Survey of different types of anemia

Mital J Gamit[1], Hemlata S Talwelkar[2]

[1]Department of Pathology, PDU Medical College and Hospital, Rajkot, Gujarat, India, [2]Department of Casualty, PDU Medical College and Hospital, Rajkot, Gujarat, India

Correspondence to: Mital J Gamit, E-mail: mittal.gamit@gmail.com

ABSTRACT

Background: Anemia is a major public health problem of considerable importance in the developing countries in the world. **Objective:** The aim of present study is to determine the prevalence of anemia and various types of anemia in admitted patients in PDU Hospital, Rajkot. **Materials and Methods:** The duration of this study is 6 months since December 2015-May 2016. A total of 4775 cases were studied, out of 27,033 which were indoor patient admitted in various wards in PDU Hospital, Rajkot. The samples for test were collected in ethylenediaminetetraacetic acid tube and received at central clinical laboratory in our hospital. The slides were prepared and stained with field stain. The samples were run in hematology cell counter Sysmex KX-21 for hematology indices and other parameters. Microscopic examination of slides was done for peripheral smear examination and complete blood count estimation. **Results:** In our study, anemia found in 4775 (17.66%) cases out of 27,033 admitted in different wards of PDU Hospital, Rajkot; 3187 (66.74%) were females and 1588 (33.25%) were males. Maximum cases 2942 (61.605) are found in age group of 21-40 years. In our study, microcytic hypochromic anemia was found in 2410 (50.47%), normocytic normochromic anemia in 2260 (47.32%), dimorphic anemia in 314 (6.57%), hemolytic anemia in 193 (4.04%), macrocytic anemia in 188 (3.93%), pancytopenia in 51 (1.06%), and sickle cell anemia in 38 (0.79%). **Conclusion:** The prevalence of iron deficiency anemia is increasing in female, mainly in reproductive age group in developing countries. A diagnosis of anemia needs adequate clinical attention, to find out the cause, type, and severity and this forms the basis for treatment of anemia.

KEY WORDS: Anemia; Microcytic Hypochromic; Normochromic Normocytic

INTRODUCTION

Anemia is defined as a reduction of the total circulating red cell mass below normal limits. Anemia reduces the oxygen-carrying capacity of the blood, leading to tissue hypoxia. In practice, the measurement of red cell mass is not easy, and anemia is usually diagnosed based on a reduction in the hematocrit (the ratio of packed red cells to total blood volume) and the hemoglobin concentration of the blood to levels that are below the normal range.[1]

A classification of anemia is based on underlying mechanism and according to alterations in red cell morphology. Morphologic characteristics provide etiologic clues such as red cell size (normocytic, microcytic, or macrocytic), degree of hemoglobinization, reflected in the color of red cells (normochromic or hypochromic), and shape. In general, microcytic hypochromic anemias are caused by disorders of hemoglobin synthesis (most often iron deficiency) while macrocytic anemias often stem from abnormalities that impair the maturation of erythroid precursors in the bone marrow. Normochromic, normocytic anemias have diverse etiologies; in some of these anemias, specific abnormalities of red cell shape provide an important clue about cause.

Anemia can caused by deficiency of essential elements required for hemoglobin synthesis (iron, vitamin B12, and folic acid), repeated pregnancy, blood loss, worm infestation, chronic conditions such as chronic renal failure, rheumatoid arthritis, and tuberculosis are also known causes.[2] In elderly females, genital blood loss due to pelvic malignancies and in both sexes gastrointestinal blood loss is also an important cause of anemia in this age group.[3,4]

According to the World Health Organization (WHO), there are 2 billion people with anemia in the world, and half of the anemia is due to iron deficiency.[5] Anemia is a late indicator of iron deficiency, so it is estimated that the prevalence of iron deficiency is 2.5 times that of anemia.[5] Iron deficiency is the most common nutritional disorder in the developing world and the most common cause of nutritional anemia in young children and women of reproductive age. With 40% prevalence of anemia in the world on an average for the general population, the prevalence in the developing countries tends to be three to four times higher than in the developed countries.

The diagnosis of iron deficiency anemia ultimately rests on laboratory studies. Both the hemoglobin and hematocrit are depressed, usually to a moderate degree, in association with hypochromia, microcytosis, and modest poikilocytosis.[1]

Impaired red cell production associated with chronic diseases is the second most common cause of anemia among hospitalized patients. The chronic illnesses associated with this form of anemia can be grouped as below:

(1) Chronic infections, such as osteomyelitis, bacterial endocarditis, and lung abscess, (2) chronic immune disorders, such as rheumatoid arthritis and regional enteritis, and (3) neoplasms, such as carcinomas of the lung and breast and Hodgkin lymphoma.

It is global problem, mainly affecting poor people in developing countries.[6] Pregnant and lactating females, growing children and elderly people, with some underlying disease causing blood loss are at more risk as compared to other groups of population.[7] The aim of this study is to describe the prevalence of anemia among admitted patients in PDU Hospital, Rajkot, Gujarat, India.

MATERIALS AND METHODS

The study was carried out in PDU Hospital, Rajkot. The patients of all age groups admitted in various wards of our hospital were included in the study. Outdoor patients were excluded from the study. The blood samples were collected in ethylenediaminetetraacetic acid tubes and were immediately sent to the laboratory for hematological testing. The hematological testing was performed in the central clinical laboratory. The equipment used is Sysmex KX-21 5 part automated hematological cell counter. The evaluated parameters included the hemoglobin concentration and red blood cell indices - mean cell volume, mean cell hemoglobin (MCH), MCH concentration, hematocrit, red blood cell count, total leukocyte count, differential count, and platelet count.

RESULTS

According to a UNICEF report, 2 billion people suffer from anemia worldwide, and most of them have IDA, especially in underdeveloped/developing countries. According to the WHO, almost 20% of[8] all women of the childbearing age in United States were suffering from iron deficiency anemia as compared to 2 % of adult males.

This study was carried out in PDU Medical Hospital, Rajkot, in December 2015-May 2016 for a period of 6 months. A total of 4775 cases were studied, out of 27,033 patients who were indoor patients admitted in various wards in PDU Hospital, Rajkot.

Out of 27,033 studied patients, anemia was found 4775 patient of different age groups. The prevalence of anemia in indoor patient is 17.66% (Table 1).

In this study, total numbers of male were 1588 and female were 3187. Hence, females are affected (66.74%) more than male (33.25%) (Table 2).

In this study, anemia is most common in 20-30 years (61.60%), which includes reproductive age of female (Table 3).

In this study, the average cases of anemia are between 15% and 25% in every month (Table 4).

In this study, cases of microcytic hypochromic anemia are highest, i.e., 2410 (50.47%) which is most common in this area and the next common anemia is normochromic normocytic anemia (2260 [47.32%]) followed by dimorphic anemia, i.e., 314 (6.57%), hemolytic anemia, i.e., 193 (4.04%), macrocytic anemia, i.e., 188 (3.93%), pancytopenia, i.e., 51 (1.06%), and sickle cell anemia, i.e., 38 (0.79%) (Table 5).

DISCUSSION

In our study, anemia found in 4775 (17.66%) (Table 1) cases out of 27,033 admitted in different wards of PDU Hospital, Rajkot; 3187 (66.74%) were females and 1588 (33.25%) were males (Table 2). Maximum cases 2942 (61.60%) are found in age group of 21-40 years (Table 3). Hence, females are more affected and mainly in reproductive age group. Microcytic hypochromic anemia is highest, i.e., 2410 (50.47%) which is most common in this area and the next common anemia is normochromic normocytic anemia (2260 [47.32%]).

Dimorphic anemia, i.e., 314 (6.57%), hemolytic anemia, i.e., 193 (4.04%), macrocytic anemia, i.e., 188 (3.93%), pancytopenia, i.e., 51 (1.06%), and sickle cell anemia, i.e., 38 (0.79%) (Table 5).

In our study, microcytic hypochromic anemia, i.e., 2410 (50.47%) is the predominant type of anemia as seen in Alvarez-Uri et al., studies[10] and Patel et al.[9] study, in which microcytic hypochromic anemia was seen in 72%. In our study, normocytic normochromic anemia was found in 2260 (47.32%), which is similar to Kaur et al.,[11] in

Table 1: Cases of anemia

Duration	Total cases	Cases of anemia
December 2015-May 2016	27,033	4775
Percentage	100	17.66

Table 2: Gender-wise distribution of anemic patient

Gender	Number of cases of anemia	Percentage
Male	1588	33.25
Female	3187	66.74

Table 3: Age-wise distribution

Age in years	Total	Percentage
<20	765	16.02
20-40	2942	61.60
>40	1068	22.36

Table 4: Total cases of anemia in admitted patient month wise

Months	Total no of patient admitted	Total no of anemia found	%
December 2015	4585	742	16.18
January 2016	4811	583	12.11
February 2016	4686	715	15.25
March 2016	4011	997	24.85
April 2016	4120	836	20.29
May 2016	4820	902	18.71

which normocytic normochromic anemia is the predominant type 56%. Hence, in this study, normochromic normocytic anemia is second most common anemia after microcytic hypochromic anemia.

The high proportion of microcytic anemia and the fact that gender differences were only seen after the menarche period in women indicate that iron deficiency was the main cause of anemia. Other Indian studies have also shown the high prevalence of iron deficiency anemia among young women.[2] The high prevalence of iron deficiency anemia among women in childbearing age has important public health implications. It is estimated that anemia accounts for 12.8% of maternal mortality in Asia.[12] Iron requirements are greater in pregnancy, and iron deficiency is associated with maternal death, preterm delivery, and low birthweight.[13,14] In India, only 28% of women consume meat, fish, or eggs on a weekly basis,[15] and the iron bioavailability of the vegetarian diet is poor.[2,16] Effective public health programs aimed at reducing iron deficiency among young women could have a major impact in reducing maternal and infant mortality.[16]

It is important to remember that anemia is multifactorial and its occurrence may be due to the presence of cancer, inflammatory diseases, kidney disease (due to diabetes and hypertension), and the use of several drugs commonly required in the elderly population.[17]

The majority of anemia cases were microcytic, suggesting that iron deficiency was the main cause of anemia. However, the prevalence of normocytic anemia increased with age, so further investigations are needed to clarify the cause of anemia among older adults.

CONCLUSION

The prevalence of anemia in patients admitted in our hospital was higher in female of reproductive age. The predominant type is microcytic hypochromic which is mainly due to iron deficiency. The second most prevalent type is normocytic normochromic which may be because of chronic diseases,

Table 5: Different types of anemia

Months	Microcytic hypochromic anemia	Normochromic normocytic anemia	Dimorphic anemia	Hemolytic anemia	Macrocytic anemia	Pancytopenia	Sickle cell anemia	Total
December 2015	434	179	52	28	43	3	3	742
January 2016	279	251	24	3	20	2	4	583
February 2016	302	283	37	27	34	12	20	715
March 2016	380	525	30	43	12	6	1	997
April 2016	343	383	48	25	27	8	2	836
May 2016	422	347	60	29	29	12	3	902
Total	2410	2260	314	193	188	51	38	4775
Percentage	50.47	47.32	6.57	4.04	3.93	1.06	0.79	100

inflammation, blood loss, malignancies, or aging process. Anemia is not a condition that should only be associated with the dietary deficiency; it is associated with pathologies which deserve adequate medical attention. Hence, any anemic patient should not be treated blindly with hematinic. They must be investigated to find out the actual cause and type of anemia before starting treatment. The results of this study can be used by public health programs aimed at reducing the burden of anemia in India.

REFERENCES

1. Kumar V, Abbas AK, Fausto N, Aster JC. Robins and Cotran Pathologic Basis of Disease. 8th ed. Ch. 14. Philadelphia, PA: Saunders Elsevier; 2010.

2. Thankachan P, Muthayya S, Walczyk T, Kurpad AV, Hurrell RF. An analysis of the etiology of anemia and iron deficiency in young women of low socioeconomic status in Bangalore, India. Food Nutr Bull. 2007;28(3):328-36.

3. Weissinger F. Basic principles and clinical significance and iron deficiency. Fortschr Med. 1999;115(31):35-8.

4. Ho S, Jackson J. The angiographic diagnosis of colonic carcinoma. Clin Radiol. 1998;53(5):345-9.

5. World Health Organisation, Iron Deficiency Anaemia Assessment, Prevention, and Control, A Guide for Programme Managers, WHO 2001.

6. Cook JD. Iron-deficiency anaemia. Baillieres Clin Haematol. 1994;7(4):787-804.

7. Lee RG, Bithell TC, Foerster J, Athens JW. Etiological factors in iron deficiency. Wintrobe's Clinical Haematology. 9th ed. Philadelphia, PA: Lea & Febiger; 1993.

8. Sahadevan S, Choo PW, Jayaratnam FJ. Anaemia in the hospitalised elderly. Singapore Med J. 1995;36(4):375-8.

9. Patel S, Shah M, Patel J, Kumar N. Iron deficiency anemia in moderate to severely anemic patients. Gujarat Med J. 2009;64(2):15-8

10. Alvarez-Uria G, Naik PK, Midde M, Yalla PS, Pakam R. Prevalance and severity of anaemia stratified by age and gender in rural India. Anemia. 2014;2014:5.

11. Kaur H, Piplani S, Madan M. Prevalence of anemia and micronutrient deficiency in elderly. Int J Med Dent Sci. 2014;3(1):296-302.

12. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: A systematic review. Lancet. 2006;367(9516):1066-74.

13. Kalaivani K. Prevalence & consequences of anaemia in pregnancy. Indian J Med Res. 2009;130(5):627-33.

14. Allen LH. Anemia and iron deficiency: Effects on pregnancy outcome. Am J Clin Nutr. 2000;71(5):1280s-4.

15. World Health Organisation. Iron deficiency anaemia assessment, prevention, and control. A Guide for Programme Managers. Geneva: WHO; 2001.

16. Cliquet MG. How to diagnose and treat Anemia in the elderly. Rev Bras Med. 2010;67(4):89-9619.

17. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? Lancet. 2014;384(9940):347-70.