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Assessment of Nutritional Status in Male School Children using Complete Blood Count and Serum Folic Acid

Tariq E.E.Elmahdi [1,2], Alzahrani, Saad[3] S, Al-hazmi.A.S[1] and Nazim.E.A.Mohammed[4]

[1]Department of Medical Laboratory Sciences and Biotechnology, College of Applied Medical Sciences, Taif University, Kingdom of Saudia Arabia.
[2]Department of Hematology, College of Medical Laboratory Sciences, Sudan University of Sciences and Technology.
3. Dean, College of Applied Medical Sciences, Taif University.
[4]M.Sc.(Hematology), Sudan University of Sciences and Technology.

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Abstract

Folate is one of the water soluble vitamins. It plays an essential role in cellular metabolism and is required for large number of reactions involving transfer of one-carbon units from one compound to another. Anemia is a common health problem throughout the world, and usually affects the work capability and mental capacity of the human. The most common anemia is nutritional type due to iron and folic acid deficiency in infancy, childhood, and pregnancy. Objective of the study.This study had been done over four months to assess the nutritional status in male students of the primary schools, through detection of hemoglobin (Hb) level, red blood cell (RBCs) count, hematocrit (HCT) , and serum folate. Study design. A total number of hundred students of male primary schools were included in this study. 2.5 ml of blood was collected from each student into Ethylene diamine tetra acetic acid (EDTA) container to estimate Hb level, RBCs count, HCT , using Sysmex (automated blood analyzer). Another 2.5 ml of blood was collected from the same student into plain container and analyzed for serum folate. Results. The results showed that the means of Hb, RBCs count, and PCV were 12.7 g/dl (±2 SD), count 4.7×1012/l, 37.2%, respectively , and the mean of serum folate were 4.4.ng/l. Conclusion. This study concluded the blood parameters and seum folate were with normal ranges. compared to control group. Nutritional status of priamary school students was good according to the results. This sort of study should be done regularly to evaluate the nutritional status of children

Keywords: *Nutritional status. School children, Complete blood count, Serum folate*

Introduction

Nutritional anemia is a widespread public health problem associated with an increased risk of morbidity and mortality, especially in pregnant women and young children. Among the numerous factors, both nutritional factors, (vitamin an mineral deficiencies) and non-nutritional (infection and hemoglobinopathies), that contribute to the onset of anemia, iron deficiency and malaria play an important role Given the role of iron in oxygen transport and the low levels of available iron in the diets of a large proportion of the global population, it is assumed that iron deficiency is one of the biggest contributing factors to anemia[1]. Nutritional anemia refers to types of anemia that can be directly attributed to nutritional disorders. Examples included Iron deficiency anemia and anemia and megaloblstic anemia. Red blood cells are made in the bone marrow and circulate in the blood. They only have a life expectancy of about four months. The body needs iron, vitamin B12 and folic acid (one of the B group of vitamins) to produce more red blood cells. If there is a lack of one or more of these nutrients, anemia will develop. You need iron for many important processes inside your body, especially for making the oxygen-carrying pigment in your blood called hemoglobin [1]**.** Iron is absorbed from the food and drink you eat by your small intestine. The iron is carried in the blood to the bone marrow - where blood cells are produced - where it's combined with proteins to make haemoglobin. Spare iron can be stored in the liver. iron is lost from your body in urine, faeces, and dead skin cells and when blood is lost from the body.[1] On average, men need 8.7mg of iron a day and women need 14.8mg a day. You can usually get all the iron you need from your diet. Certain groups of people are more likely to have iron-deficiency anaemia. These include babies, teenagers and women who have heavy periods.[2] Folate deficiency may lead to glossitis, diarrhea, depression, confusion, anemia, and fetal neural tube defects and brain defects (during pregnancy). Folate deficiency is diagnosed by analyzing CBC and plasma vitamin B12 and folate levels. CBC may indicate megaloblastic anemia but this could also be a sign of vitamin B12 deficiency. A serum folate of 3 µg/L or lower indicates deficiency. Serum folate level reflects folate status but erythrocyte folate level better reflects tissue stores after intake. An erythrocyte folate level of 140 µg/L or lower indicates inadequate folate status. Increased homocysteine level suggests tissue folate deficiency but homocysteine is also affected by vitamin B12 and vitamin B6, renal function, and genetics. One way to differentiate between folate deficiency from vitamin B12 deficiency is by testing for methylmalonic acid levels. Normal MMA levels indicate folate deficiency and elevated MMA levels indicate vitamin B12deficiency.

Materials and Methods

This study has been done in over four months to assess the nutritional status in schoolchildren using CBC and level of serum folic acid. Three hundred students were selected for this study. The students aged between 6 -14 years. Twelve primary schools were selected according to geographical and socioeconomic distributions. Seven schools for males and five for females. 25 to 30 blood samples were collected from each school. Study was conducted after permission from authorities of the schools and the families of students. ALL participants informed about the objectives of the study and its health emphasis in the future. 2.5ml of Ethylene Diamine Tetra Acetic Acid (EDTA) blood were collected to perform complete blood count (CBC), and another 2.5 ml of blood were collected to perform serum iron and serum firritin. Data was collected using structure interviewing questionnaire. All students with chronic diseases can interfere in the results were excluded.

Laboratory procedure

2.5 ml of venous blood was collected into EDTA container and mixed gently, then labelled with student number. The blood samples were analyzed within four hours for CBC, using Sysmex automated blood analyzer. For serum folate, 2.5 ml of blood was collected and delivered into plain container then let to clot , the serum was separated using bench centrifuge machine at 2500 rpm for 10 min. Serum folate was determined using automated system(TOSOH CORPORATION.AIA 600ii). The AIA-600 II is capable of performing three methods of immunoassay: an immunoenzymetric (IEMA) or sandwich immunoassay, a competitive binding (EIA) immunoassay, and a two-step immunoenzymetric immunoassay.

An antigen-antibody reaction begins by combining a patient sample, control, or calibrator with a diluent in an immunoreaction test cup from the AIA-PACK reagent series.

In the IEMA assay, during the incubation period, the antibodies attach to two distinct epitopes on the antigen being measured forming a sandwich.

In the EIA assay, during incubation, antigen in the patient sample competes with enzyme labeled antigen for a limited number of antibody binding sites.

Results

One hundred male students of primary schools were included in this study. According to this study the means of Hb, PCV, MCV,MCH, MCHC, and RBCs count, were 12.0 g/dl, 36.6%, 82.7fl, 26.6 pg, 32.3 g/dl, 32.2%, 4.7×10^{12}/l respectively**(Table 1).** The mean of serum of serum folic was 5.2 ng/ml

Table 1 Means of different blood parameters and folic acid among study group

Blood parameter	Mean
Hb concentration(g/dl)	12.0
PCV(%)	36.6
RBCs count(10^6/µl)	4.7
MCV(fl)	82.7
MCH(g/dl)	26.6
MCHC (pg)	32.3
TLC (10^3/µl)	5.7
Platelet count(10^3/µl)	309
Folic acid (ng/ml)	5.2

Discussion

This study contributes to generate information on the magnitude of the deficiency of both vitamins, since there are very few available publications documenting folate and vitamin B12 deficiencies in children at preschool age, one of the most affected group. The means of Hb,PCV(%),RBCcount(10^6/µl)count(10^6/µl), MCV(fl), MCH, MCHC, TLC (10^3/µl), Platelet count(10^3/µl), Folic acid (ng/ml) were found to be in normal range. This result agreed with the study had been done by Ghai *et al* (1977) in India, reported that the Hb level in students of primary school was normal, but this result disagreed with the results done in Pakistan by Tariq *et al 2008.*The levels of B12 vitamin in participants of this study were similar to those found in young Ugandans. [6]Also There are no differences between the findings of this study and other studies in vitamin B12 values owing to differences in study populations involving adolescents [7,8] and young people. [6] These values also depend on nutritional status and genetic factors such as polymorphisms are different in different countries and different geographic areas. [9,10] In Greece, Panpadreou [11] studied the same school age population and concluded that the vitamin B12 decreased markedly with increasing age. TLC, and platelet count were in normal ranges, this may indicated that there is no any sort of parasitic infections and bleeding. Also, the high prevalence of B12 deficiency in school children might be associated with an inadequate intake or a low absorption of the vitamin because of parasitic or recurrent bacterial infections. The current strategies for reducing and controlling micronutrient deficiencies should thus be reexamined. Particular attention must be paid to the content of folic acid and vitamin B12 of the food or supplements distributed by food assistance programs.

Conclusion

This study shows that vitamin B12 deficiency is not common among schoolchildren in School children. Also in this study we get that analysis of blood parameters and serum folate are good indicators help in diagnosis of nutritional anemia.

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