	34.9%	22.9%
Total		Count	164	146	310
		% within Gender	100.0%	100.0%	100.0%
CHI2=22.61		DF=1	P Value=0.000(VHS)		
Note: the p values was considered statistically significant if less than 0.05 (p < 0.05). NS: - Not significant, VHS: - very high significance.					

Table 3. Prevalence of Different Grades of Anemia

			Gender		Total
			girls	boys	
Hb	Severe	Count	13	6	19
		% within Gender	7.9%	4.1%	6.1%
	Moderate	Count	63	24	87
		% within Gender	38.4%	16.4%	28.1%
	Mild	Count	68	65	133
		% within Gender	41.5%	44.5%	42.9%
	Normal	Count	20	51	71
		% within Gender	12.2%	34.9%	22.9%
Total		Count	164	146	310
		% within Gender	100.0%	100.0%	100.0%
CHI2=32.73		DF=3	P Value=0.000(VHS)		
Note: the p values are considered statistically significant if the p value is Less than or equal to 0.05 (p ≤0.05). NS: - Not significant.					

Table 4. Correlation of Hemoglobin with Height and Weight

		Weight(kg)	Height(cm)	Hemoglobin (gm/dl)
Hemoglobin (gm/dl)	Pearson Correlation	0.106	0.107	1
	Sig. (2-tailed)	0.063	0.061	
	N	310	310	310
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 4 shows hemoglobin was positively correlated with weight & height but not significantly (p > 0.005).

Table 5. Clinical Features

Clinical Features	Frequency	Percent
Absent	252	81.3
Present	58	18.7
Total	310	100.0

Table 5 indicate 18.7 % of Children who participated in the study shows symptoms of anemia like giddiness, fatigue, dizziness and weakness and Table 6 show Anemia was not significantly varies with the BMI.

Table 6. Anemia vs. BMI

			Hb status		Total
			Abnormal	Normal	
BMI	Underweight	Count	72	21	93
		% of Total	23.2%	6.8%	30.0%
	Normal	Count	138	46	184
		% of Total	44.5%	14.8%	59.4%
	Overweight	Count	25	3	28
		% of Total	8.1%	1.0%	9.0%
	Obese	Count	4	1	5
		% of Total	1.3%	.3%	1.6%
Total		Count	239	71	310
		% of Total	77.1%	22.9%	100.0%
FISCER=2.84	DF=3	P Value=0.416			

4. Discussion

4.1. Prevalence of anemia in previous studies

In a study of B.Sudhagandhi, et al stated that Prevalence of anemia was 52.88%. In girls it was 67.77% and in boys 38 %, prevalence of anemia was higher in underweight children as compared to children with normal BMI and Obese children and age group of children was 8 – 16 years including 450 boys and 450 girls (Sudhagandhi et al., 2011). Verma et al stated that the prevalence of anemia in the 5 - 15 years age group of urban children in Punjab was 51.50% (Chhatwal and Kaur, 2004). Gomber et al stated that prevalence of anemia in the 5 - 10 years age group of urban slum children was 41.8% (Gomber, 2003). Another study of Neeraj Jain and Vibha Mangal Jain stated that Prevalence of anemia in school children was seen in 56.5% of cases, age group was 5 – 16 years, and prevalence of anemia was higher in girls than boys (Jain and Jain, 2012).

4.2. Prevalence of anemia in present study

The result of present study indicated that the prevalence of anemia was 77.1% (239/310) in the school children of tribal ashram schools, Ahmednagar. The prevalence of anemia in girls (87.8%) was higher than the boys (65.1%) [Table 2]. Prevalence of anemia in our study was higher in normal weight children (44.5%) when compared to children with underweight (23.2%) and obese children (1.3%) [Table 6]. So, in the present study, prevalence of anemia in school children was higher as compared to the previous study. 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 bioavailability of iron.

5. Conclusions:

It is concluded that anemia still constitutes a health problem among school children with the present prevalence of 77.1%.

Acknowledgments

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