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Original Paper

Evaluation among Iron Deficiency Anemia and helmenthis infection of the School Going Children of Rural Area of Takht Bhai District Mardan Khyber Pakhtunkhwa Pakistan

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***Abstract*— Iron is essential for normal human growth, including oxygen transport, adenosine triphosphate (ATP) production, DNA synthesis, mitochondrial function, and protection of cells from oxidative damage. Iron deficiency anemia is the most prevalent hematologic disorder in school-going children. Therefore the aims were the study to assess the prevalence of anemia among school-going children of rural areas of Mardan Khyber Pakhtunkhwa. A total 600 samples were taken from those children of signs and symptoms of Iron deficiency Anemia cross-section survey. Thorough physical Examination, Lab investigations and Clinical examination. The current research work shows that 1 of 3rd of the school-going children who had signs and symptoms of iron deficiency anemia were effected with iron deficiency Anemia at the ages of 4 to 7 years 80(40%), 7 to 10 years 70(35%) and 10 to 13 years 50(25%) respectively. severe anemia were rare with 10%, moderate anemia 25% led by the mild type of anemia with a high percentage of 65% on the basis of Hb level. lower class families were more affected by iron deficiency anemia with 60%, children of middle class were less affected by anemia with 35% while children of upper class families were much less affected by anemia which may be due to the socioeconomic state of the family. Therefore it is recommended that iron supplementation and health and nutrition education programs should be conducted in the schools for the awareness of children.**

***Keywords*— Anemia, Children, Deficiency, Iron, Prevalence**

I. INTRODUCTION

Iron is essential for normal human growth. Iron is required for many essential body functions, including oxygen transport, adenosine triphosphate (ATP) production, DNA synthesis, mitochondrial function, and protection of cells from oxidative damage[1,2]. Iron deficiency anemia is the most prevalent hematologic disorder in school-going children[3]. It is estimated that around 2.15 billion individuals suffer from iron deficiency anemia [4]. In a recent review of the prevalence of iron deficiency anemia in the United States, 9% of toddlers and up to 11% of adolescent girls were iron-deficient [2]. The absorption of dietary iron is assumed to be 5-10%, but it increases 3-5 times when iron storage is depleted [5, 6]. Inadequate dietary iron, iron absorption and intense exercise, along with blood loss and parasitic infections are some etiologies of iron deficiency anemia (IDA). Some consequences of IDA are growth retardation, exercise intolerance, behavioral changes, and abnormal thermogenesis. Although the prevalence of IDA has declined in industrialized countries, there have been few changes globally [7]. According to a UNICEF report, two billion people suffer from anemia worldwide and most of them have IDA, especially in underdeveloped/developing countries, where 40-50% of children under age 5 are iron deficient [8]. It has been reported that 46.5% of Indonesian and 30-60% of Guatemalans under the age of 5 have suffered from IDA [9, 10]. In Iran, 30-50% of women and children, especially those in low-income families, are suffering from iron deficiency [11-13]. Anemia has been shown to affect mental development and learning capacity. In infancy it may cause a permanent loss of IQ later in life, shortened attention span, irritability, and fatigue, difficulty with concentration, lethargy, weakness and increased susceptibility to infection. Consequently, anemic children tend to do poorly on vocabulary, reading, and other tests [14]. In Saudi Arabia most of the studies on anemia were based on nutritional status and concentrated on preschool children who were under six years old[15-19], so data on the nutritional status of children and adolescents in the Kingdom are insufficient[18]. According to a World Health Organization (WHO) report, IDA is most frequent

in children and women around the world, especially in non-industrialized countries. It is the only nutrient deficiency which is also significantly prevalent in virtually all industrialized nations. In addition, there are no current global figures for iron deficiency.

Anemia as an indirect indicator it can be estimated that most female preschool children and pregnant women in non-industrialized countries, and at least 30-40% in industrialized countries, are iron deficient [4] Therefore, the aim of this study was to assess the prevalence of iron deficiency and IDA among female elementary school students and their relation to variables such as: age, weight, height, mother's education, number of family members, and nutritional habits in Jeddah, western province of KSA.

The main aim of the present study was to assess the prevalence of Iron Deficiency Anemia and helmenthis infection of the School Going Children of rural area of Takht Bhai Mardan Khyber Pakhtunkhwa Pakistan; to detect prevalence and clinical presentation of iron deficiency anemia (IDA) in school-going children; to detect socioeconomic factors of Iron deficiency anemia; and to detect age wise prevalence of iron deficiency anemia

II. Methodology

A cross-section survey was conducted on randomly selected school-going children with Iron deficiency anemia aged from 4 to 13 years in Mardan Khyber Pakhtunkhwa after obtaining ethical approval from the School Head Teachers and the research ethics committee of faculty of medicine at Tehsil Head Quarter Hospital Takht Bhai Mardan.

A. Sample Size

A total of 600 samples were taken from those children with signs and symptoms of Iron deficiency Anemia.

B. Children aged

Aged wise three groups were made including 4-7, 7-10, and 10-13 years of aged

C. Questionnaire

Questionnaires were set to collect data about age, black tea intake, gender, education, and social classes based on monthly income14, use of unfortified cow milk, vitamin supplementation drugs, and dietary intake. The principal author validated the Pashto version of questionnaire by involving two independent bilingual translators who performed forward and back translation and an expert committee at Tehsil Headquarter Hospital Takht Bhai Mardan.

D. History

Data history is taken to fulfill the following:

- Clinical history was taken from children and relatives including age, onset of anemia, nutritional history, and intake of iron supply.
- History of fatigue, poor activity, exertion, dyspnea. Breathlessness at rest.
- History of blood transfusion

E. Thorough Physical Examination

Clinical examination, general, chest, cardiac, abdominal, and neurological examination

F. Lab investigations and Tests:All patients were subjected to

- Complete Blood Picture and reticulocyte count. Patients with microcytosis underwent the following:
- Serum Iron, ferritin and TIBC
- An automatic hematological analyzer and Biochemistry analyzer were used for clinical examination.

G. Sample type

Blood samples were taken from all patients through EDTA tubes for transporting to Hospital.

H. Statistical analysis

After collecting information from the selected sites of the study area through questionnaires, and the completion of laboratory tests, the Statistical analysis of data was carried out through MS Word 2010.

III. Results

Table 1. Shows that 1 of 3rd of the school-going children who were sign and symptoms of iron deficiency anemia were effected with iron deficiency Anemia with age of 4 to 7 years 80(40%), 7 to 10 years 70(35%) and 10 to 13 years 50(25%) respectively.

Examination of patient with sign and symptoms of Iron deficiency anemia were pale skin children were more frequent, leading by weakness of children with percentage of 35% while symptoms of fatigue were very less as compare to other sign and symptoms.

Table.3 shows that severe anemia were rare with 10%, moderate anemia 25% leading by mild type of anemia high high percentage of 65% on the basis of Hb level.

Table.4 shows that children of lower class family were more affected by iron deficiency anemia with 60%, children of middle class were less effected by anemia with 35% while children of upper class family were very less effected with anemia which may be due to the socioeconomic state of the family. The prevalence of anemia is a severe nutritional problem of public health significance. Therefore, iron supplementation and health and nutrition education programs should be strengthened. The community needs to be encouraged to diversify their diets by consuming iron-fortified and iron-rich foods.

Table.5 This study found that the prevalence of STH among study subjects was 20(6.65%), of age 4-7 years were 10(3.33%), age of 7-10 years were 8(2.66%) while the age of 10-13 years were 2(0.66%). The most common types of worm infections were Ascaris lumbricoides (25.0%), Trichuris trichiura (11.2%) and mixed infections (3.8%). A significant correlation was found between the presence of STH infection and underweight nutritional status. Conclusions the presence of STH infection in children is strongly influenced by their hygiene practices. Small clinics and student healthcare units should play an active role in conducting periodic assessment of children's nutritional status and in providing them with information on STH symptoms and prevention.

TABLE I. AGE WISE PREVALENCE OF ANEMIA

Age	Sample size	Normal	Anemic
4-7	200	120	80
7-10	200	130	70
10-13	200	150	50
total	600	400	200

TABLE II. SIGNS OF ANEMIA AND EXAMINATION OF PATIENTS UNDER THE STUDY

Symptoms	No. children (Hb < 11.5 gm/dL) N	Percentage (%)
Pale skin	110	55%
Weakness	70	35%
fatigue	20	10%
total	200	100%

TABLE III. PREVALENCE OF IRON DEFICIENCY ANEMIA ON THE BASIS OF TYPES

Type of anemia	Hb level	Sample size	Percentage (%)
Severe anemia	(Hb < 7.0 g/dL)	20	10%
Moderate anemia	(Hb 7 < 10 g/dL)	50	25%
Mild type of anemia	(Hb 10 < 11 g/dL)	130	65%

TABLE IV. PREVALENCE OF IRON DEFICIENCY ANEMIA ON THE BASIS OF SOCIOECONOMIC STATE

Economic state	Normal Hb	Low Hb	No.sample
Lower class	80	120	200
Middle class	130	70	200
Upper class	190	10	200
Total	400	200	600

TABLE V. OVERALL PREVALENCE OF HELMINTHIC INFECTION IN SCHOOL GOING CHILDREN

Age	Sample size	Normal	No. Helminthes Children	Percentage %
4-7	100	90	10	3.33%
7-10	100	92	8	2.66%
10-13	100	98	2	0.66%
total	300	280	20	6.65%

TABLE VI. OVERVIEW OF INDICATORS AND CUTOFFS THAT ARE CONSIDERED APPROPRIATE TO ASSESS MALNUTRITION IN SCHOOL-GOING CHILDREN

Condition	Appropriate indicator	Appropriate cutoff value
Stunting[a]	Height-for-age	< –2 SD from median or < 3rd percentile of WHO growth reference or CDC
Underweight[a]		growth charts
	Weight-for-age	< –2 SD from median of WHO growth reference or CDC growth charts
Thinness[a]	BMI-for-age	< –2 SD from median or < 5th percentile of WHO growth reference or CDC
Overweight[a]		growth charts
	BMI-for-age	> + 1 SD from median or > 85th percentile of WHO growth reference or
		CDC growth charts
Obesity[a]		> BMI value corrected to BMI = 25 in adults (IOTF)
	BMI-for-age	> + 2 SD from median or > 95th percentile of WHO growth reference or
		CDC growth charts
Anemia[b]		> BMI value corrected to BMI = 30 in adults (IOTF)
	Hemoglobin	< 110 g/L in children < 5 yr
		< 115 g/L in children 5–11 yr
		< 120 g/L in children 12–14 yr and older girls
Iron deficiency[b]		< 130 g/L in boys ≥15 yr
	Serum or plasma	< 12 µg/L in children < 5 yr

Condition	Appropriate indicator	Appropriate cutoff value
	ferritin	< 15 μg/L in children ≥ 5 yr
Iron-deficiency	Hemoglobin	< 110 g/L in children < 5 yr
anemia[b]		< 115 g/L in children 5–11 yr
		< 120 g/L in children 12–14 yr and older girls
		< 130 g/L in boys ≥ 15 yr
	AND	
	Serum or plasma	< 12 μg/L in children < 5 yr
Iodine deficiency[b]	ferritin	< 15 μg/L in children ≥ 5 yr
	Urinary iodine	< 100 μg/L (< 0.79 μmol/L)
Zinc deficiency[c]	Serum or plasma zinc	< 65 μg/dl (9.9 μmol/L) in children < 10 yr
		< 70 μg/dl (< 10.7 μmol/L) in girls ≥ 10 yr
		< 74 μg/dl (11.3 μmol/L) in boys ≥ 10 yr
Vitamin A	Serum or plasma	< 20 μg/dl (< 0.70 μmol/L)
deficiency[b]	retinol	

IV. DISCUSSION

The current study shows that the 1 of 3rd of the school-going children who were sign and symptoms of iron deficiency anemia were effected with iron deficiency Anemia with age of 4 to 7 years 80(40%), 7 to 10 years 70(35%) and 10 to 13 years 50(25%) respectively. Similarly a research work also conducted by [16] A majority (81%) of the rural children of West Bengal were anemic, and the prevalence was significantly ($p<0.001$) higher among 1–3-year-old (91%) as compared to 4–5-year-old (74.6%) children. A significantly ($p<0.01$) higher proportion of 1+ (OR = 7.7; 95% CI: 2.6–22.4) and 2+ year children (OR = 3.0; 95% CI: 1.5–6.0) and those belonging to lower socio-economic heduled Caste and Scheduled Tribe communities were at risk for anemia (OR = 2.3; 95% CI 1.3–3.9).

Examination of patient with sign and symptoms of Iron deficiency anemia were pale skin children were more frequent, leading by weakness of children with percentage of 35% while symptoms of fatigue were very less as compare to other sign and symptoms. The current results shows that severe anemia were rare with 10%, moderate anemia 25% leading by mild type of anemia high high percentage of 65% on the basis of Hb level. Same work also performed by [17] Risk factors for moderate to severe anemia included incomplete immunization, stunted growth, recent infection, absence of bednet, low household living standard, rural residency (Mali), low maternal education, and low community development index (Benin). In addition, multilevel analysis indicated a clustering level of anemia in communities (intra class correlation) of 14% and 19% in Benin and Mali, respectively.

The current results also shows that children of lower class family were more effected by iron deficiency anemia with 60%, children of middle class were less effected by anemia with 35% while children of upper class family were very less effected with anemia which may be due to the socioeconomic state of the family. The prevalence of anemia is a severe nutritional problem of public health significance. Therefore, iron supplementation and health and nutrition education programs should be strengthened. The community needs to be encouraged to diversify their diets by consuming iron-fortified and iron-rich foods. [18] Similarly the anemia percentage was recorded high in lower socioeconomic family children, than middle class and upper class. The percentage of anemic children was also high in age group of 10 - 12 years. Pale skin was the most common symptom of anemia.

V. CONCLUSION

The prevalence of anemia is a severe nutritional problem of public health significance. Therefore, iron supplementation and health and nutrition education programs should be done. Anemia is a serious nutritional issue with public health implications. As a result, iron supplementation as well as health and nutrition education initiatives should be expanded. The community should be encouraged to eat iron-fortified and iron-rich foods to vary their diets.

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