Prevalence and Pattern of Anaemias in Children at ASCOMS & Hospital Jammu

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Abstract
Anaemia, particularly iron deficiency anaemia continues to be a serious problem among children. The present study was undertaken to work out prevalence and pattern of anaemias in children in Jammu region of Jammu and Kashmir state. A total of 303 (159 males; 144 females) children were screened during a period of one year. Over all prevalence of anaemia was, 60.3% and 49.7 % in children below 6 years and in 6-14 years of age, respectively. The prevalence of anaemia was more in female children than males. Iron deficiency anaemia was observed to be the most common followed by megaloblastic anaemia. Thalassemia was reported in five cases whereas only two cases of aplastic anaemia were encountered. Mean haemoglobin value was 10.6 gms /dl ±2.7 but higher in males (11.22gms/dl±2.81) than females (10.07gms/dl± 2.45). Mean haematocrit value was 32.2%; males 34.02% and female children 30.56%.

Key Words
Iron Deficiency Anaemia, Megaloblastic Anaemia, Dimorphic Anaemia, Haemolytic Anaemias

Introduction
Anaemias of different types are known to cause impaired growth, developmental delay, behavioural abnormalities and also lead to cognitive dysfunction and school performance (1). Anaemias in general constitute a global problem but there prevalence is more in developing countries than in the developed countries. One of the contributory factors is poverty and lack of proper attention towards the nutritional needs of the children. According to De Maeyer, et al. (2), anaemia is common in women & children with an estimated global prevalence of 43% & 51%, respectively. In an estimate Viteri (3) reported that, more than a billion people worldwide are affected by anaemia and according to W.H.O (4), half of anaemias worldwide are due to nutritional iron deficiency.

Anaemia is functionally defined as an insufficient RBC mass to adequately deliver oxygen to peripheral tissues. It is a common practice to use any of the three concentration measurements to establish the presence of anaemia viz. Haemoglobin level ( gm/dl), Haematocrit (%) and RBC numbers (1012/L) (5). In addition to Iron deficiency, anaemia may be caused by deficiency of folic acid and vitamin B12. Malaria, hook worm infestation also play an important role in causing anaemias in tropical climate. Congenital haemolytic diseases are found in certain populations in Africa, Asia and some Pacific islands, they rarely constitute health problem (2). Haemorrhage, infections and genetic disorders may also be extremely important in causing anaemias (6).

Studies pertaining to anaemias have been conducted world wide of which Koc et al. (7) in Turkey, Hall, et al. (8) in Africa, Miller et al. (9) in U.A.E., Rondo et al. (10) in Brazil, Sayyari et al. (11) in Iran, are important and worth mentioning. In India similar studies have been conducted by Chakma et al. (12) in MP, Gomber et al. (13) in Delhi, Basu et al. (14) in Chandigarh, Sidhu et al. (15) in different districts of Punjab but hardly any study in this aspect has been conducted in Jammu and Kashmir state. The present study on prevalence and pattern of anaemias in children was undertaken in ASCOMS and hospital Sidhra, Jammu.

Material and Methods
The present study is based on blood samples of 303 children below the age of 15 years, who attended as out patients, in Department of Paediatrics and affiliated urban centre of Acharyya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu- J&K India 180001

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Sciences. The study was carried out in two parts i.e from November 2007 to November 2008 for a period of one year: number of children were 203 and remaining 100 children were studied in residency period i.e from December 2009 to December 2010. Blood samples under usual aseptic precautions were procured using EDTA as anticoagulant, however heparin was used as anticoagulant for blood samples used for the estimation of serum Iron and TIBC. Cyanmethaemoglobin method 2006 was used for haemoglobin estimation. Neubauer chamber was employed for the estimation of TLC and platelet count and for DLC and reticulocyte count the method followed was after Bain et al. (16). The blood samples were screened for anaemias as per WHO guidelines. Children aged 6-15 years with haemoglobin less than 12 gm/dl were investigated further.

Peripheral blood film as per Lewis and Bain (17), were prepared wherever, necessary and examined after staining with Leishman,s stain. PBF were studied for RBC morphology, anisocytosis, poikilocytosis, chromia, RBC inclusions, haemoparasites, nucleated RBC’s, morphological details of WBC’s and platelets. Wintrobe’s method was employed for haematocrit and Westergren’s method was used for ESR (17). Serum Iron estimation and transferrin saturation was done by the procedure given by Virgil et al. (18). Bone marrow studies were done using Bates technique and Pearl’s Prussian blue staining was done for estimation of marrow Iron (19). Bates (20) procedure was followed for bone marrow trephine biopsy. Haemoglobin electrophoresis was done for HbF, HbA2 estimation. Metabisuphite slide test (21) was employed for sickling test. Osmotic fragility test (22) and G6 PD deficiency test (23) were employed. Usual statistical analysis was done to arrive at various conclusions.

**Results**

Out of a total of 303 children, 159 (52.5%) were males and the remaining 144 (47.5%) were females, thus male : female ratio in the present study was 1.1 : 1. The age, sex distribution of the children studied, is given in Table (1). Maximum number of children belonged to age group of 12-13 years, being 35 children (11.6%). Minimum of 5 children (1.7%) were more than 13 years. (Table-1) The present study of prevalence of anaemia in Jammu and Kashmir State has revealed some interesting observations as mentioned below.

Mean Hb value was 10.6gm/dl (± 2.7). The mean Hb value was significantly higher in male children 11.22 gm/dl (±2.81) as compared to female children which possessed 10.07 gm/dl (± 2.45). Mean haematocrit value was 32.2%; 34.02% in male children and 30.56% in female children. Mean value of serum iron was 41 ug/dl (± 24), whereas, in males the same was 48.07 ug/dl (± 34.06) and in females 36.14 ug/dl (±11.36).Mean value of TIBC was 407 ug/dl (± 42); in males being 404.23 ug/dl (± 39.35), whereas, in females it was 410 ug/dl (± 39.35). Mean value of transferrin saturation was 9.36% (± 4.69%), in males it was 10.08% (± 5.7%) and in females 8.88% (± 3.84%). Most cases of microcytic hypochromic anaemia on PBF, showed low serum Iron, increased TIBC and decreased transferrin saturation, indicating Iron deficiency anaemia. Some cases showed low serum iron, decreased TIBC and decreased transferrin saturation indicating anaemia of chronic disease. A few cases showed normal serum iron, TIBC and transferrin saturation which indicated Thalassemia minor. The overall prevalence of anaemia was 60.3% and 49.7% in children less than 6 years and 6-14 years of age, respectively. Prevalence of anaemia in male children was observed to be comparatively less 44.94% against female children which showed 55.06% of anaemia. Iron deficiency anaemia was observed to be the most common type of anaemia 57.6% followed by megaloblastic anaemia 21.5% and dimorphic anaemia 10.1% (Fig 1-3). The other types of anaemias, haemolytic anaemia, anaemia of chronic disease and aplastic anaemia were low i.e. 5.6%, 2.5% and 1.2% respectively. ALL was 1.2%. (Table -1 & 2).

The haemolytic anaemia comprised of 5 cases of thalassemia, (1 major, 3 minor and 1 intermedia), 3 G6PD deficiency cases and 1 case of hereditary spherocytosis. Anaemia of chronic diseases was found in two cases of tuberculosis, 1 case of juvenile rheumatoid arthritis and 1 case of chronic osteomyelitis. Only two cases of aplastic anaemia were diagnosed, one of which was pure red cell aplasia. Pancytopenia was present in 38.2% children suffering from megaloblastic anaemia. In children 0-5 years of age Iron deficiency anaemia, megaloblastic anaemia, dimorphic anaemia, haemolytic anaemia and ALL were observed in 73.1%, 12.1%, 4.8%, 7.3% and 2.4% cases, respectively. (Table-2 & 3).

However in children from 5-15 years, Iron deficiency anaemia was 52.1%, megaloblastic anaemia 24.7%, dimorphic anaemia 11.9% and haemolytic anaemia 5.1%. (Table-2) Anaemia of chronic disease 7.55%, aplastic anaemia 3.77% and ALL 1.9% were present in children more than 10 years of age. (Table-3)

**Discussion**

Anaemia is regarded as a major health problem among preschool and school going children. Anaemia affects the scholastic achievements, impairs cognitive performance, normal behavioural and motor development,
which can lead even to irreversible damages (24). Anaemia is the most prevalent haematological abnormality, out of which the most common one is the nutritional anaemia caused by iron deficiency. About 2 billion people worldwide are known to suffer from anaemia, 50% of which is due to iron deficiency (25). Iron deficiency anaemia in children has damaging effects on their health and development (26).

Overall prevalence of anaemia varies from place to place, but it is four times more prevalent in developing than developed countries (24). There are many factors responsible for this (27), but some are of the opinion that in developing countries it is due to malaria and worm infestation (24). In South East Asia and subtropical Africa, it is thought to be due to poverty and nutritional deficiency (4). In India, different authors have given different figures for prevalence of anaemia, viz. 93.7% (28); over 70% (29); 70-90% (26) and 80-90% (24). From there figures it is evident that there is no trend in its decrease, in fact it is static ranging from 70 to 90%. However, prevalence of anaemia in different parts of India show large variability, the lowest being in Bangalore province of Karnataka i.e. 13.6% (30) and highest in Bihar 78% (31). In Goa and Dharward it has been reported as 38% and 62.56% respectively (31). The present figures of anaemia in Jammu i.e 60.3% for children less than 6 years and 49.7%...
for children between 6-14 years seems to be much higher than reported from Bangalore and much less than reported from Bihar but similar to one reported in Dharward. While studying the patterns of anaemia it was noted that iron deficiency anaemia was present in maximum cases that is 57.6% which was similar to the findings of Jigalur (24) being 62.5%. The least prevalence was found in cases of aplastic anaemia and ALL being 1.3% in each. Anaemia of chronic disease was 2.5%, comprising two cases of tuberculosis, one case of juvenile arthritis and one case of chronic osteomyelitis. This is in conformity with the findings of Jigalur (24).

The prevalence of thalassemia trait in India is 3.3% (24). In West Bengal its percentage was 3.5% whereas, in present study Beta thalassemia cases (major, minor) were almost half i.e 1.6% which is comparatively very low. In the present study, the mean heamatocrit value was 32.37% which is similar to Shah (32)i.e 33.4%.

In our study the mean haemoglobin values are 11.2gm/dl±2.8 in males and 10.07gm/dl±2.45 in females which is comparatively similar to the one reported by Gombhar et al (13) viz. 11.9gm/dl in males and 11.85gm/dl in females. This indicates that girls on the whole have less Hb than boys. It was found that girls were more anaemic than boys(24). Muthayya (30) also reported 12% prevalence in boys and 15.3% in girls. Similarly in our study, girls were more anaemic(55.06%) than boys (44.9%). This may be due to preferential treatment given to boys and gender biased society (24).

On comparison of prevalence of different grades of anaemia in the present study with the figures tabulated by (29) for other parts of India, it was noted that there is vast difference between them which may be due to difference in age groups and heterogeneity of the population. However with respect to J&K state, the figures given (Mild=25.8%, Moderate=30.4%, Severe=2.4%) by Kotecha 2011 show less variation except for severe anaemia.

Conclusion
Childhood anaemia continues to be a significant health problem and measures should be taken to reduce its incidence. Our study demonstrated a high prevalence of anaemia in children less than 15 years of age. Iron deficiency anaemia was the commonest cause followed by megaloblastic anaemia. High frequency among this group might be due to higher dietary inadequacy of all nutrients including iron. However, whole anaemia cannot be solely explained by iron deficiency. Further studies are needed to consider micronutrient status, parasitic infestation, hereditary disorders and other etiological factors as contributory to high prevalence of anaemia in children of our region.
References

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