PREVALENCE OF IRON DEFICIENCY ANEMIA (IDA) IN ADOLESCENCE GIRLS OF PESHAWAR

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ABSTRACT

Objective: The main objective of this study was to find out the Prevalence of iron deficiency anemia (IDA) in adolescence girls of Peshawar, the effect of dietary habits and anthropometric measurement in causing IDA.

Methodology: This cross sectional study was conducted on 400 adolescent girls selected randomly from girls' schools and colleges of different regions of Peshawar. The study was conducted for duration of two months from 15th June 2016 to 15th august 20016

Female students of fourth and final year MBBS were recruited as research assistants for data collection. The team also consisted of a female doctor, a lady health visitor and a lab technician. They were explained with signs and symptoms of anemia and also trained on how to examine the girls. A semi structured questionnaire was also designed for relevant data collection and students were trained on it. Girls of adolescent age mainly of age 13 to 19 years of any class were included in study while those with any systemic diseases were excluded from the study. A pilot study was conducted to check the feasibility of study and questionnaire before the final study.

Most of the information's were collected as verbal responses from the respondent; however data for clinical assessment especially for signs for IDA was recorded after medical examination. Biochemical test for Hb were performed in the field. The collected data was processed with the help of computer in Microsoft excel and all figures were computer generated.

Results: From the result of the research it proved that IDA is a widespread problem in adolescent girls of Peshawar i.e. 61 %. The average HB level of adolescent girls is only 11.37 g/dl below the normal level of 12 g/dl.It was found that BMI did not have any significant correlation with IDA. Dietary information pointed that increased dietary iron intake does help in prevention of IDA.

Conclusions: A number of factors affect prevalence of IDA in adolescent girls. Major factor may relate to dietary/iron intake. However, socio-economic status, education and even hygiene can have relevance on prevalence of IDA. The empirical/primary data is required to confirm the prevalence and its causes with a specific degree of confidence in Pakistan.

Key words: Iron deficiency anemia (IDA), Adolescence, Basal metabolic index (BMI), AnthSropometric measurement.

INTRODUCTION

Anemia is one of the most prevalent morbidities suffered by individuals in world particularly in developing countries, and is an important contributor to the increase mortality in these regions.[1]

Iron deficiency Anemia (IDA) is a clinical condition in which a person has insufficient amount of iron to meet body requirement. Anemia is present in adults if the hematocrit is less than 41% (Hb< 13.5g/dl) in male or 37% (Hb< 12g/dl)in females[2]. if an individual suffers from anemia there will be impaired physical and mental development and work capacity, diminishes learning ability, increases susceptibility to infection and greater risk of death associated with pregnancy and childbirth.

The most common form of anemia is the iron deficiency anemia (IDA) which alone affects more than 1 billion people in developing countries.[1]the burden of disease is highest in South Asia and Africa where around 40% of all age group are affected by iron deficiency anemia. The prevalence rate in adults and pregnant ladies is around 65% which is an alarming figure.[3-5.]

Despite of the fact that the developmental processes of adolescence needs increase demand of both micro and macro nutrients especially in girls at their age of menarche , this age has been surprisingly ignored by the researchers to study and mostly children below 12 years of age are selected for their studies particularly in sub Saharan region. DeMaeyer and Adiels-Tegman conducted a review study to find out the work done on this global issue and they found only six studies conducted till 1985.in their study the found that in all the studies conducted almost half of the girls of adolescence age were suffering from iron deficiency anemia.[6-10].

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It has also been observed by the researchers that Chronic anemia, especially when associated with severe micronutrient deficiencies, may also affect school performance and attendance and physical work capacity.[11-13]

One common complication of iron deficiency anemia is growth retardation and cephalo pelvic disproportion which caused obstructed labor that could lead to increase rate of perinatal and maternal morbidity and mortality.[14] Due to competition between nutritional requirements of the developing fetus and the mother's requirement for continuing growth the adolescent pregnancies are also at increased risk of severe anemia, preterm deliveries, still births, and neonatal deaths [15-17]. The most important cause of anemia in the world and a major potential contribution to adolescent anemia in sub-Saharan Africa is the national deviancy[18].

Like other developing countries Pakistan is also facing with the problem of IDA. The burden of the disease in different parts of the country varies from 35% to 69%.[19-21] IDA is present in almost every part of Pakistan and it affects an estimated three millions new born and million more under five years of age children in Pakistan.[25] An estimated nine million children and adolescent girls are suffering from iron deficiency anemia which is affecting their physical as well psychological development.[25]

Adolescence is the stage of rapid growth for the human body. Without enough iron, full growth and mental development does not occur. A number of important issues arise that influence the nutritional well-being of the teenager. The child gains about 20% of adult height and 50% of weight. Compositions of the body changes and females gain more fat during this period. Meal patterns are changed and adolescent girls usually miss their breakfast and other meals. The nutritional requirements of this group increases. In female iron is lost monthly with the onset of menses. Adequate information on the nutrition including iron status of the adolescent girls is not available. The present investigation covers study of the prevalence of IDA in adolescent girls residing in Peshawar area. The study will help in the identification of factors responsible for causing IDA in adolescent girls of selected socioeconomic group which may help in improving the iron status of these girls: the future mothers.

Limitations

1. Sample size of 400cannot cover the majority of population suffering from IDA.
2. Hb percentage evaluation is not a specific test for iron level. However, serum ferritin is a more reliable test for the evaluation of IDA but due to limited resources, reliance on Hb values has been made.

MATERIAL AND METHODS

It was a cross sectional study which was conducted in different regions of Peshawar. The study population comprised of adolescent girls between the ages of 13-19 years from different schools and colleges of Peshawar region.

The random sampling technique was followed in which various schools and colleges of Peshawar region were visited. A total sample size of 400 girls was selected for this study. Girls falling within the desired age group of each school were requested to participate in the study. Permission from Principals/ Headmistresses was sought to conduct the study at their schools. Informed verbal and written consent was taken from the parents as well as the girls after explaining purpose of the study to them. Initially Girls hesitated, however with some motivation; they agreed to participate in the study. No restriction or limitations were imposed; they only criterion for participation in the study was that the girl should be within the age bracket of 13-19 years, regardless of what class she was studying in. a semi structured questionnaire was designed to collect the data.Biochemical test to find the HB level was performed on all girls.The medical team comprised of one female doctor, one lady health visitor and a dispenser. Lady health visitor took anthropometric measurements, while dispenser conducted biochemical test. Students filled in the questionnaire for dietary assessment and clinical examination.

Among the anthropometric measurement height and weight of the girls belonging to 12 to 19 years age group were taken. Height was taken in standing position without footwear. The girls were made to stand against the wall and a foot ruler was placed on their heads, which was also in contact with the wall. A pencil mark was made on the wall at bottom contact of the foot ruler. Care was taken that foot ruler was parallel to the ground, while it was kept on the head of the sample. Heights were measured in inches and recorded in the questionnaire. Later on these were converted into meters by dividing height in inches with 39.37 during processing of the data. Weight was measured using bathroom scale. Shoes and chaddar/scarf were also removed. Weight was measured in kilograms and recorded in the questionnaire.

Body mass index of each sample was calculated using following formula;-

BMI= weight (Kilograms)/Height (meter^2).

Oral questionnaire method was used to assess the dietary intake. Inquiries were made about the nature and quantity of food eaten during the previous 24 hours (24 hours dietary recall method). 24 hours recall method provides information about dietary intake pattern, specific food consumed and estimated nutrient intake. The data were recorded in the questionnaire as basic food groups and approximate weight by asking investigative questions in order to reach closest possible quantity of

food intake in grams.

The type of food intake and its quantity was compared with the food table (Table-1) to record the total food iron intake in last 24 hours.

HB concentration

It is relatively insensitive index of nutrient depletion. Normal value for female (non-Pregnant) is 12 g/dl and for pregnant female is 11 g/dl. For adult male it is 13 g/dl its value is less in population groups in which anemia is not severe: This because anemia is a late manifestation of iron deficiency.

Sally's Method being a field method was used to detect Hb values of the samples on the spot. Laboratory assistant accompanying the survey team took the blood sample using lancet to the prick the middle finger of the sample girls. First drop of blood was discarded diluting and second drop of blood was taken into haemocytometer containing dilution solution. Hb values were then recoded for each sample in the respective questionnaire.

RESULTS AND DISCUSSION

In order to measure the prevalence of IDA in the sample group, the entire data were arranged in sequence and the standard value of Hb was fixed as 12 g/dl. All the girls who had Hb value of below 12 g/dl were considered to be Positive for IDA, whereas Girls with Hb value ofabove! 12 g/dl where considered as negative for IDA. Out of 400 girls, 244 had Hb value below 12 g/dl which is 61% while 156 (39%) girls were non-anemia

Prevalence of anemia in Peshawar

At national level about 28.9% adolescent were anemic. The proportion of Rural adolescent was relatively higher (30.2%) compared to urban residence, which

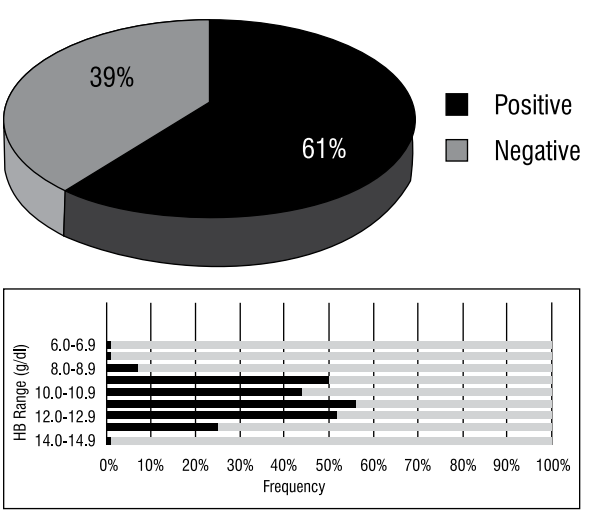

Fig 1: Hb Levels in Adolescent Girls

Table1: HB leveIss and ida prevalence adolescent girls

S/ NO	Range (HB levels in g/dl	Frequency	Percentages
1	6.0-7.9	2	0.5%
2	7.0-7.9	2	0.5%
3	8.0-8.9	14	3.5%
4	9.0-9.9	26	6.5%
5	10.0-10.9	88	22.0%
6	11.0-11.9	112	28.0%
7	12.0-12.9	104	26.0%
8	13.0-13.9	50	12.5%
9	14.0-14.9	2	0.5%
10		400	100.0%

Table 2: BMI Range, Frequency and Average Hb of the Group

S/No	Description	BMI Range	Frequency	Average HB(g/dl
1	Under Weight	<20.8	226	11.58
2	Desirable Weight	<20 to 24.5	118	11.13
3	Moderate obese	24.6to 28.6	48	10.92
4	Severe obese	>28.6	8	11.27

was 27%[24]. However, in Peshawar area, this percentage was very high i.e. 61% for which can be attributed to many other factors, such as small sample size, single biochemical test (HB only) and selection of middle and lower middle class etc. in one such study 115 students were examined out of which 65% were anemia from biochemical point of view[81]. in another similar study conducted on Lady Health Visitor students Class, Hb Levels were found below 12 g/dl in 50% cases[26]. Therefore, the prevalence of IDA is higher in girl'sespecially adolescent girls of middle class. The low prevalence at national level (28.9%) may have reasons such as large sample size and application of more sensitive biochemical tests such as serum Ferritin Tests, however, in Peshawar IDA is very High (61%).

For measuring the acuteness of IDA the data were divided in groups of 1 g/dl each

The minimum Hb level and upper Hb level Measured Serve as the boundary lines. Since the minimum Hb level measured was 6.5 g/dl and maximum was 14 g/dl, therefore data were divided into 9 groups of 1 g/dl each. The data along with percentage is presented in the table 1 and illustrated in fig-2.

Table 3: Food Table for Iron Contents

Ser	Food Item	Iron Contents Per 100 Gram
1	Wheat	1.5mg
2	Rice	0.6mg
3	Maize	1.5 mg
4	Black Gram (urd)	3.8 mg
5	Soya bean (green peas & beans)	10.4 mg
6	Red Gram (Arhar) and Lentil pulse	2.7 mg
7	Whole Gram	4.6 mg
8	Green leafy Vegetables	Unabsorbed
9	Roots, tubers and other vegetables	Negligible
10	Cabbage	0.6 mg
11	Potatoes	0.7 mg
12	Nuts	10-14 mg
13	Apple	0.3 mg
14	Banana	0.5 mg
15	Grapes	1.5 mg
16	Guava	0.27 mg
17	Mango	1.3 mg
18	Orange	0.32 mg
19	Dates	7.3 mg
20	Raisin	7.7 mg
21	Milk	0.2 mg
22	Egg	2.1 mg
23	Fish	0.7-3 mg
24	Chicken	1.0 mg
25	Beef	1.9 mg
26	Kidney	6 mg
27	Liver	11.4 mg
28	Mutton	1.1 mg

Out of the 61% of IDA cases, 11% of the girls had severe Ida I.e. Hb levels were below 10 g/dl (table-1) which need special attention and treatment. 22% of girls fall between the range of 10-10.9 g/dl and require supplementation for some time along with dietary advice. 28% girls are within the range of 11-11.9 g/dl of Hb level and can be handled with improved diets and iron supplements, to avoid further fall and to improve Hb to non-anemia 12 g/dl level.

The average value i.e. Mean of Hb in adolescent girls of the sample was calculated by adding the values of Hb of each girl and dividing the total by 400. Therefore the sample average is 11.37 g/dl. The data were collected and related with anthropometric measurements, and dietary information.

In order to determine the effects of weight and height on prevalence of IDA some common factor such as age or BMI was necessary. Since effect of weight or height alone on IDA would be meaningless without any common or constant variable, therefore BMi was considered more relevant. BMI=Weight (Kilograms)/ Height/(Meter2). The lowest BMI was 11.35 Kg/M2 and the highest was 32.29 kg/m2. The data were divided into four main categories Table-2[27] and presented in table 2.

Underweight girls had highest average Hb levels (11.58g/dl) on the other hand severe obese girls also had still better Hb levels (11.27g/dl) than girls falling in desirable and moderate obesity. However difference in average Hb levels was not that significant nor do they display any trend, therefore there appears to be no relationship between the BMI and IDA. In an earlier study conducted[28] in the area shows that out of 1019 underweight children 50.6% had IDA and 49.6 % did not have IDA. Also out of 2040 non-underweight children 49.7% had IDA and 50.3% did not have IDA. This also establishes that there is no-significant relationship of IDA and weight or BMI.

Using 24 hours dietary recall method, dietary pattern of the adolescent girls was noted in the questionnaire. Approximate quantity of the food intake was noted. Food table (Table-3) was consulted to ascertain iron contents in the diet.

Average daily diet should contain 13-15 mg of iron for girls between the ages of 13-19 years though only 10% of this is absorbed[29]. Daily intake of iron recommended by UK DHSS (Department of Health And Social study only 19 girls (9.5%) of the girls were found to be taking 12 mg or above dietary iron and their average Hb was 12.04 g/dl (Fig-6) most of these girls were talking beans, peas, meat and fish. All the girls had bread (roti) in their dinner and only three of them had rice (Table-3). This clearly shows that iron rich diet has a strong correlation in prevention of IDA.

About 55% of the girls were consuming less than 8 mg of dietary iron per day and these had the lowest averageHb of 11.12 g/dl. A total of 32 girls were found to be skipping either breakfast or lunch, out of these 30 were in this group and remaining two in the group 8-12 mg/ and both these groups had levels of 11.12 g/dl and 11.55 f/dl respectively, which is below the standard 12 g/dl which indicates that low dietary iron intake results in prevalence of IDA.

RECOMMENDATIONS

From the above results and discussions following recommendations are made:-

IDA has strong prevalence in adolescent girls

(61%) and requires concrete curative and preventive efforts by all concerned at public and private sector. Since IDA is the outcome of several factors, the problem can be solved by taking actions simultaneously at various level for example family, community, national and international level.

Nutrition education is important both at family and community level. Harmful food taboos and dietary prejudices can be identified and corrected. Since food expenditure often amounts 50 to 70% of the family budget (80), nutrition education programs can be a good investment. Family can be given information for selection of right kind of food.

Early screening is also important for the early identification of the problem to avoid the ill consequences of chronic anemia. Visits of medical teams from local health units must be arranged at least biannually to investigate girls for anemia.

Girls should be educated that presence of symptoms of IDA are not normal and not related to puberty but are indication of problem of IDA. Whenever symptoms such as fatigue, dizziness dyspnea, and irregular menstruation, and repeated infections are experienced, they must think of improving iron levels through proper diet and mineral supplements, as these are positive symptoms of presence of IDA.

An iron strategy should be comprehensive, addressing iron deficiency in all vulnerable groups and all causes of iron deficiency anemia. To this end, strategies have to be based on numerous factors, including anemia prevalence rates, cultural acceptability, feasible channels for interventions and resources. For example, in many countries, effective strategies entail providing supplements to vulnerable groups, fortifying a common food source with iron, increasing income levels to improve the intake of such food and promoting dietary guidelines that encourage iron intake and absorption.

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