

## IRON DEFICIENCY IN ANAEMIC PATIENTS: STUDY IN A TERTIARY CARE CENTRE

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**ABSTRACT**

**Introduction:** Anemia is a clinical abnormality characterized by a reduction in hemoglobin concentration below the normal for age and sex. It can be of different types, the most common being iron deficiency anemia which affects mostly pregnant and lactating females and growing children in the developing world.

**Materials and Methods:** This was a hospital-based observational study conducted at National Medical College and Teaching Hospital, Pathology Department, Birgunj, Nepal. Patients above the age of 10 years of both sexes (male and females) having anemia (males having hemoglobin level <13 gm/dl and females having hemoglobin level <12 gm/dl) were included. After a detailed history, preliminary blood tests including complete blood counts, peripheral smear, and reticulocytes count were done. In patients suspected (microcytic hypochromic blood picture and normal reticulocytes count) to have iron deficiency anemia, serum ferritin was done to confirm the diagnosis. Patients under the age of 10 years and those patients having blood malignancies (acute or chronic leukemia) were excluded from the study.

**Results:** Sixty anemic patients were found to have iron deficiency. Females were affected more (66%) with iron deficiency anemia than males (34%). There were two peaks (30% and 21%) in age groups 10 – 20 years and 61 – 70 years. Complete blood counts revealed a significant decrease in the value of red cell indices like mean corpuscular volume in 70% patients (Normal MCV 80 to 100 fl) and mean corpuscular hemoglobin in 72% patients (Normal MCH 27 to 33 pg). On peripheral smear, it was seen that most of the patients (72%) had microcytic hypochromic blood pictures. Iron deficiency anemia was more common in rural areas.

**Conclusion:** Iron deficiency anemia was the most common type of anemia. It is more common in females and the prevalence is more in rural areas.

**Keywords:** anemia; hemoglobin; iron deficiency.

**INTRODUCTION**

Anemia is the most common blood disorder. It is described as a clinical condition characterized by a decrease in total circulating red cell mass below normal limits or a decrease in blood hemoglobin concentration in comparison to normal values for that age and sex.<sup>1</sup> It is a worldwide problem that mostly affects people in developing countries.<sup>2</sup> Compared to other classes of people, lactating and pregnant women, growing infants and the elderly are more at risk.<sup>3</sup> Teenagers, farmers, women, and people from the Lama, Sherpa, and Tamang ethnic groups have all been found to have a high prevalence of anemia in Nepal.<sup>4</sup>

Anemia is prevalent in Asia and Africa, with 42% prevalence

in Nepal, 55% in India, and 32% in Cameroon.<sup>5</sup> Anemia is caused by a variety of factors, the most common of which are a lack of necessary elements for hemoglobin synthesis (iron, vitamin B12, and folic acid), blood loss, frequent pregnancies in women of reproductive age, worm infestation, hemolysis due to known or unknown causes, and bone marrow conditions that inhibit red cell synthesis.

Anemia can also be caused by chronic diseases such as chronic renal failure, rheumatoid arthritis, and tuberculosis. Blood loss in elderly females due to pelvic malignancies is also an important cause.<sup>6-8</sup>

Iron deficiency anemia is the most common form of anemia worldwide, affecting 50-60% of young children and pregnant women in developing countries, as well as 20-30% of non-pregnant women.<sup>9</sup>

The objective of this study was to observe the prevalence of iron deficiency in anemic patients coming to National Medical College, Birgunj. This study bears significance because anemia is common in this part of Nepal. Few studies have been done in this region of Province-2 which highlights iron deficiency in anemic patients.

## MATERIALS AND METHODS

This was a hospital-based observational study performed at National Medical College and Teaching Hospital in the Department of Pathology from January 2020 to June 2020. Prior to starting the study, the approval of the institutional review committee was received with reference number of F-NMC/408/078/076. Anemic patients of either sex, aged 10 years or older, with a haemoglobin level less than normal for respective sex (for males haemoglobin level <13 gm / dl and for females haemoglobin level <12 gm/dl) were included who were referred to Central Laboratory of National Medical College. Total of 100 patients of anemia were found to meet this criterion during the study period. Patients with blood malignancies (acute or chronic leukemia ) as well as anemic children under the age of ten, were excluded from the study. Following a detailed history, blood tests were performed on 5 mL venous blood which was collected from each of the patients with care and adequate safety precautions. To avoid contamination from blood transmissible pathogens, protective gloves were worn during collection, syringe were sterile and dry, blood collecting materials were discarded safely to avoid injury from needles and lancets. The hematological parameters were measured using fully automated analyzer (Yumizen H550 : HORIBA). Reticulocytes count was performed manually using methylene blue stains. Peripheral smear slides were made and stained with Wrights stain. In patients who were suspected of having iron deficiency anemia (patients with microcytic hypochromic blood picture and normal reticulocytes count) serum ferritin was done to confirm the diagnosis. Serum ferritin was estimated using the chemiluminescence procedure. Serum Ferritin level < 7ng/ml was considered diagnostic of iron deficiency. For the statistical analysis, Data were entered into Microsoft excel 2010, checked for consistency. Statistical Package for the Social Sciences (SPSS) version 17 was used. Data were expressed in terms of percentage.

## RESULTS

A total of 100 anemic patients were selected (patients of either sex, aged 10 years or older, with a haemoglobin

level less than normal for respective sex : for males haemoglobin < 13 gm/dl and for females haemoglobin < 12 gm/dl). Majority of the anemic patients (66%) were females. Iron deficiency anemia was more common (80 %) in rural areas. About 60% of the anemic patients were found to have iron deficiency on the basis of serum ferritin level (serum ferritin level below 7 ng/ml).

**Table-1: Serum ferritin level**

Serum Ferritin Level	No. of Patient	Percentage
< 7 ng / ml	60	60
7 – 189 ng / ml	25	25
189 > ng / ml	15	15

Majority of the anemic patients were seen in 2 age groups : 10-20 years (30 %) and 61-70 years (21 %) respectively .

**Table-2: Age distribution of Anemia patients**

Age	No. of Patient	Percentage
10-20	30	30
21-30	10	10
31-40	10	10
41-50	15	15
51-60	14	14
61-70	21	21

According to the morphology of cells on peripheral smear it was seen that most of the patients (72%) had microcytic hypochromic blood picture.

**Table-3: Red Cell Morphology of Anemic patients on Peripheral Smear**

Cell Morphology	No. of Patients	Percentage
Normocytic Normochromic	24	24
Microcytic Hypochromic	72	72
Macrocytic Normochromic	04	04

Red blood cells in most of the patients (70%) was of microcytic (72%) hypochromic type (on the basis of red blood cell indices in complete blood count). The value of reticulocyte of most of the patients (92 %) were within normal range (0.5% - 2.5%) . Reticulocyte count of eight patients were mildly increased (2.7 - 3.6%), hence Hb electrophoresis was advised to these patients, to exclude hemolytic anemias. The results of the Hb electrophoresis were found to be normal.

## DISCUSSION

Iron Deficiency Anemia is a widespread health problem and is one of the major cause of malnutrition in developing countries. The most common cause of iron deficiency anemia is inadequate intake of iron in diet and loss due to parasitic infections.

The number of anemic patients having iron deficiency was 60 % in the present study. This finding correlates well with the findings of Karim et al. who found in their studies that 63.5 % of anemic patients had iron deficiency.<sup>10</sup> In a study done by Sinha et al among the people of Morang district of Nepal 25.57% of the patients were suffering from iron deficiency anemia.<sup>11</sup> In the present study it was seen that most of the patients (72 % ) had microcytic hypochromic blood picture. Patel et al and Mach-Pascual et al in their studies found microcytic hypochromic blood picture in 40% and 35.2% of anemic patients respectively.<sup>12,13</sup> In an etiological study of microcytic hypochromic anemia by Kafle et al, it was seen that iron deficiency was the commonest etiology (49 % ) of microcytic hypochromic blood picture.<sup>14</sup> The findings of Agouza et al however differs from the findings of the present study in case of blood picture type. In their study only 11.1% of the anemic patients had microcytic hypochromic blood picture.<sup>15</sup> Females were affected more ( 66 % ) in the present study compared to males ( 34 % ). In a study conducted in Hodeida Province of Yemen, by Al -Alimi et al, it was seen that females were affected more ( 54 % ) by iron deficiency anemia.<sup>16</sup> The present study showed that anemia was more prevalent ( 30 % ) in the age group of 10-20 years. This result of the present study differs from the findings of Mishra et al, in which the most affected ( 42.55 % ) age group was from 21 – 40 years.<sup>17</sup> In a study by Kim et al, it was seen that the prevalence of anemia was 12.3 % in men of 70 years and older.<sup>18</sup>

This study was confined within National Medical College, Birgunj so the findings may not be viewed as a good representation of the whole region (as patients of this region seek treatment from other health centres as well). In this study iron deficiency in anemic patients were determined on the basis of serum ferritin level. Investigations like TIBC, transferin saturation and transferin receptor test were not carried out. Further studies with detailed investigations are required to address the issue of iron deficiency.

## CONCLUSION

The most common type of anemia was iron deficiency anemia. Most of the patients with iron deficiency had a microcytic hypochromic blood picture . It is more common in women and prevalence is high in rural areas.

## REFERENCES

1. Aster JC. Red Blood Cell and Bleeding Disorders. In: Kumar V, Abbas AK, Favsto N. Robbins and Cotran Pathologic Basis of Disease. 7<sup>th</sup> Edition Noida, India: Elsevier; 2005. p. 622-3.
2. Cook JD. Iron deficiency anemia. Journal of Baillieres Clinical Haematology 1994;7:787-804. [DOI]
3. Lee GR, Wintrobe MM. Etiological factors in iron deficiency. Wintrobe's, clinical haematology 9<sup>th</sup> edition. Philadelphia: Lea & Febiger; 1993.
4. Bondevik GT, Lie RT, Ulstein M, Kvale G. Seasonal variation in risk of anemia among Nepali women. International Journal of Gynecology & Obstetrics 2000;69:215-22. [DOI]
5. Kurz KM. The Nutrition and Lives of Adolescents in Developing Countries: Findings from the Nutrition of Adolescent Girls Research Program. Journal of Proceedings of The Nutrition Society. 1996;55:321-31. [DOI]
6. Weissinger F. Basic principals and clinical significance of iron-deficiency. Journal of Forsch Medicine. 1999;115(31):35-38.
7. Jackson J. The angiographic diagnosis of colonic carcinoma. Journal of Clinical Radiology. 1998;53(5):345-449. [DOI]
8. Sakiewicz P, Pagarini E. The use of iron in patients on chronic dialysis: mistake and misconceptions. Journal of Nephrology. 1998;11(1):5-15.
9. Iron deficiency. Bulletin of the World Health Organization. 1998; 76(2):121-123. [Full Text]
10. Karim SA, Khurshid M, Memon AM, Jafarey SN. Anemia in pregnancy- Its cause in the underprivileged class of Karachi. Journal of Pakistan Medical Association. 1994;44 (4): 90 – 91. [Full Text]
11. Sinha AK., Majumdar B, Yadav SK. Prevalence and significance of Iron Deficiency anemia among people of Morang district of Nepal. Journal of Nobel Medical College. 2011 ; 1 : 40-44. [DOI]
12. Patel S, Shah M, Kumar N. Iron Deficiency Anemia In Moderate to Severely Anaemic Patients. Gujarat Medical Journal. 2009; 64(2): 15-18.
13. Mach-Pascual S, Darbellay R, Pilotto PA, Beris P. Investigation of microcytosis: A Comprehensive Approach. European Journal of Hematology. 1996;51:54-61. [DOI]
14. Kafle S, Lakhey M. Etiological study of microcytic hypochromic anemia. Journal of Pathology of Nepal. 2016;6 : 994 – 997. [DOI]
15. Agouza EI, Shahla A, Sirdah M. The effect of iron deficiency anemia on the levels of haemoglobin subtypes : possible consequences for clinical

- diagnosis. *Journal of Clinical & Laboratory Haematology*. 2002;24(5):285-289. [DOI]
16. Al - alimi AA, Bashanfer S, Morish MA. Prevalence of Iron Deficiency Anemia among University Students in Hodeida Province, Yemen. *Journal of Anemia* 2018;1:1-7. [DOI]
17. Mishra SK, Marasini S, Gupta BK, Agrawal KK, Gautam N. Prevalence of Iron Deficiency Anemia in Anemic Patients: A Hospital Based Study. *Journal of Universal College of Medical Sciences*. 2018;6(2): 1-5. [DOI]
18. Kim SK, Kang HS, Kim CS, Kim YT. The prevalence of anemia and iron depletion in the population aged 10 years or older. *The Korean Journal of Hematology*. 2011; 46 (3):196-199. [DOI]