FACTORS CONTRIBUTING TO IRON DEFICIENCY ANEMIA IN FEMALES OF CHILD BEARING AGE

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ABSTRACT

Objective: To analyze the risk factors associated with iron deficiency anemia in females of child bearing age in a tertiary care hospital.

Methods: It was a cross sectional study, done at Khyber Teaching Hospital, Peshawar over a 6-month period. Women with child bearing age and hemoglobin level of less than 12.0 g/dl were included in this study. Cases having suspicion of sickle cell disease, beta-thalassemia trait, menopausal females and those using iron supplements were excluded. Data regarding demographics, menstrual cycle, intake of red meat, vegetables. vitamin C and tea and cola consumption was noted and analyzed. Quantitative data was analyzed by mean and standard deviation. Qualitative data was analyzed by frequency and percentage.

Results: Around 188 females had iron deficiency anemia. About 2 of these had sickle cell disease, 4 cases had beta-thalassemia trait, 4 cases were in menopause and 12 cases were on iron supplements. Also 12 patients had incomplete investigations and another 10 patients did not fulfill the requirements needed for the diagnosis of IDA. These 44 cases were not included and were thus excluded from the present study. So, the remaining 144 cases were included in the present study. Age of the females in the study ranged from 14-42 years, with mean of 28±14 years. Cases having iron deficiency anemia showed low intake of red meat (81% cases), low intake of vitamin C (90% cases) and high intake of tea and cola drinks after mean in (68% cases), previous history of NSAID intake in (69% cases). These associations were statistically significant with $p<0.05$.

Conclusion: Dietary habits and history of taking non-steroidal anti-inflammatory drugs are significant risk factors for developing iron deficiency anemia in females of child bearing age in Pakistan. There is a need to create awareness in the women in this part of the world about these risk factors. This will reduce the burden of iron deficiency anemia in females and thus decrease the associated morbidity.

Key Words: Anemia, Non-steroidal anti-inflammatory drugs, Iron deficiency anemia, vitamin C.

INTRODUCTION

Iron deficiency Anemia (IDA) is a major health problem in females of child bearing age in both the developed and developing countries[1]. It is so because IDA not only causes impairment of health in women but is also associated with poor outcomes[1]. Iron deficiency anemia affects about more than 1.2 billion people all over the world[2]. It is suggested by studies that about 22% of maternal deaths are caused due to morbidities associated with iron deficiency[1].IDA not only effects the health of the mother but also raises the risk of congenital birth defects, low birth weight babies and retarded and stunted growth in children[1]. In short, IDA is a major contributor to maternal as well as child health worldwide[1].

Throughout the world, the iron deficiency anemia is the commonest anemia. It occurs commonly in low socioeconomic areas like Africa and South Asia[1]. It is reported that IDA effects about 17% of females all over the globe[1]. The incidence of IDA in women in Pakistan is 40-60%[1]. This is quite an alarming figure. The World Health Organization reports that about 2 billion individuals are iron deficient, this turns out to be over 30% of the world's population[3]. To reduce incidence of IDA in Pakistani women, there is a need for campaigns that create awareness about risk factors of iron deficiency and about benefits of iron supplements and food fortification to prevent the iron deficiency states[1].

IDA is caused due to either increased iron requirement by the body or due to decreased intake of iron in the food[2]. Other causes are decreased iron absorption in the gut due to gastrointestinal disorders and due to chronic blood loss[2]. A diet inadequate in iron and vitamins is the important cause of iron deficiency anemia all over the globe[3].There are certain drugs that inhibit iron absorption from the gut including aspirin and antacids. Excessive intake of tannates and phylates in

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tea is also associated with iron deficiency states[3]. Other less common causes are genitourinary loss of blood, pregnancy and childbirth, menarche and menstrual abnormalities[3].

The investigations done for iron deficiency include determination of the hemoglobin level, peripheral blood film examination, serum iron, ferritin level, and transferrin saturation[2]. In IDA, hemoglobin, hematocrit and mean cell hemoglobin (MCH) are abnormally low[3]. The blood film shows microcytosis, hypochromasia, pencil cells and anisocytosis[3]. The serum ferritin is reduced[3]. The ferritin level is the confirmatory test for detecting depleting iron stores in the body and so iron deficiency anemia[3].

Iron plays role in the synthesis of hemoglobin, myoglobin and other heme proteins[3]. The food rich in iron includes red meat, grains and eggs. Around 10% of iron that is taken in food is absorbed in the gut into the blood. When the iron intake is not sufficient, body starts using its own iron stores. Thus, the body stores start getting depleted gradually. It is when the level of ferritin begins to fall. This is followed by fall in serum iron levels, decreased transferrin saturation and an increases in total iron-binding capacity[3]. Iron deficiency is treated by replenishing the iron stores of the body by giving oral or injectable iron preparations to the patients[1]. Oral iron preparations are frequently associated with gastrointestinal side effects such as gastric irritability and nausea[4]. In such cases, parenteral iron infusions are used[4].

There are very few studies done on risk factors of iron deficiency anemia in our setup or if the studies are available, they are too old or are done in a small subgroup with pregnancy[1]. Even the most recent data from Pakistani National Nutrition Survey was conducted in 2001-2002, which is more than a decade old data[1]. So, the present study was done to analyze the risk factors in women having iron deficiency anemia in our setup.

MATERIALS AND METHODS

This was a Cross sectional analytical study. It was done in Khyber Teaching Hospital Peshawar. It was done from October 2016 to April 2017 i.e. for a period of 6 months. The study included non-pregnant females of child bearing age, whose hemoglobin was less than 12 g/dl. Females suspected of having sickle cell disease, beta-thalassemia trait, megaloblastic anemia were excluded. Females who were postmenopausal, pregnant or were taking iron supplements were also not included in the study. Hemoglobin of less than 12.0 g/dl was taken as a cut off value of diagnosing anemia as per WHO criteria[5]. Patients were diagnosed as iron deficient on the basis of mean cell volume (MCV), serum ferritin levels and transferrin saturation values. For the diagnosis of iron deficiency, the individual had to have at least two of the above values to be low[6]. Mean cell volume was considered low if it was below 80 fl. Cut off value for ferritin was taken as 12 ng/ml[6]. The cut off for Transferrin saturation was taken as $<12\%$[6]. The data was processed through SPSS 23. A p-value of less than 0.05 was considered statistically significant. Standard deviation and mean were used for quantitative variables. Frequency and percentage were used for qualitative variables.

RESULTS

About 188 females were diagnosed as iron deficiency anemia during the study period. 2 of these patients with sickle cell anemia, 4 cases of beta-thalassemia minor, 4 menopausal females, 12 cases taking iron supplements, 12 patients with incomplete investigations and 10 patients not satisfying the definition of iron deficiency anemia were excluded from the study. So, the remaining 144 cases of iron deficiency anemia were included.

The age range of the study population was 14-42 years with mean of 28 ± 14 years.

The demographic data and dietary habits of the study population are shown in Table 1 and Table 2 respectively.

The gynecological history of the study sample is shown in Table 3. While the medical and drug history is shown in Table 4.

DISCUSSION

The present study suggests a positive association of iron deficiency anemia with dietary habits, gynecological and drug history in females of childbearing age. These findings were same as those reported in various studies done so far[7-9]. Studies have linked certain dietary risk factors like decreased consumption of red meat, cereals and fruits with development of IDA[9,10]. In the present study, it was established that patients who consumed less meat and vegetables had higher tendency of having iron deficiency anemia. Heme iron is present in the meat. It provides about 15% of iron required by the body. The iron available in vegetables is in the non-heme form. This form supplies about 85% of total iron required by the body. It is the heme

Table 1: Characteristics of 144 cases of iron deficiency anemia.

Characteristics	n (%)
Married	87 (60%)
Unmarried	57(40%)
Literate	28(19%)
Illiterate	116(81%)
Rural areas	87 (60%)
Urban areas	57(40%)

Table 2: Analysis of dietary habits in 144 cases of iron deficiency anemia.

Dietary habits	n (%)		P-value
	Yes	No	
Adequate Intake of red meat	28(19%)	116 (81%)	P<0.05
Intake of vegetables	60(42%)	84(58%)	P<0.05
Intake of vitamin C (juices/supplements	14(10%)	130(90%)	P>0.05
Intake of tea, and cola drinks after meals	98(68%)	46(32%)	P>0.05

Table 3: Gynecological history in 144 cases of iron deficiency anemia

Menstrual cycle	n (%)	p-value
Normal duration	101(70%)	P<0.05
More than 8 days	43(30%)	

Table 4: Medical and drug history in 144 cases of iron deficiency anemia.

Variables	n (%)		P-value
	Yes	No	
Intake of NSAIDs	100(69%)	44(31%)	P<0.05
Intake of Antacids	44(31%)	100(69%)	P<0.05
Peptic ulcer disease	28(19%)	116(89%)	P<0.05
History of Hemorrhoids	14(10%)	130(90%)	P<0.05
Parasitic infestation	14(10%)	130(90%)	P<0.05

content that enhances enteric absorption of the non-heme form of iron. Iron absorption is also dependent on the inhibitors of iron absorption present in the food[11]. Vitamin C is the main enhancer of iron absorption in the gut[5,6,12]. The present study showed that there was a significant association between iron deficiency anemia and a low intake of vitamin C in the form of juices. Same findings have been reported by various studies done so far[10-13]. Polyphenols and tannates are the inhibitors of iron absorption from the gut. They are found in tea and coffee and also in cola drinks in the market. There are several studies done in different parts of the world that report these inhibitors to be associated with the development of iron deficiency anemia[6,10,13,14]. In the present study, it was seen that the infrequent intake of tea was associated with reduced risk of developing IDA. But this association was statistically not significant. This may be due to the fact that in Pakistan, it is a tradition to drink tea after meals. Several studies report that iron absorption can be reduced in the presence of calcium and hence calcium supplements intake can reduce the iron absorption from the gut[6,9]. Also different European studies showed that using calcium supplements were associated with low serum ferritin and thus iron deficient states[9,14].

The present study also reported that iron deficiency anemia was common in females whose menstrual cycle extended beyond 8 days duration. This shows the importance of taking menstrual history in finding the cause of iron deficiency anemia in females of child bearing age. Females who use contraceptive pills have a high ferritin level in the body and thus a decreased chance of developing iron deficiency anemia[6,9]. However, no such association was found in this study.

Nonsteroidal anti-inflammatory drugs, also referred to as NSAIDs, are one of the most notorious causes of IDA[8]. These drugs cause bleeding from the mucosa of stomach. Such gradual bleeding from the gut lead to iron deficiency over prolonged periods of time. Another group of drugs are the antacids, which cause iron deficiency. These decrease the absorption of iron from the gut lining[15]. Studies have proved that gut bleeding due to NSAIDS or any other cause is a significant cause of IDA in most of the cases[16]. It is suggested in literature that those who have IDA have a high risk of developing other diseases in future[6]. So, all these risk factors of iron deficiency need to be investigated. It is necessary in order to identify the cause and then correct it.

CONCLUSION

The study identified poor intake of iron containing food, menorrhagia, intake of NSAIDs and antacids to be the important risk factors for development of iron deficiency anemia in females in our setup.

RECOMMENDATIONS

There is a need to observe campaigns to raise the awareness about these risk factors in our setup to decrease the incidence of iron deficiency anemia and hence the associated morbidity. Larger studies should be done including large populations in order to generate bigger data regarding risk factors for iron deficiency.

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