ORIGINAL RESEARCH PAPER

Paediatrics

CLINICO- ETIOLOGICAL PROFILE OF SEVERE NUTRITIONAL ANAEMIA IN CHILDREN – A HOSPITAL BASED STUDY.

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ABSTRACT

Nutritional anemia is a common public health problem in India. Severe anemia compromises growth and development of children. Iron deficiency is the most common cause but vitamin B12 and folic acid deficiencies are also increasingly reported.
Objectives:
1) To study the aetiology of severe nutritional anaemia in children between 6 months to 14 years of age and to correlate severity of anaemia with serum levels of iron, folic acid and Vitamin B12.
2) To determine the demographic and socioeconomic factors and dietary practices contributing to nutritional anaemia.
Material and Methods: A prospective observational study done on 140 children aged 6 mo to 14 years admitted in Niloufer hospital for severe nutritional anemia. Subjects were divided into group1(6 mo to 59 mo) constituting 41.4%, group 2(5 yr -10 yr) constituting 33.5% and group 3 (10 yr -14 yr) constituting 25% of the total. Demographic, clinicoetiological factors were analysed to identify the risk factors in each group.
Results: Iron deficiency anemia was the most common cause across all the groups. Macrocytic anemia is sharply increased in the adolescent age group. Low birth weight, improper complementary feeding , recurrent diarrhea were important risk factors in group1. Female sex, vegetarian diet are the important risk factors in adolescent group. Serum levels of iron, ferritin, foliate, vitamin B12 correlated well with severe anemia. Female adolescents with megaloblastic anemia presented with peculiar clinical features not seen in other groups.

INTRODUCTION:

Anaemia is a global problem especially so in the developing countries. In India, 82% of the children under 2 years and 70% of children under five are anaemic(1). The prevalence of anaemia in adolescents as per DLHS 4 (2012-2013) is as high as 61%(2) . Among adolescents, 7.1 to 11.7% suffer from severe anaemia. Anaemia in a growing child can result in long lasting detrimental effects on the physical and mental attributes of the child. Nutritional anaemia resulting from deficiencies of dietary iron, folic acid and vitamin B12 either alone or in combination is responsible for more than 98% cases of anaemia. Though iron deficiency is the predominant cause of nutritional anaemia, macrocytic anaemia secondary to folate and vitamin B12 deficiencies is increasingly being diagnosed in children. Children beyond the neonatal period till the adolescent stage constitute a heterogenous population with considerable variations in terms of nutritional needs, growth rates accounting to the variations in the clinicoetiological factors in nutritional anaemia. The present study is to determine the types of nutritional deficiencies in children presenting with severe nutritional anaemia.

AIMS AND OBJECTIVES:

3) To study the aetiology of severe nutritional anaemia in children between 6 months to 14 years of age and to correlate severity of anaemia with serum levels of iron, folic acid and Vitamin B12.
4) To determine the demographic and socioeconomic factors and dietary practices contributing to nutritional anaemia.

STUDY DESIGN:

This is a prospective study done on 140 subjects with severe nutritional anaemia.

MATERIAL AND METHODS:

The study was conducted in Niloufer Hospital, Department of Pediatrics, Osmania Medical College between August 2017 and January 2018 as a prospective observational study. One hundred and forty children aged between 6mo to 14 years presenting with severe anaemia are recruited to the study.

INCLUSION CRITERIA:

1. Age group: 6mo to 14 years
2. Haemoglobin levels below 7g/dl

EXCLUSION CRITERIA:

1. Those who received haematinics in past 6 weeks.

2. Those who received blood transfusion in past 6 weeks.
3. Those with haemolytic anaemia
4. Those with systemic diseases
5. Those with chronic infection (Tuberculosis, malaria etc.).

A socio- demographic profile including parents' education, family structure and diet consumed (vegetarian, non-vegetarian) was recorded. A detailed general physical examination was done to look for pallor, icterus, edema, hyperpigmentation, lymphadenopathy, bleeding spots and signs of vitamin deficiency and was noted. The anthropometric values were recorded and nutritional status was evaluated. Detailed history with special reference to menstrual history in females was taken and recorded in a pre-designed proforma. Investigations for anaemia and its causes i.e., peripheral smear, serum vitamin B12, serum folic acid, stool for worm infestation were done in all patients. Hemoglobin level was estimated by Sahli's method, peripheral smear was stained by Leishman's stain, and PCV, MCV, MCH, MCHC and RDW were determined by automated cell counter. Normal values were taken as follows: PCV 35-45%, MCV 77-95fl, MCH 25-33pg, MCHC 31-37gm/dl and RDW 14.5-18.5. Results were analysed by Graphpad Instat 3 software program. P value less than 0.05 was taken as statistically significant.

RESULTS AND OBSERVATIONS

Of the 4960 admissions 140 cases were found to have severe nutritional anaemia giving an incidence of 2.82 percent.

A total of 140 cases from 6mo-14 year age group were included in the study. They were divided into three groups 6mo to 59 months (group1), 5 to 10 years(group 2) and 10 to 14 years (group3).Group1 had 58 children of which males were 31(53.4%) and females 27(46.5%). Group 2 consisted of 47 children of which males were 23(48.9%) and females 24(51.1%). Group 3 had 35 children of which males were 10(28.5%) and females were 25(71.4%).

In group 1, 54% belonged to class 3 where as 28% to class 4 and 18% to class 5 socioeconomic status according to modified Kuppuswamy socioeconomic classification. Sixty six percent of this group had low birth weight. History of exclusive breast feeding up to 6months was present in 36% of the patients. History of delayed and inappropriate complementary feeding was seen in 77% of the children. 46% consumed mixed diet. Worm infestation was noted in 40%.History of pica was seen in 25%. All the children in this group had iron deficiency anaemia with mean serum iron level of

18.8mcg/dl, mean s.ferritin level of 7.5ng/ml. All of them showed normal mean s.vitamin B12(411pg/ml) and normal mean s.folic acid(13.1ng/ml) levels.

In group 2, 52% belonged to class 3 and 48% belonged to class 4 socioeconomic status. Exclusive breast feeding up to 6 months was obtained from 30% of the children. 51% consumed mixed diet. History of pica was seen in 19% .Worm infestation was present in 34% of the children.In this group, 42(89.3%) showed microcytic hypochromic anaemia and 5(10.6%) showed dimorphic anaemia. The mean serum iron and ferritin levels in this group were 25mcg/dl and 11ng/ml respectively. All those with dimorphic anaemia were deficient in vitamin B12 (mean serum Vit B12(182pg/ml).

In group 3, 35% belonged to class 3 where as 35% to class 4 and 30% to class 5 socioeconomic status. History of food fads was common in this group with 71% children on almost pure vegan diet and receiving little milk as in tea. Worm infestation was seen in 14%. Microcytic hypochromic picture was seen in 42.8% with dimorphic picture in 25.7% and macrocytosis in 31.4% of the children in group 3. The mean serum iron and ferritin in children with microcytic hypochromic picture were 27.6mcg/dl and 10.7ng/ml respectively. The mean serum iron and ferritin in children with dimorphic anaemia were 25mcg/dl and 10ng/ml respectively with s. Vit. B12 of 102pg/ml and s.folic acid of 11ng/ml. In macrocytic subgroup all the children are found to have Vit. B12 deficiency with 3 children also having folic acid deficiency. None of the boys in this group showed macrocytes in the peripheral smear. Perioral hyperpigmentation, pigmentation of knuckles were seen in 72% of the female children with macrocytes in blood picture. Icterus was noted in 52%, splenomegaly and thrombocytopenia in 47 % of these female children.

DISCUSSION:
Nutritional anaemia is a widespread public health problem in India especially in childhood compromising productivity of the future generations. As the prevalence rates vary among various age groups, so are the risk factors appear to vary according to the age group(3). Although pure iron deficiency is the most common deficiency resulting in anaemia over all age groups, adolescents constitute a distinct group with variations in their clinicoetiologic profile. Significant number of adolescents are being recognised as being deficient in Vit B12 and Folic acid(4). Nutritional anaemia is closely associated with poverty and several factors like lack of adequate food in terms of both quantity and quality, recurrent intestinal infections and infestations, lack of diversity in food are responsible for majority of the cases.

The present study showed iron deficiency as the only cause of anaemia in group 1 where as Venkatesh et al demonstrated significant numbers with dimorphic and megaloblastic picture(5). Incidence in male and females is approximately equal which is in agreement with observation of Gerardo et al.(6) Low birth weight, lack of exclusive breast feeding, improper complementary feeding, diarrhea, worm infestation had a significant correlation with anaemia.Similar findings were found in the Zhao et al study(7). In group 2, girls are more than boys but the difference is not clinically significant. The majority had microcytic anaemia. Dimorphic anaemia is seen in 10.6% of the children. Nasera et al also showed a higher incidence of dimorphic anaemia in children above 5 years(8). Further the mean S. Vit B12 in this age group is significantly less than that in group 1 and higher than that in group 3. . Multivariate analysis showed significant association with worm infestation and pica. In group 3, more girls are affected and is clinically significant. Though Iron deficiency is still the commonest cause, Vitamin B12 and folate deficiencies were responsible for almost equal number of cases. Further the mean Vitamin B12 and folate levels were significantly less when compared to the other groups. Female sex, dietary habits, predominantly vegetarian diet showed significant association with anaemia in this group. Rajendra et al also reported severe anemia to be more common in vegetarians in this age group(9). Worm infestation and diarrhea did not have a statistical correlation in this age group.

The present study establishes that anaemia is common across all the age groups. Preschool Children between 6-24 months are particularly at risk owing to the rapidity of growth coupled with improper transition from milk to semisolids(7).

Adolescence is another high risk period with a spurt in growth and inadequate intake of hematinic principles. The average age of menarche in Indian girls is 11-12 years. With growth spurt occurring prior to menarche, girls have an accelerated increase in iron, Vit. B12 and folate requirements. Inadequate intake coupled with losses during menstruation keep them at risk of developing severe anaemia(10). Certain clinical signs like hyperpigmentation, icterus, splenomegaly, low platelets are particularly seen in association with macrocytosis. Ravi Kumar et al reported similar findings(11).

The present study highlights the most important causes of anaemia in children over various age groups. It also shows positive correlation of severe anaemia with deficiencies in iron, folic acid and vitamin B12.

These cases of severe nutritional anaemia only represent a tip of the iceberg and there could be many more cases in the community yet to be detected and treated. Government of India through various programmes like ICDS and WIFS is trying to educate and provide supplements to prevent and cure anemia in children. If properly implemented, these schemes can help break the intergenerational cycle of nutritional anaemia and help in building a healthy nation.

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