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Original Research Article

Assessment of Anemia in School Aged Children Attending Tertiary Care Hospital

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ABSTRACT

Background: Anemia is the most widespread nutrition problem in the world and has predominance in developing countries like Nepal particularly in children. The main objective of this study was to estimate the prevalence of anemia and its correlation to variables such as age and gender in school aged children attending tertiary care hospital of Lumbini zone, Nepal.
Methods: A total 1404 children in the age group 5-12 years were included in this study. Out of 1404, boys were 63% (885/1404) and girls were 37% (519/1404). Hemoglobin was estimated by cyanmethemoglobin method.
Results: Prevalence of anemia among these children was 46.0% as per the World Health Organization recommendation for cut off values of hemoglobin. The mean and SD of hemoglobin and age were 10.13 ± 1.54 g/dl & 8.62 ± 2.54 years among anemic population respectively. The prevalence of anemia was significantly higher amongst boys as compared to the girls. The mean and SD of hemoglobin and age of total population were 11.59 ± 1.86 g/dl & 8.75 ± 2.42 years respectively.
Conclusion: Our study results suggest that all the school aged children should be screened periodically and appropriate measures should be taken.

Key words: Anemia, School age children, Prevalence, Hemoglobin

INTRODUCTION

Anemia is a serious public health problem in low and middle income countries, especially among women of child bearing age (15-49 years old) and their children.[1] Anemia is a very common problem in pediatric age group in many developing countries with an estimated prevalence of 43%.[2] In preschool and school children, an estimated 2 billion people worldwide are affected with anemia. Young people 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. India is an economically poor country. Although school children constitute 20.25% of total population in India but data are even more limited on younger children.

Iron deficiency population is also more susceptible to infectious diseases [3] because the immune system is adversely affected. Anemic people also suffer from

fatigue, low productivity at work, impairment of reproductive functions and retardation of physical and mental development.[4]

According to the latest data, more than 3 billion people throughout the world have some form of anemia ranging from deficiency in iron resources without symptoms of anemia to iron deficiency anemia.[5] Recently, it has been reported that preschool children have the highest prevalence of anemia nearby 50% across developing countries compared with pregnant and non pregnant women.[6]

In this study, we investigated the distribution of hemoglobin (Hb) values and estimated the prevalence of anemia among 5-12 years old children of both sexes in Lumbini zone.

MATERIALS AND METHODS

This cross sectional study was carried out at the Universal College of Medical Sciences (UCMS), Hospital from January 2012 to August 2013 among school age children (5-12 years). UCMS is situated in Lumbini zone and provides health services to people from different districts of Lumbini zone, Nepal and adjoining areas of Uttar Pradesh, India. A total of 1404 outdoor and indoor patients who visited UCMS during the study period for their medical check-up and got their Hb estimated were included in this study. Assessment of Hb level was carried out by Cyanmethemoglobin method [7] and analyzed for anemia. Cut off values to diagnose anemia in school age children (5-12 years) were Hb level 11.5 g/dl for 5-11 years and <12 g/dl for ≥12 years age group.[8] As anemia is classified in to three categories, mild, moderate, and severe were defined as Hb level 10.0-11.5/12.0 g/dl, 8.9-9.9 g/dl and <8.0 g/dl respectively.[9] The research protocol was reviewed and approved by the Institutional Ethical Committee.

Statistical analysis: Results of the study are presented in mean ± SD and student's 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

Table 1: The study showed that the overall prevalence of anemia among children in the age between 5-12 years was 46.0% (646/1404). The prevalence of anemia in both sexes i.e. boys and girls were 29.1% (409/646) and 16.8% (237/646) respectively. The mean and SD of Age and Hb were 8.62 ± 2.54 years and 10.13 ± 1.54 g/dl among total anemic population i.e. (Boys and girls).

Table 1: Prevalence of anemia

	Total Anemic	Total non-anemic	Total population
Total subjects	646 (46.0%)	758 (54.0%)	1404 (100%)
Boys	409 (29.1%)	476 (33.9%)	885 (63%)
Girls	237 (16.8%)	282 (20.1%)	519 (37%)
Age (yr)†	8.62 ± 2.54	8.86 ± 2.30	8.75 ± 2.42
Hb (gm/dl)†	10.13 ± 1.54	12.83 ± 1.02	11.59 ± 1.86

†values are given as mean ± SD

Table 2: The highest prevalence of anemia (20.73%) was present in the age group of the 12 years and the mean ± SD of Hb was 11.70 ± 2.37. The second highest prevalence of anemia (19.19%) was in the age group of 5 years and mean ± SD of Hb was 11.40 ± 1.53. The minimum frequency was in the age group of the 6 years in the girls and 7 years in boys. The prevalence of anemia was higher in boys when compared to girls in all

age groups (5-12 years). The anemia was graded according to cut-off values. It showed that 44.42% of boys were mildly anemic, 14.24% were moderately anemic and 5.57% were severely anemic and 25.23% of girls were mildly anemic, 9.54% and 2.01% were moderately and severely anemic respectively.

Table 2: Age and sex wise prevalence of different grades of anemia (B=Boys, G= Girls, T= Total) .

Severity/age group		5yr	6yr	7yr	8yr	9yr	10yr	11yr	12yr
Mild anemia	B	63 (9.75%)	31(4.79%)	15(2.32%)	27 (4.17%)	27 (4.17%)	33 (5.10%)	21 (3.25%)	64 (9.90%)
	G	26 (4.02%)	7 (1.08%)	16(2.47%)	29 (4.48%)	7 (1.08%)	24 (3.71%)	15 (2.32%)	39 (6.03%)
	T	98 (13.77%)	38(5.87%)	31(4.79%)	56 (8.65%)	34 (5.25%)	57 (8.81%)	36 (5.57%)	103(15.93%)
Moderate anemia	B	16 (2.47%)	9 (1.39%)	9 (1.39%)	8 (1.23%)	18 (2.78%)	17 (2.63%)	10 (1.54%)	5 (0.77%)
	G	17 (2.63%)	3 (0.46%)	3 (0.46%)	11 (1.70%)	7 (1.08%)	5 (0.77%)	6 (0.92%)	9 (1.39%)
	T	33 (5.10%)	12(1.85%)	12(1.85%)	19 (2.93%)	25 (3.86%)	22 (3.40%)	16 (2.46%)	14 (2.16%)
Severe anemia	B	2 (0.30%)	3 (0.46%)	7 (1.08%)	3 (0.46%)	2 (0.30%)	5 (0.77%)	2 (0.30%)	12 (1.85%)
	G	0 (0.00%)	3 (0.46%)	0 (0.00%)	3 (0.46%)	0 (0.00%)	0 (0.00%)	2 (0.30%)	5 (0.77%)
	T	2 (0.30%)	6 (0.92%)	7 (1.08%)	6 (0.92%)	2 (0.30%)	5 (0.77%)	4 (0.60%)	17 (2.62%)
Total anemic	B	81 (12.53%)	43(6.66%)	31(4.80%)	38 (5.88%)	47 (7.28%)	55 (8.51%)	33 (5.10%)	81 (12.53%)
	G	43 (6.66%)	13(2.01%)	19 (7.0%)	43 (6.66%)	14 (2.17%)	29 (4.49%)	23 (3.56%)	53 (8.20%)
	T	124(19.19%)	56(8.67%)	50(7.80%)	81 (12.54%)	61 (9.45%)	84 (13.0%)	56 (8.66%)	134(20.73%)
Non anemic	B	60 (7.91%)	37(4.88%)	52(6.86%)	58 (7.65%)	47 (6.20%)	83 (10.94%)	59 (7.78%)	80 (10.55%)
	G	34 (4.48%)	20(2.63%)	23(3.03%)	45 (5.93%)	29 (3.82%)	54 (7.12%)	33 (4.35%)	44 (5.80%)
	T	94 (12.39%)	57(7.51%)	75(9.89%)	103(13.58%)	76(10.02%)	137(18.06%)	92(12.13%)	124(16.35%)
Total Population	B	141(10.04%)	80(5.69%)	83(5.91%)	96 (6.83%)	94 (6.69%)	138 (9.82%)	92 (6.55%)	161(11.46%)
	G	77 (5.48%)	33(2.34%)	42(2.99%)	88 (6.26%)	43 (3.06%)	83 (5.91%)	56 (3.98%)	97 (6.90%)
	T	218(15.52%)	113(8.03%)	125(8.90%)	184(13.09%)	137(9.75%)	221(15.73%)	148(10.53%)	258(18.36%)

The mean Hb values according to the age in both sexes are shown in Table 3. The mean age and Hb values of boys and girls were not significantly different ($p>0.05$).

Table 3: Correlation of age with mean Hemoglobin (Hb) level (g/dl)

Age group/ Severity of anemia	Hb level (g/dl) †				
	Mild anemia	Moderate anemia	Severe anemia	Non anemic	Total
5yr	10.84±0.41	9.38 ± 0.46	7.65 ± 0.21	12.77±1.15	11.4 ± 1.53
6yr	10.88±0.48	9.31 ± 0.48	5.76 ± 2.19	12.79±1.05	11.40±2.02
7yr	10.98±0.43	8.96 ± 0.49	6.95 ± 0.89	12.66±0.92	11.57±1.81
8yr	10.86±0.47	9.05 ± 0.50	6.45 ± 0.90	12.72±0.92	11.57±1.74
9yr	10.77±0.49	8.84 ± 0.52	3.10 ± 0.14	12.48±0.74	11.26±1.83
10yr	10.92± .44	9.06 ± 0.59	7.40 ± 0.30	12.82±0.87	11.83±1.60
11yr	10.99±0.49	9.22 ± 0.41	6.30 ± 0.84	12.76±0.83	11.77±1.67
12yr	11.06±0.63	9.12 ± 0.58	5.40 ± 1.71	13.40±1.25	11.70±2.37

†values are given as mean ± SD

DISCUSSION

The results of the study indicated that the prevalence of anemia was 46.0% in the school aged children of Lumbini zone, Nepal. The results of the study showed that 46.0%, the prevalence of anemia in boys 29.1% was higher than in the girls 16.8%. The result of the study elaborated 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% [9]. Similarly a study by Gomber et al stated that the prevalence of anemia in school children from urban slums aged 5 to 10.9 years was 41.8% . [10] Another study that the prevalence of anemia in school children in

Biratnagar, Nepal aged 2-12 years was 24.4%. [11]

In our study, the highest prevalence was seen in the age of 12 years 20.73% among the anemic population 46.0% (646/1404). The WHO proposed a scheme for classification of public health severity of anemia[12] and anemia was considered as mild if prevalence is 1 to 9%, moderate if it is 10-39% or severe problem if it is more than 40%.

Our study showed that anemia of moderate severity among studied school aged children was considered a health problem. In our study, in boys the higher prevalence of anemia observed reflects the adverse affect lower dietary iron intake. This is in agreement with many studies reported elsewhere.[13,14]

The overall prevalence of anemia among school going adolescent girls of urban Kathmandu Nepal was 54.4%.[15] Another study of male adolescent reported that the prevalence of 47.7% anemia in the Morang district Nepal.[16] In the national capital territory of Delhi 393 children reported the prevalence of 66.4% anemia among primary school children (6-11 years).[17]

It is evident from our results that a significant proportion of apparently children suffer from anemia. The rising trend of consuming snacks and junk food which supply empty calories is also responsible for healthy children being anemia. According to WHO, if the prevalence of anemia at the community level is >40.0% it is considered as a problem of high magnitude. [18]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 of anemia among school age children.

Although the present 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.

CONCLUSION

It is concluded that anemia still constitutes the health problem among school aged children with the present prevalence of 46.0%.

Conflict of interest: There is no conflict of interest among the authors in this study.

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