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STUDY TO KNOW THE SERUM FERRITIN IMPORTANCE FOR DIAGNOSIS OF IRON DEFICIENCY ANEMIA IN CHILDREN

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Abstract:
Objective: *To assess the serum ferritin importance in children of iron deficiency anemia according to other indices.*
Study Design: *A cross-sectional Study*
Place and Duration: *The study was performed in the Pediatric Unit I of Nishter Hospital, Multan for the period of 1 year from November 2015 to November 2016*
Methods: *Children were selected as anemic and anemic based on hemoglobin (10 g / dl) and ferrine saturation (15%). Morphology of red blood cells, serum iron, hemoglobin, transferrin saturation TIBC and serum ferritin were recorded.*
Findings: *The red blood cells morphology was very poor. Hemoglobin, transferrin saturation serum iron and serum ferritin in children are lower. There was a positive correlation between age and serum ferritin, serum iron, hemoglobin, a negative correlation and transferrin saturation with TIBC.*
Conclusion: *Serum ferritin was a more sensitive and important indicator than transferrin saturation, TIBC and serum iron.*
Key Words: *serum ferritin, iron deficiency anemia,*

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INTRODUCTION:

The most common known malnutrition cause is the anemia of iron deficiency, a hypochromic microcytic anemia between infants and young children. 1 Despite various laboratory procedures for mild iron deficiency detection, anemia usually does not occur, hemoglobin or hematocrit. In the reticuloendothelial system the second most important intracellular iron storage protein is Ferritin.During protein synthesis Hemoglobin functions not only as an intermediate, but also during denaturation act as a storage protein for iron released from Hemoglobin. In patients with iron deficiency anemia serum ferritin level indicate that serum ferritin concentration closely reflects the magnitude of iron deposits. Serum ferritin level shows higher predictive value and sensitivity in uncomplicated anemia and in anemia cases. In addition to a confirmatory test Ferritin measurement has special features, being the only test that can identify subjects. risk before becoming symptomatic. For iron status Serum is the most accurate test such as ferritin, iron deficiency and iron deficiency. In a developing child, iron deposits have a very fine balance between needs and supply, a hypochromic microcytic anemia it is very important to be diagnosed at a certain stage before it is caused. The aim of this study is to compare the importance of ferritin in serum with other indices in the iron deficiency anemia.

MATERIALS AND METHODS:

This is a cross-sectional study was performed in the Pediatric Unit I of Nishter Hospital, Multan for the period of 1 year from November 2015 to November 2016. 100 healthy-looking children without abnormal bleeding trauma, Transfusion history visited the Pediatric OPD were selected. The iron deficiency anemia appears when hemoglobin was less than 10 g / dl, and less than 16% transferrin saturation , Greater than 400 g / dl TIBC , and less than 10 ng serum ferritin level. / ml. For the sake of simplicity, the three groups of children were made: from 0.5 years to 3 years and from group 3 to 12 years. Red blood cells, hemoglobin, serum morphology were studied. From all selected children to know ferritin levels and TIBC 5 ml of venous blood was withdrwan. After complete mixing, for hemoglobin assay 20 µl of sample was preserved. For 5 minutes remaining blood was centrifuged at 3000 rpm and the clear plasma stored in a suitable labeled Eppendorph tube at -20 ° C for further metanalysis. For the morphology of red blood cells, blood films on slides were made and under an optical microscope slides were examined. Standard hemoglobin kits were used with plasma ferritin method with Plasma Iron and TIBC (Roche), cyanomatemoglobin (Boehringer-Mannheim) and (Amersham) radioimmunoassay.

RESULTS:

Based on the serum ferritin level and transferrin saturation, in group A the iron deficiency anemia was more frequent than in group B. Sixty-eight (83%) of 80 anemic children had iron deficiency. Compared to non-anemic children, all anemic children showed variable cell morphology at variable rates. The children in group A were quite abnormal compared to group B. However, normoblasts were not observed in any smear slide of children in group B (table 1).

Table 1. Microscopic Examination of RBC in normal and Iron Deficient Infants and Children.

Group	Total	Normal	Hypochromic	Microcytic	Macrocytic	Anisocytic	Poikilocytic	Target Cells	Normoblast
Normal	20	20 (100)	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group A	36	2	34	34	13	30	27	16	3
(%)		(5.6)	(94)	(94)	(36)	(83)	(75)	(44)	(8)
Group B	30	12	17	17	4	12	9	4	Nil
(%)		(40)	(57)	(57)	(13)	(40)	(30)	(13)	
Total	66	14	51	51	17	42	36	21	3
(%)		(21)	(77)	(77)	(26)	(64)	(55)	(32)	(5)

The mean hemoglobin value of the anemic children of groups A and B was below than normal and very important indicator . There was a vast difference in serum iron in A and B groups in normal and anemic children (Table 2). However, iron in group A and group B of anemic children there was a huge difference between serum levels. TIBC increase in average of anemic children and B group was quite important. Comparisons of the two age groups of children did not show a significant difference in TIBC levels between normal and anemic children . A major decrease was observed in the average value of saturation of the anemic group transferrin and of the anemic group B (table 3).

Table 3. Data Showing Significance of Serum Ferritin as Index of Iron Stores Compared with Other Tests.

Tests Performed	Patients	Total Cases	Specificity (%)		Sensitivity (%)	
TIBC	Iron Deficient	66	12	(18)	54	(82)
	Total Anaemic	80	22	(28)	58	(73)
Transferrin Saturation	Iron Deficient	66	3	(5)	63	(95)
	Total Anaemic	80	13	(16)	67	(84)
Serum Ferritin	Iron Deficient	66	0	(0)	66	(100)
	Total Anaemic	80	12	(15)	68	(85)

Also, the transferrin saturation mean value of the normal group was not different significantly, but there was a vast difference between the saturation level of transferrin in the anemic group and the anemic group of the children B (Table 2). While in serum ferritin there was no significant difference between anemic and normal subjects, there was a significantly higher serum ferritin difference between group A and B in anemic and normal children shown in (Table 2).

Table 2. Hematological parameters Group A and B were Iron deficient of normal and anaemic subjects.

Parameter	Normal		Anaemic		P Value
	Group A n= 10	Group B n=10	Group A n=36	Group B n=30	Anaemic and Control
Haemoglobin (g/dl)	11.0 ± 0.56	12.0 ± 0.54	6.6 ± 1.95	8.0 ± 1.90	<0.005 *
Iron (µg/dl)	83.0 ± 19.0	88.0 ± 15.5	42.0 ±12.2	50.0 ± 12.0	<0.005 *
TIBC (µg/dl)	321.0 ± 47.0	319.0 ± 42.0	452.0 ± 60.0	455.0 ± 40.0	<0.005 *
Transferrin (%)	26.0 ± 7.5	30.0 ± 10.0	10.0 ± 4.0	11.0 ± 2.96	<0.005 *
Ferritin (ng/ml)	42.0 ± 36.0	65.0 ± 62.5	8.0 ± 2.5	9.0 ± 3.5	<0.005 *

In anemic children serum ferritin was 85% sensitive and 15% specific. Lower than 15.0 ng / ml in all children with iron deficiency (Table 3). serum ferritin Correlation with hemoglobin, serum iron, age, transferrin saturation, TIBCwas evaluated using Karl Pearson correlation coefficient. Serum ferritin had a positive correlation with age (r = 0.13).

Table 4. Results Showing Correlation of Serum Ferritin with Age and other Hematological Parameters.

Parameters	Control n=20	Anaemic n=66
Age	r = 0.33*	r = 0.13*
Hb	r = 0.27*	r = 0.27**
Iron	r = -0.10*	r = 0.23**
TIBC	r = -0.02*	r = -0.03*
Transferrin	r = 0.03*	r = 0.19*

Serum ferritin concentrations changes in anemic patients were correlated positively with serum iron (r = 0.23), hemoglobin (r = 0.27),and transferrin saturation (r = 0.19) (Table 4).

DSICUSSION:

Transferrin saturation, ferritin level and Hemoglobin levels become abnormal in the iron deficiency anemia, and the iron deposits decrease is reflected in the decrease in serum ferrites. It is difficult to document the serum iron decrease in serum and the increase in TIBC. The spread of the blood is seldom useful for diagnosing iron deficiency until anemia is severe. For purpose of hemoglobin level in large scale population studies all tests except ferritin are either specific for their specificity or not suitable. In our population the lowest iron status is due to environmental, racial, dietary factors and parasitic. The most important dietary factor causing anemia are the low in the proteins and heme content in the diet that found cheaply in the wheat flour. Assessment of body composition in the anemia is an important factor. In both groups in our study the most common cause of anemia is Iron deficiency . When the iron stores are completely consumed, the increasing PCV, hemoglobin, MCHC and transferrin saturation indices become even more abnormal. In the study, it was found that the iron deficiency anemia in the age groups was lower than the children in the youngest age groups. In normocytic and normochromic children, hypochromes, macrocytosis, microcytosis, poichilocytosis anisocytosis and target cells were observed. The red blood cells morphology was not a acceptable indicator of the iron deficiency anemia. Changes in the morphology of red blood cells were observed in our study when the iron deficiency anemia was severe. With age in hemoglobin levels there was a significant increase. On TIBC Age has no effect. After 2 years of age it was similar for healthy people. Transferrin saturation gave better results in anemic and control subjects compared to the morphology of red blood cells, TIBC and serum iron. Between normal anemic individuals transferrin saturation levels there was a vast difference and those with iron deficiency. Serum ferritin was the only sensitive and reliable hematologic indicator for the iron deficiency anemia in normal and anemic individuals, and the estimated diagnosis of iron deposits. We found that normal and ineffective individuals had lower hemoglobin, lower serum iron levels, lower transferrin saturation, lower ferritin and tissue levels, and serum iron levels 15 ng lower than normal serum iron levels. In all children deprived of TDBC and transferrin saturation for the detection iron deficiency / ml, blockage ferritin and other conditions re-infiltrate the ferric reticuloendothelial storage (ferritin). In addition, the MCHC and TIBC indices are considered less susceptible to the iron deficiency anemia. In this study, other investigators reported a positive correlation with serum ferritin at 6 years.

CONCLUSION:

Serum ferritin is more reliable and sensitive than TIBC , serum iron and transferrin saturation.

REFERENCES:

1. Rzymski, Piotr, and Tomas Ganz. "Comment on “Serum Hepcidin and Soluble Transferrin Receptor in the Assessment of Iron Metabolism in Children on a Vegetarian Diet”." *Biological trace element research* (2018): 1-3.
2. Athiana, I., Waldenvik, K., Paulsson, M., Engstrand-Lilja, H., Lundberg, A., Finkel, Y. and Nyström, N., 2018. 5PSQ-017 Safety of intravenous ferric carboxymaltose in treatment of iron deficiency in children under 2 years with intestinal failure.
3. Cusick, Sarah E., Michael K. Georgieff, and Raghavendra Rao. "Approaches for reducing the risk of early-life iron deficiency-induced brain dysfunction in children." *Nutrients* 10, no. 2 (2018): 227.
4. Ahmad, Mirza Sultan, Hadia Farooq, Sumaira Noor Maham, Zonaira Qayyum, Abdul Waheed, and Waqar Nasir. "Frequency of Anemia and Iron Deficiency among Children Starting First Year of School Life and Their Association with Weight and Height." *Anemia* 2018 (2018).
5. Chen, Szu-Ta, Yen-Hsuan Ni, Chuan-Chun Li, and Shing-Hwa Liu. "Hepcidin correlates with interleukin-1β and interleukin-6 but not iron deficiency in children with Helicobacter pylori infection." *Pediatrics & Neonatology* (2018).
6. Moos, Torben, Tina Skjørringe, and Lars Lykke Thomsen. "Iron deficiency and iron treatment in the fetal developing brain–a pilot study introducing an experimental rat model." *Reproductive Health* 15, no. 1 (2018): 93.
7. Robinson, Sonia L., Constanza Marín, Henry Oliveros, Mercedes Mora-Plazas, Blair J. Richards, Betsy Lozoff, and Eduardo Villamor. "Iron Deficiency, Anemia, and Low Vitamin B-12 Serostatus in Middle Childhood Are Associated with Behavior Problems in Adolescent Boys: Results from the Bogotá School Children Cohort." *The Journal of nutrition* 148, no. 5 (2018): 760-770.
8. Sacri, A.S., Hercberg, S., Gouya, L., Levy, C., Bocquet, A., Blondel, B., Vincelet, C., Hebel, P.,

Vinatier, I., de Montalembert, M. and Barros, H., 2018. Very low prevalence of iron deficiency among young French children: A national cross-sectional hospital-based survey. *Maternal & child nutrition*, *14*(1), p.e12460.

9. Matias, Susana L., Malay K. Mridha, Rebecca T. Young, Md Showkat A. Khan, Zakia Siddiqui, Md Barkat Ullah, Stephen A. Vosti, and Kathryn G. Dewey. "Prenatal and Postnatal Supplementation with Lipid-Based Nutrient Supplements Reduces Anemia and Iron Deficiency in 18-Month-Old Bangladeshi Children: A Cluster-Randomized Effectiveness Trial." *The Journal of nutrition* (2018).
10. Conway, Melanie, Peggy Marcon, Paul Meinert, Carol Durno, Julia EM Upton, Melanie Kirby-Allen, and Michael Weinstein. "A Toddler With Treatment-Resistant Iron Deficiency Anemia." *Pediatrics* 142, no. 1 (2018): e20172971.
11. Nelson, Jennifer M., Priya Gupta, Kelley Scanlon, and Cria Perrine. "Iron Status Among Children Aged 12-23 Months by Infant Feeding Method, Nhanes 2003-2010." (2018): 292-292.
12. Binh, Truong Quang, Nguyen Thi Bang Suong, Nguyen Hoang Dinh, Vo Tuan Anh, and Vu Tri Thanh. "Iron Deficiency Anemia in Children with Congenital Heart Disease and the Usefulness of Erythrocyte Indexes as a Screening Tool." *Archives of General Internal Medicine* 2, no. 3 (2018): 1-4.
13. Roy, Aditi, Elena Fuentes-Afflick, Lia CH Fernald, and Sera L. Young. "Pica is prevalent and strongly associated with iron deficiency among Hispanic pregnant women living in the United States." *Appetite* 120 (2018): 163-170.