

HEMATOLOGICAL PROFILE AMONG SCHOOL CHILDREN IN RURAL COMMUNITY OF CHIDAMBARAM, CUDDALORE DISTRICT, TAMILNADU

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ABSTRACT

Nutritional anemia is a recognized health problem throughout the world, mostly in developing countries. In India, anemia is widely prevalent which affects both sexes and all age groups. In the present study a baseline haematological survey was conducted among school children attending Rajah Muthiah Medical College and Hospital, Chidambaram. Objective of the study is to assess the prevalence of anemia among school children aged 6 to 12 years and its comparison in both the sexes. A total number of 150 children attending Rajah Muthiah Medical College and Hospital were included in the present study. Venous blood samples were collected by vein puncture. All samples were analysed for haemoglobin, Haematocrit, Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC) & Red Cell Distribution Width (RDW) in an automated cell counter. Anemia was diagnosed when haemoglobin less than 12g/dl for children of aged more than 6 years. In the present study 99/150 cases were found to be anemic as per WHO definition of anemia. The overall prevalence of anemia was found to be 66%. Girls had a slightly higher prevalence 56(71.79%) when compared to boys 43(59.72%). 75 children (50%) had mild degree of anemia followed by moderate degree 21(14%), only 2% of children showed severe degree of anemia. Reduced Haematocrit, MCV, MCH and MCHC were noticed in 42%, 54%, 44.67% and 40% respectively. Increased RDW was noticed in 52% of the cases. 60/99 (60.6%) of anemic children showed microcytic heterogenous type of anemia, which is possibly due to iron deficiency. From the result it was concluded that, haemoglobin concentration below 12.0g/dl in school age group (between 6 – 12 yrs) was found to be an effective screening test for selecting patients for further evaluation. A significant correlation was observed between Hemoglobin, Haematocrit, MCV, MCH and RDW..

INTRODUCTION

Anemia is a global public health problem affecting both developing and developed countries with

major consequences for human health as well as social and economic development (Worldwide prevalence of anemia 1993–2005, WHO Global Database on Anemia). In 2002, iron deficiency anemia (IDA) was considered to be among the most important contributing factors to the global burden of diseases [1]. It is generally assumed that 50% of the cases of anemia are due to iron deficiency but more

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frequently it coexist with a number of other causes, such as malaria, parasitic infection, nutritional deficiencies and haemoglobinopathies. An estimated 30 per cent of the world's population is anemic, with the global prevalence of anemia among 6-12 yr old children to be 43 per cent and 77 per cent in developing regions respectively [2].

India continues to be one of the countries to have highest prevalence of anemia because of low dietary intake, poor availability of iron and chronic blood loss due to hookworm infestation and malaria. Anemia is a serious concern for young children as it can adversely affect cognitive performance, behavioural and motor development, coordination and language development and scholastic achievement as well as increased morbidity from infectious diseases. School children who constitute a sizable segment of the population (about 20.25% of total population) in India are more vulnerable to this disease due to their rapid growth need of high iron [3].

MATERIALS AND METHODS

This study was designed to include children aged 6 to 12 years; data's were collected from 150 children hailing from rural community in and around Chidambaram, District of Cuddalore Tamilnadu, India who attended Rajah Muthiah Medical College & Hospital, Chidambaram. Ethics approval was received from children and parents and was cleared by Institutional Ethical committee.

Anemia was defined using WHO criteria for different age groups. With these criteria, the hemoglobin cut off used to define anemia in children between age groups 6 to 12 yrs is < 12 gm / dl. Anemia was further graded as mild (Hb 9.0 - 11.9 g/dl), moderate (Hb = 6.0 -8.9 g/dl) and severe (Hb<6.0 g/dl) based on hemoglobin values.

Hematological Parameters

Blood samples were collected under standard procedure protocol and the data's were analysed in the automated cell counter (MODEL & COMPANY: MYTHIC 18, ORPHEE SA, C2 DIAGNOSTICS, FRANCE) for complete blood count (Erythrocyte count, Hemoglobin, Mean corpuscular volume (MCV), Mean corpuscular Hemoglobin concentration, Red cell distribution width, Reticulocyte count, & platelet count. The values were tabulated and compared to the standard values of grading of anemia according to WHO guidelines.

RESULTS

In the present study 99/150 cases were found to be anemic as per WHO definition of anemia. Out of 99 anemic school going children aged between 6 – 12 yrs, 56(71.79%) were found to be girls and 43(59.72%) were found to be boys, a significantly higher number of girls were anemic.

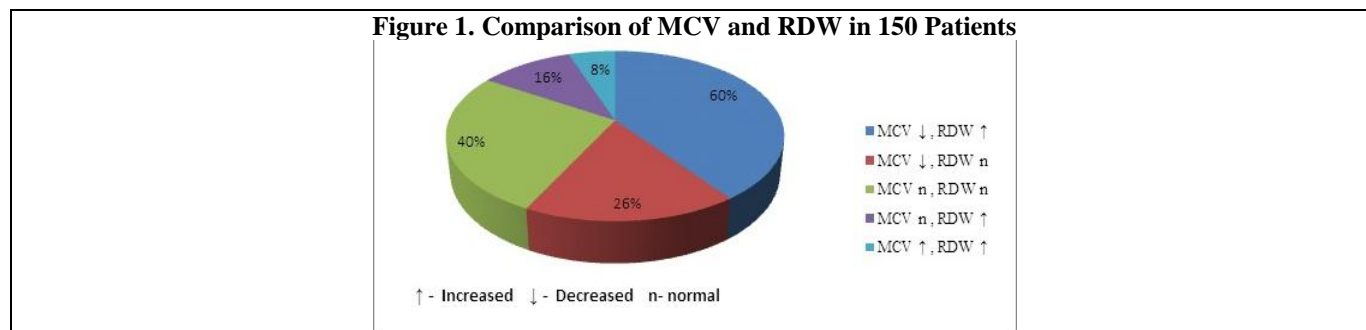


Table 1. Hemoglobin gm/dl in girls and boys

Hemoglobin level (Hb gm/dl)	Girls (n=78)		Boys (n=72)		Total (n=150)	
	Number	Percent	Number	Percent	Number	Percent
< 12	56	71.79	43	59.72	99	66
≥12	22	28.21	29	40.28	51	34
TOTAL	78	100	72	100	150	100

99 children (66%) had hemoglobin value less than 12.0gm/dl. Among children aged 6 to 12 years showed mild degree of anemia (9.0 - 11.9gm/dl) seen in 75 children (50%), moderate degree of anemia (6.0 - < 8.9 gm/dl) seen in 21 children (14%) and severe degree of anemia (< 6.0gm/dl) seen in 3 children (2%).

Table 2. Different Grades of Anemia

Grades of Anemia (g/dl)	Total (n=150)	
	Number	Percent
Normal (≥12)	51	34
Mild (9.0 - 11.9)	75	50
Moderate (6.0 - < 8.9)	21	14
Severe (< 6.0)	3	2



81/150 (54%) had MCV below 80fl, 56/150 (37.33%) had MCV within the normal range and 13/150 (8.67%) had MCV more than 100 fl. 67/150 (44.67%) school going children aged between 6 - 12 yrs had MCH below 25.9 pg, 70/150 (46.67%) had MCH within normal range (26.0-34.9 pg) and 13/150 (8.66%) had MCH more than 35.0 pg. 72/150 (48%) school going children aged between 6 – 12 yrs had RDW within the normal range (10.0-16.0%), 78/150 (52%) had RDW more than 16.0%. Classification of anemia is made based on Comparison between MCV and RDW.

DISCUSSION

The prevalence of anemia in the present study was 66%, The prevalence of anemia in girls (71.79%) was higher than the boys (59.72%) which was shown on table 1. Kumar *et al.*, 2014[2], stated that overall prevalence of among scheduled caste school children in Fatehabad district of Haryana was 85.72 % and the highest prevalence of anemia was present in the girls (94.52 %) than boys (75.0 %) which is higher than the present study. Sudhagandhi *et al.*, reported the prevalence of anemia was observed in girls 67.77% and boys 38 % with an average of 52.88% [4]. Jain and Jain 2012, stated that prevalence of anemia in school children was observed as 56.5% in age group 5 – 16 years and prevalence of anemia was higher in girls than boys [5]. Gomber *et al.*, 2003, stated that prevalence of anemia in the 5 - 10 years age group of urban slum children was 41.8% [6]. While Verma *et al.*, 2004 and Gupta & Shukla 1985, reported that, the prevalence of anemia was 77% in 5 – 15 yr old urban school children of Punjab and 93% in children from Varanasi respectively [7, 8]. The National Family Health Survey NFHS-2 survey estimated prevalence of anemia among children of Delhi to be 69% and NFHS- 3 estimates reveal the prevalence of anemia to be 73% in children aged (5-11) years [9]. De Maeyer *et al.*, 1989, reported the prevalence of anemia in 6-12 yr old children to be 36 % [10].

In the present study 50% of children had mild degree of anemia (9.0 - 11.9g/dl), 14% of children had moderate degree of anemia (6.0 - < 8.9 g/dl) and severe degree of anemia (< 6.0g/dl) seen in 2% of children. These findings were in accordance with studies conducted by Gomber *et al.*, 2003 [6] and Chakravarty & Ghosh, 2000 [11]. Comparison of MCV and RDW were done and found out that 54% of children had decreased MCV (<80 fl) and

52% had increased RDW, which correlated with studies conducted by Patton *et al.*, 1991 [12], Oski *et al.*, 1993 [13] and Pusic *et al.*, [14]. Classification of anemia was made on the basis of MCV and RDW which was proposed by Bessman *et al.*, [15] in to six types - microcytic heterogeneous, microcytic homogeneous, normocytic homogeneous, normocytic heterogeneous, macrocytic homogeneous and macrocytic heterogeneous. In the present study, 60 school children had microcytic heterogeneous type of anemia (MCV ↓, RDW ↑) possibly due to iron deficiency.

CONCLUSION

To conclude, childhood anemia continues to be a significant public health problem in school children and iron deficiency either alone or in combination is the commonest nutritional cause of anemia. The study also provides an indication to initiate the anemia prophylaxis measures for school children including nutrition education in schools. Premenarche/menarche Girls should be given additional nutritional supplementation. The principal target of nutritional improvement in the community is the family and the instrument for combating nutritional deficiency/malnutrition at the family level is nutrition education. Mother needs to be educated on the selection of right kind of local foods and in the planning of the nutritional adequate diets within the level of their purchasing power.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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