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Prevalence of Iron Deficiency in Iranian Boy's Primary Schools in Yasuj.

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ABSTRACT

The aim of present study was determination of prevalence of iron deficiency in Yasuj BOY'S primary schools. A randomized, cross-sectional study was carried out on 280 boy's primary schools 6 to 10 year's old living in urban areas of Yasuj district in Kohgilooyeh and Boyrahmad Province of Iran. Two ml of blood in EDTA tubes for hematological parameters such as red blood cell (RBC) count, hemoglobin (Hb), hematocrit (Hct), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) was collected. Four ml blood in non anticoagulated tubes for serum iron (SI), total iron binding capacity (TIBC) and serum ferritin (SF) was collected also from all participants by antecubital vein puncture. Student's "t" test was used to compare the proportions iron deficiency and normal students in all parameters. In present research the prevalence of iron deficiency was 13.92%.The mean serum SI and SF were 105±33.2 µg/dL and 19.2± 12.5 ng /ml respectively. From 56 participants with microcytic hypochromic pattern, 39 students (13.92%) had anemia. Out of all participant, 39 (13.92%) was reported with MCV ≤ 80 fl, SF below 12 ng/ml and 241(86.08%) subject had SF more than 12 ng/ml. Out of 280 students screened 39 (13.92%) were found to be anemic

Keywords: Iron Deficiency, Serum Ferritin, Serum Iron, Primary School, Yasuj

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INTRODUCTION

Iron is a trace element that required for normal human growth. It has many function and take part in biosynthesis of hemochromoproteins such as hemoglobin and myoglobin for oxygen transport [1, 2]. Iron deficiency is a preventable micronutrient deficiency and the most frequent anemia that prevalent in all industrialized nations and affecting 2 billion people in the world population [3].Iron deficiency accounts for 75% of all types of anemia in the developing countries that occur in 30% of population [4]. According to WHO, Iron-deficiency is a basic nutritional problem in Iran with the prevalence of moderate category [5].

Iron-deficiency anemia is associated with a variety of developmental and behavioral parameters such as growth retardation, IQ defect in severe state, fatigue, irritability, exercise intolerance, lethargy, abnormal thermogenesis, susceptibility to infection and, poorly on vocabulary and reading potential and result in learning capacity problem [5, 6].

The prevalence of iron deficiency in Iranian children under 5 years old and woman was estimated 18% - 38% and 30-50% respectively [5] .The aim of this study was to assess the prevalence of iron deficiency among male primary school students in Yasuj, southern province of Iran.

MATERIAL AND METHODS

A total of two hundred eighty students 9-11 ages were collected in 11 schools included in the analytical cross-sectional study that selected from a list of all primary schools using a systematic sampling method. The schools were more or less randomly selected, but an attempt was made to include most of the local population from different areas in the cities. After providing the necessary permission from the Education Departments an informative write-up on iron deficiency was sent to the parents and obtaining their written informed consent, blood collection was organized during school hours.

They were screened for, iron deficiency using complete blood count (CBC) and with EDTA anti-coagulated whole blood samples and a serum ferritin level, serum iron was determined. Two ml of blood in EDTA tubes for hematological parameters and 4 ml in non-anticoagulated tubes for iron deficiency parameters. Serum iron (SI), and total iron binding capacity (TIBC) were determined by a Autoanalyzer (Ra 1000 USA) and serum ferritin (SF) was estimated by radioimmunoassay method within 24 hours from sampling. Transferrin saturation for all samples was determined [7]. Routine hematological test CBC such as red blood cell (RBC) count, hemoglobin (Hb), hematocrit (Hct), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin and Concentration (MCHC) were measured immediately after blood sampling by automated cell counter (Sysmex KX21; Sysmex, Kobe, Japan). Individuals with ferritin level < 12 µg/L or transferring saturation < 15% were considered to have ID. Individuals without disease, normal CBC, ferritin, iron, TIBC concentration was regarded as normal group [8, 9].

Statistical Analysis

All data were express as means ± standard deviation (n=3). Statistical Package for Social Sciences program (SPSS) ver. 21 was used for calculation of descriptive parameters.Student's "t" test was used to compare the proportions anemic and normal students in all parameters.

RESULTS

The study demonstrated that Out of 280 school children enrolled in this study; 120 (42.8%) were of the age group age 9-10 years, 140(50%) 10-11 years and 20(7.2%) 11-12years. Students were divided into two groups normal and iron deficiency. MCV≥80fl in 80% and MCV below 80 fl in 20 % of all participants was reported .MCH ≤25 pg, was found in 10% of participants respectively. Out of all participant 38 (13%) was reported with MCV ≤ 80 fl (Table 1).

The mean and SD of hemoglobin in all participants 14.08 ± 1gr / dl, Hct = 43.57 ± 2.98, MCV = 82.6 ± 7 fL, MCH = 26.4 ± 2.5 pg and MCHC= 32.3±1 g / dl were reported (Table 1).The mean serum (SI) iron and serum ferritin (SF) were 105±33.2 µg/dL and 19.2± 12.5 ng /ml respectively. From 56 participants with microcytic hypochromic pattern, 39 students (13.92%) had anemia (Table 3).Out of 280 participants, 39

(13.92%) subjects had SF below12 μg/ml and 241(86.08%) subject had SF more than 12 μg/ml (Table 3). Overall, the prevalence of iron deficiency was 13.92%.

Table 1: Hematological parameters (mean ± SD) in boy's primary schools in Yasuj, Iran

Parameters	HCT (%)	Hb(g/ dl)	RBC(10^6/μL)	MCH(pg)	MCV(fL)	MCHC (%)
Normal	43.57 ±3	14.08 ±1	5.26 ±0.4	26.4 ±2.5	82.6 ±7	32.3 ±1
ID	31 ±4.2*	10.1 ±1.2*	4.6 ±.25	15.1 ±2.5*	61.2 ±6.4*	29.8 ± 1.2

Hematocrit (Hct), hemoglobin (Hb), Red blood cell (RBC) count, mean corpuscular hemoglobin (MCH), mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), ID=Iron deficiency.*significant at P< 0.05 compare to normal

Table 2: Hematological parameters (mean ± SD) in boy's primary schools in Yasuj , Iran

Parameters	Platelet(×10^3/μl)	RDW (%)	WBC(×10^3/μl)
Normal	261± 25.1	14.1±1.2	6.8±1.1
ID	245±27.2	19.3±1.1	6.1±1.3

ID=Iron deficiency, Red cell distribution width (RDW), white Blood Cell (WBC).

Table 3: Iron deficiency indices (mean ± SD) in boy's primary schools in Yasuj, Iran

Parameters	SI(μg / dL)	TIBC(μg/dL)	SF(μg/L)
Normal	82 ±13.5	356 ±25.1	39 ±11.8
ID	27 ±1.9*	289 ±23.4	5.9 ±1.5**

Serum iron (SI), total iron binding capacity (TIBC), serum ferritin (SF), ID=Iron deficiency, *significant at P< 0.05 compare to normal. .**significant at P< 0.01 compare to normal

DISCUSSION

The aim of present research was to assess the prevalence of iron deficiency among male primary school students. For evaluation of iron deficiency, some laboratory tests such as serum iron, total iron binding capacity (TIBC) and ferritin are essential. The last one test is most sensitive indicators of iron stores.Serum ferritin is one of the most sensitive indicators of iron stores, with a normal value of 20 to 250 μg/L for men and 10 to 120 μg/L for women [10, 11].

The mean of SF in present work was 19.2 ± 12.5 μg/dl and 39 (13.92%) participants had low SF (SF <12 ug/mL). The prevalence of iron deficiency in recent study was 13.92% which comparable with study of Karimi with prevalence of 17.7 in Fars Province, southern Iran. The present prevalence is less than other developing countries. This difference is due to low iron content of diets since; iron deficiency is depended to iron level of foods [3].

The prevalence of iron deficiency in Jeddah with Hb < 10.5 g/dL was 25.2% .Prevalence of anemia in some parts of India 76%, in northern of Thailand in children between 0.5-13 years old 25%, in young Cameroon children 21 % and in urban Haitian children 40% were reported [5]. Prevalence of ID in Saudi Arabia, Southeast Asian countries , India, Thailand, Cameroon and Haitian are higher than in Iran [5].

Prevalence of iron deficiency was reported with significant difference with present study. In India with high population iron deficiency is one of the most anemia due to food and nutrient with iron not well available for everybody. The absence of iron supply for hemoglobin synthesis that induced anemia and insufficient consumption of iron rich foods must be recorded as associating parameters.

In one study In the United States in adolescent girls prevalence of anemia was reported, 9% which is not consistent with the present research. Also in another report published, the prevalence of iron deficiency in industrialized and nonindustrialized countries was 20 and 39% [3].Diagnoses and treatment of iron deficiency in children is essential program, Due to learning ability problem, cognitive disorder and growth retardation[12] .

CONCLUSIONS

According to present data: 13.92% was reported with MCV ≤ 80 fl and SF below 12 ng/ml, therefore13.92% were found to be iron deficiency.

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