

IRON DEFICIENCY ANEMIA: RISK FACTORS AMONG ADULT POPULATION  
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Article Received on 06/05/2017

Article Revised on 27/05/2017

Article Accepted on 16/06/2017

## ABSTRACT

**Background:** anemia is one of the most important conditions in developing countries like india. Iron deficiency is most important factors in anemic patients. There are various risk factors for the development of iron deficiency anemia. If we come to know the most important risk factors for iron deficiency anemia in particular locality, we can minimize the various complications associated with iron deficiency anemia by taking various preventive measures. **Aims and objectives:** this study was undertaken to find out various risk factors of iron deficiency among adult population and know the clinical manifestations related to it. **Material and method:** after detailed clinical history and examination, preliminary blood tests including complete blood counts, reticulocyte count and blood film examination were done. In patients suspected to have iron deficiency anemia, serum iron studies (serum iron, total iron binding capacity and serum ferritin) were done to confirm the diagnosis. **Results:** among the selected anemic patients, 65% were of iron deficiency anemia, while 35% were of non-iron deficiency anemia. Iron deficiency anemia was more common among females (57%) than males (43%). the risk factors for iron deficiency were found to be nutritional deficiency (30%), various gastrointestinal pathologies (12%), menorrhagia (11%), pregnancy (10%), hematuria (9%), inflammatory diseases (9%), hemorrhoids (7%), bone marrow depression (4%), malignancy (3%), hypothyroidism (3%) and hookworm infestation (2%). **Conclusion:** nutritional deficiency was found to be the most common cause of iron deficiency anemia in females and gi pathologies and nutritional deficiency in males of rural area.

**KEYWORDS:** Anemia; iron deficiency; risk factors.

## INTRODUCTION

Iron deficiency anemia is the third and final stage of iron deficiency said to be present when signs of iron deficiency get combined with a lowering of hemoglobin level below a standard reference value. Iron deficiency is the most common cause of anemia and hemoglobin is an easy parameter to measure anemia.<sup>[1]</sup> It occurs when dietary intake or absorption of iron is insufficient and hemoglobin which contains iron cannot be formed.<sup>[2]</sup> It is major public health problem throughout the globe especially in developing countries. Infants, young children, menstruating women and in particular pregnant women are most frequently affected.<sup>[3]</sup> Iron deficiency often coexist with malnutrition, vitamin a deficiency, foliate deficiency and infections. In tropical regions parasitic infestations and haemoglobinopathies are also a common cause of anemia, which may contribute to the development of iron deficiency.<sup>[4]</sup> In india like other developing countries, we are facing major problem of high population growth, limited resources which affect socio-economic development as whole. Iron deficiency is a major health problem for the health professionals to

deal with it as it complicates various clinical conditions and it is a challenge for the policy makers.<sup>[5]</sup> It is major contributing factor to the maternal and fetal morbidity and mortality. In india various studies have been performed on different segments of the population covering many important public health problem including iron deficiency as one of them.<sup>[6]</sup>

The aim of our study is to determine the various risk factors for iron deficiency anemia among adult population of area around latamangeshkar hospital, situated in the rural areas of hingna, nagpur. A clear understanding of risk factor in the population will help to plan for more effective strategies to prevent and to minimize the nutritional deficiencies and its causes by creating awareness amongst the target population.

## AIMS AND OBJECTIVES

- 1) To find out various risk factors of iron deficiency among adult population.
- 2) To find various clinical manifestation related to iron deficiency anemia.

## METHODOLOGY

Adult patients with hb % less than 13.0 g/dl in males and less than 11.50 g/dl in females who were admitted in the Lata Mangeshkar Hospital, Hingna, for various clinical conditions were included in this study. This hospital is catering the needs of 60% population of Hingna and rural areas around Hingna comprising mostly population from low socioeconomic strata. Inclusion criteria- all adult patients with hemoglobin level less than 13.0 g/dl for males and less than 11.5 g/dl for female were included in the study. Exclusion criteria- patients who had donated blood or had received blood transfusion during last three months, patient with recently documented acute blood loss were excluded from the study. Detailed clinical history and thorough physical examination was done and the positive findings were noted (knuckle pigmentation, greying of hair, hair fall, tachycardia, palpitation, pallor, icterus, nail deformities, bone tenderness, headache, neuropathy, abnormal skin pigmentation, spider nevi, petechial spots, echymosis, purpura, glossitis, splenomegaly, lymphadenopathy). [6] signs of anemia, especially iron deficiency anemia, were particularly looked for. Any sign giving a clue about underlying pathology was carefully observed and noted. The following laboratory investigations were done:

1. Cbc
2. Peripheral blood smear
3. Serum ferritin (sf), serum iron (si), Serum total iron binding capacity (tIBC).
4. Bone marrow study for iron stores (when-ever there is indication).
5. Urine analysis for rbc's.
6. Stool examination (including occult blood or ova of parasite or hookworm).
7. Abdominal ultrasound.
8. Endoscopy and proctoscopy.

## MATERIAL

The hb estimation was done in all cases as a screening test for anemia. All male patients with hemoglobin less than 13 g/dl and females with hb less than 11.5g/dl were labeled as 'anemic' and were included in this study. The 'anemic' patients were then subjected to red cell indices (pcv, mcv, mch, mchc) and peripheral blood smear. Those with red cell indices decreased below the normal level and showing a microcytic hypochromic picture on peripheral blood smear were labeled as 'iron deficiency anemia'. On the other hand, the patients whose red cell indices were in the normal range or above and the peripheral smear was not in favour of iron deficiency were labeled as 'non-iron deficiency anemia' and were not considered for further investigations. Iron deficiency state was confirmed in patients labelled as 'iron deficient anemic' by the estimation of serum ferritin or bone marrow staining. These patients were then further investigated in order to find out a cause for the iron deficiency anemia other than nutritional deficiency.

## RESULT

In 65% of all the anemic patients the red cell indices were below the normal range and the peripheral blood film showed hypochromic microcytic features with anisocytosis and poikilocytosis in some smears. These 65% patients were labelled as "iron deficient anemic". Serum ferritin and serum total iron binding capacity proved useful for confirming iron deficiency state as well as for differentiating iron deficiency anemia from other 'microcytic anemic states' like thalassemia minor and sideroblastic anemia. In these 65% patients labelled as 'iron deficient anemic', serum ferritin was found to be in the range (12-37 ng/ml) its normal range is (30-250 ng/ml), while tIBC was in the range of (30-450 micro gram/dl) and in some cases it was >500 micro gram/dl, its normal range is (250-400 micro g/dl). These results thus excluded the above mentioned conditions which present a microcytic picture on peripheral smear. Iron deficiency anemia was much common among females (57%) than males (43%). The gender wise distribution of each risk factor is shown in the table no.1. Nutritional deficiency was common in females (66%) where as gastrointestinal pathologies were common in males (75%).

**Table 1: Gender distribution in various risk factors.**

Causes	Gender	
	Male	Female
Nutritional adequacy	33%	66.6%
GI pathologies	75%	25%
Menorrhagia	0%	100%
Pregnancy	0%	100%
Hematuria	66.6%	33.3%
Inflammatory diseases	67%	33%
Hemorrhoids	71.4%	28.5%
Bone marrow depression	100%	0%
Hormonal pathologies	0%	100%
Malignancy	0%	100%
Hookworm infestation	100%	0%

Iron deficiency anemia was found to be common in the age of 18 years to 37 years in both the genders. Age-wise distribution of iron deficiency anemia is shown in table no.2. 60% iron deficient anemic patients were found in age group of 18-27 years and 27% in age group of 28-37 years. Iron deficiency anemia is mostly a problem of poor and low socio-economic class as (75-80%) belonged to the lower socio-economic states, (10-15%) belonged to lower middle class families and (5%) belonged to upper middle class families.

**Table 2: Indices of ida in different age group.**

Age	18- 27	28-37	38-46	47-55	56-62
% of ida	60%	27%	7%	3%	3%

**Table 3: Investigation in Case of iron deficiency anemia.**

1) Result of hb and pcv in ida patients								
	Investigations	Normal values	Result					
i.	Hb (g/dl)	Males: 13-18 g/dl Female: 11.5-16.5 g/dl	2-5	4%	5.1-8	25%	8.1-12	71%
ii.	Pcv(%)	Males: 40-54% Females: 37-47%	16-27	25%	28.1-38	72%	38.1-50	3%
2) Result of red cell indices: mcv, mch, mchc in ida patients								
	Investigation	Normal values	Result					
I.	Mchc (g/dl)	30-35 g/dl	11-15	4%	16-24	39%	25-31	57%
Ii.	Mch (pg)	27-31 pg	9-15	10%	16-21	27%	22-30	63%
Iii.	Mcv (fl)	77-93 fl	28-45	7%	46-61	10%	62-78	83%
3) Results of serum iron studies: serum ferritin, tbc, serum iron in ida patients								
	Investigation	Normal values	Result					
I.	Serum ferritin (ng/dl)	30-250	12-18	4%	19-24	71%	24-30	25%
Ii.	Serum iron (ug/dl)	40-140	41-21	5%	22-31	32%	32-41	62%
Iii.	Tbc (ug/dl)	250-400	304-420	18%	450-500	74%	>500	8%

Investigation performed in order to determine the cause of iron deficiency anemia in these patients were abdominal ultra sonography, proctoscopy and upper gastro intestinal tract endoscopy, stool examination for occult blood or ova and parasites, urine analysis. The findings obtained in each of the above investigation is mentioned with its obtained %age in table no.4.

**Table 4: Investigations showing the cause of iron deficiency anemia.**

Sr. No.	Investigations	Findings	Result (%)
1	Abdominal usg	Normal Ascitic fluid Pregnancy Splenomegaly	71% 10% 10% 9%
2	Stool examination	Normal Occult blood Ova of hookworm	80% 18% 2%
3	Upper git endoscopy	Normal Gastric erosion Peptic ulcer	82% 12% 6%
4	Proctoscopy	Normal Hemorrhoids	93% 7%
5	Urine examination	Normal Rbc in urine	91% 9%

There are various no. Of risk factors for iron deficiency anemia, after taking detailed history and excluding other pathologies nutritional deficiency was the commonest, seen in 30% cases of iron deficiency anemia and gastrointestinal pathologies is the second most common risk factor of iron deficiency anemia seen in 12% cases. The other risk factors of iron deficiency anemia with % are mentioned in table no.5.

**Table 5: Risk factors of iron deficiency anemia.**

Sr. No.	Risk factors	Result (%)
1	Nutritional inadequacy	30%
2	Various gi pathologies	12%
3	Menorrhagia	11%
4	Pregnancy	10%
5	Hematuria	9%
6	Inflammatory disease	9%
7	Hemorrhoids	7%
8	Bone marrow depression	4%
9	Hormonal pathologies eg. Hypothyroidism	3%
10	Malignancy	3%
11	Hook worm	2%

## DISCUSSION

Iron deficiency anemia is one of the leading cause in the world responsible for complicating various clinical conditions, increasing the morbidity and mortality. There are various risk factors for development of iron deficiency. Diagnosing and treating them at right time can alter the health scenario of the country. The analysis made in this study is meant to address the deficiencies in women living in deprived conditions along with all other responsible factors, also to disseminate the information to specific community in other region to be careful where such type of life style may exist. Studies also verify the consequences of nutritional deficiencies complicating the conditions of poor people living under miserable conditions.

Iron deficiency anemia was the most common type of anemia among the anemic patients admitted in lata mangeshkar hospital, hingna, as 65% of the anemic patients were iron deficient while the rest 35% had anemia due to other causes.

In this study 57% of the iron deficient anemic patients were female – thus iron deficiency anemia was found to

be much more common among females than males especially in the child bearing age. At puberty, menstruation increases the risk of iron deficiency. Pregnancy markedly increases iron requirement in the second and third trimesters due to high growth rates of placenta and fetus and the expansion of material red cells mass. They get diet of inferior quality as compared to that of males due to social customs. Most of the pregnant women do not get proper iron supplementation during pregnancy and lactation. Hence increase demands and decreased supply multiply the magnitude of the problem due to which iron deficiency anemia is so commonly found among women of child bearing age. However, in this study it is remarkable to find males also as suffers in the age group 25-35 years as having iron deficiency anemia. It is probably due to poverty and with poor living conditions.<sup>[2]</sup> Most of them were laborers, do not get adequate diet, thus develop several nutritional deficiencies including iron deficiency. Poor living conditions makes them vulnerable to parasitic infestations. The most common causes of iron deficiency in males were pathologies other than dietary deficiency. Such as chronic blood loss due to various gastrointestinal pathologies, hematuria and hemorrhoids.

In this study, nutritional inadequacy was found to be most common cause of iron deficiency anemia (30%). These patients did not have any accompanying chronic disease but belonged to very poor families in which mostly there was a single bread earner for large number of dependents family members. According to southern medical journal (2007) the main risk factor of iron deficiency anemia around quetta valley is pregnancy (43%). Similarly, the other factors of iron deficiency anemia in quetta valley also differ from the risk factors mentioned in present study.<sup>[8]</sup>

The second most common cause was gastric erosions, found in 12% patients. The trend of self-medication especially for pain has increased leading to increased incidence of epigastric discomfort and gastric erosions on prolonged use that ultimately cause iron deficiency anemia. The main cause of gastric mucosal erosion is dietary habits of eating spicy food. 2% patients were found to be infested by hookworm, which is one of the commonest causes of iron deficiency anemia worldwide. On proctoscopy examination 7% patients were found to have hemorrhoids, which leads to chronic blood loss leading to iron deficiency anemia. The clinical findings reveal that 9% of iron deficiency anemia patient has mild to severe splenomegaly. Whereas, around quetta valley only 3% splenomegaly is seen in iron deficiency anemia patients.<sup>[8]</sup> The risk factors for iron deficiency anemia in adult are nutritional deficiency, gastrointestinal pathologies, menorrhagia, pregnancy, etc mentioned in table no.5. previously many researches were done to enumerate the risk factors of iron deficiency like pregnancy (43%), nutritional deficiency (15%), various gastrointestinal pathologies (15%), menorrhagia (4%), hemorrhoids (5%), hook worm infestation (6%),

hematuria (7%).<sup>[2]</sup> Awareness and the nutrition supplements to the needy is playing vital role to have healthy population especially children and women, living in adverse conditions. The right time investigation of the disease and deficiencies will provide opportunities of better family care and it will also benefit to find out various clinical manifestations of iron deficiency anemia. Iron deficiency anemia complicates the preexisting medical and surgical conditions like- cardiovascular diseases, stroke, respiratory problems. It also complicate various elective and emergency surgical procedures.

## CONCLUSION

Iron deficiency anemia is found to be a common type among all anemic patients admitted to the lata mangeshkar hospital, hingna. It is one of the commonest problem faced by many developing and under developed countries.

The important risk factors being nutritional inadequacies, multiple pregnancies, gastrointestinal pathologies, chronic blood loss etc.

It can thus be concluded from this study that the risk factors for iron deficiency anemia are nutritional inadequacy, pregnancy, gastrointestinal pathologies, etc. With different percentage in different geographical regions. Iron deficiency anemia is most common type of anemia among the anemic population and nutritional deficiency being the most important risk factor around lata mangeshkar hospital. Iron deficiency anemia also affect other clinical conditions and worsen them, like iron deficiency worsen lead poisoning as deficiency of iron increases the absorption of lead. Iron deficiency also hamper the physical and mental development in children and it complicates medical and surgical conditions. It can be prevented by following four approaches:

1. Nutritional counselling- by improving diet, encouraging breast feeding, that is diet modification.
2. Iron supplementation therapy, oral or parantal.
3. Fortification of food with iron.
4. Control of infection.<sup>[7]</sup>

In this way iron deficiency anemia can be reduced in society. There is a need to guide the society about iron deficiency anemia, mainly adolscents and young girls as they are the future of country. Various government schemes are in work to overcome nutritional deficiencies, which should be modified and proper care should be taken for its distribution, so that each and every needy should overcome nutritional deficiency.

## ACKNOWLEDGEMENT

This research was supported by icmr. We thank our colleagues from nkp salve institute of medical science and research center, hingna who provided their views for the research. We thank all the staff members of the pathology department of lata mangeshkar hospital, hingna for the assistance and cooperation on laboratory

investigations. We would also like to show our gratitude to all the patients who participated in this study.

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